

**Annual Scientific Meeting of the New Zealand and
Australian Nutrition Societies**

**Nutrition & Wellbeing
In Oceania**



**NUTRITION & WELLBEING
IN OCEANIA**

28 November- 1 December 2023

Massey University, Albany, Tāmaki Makaurau Auckland

Haere mai



Welcome

Welcome to “Nutrition and Wellbeing in Oceania”.

It is a great pleasure to welcome you to the combined Annual Scientific Meeting of the Nutrition Society of New Zealand (NSNZ) and the Nutrition Society of Australia (NSA).

We have waited a long time for this conference which should have been held in December 2020, but fell victim to Covid-19. What makes this long-awaited event even more special is the focus on all of Oceania, the launch of the Federation of Oceanic Nutrition Societies (FONS), and the inclusion of colleagues from all around the Pacific.

We look forward to four stimulating days of widely varying scientific presentations, interactive workshops, student and early career sessions and lots of networking – catching up with colleagues and making new friends.

The theme of the conference is unashamedly Pacifica, and so it follows that the social activities have a tropical flavour as well. Please come and get acquainted (or reacquainted) at the welcome function on Tuesday 28th November at 5pm, following the launch of FONS. This event is included in your registration. If you have signed up for the conference dinner on Thursday 30th November, then remember to dress Cool, Colourful and Casual and come prepared to have a great time!

Pam von Hurst, PhD

Organising Committee Chair

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He Wātaka 2023

Programme 2023

Rātū 28 Whiringa-ā-rangi, RĀ TUATAHI - Tuesday 28th November 2023, DAY ONE					
Session	Workshop 1 SNW 2.31	Workshop 2 SNW 2.33	Workshop 3 SNW 2.34	Workshop 4 SNW 2.32	Early Career SNW 2.36
9:00-10:30	W1. Update on dietary carbohydrate digestibility Elizabeth Barber	W2 Postprandial metabolism - Special interest group Anthony James	W3 Developing work integrated learning for Nutrition Curriculum Katya Clark	W4 Bridging Boundaries: uniting rural nutrition researchers Laura Alston	Early Career Masterclass Starts 8:30 till 10:30 am <i>Sponsored by Foodcom</i>
9:30-10:30	 Registration & refreshments				
Session	He Mihi Whakatau - Welcome and Opening Plenary: Nutrition in our land and water Room: SNW 300				
11:00-1:00	<p>He Mihi Whakatau - Welcome Prof Nick Rāhiri Roskrige (Ātiawa, Ngāti Tama-ariki) (Massey University) <i>Food sovereignty and food security in Aotearoa and the Pacific</i></p> <p>Dr Sam Murray (Cawthron Institute) <i>Supporting resilient communities in the Pacific</i></p> <p>Dr Priscila Machado (Deakin University) <i>A multidimensional diet quality score for a global sustainable healthy diet (SUSDIET)</i></p>				
1:00-2:30	 Poupoutange o te rā - Lunch & campus walk Posters 1A & 1B Session A: SNW 2.35 & Session B: SNW 2.36		Australian Nutrition Society AGM Room: SNW 200		
Session	Plenary 2: Nutrition in our land and water Room: SNW 300				
2:30-4:00	<p>Dr Ty Beal (GAIN) <i>Achieving adequate nutrition in a malnourished world: the role of sustainable diets and animal source foods</i></p> <p>Eli Kliejunas (The University of Auckland) <i>Quantifying the greenhouse gas emissions of New Zealand households' food purchases</i></p> <p>James Goode (University of Tasmania) <i>Modeling the replacement of red & processed meat with plant-based alternatives and the estimated effect on insulin sensitivity</i></p> <p>Oceanic Nutrition Leadership Platform (ONLP) presentation</p>				
4:00-5:00	Federation of Oceanic Nutrition Societies (FONS) Launch: Sarah Burkhart, Sefano Katz, Jioje Fesiatu, Jeanne Pau'uvale Teisina				
5:00-7:00	 Welcome Function				

Rāapa 29 Whiringa-ā-rangi, RĀ TUARUA - Wednesday 29th November 2023, DAY TWO			
Session	Plenary 3: Nutrition in education settings Room: SNW 300		
9:00-10:30	<p>Presenter & title TBC Dr Sarah Burkhart (University of the Sunshine Coast) <i>Feeding our Future: school food and local agriculture in the Pacific</i></p> <p>Assoc Prof Pragma Singh (Fiji National University) <i>Nutrition and physical activity in schools in Fiji</i></p>		
10:30-11:30	 Paramanawa – Morning refreshments sponsored by Anchor, Posters 2A & 2B Session A: SNW 2.35 & Session B: SNW 2.36		
Session	Plenary 4: Dairy Australia Sponsored Session Room: SNW 300		
11:30-12:25	<p>Dr Nick Smith (Riddet Institute) <i>Nutrient trade in Oceania</i></p>		
Session	A1 School food environment SNW200	A2 Sustainable diets SNW300	A3 Eating patterns & weight management Room SNW100
12:30-1:30	<p>1.a Danika Pillay: <i>Assessment of food availability in New Zealand primary schools</i></p> <p>1.b Olivia Coady: <i>The barriers and enablers to providing healthy food in New Zealand secondary school canteens</i></p> <p>1.c Janandani Nanayakkara: <i>Victorian (Australian) parents are receptive to the idea of a primary school-provided lunch program: a mixed-method survey</i></p> <p>Short oral presentations</p> <p>1.d Kylie Smith*: <i>Parents' perceptions of the Tasmanian school lunch project - interim findings</i></p> <p>1.e Jessica Kempler*: <i>Mealtime and food provision environments in primary schools - an opportunity for nutrition intervention?</i></p> <p>1.f Jessica Kempler*: <i>Exploring the use of school-based infrastructure in health and sustainable food education</i></p> <p>1.g Salome Kruger*: <i>Intakes from healthy and unhealthy food groups and obesity among 5- to 10-year old South African children</i></p>	<p>2.a Pamela von Hurst: <i>An audit of plant-based, ultra-processed vegan foods in New Zealand</i></p> <p>2.b Nicola Gillies: <i>Adherence and eating experiences differ between participants following a flexitarian or vegetarian diet in a 10-week trial.</i></p> <p>2.c Kathryn Bradbury: <i>An overview of labeling and environmental claims on fish & seafood products in NZ supermarkets</i></p> <p>Short oral presentations</p> <p>2.d Garalynne Stiles*: <i>Increasing the proportion of plant to animal protein in hospital patient menus: what do stakeholders think?</i></p> <p>2.e Adaline Lanham*: <i>Towards sustainable diets - interventions & perceptions amongst adolescents</i></p> <p>2.f Mahya Tavan*: <i>Development of the iOTA Model®: a dietary optimisation tool for assessing nutrient adequacy, environmental impact & acceptability of diets in NZ</i></p> <p>2.g Katherine Livingstone*: <i>Identifying the barriers and facilitators to fruit and vegetable consumption</i></p>	<p>3.a Kylie Fraser: <i>Mapping the potential of meal kits to influence parental food literacy: an application of behaviour change frameworks</i></p> <p>3.b: Courtney Davis: <i>Impact of a Mediterranean diet on food cravings in an Australian population</i></p> <p>3.c Yan Yin Phoi: <i>The influence of chronotype on temporal patterns of eating and diet composition in shift and non-shift workers.</i></p> <p>Short oral presentations</p> <p>3.d Karen Murphy*: <i>The nutritional adequacy of popular weight loss diets - do they meet the requirements for dairy foods and calcium?</i></p> <p>3.e Tina Buch*: <i>Risk of low energy availability and level of nutrition knowledge in recreational trail runners in Aotearoa/New Zealand</i></p> <p>3.f Jessie Speedy*: <i>Dietary intake of adolescent rowers - analysis of energy intake</i></p> <p>3.g Samantha Watts*: <i>Macronutrient intakes of adolescent rowers for growth, development and sports performance</i></p>

Rāapa 29 Whiringa-ā-rangi, RĀ TUARUA - Wednesday 29th November 2023, **DAY TWO cont'd**


1:30-2:30	 Pouputange o te rā - Lunch & Posters 3A & 3B Session A: SNW 2.35 & Session B: SNW 2.36	Meet the experts: Early career & postgraduate session SNW 2.31, 2.32 and 2.33	
Session	A4 Food, bioactives & mechanisms SNW300	Workshop 5 room SNW 2.33	Workshop 6 room SNW 2.32
2:30-4:00	<p> 4.a Alison Coates: <i>Changes in liver health biomarkers following consumption of energy restricted diets containing almonds compared with carbohydrate-rich snack foods for 9 months</i> 4.b Vinicius Do Rosario: <i>Anthocyanins attenuate vascular and inflammatory responses to a high fat high energy meal challenge in overweight older adults: A cross-over, randomized, double-blind clinical trial</i> 4.c Linda Nezbedova: <i>Phytochemicals from Monty's Surprise apple are absorbed in humans, increase plasma antioxidant response, and inhibit lung and breast cancer proliferation in vitro</i> Short oral presentations 4.d Kim Bell-Anderson*: <i>Australian native grain reduces blood glucose response and Glycemic Index</i> 4.e Damien Belobrajdic*: <i>Evaluating the effect of replacing wheat flour with legume flour on ileal amino acid digestibility in healthy adults with an ileostomy</i> 4.f Laima Hareer*: <i>Resistant Starch Content of Selected Australian Foods</i> 4.g Michael Billows*: <i>SunGold Kiwifruit and Psychological Health (GoKiPH): a randomised, crossover trial</i> 4.h Emma Beckett*: <i>The balance of evidence on 100% juice & health: A systematic umbrella review of meta-analyses</i> 4.i Kingsley Kalu*: <i>Relative bioavailability of Lutein and Zeaxanthin in the presence of Omega-3-supplements and oxidative stress levels in humans</i> 4.j Aysu Shahin*: <i>Exploring the potential of objective metabolite measures in dietary assessment: randomised cross over feeding study</i> 4.k Mena Farazi*: <i>Investigating the effect of polyphenols from nuts on human carbohydrate digestion in vitro.</i> 4.l Jiale Zhang*: <i>Minerals and trace elements in broad-leaved Geebung (Persoonia stradbrogensis), an underutilised native Australian fruit</i> 4.m Elza Bevilacqua*: <i>Bioactive compounds of spent coffee grounds and their potential use as functional food</i> 4.n Jessica Biesiekierski*: <i>The effectiveness of a Lactobacillus probiotic on measures of psychosocial health in adults diagnosed with subthreshold depression: a double-blind RCT</i> </p>	W5. Exploring global school food environments for Pacific action Monica Smith	W6. Empowering the nutrition workforce to be leaders in sustainable food systems research and policy practice Jolieke van der Pols
		Workshop 7 room SNW 2.34	Workshop 8 room SNW 2.31
		W7. The role of TikTok in public health nutrition messaging Joelle Mandzufas	W8. A DiRECT approach to weight loss: low energy meal replacement followed by supported weight loss maintenance Andrew Reynolds

Rāapa 29 Whiringa-ā-rangi, RĀ TUARUA - Wednesday 29th November 2023, DAY TWO cont'd



	A5 Food Environments SNW300	A6 Gut Health SNW200	A7 Nutrition, psychology & mental health Room SNW100
4:00-5:00	<p>5.a Paige Brooker: <i>What's in store for you? Identifying effective initiatives used in supermarkets to improve consumer purchasing: a systematic review</i></p> <p>5.b Kitty Tse & Michelle Zeng: <i>Using Google Street View to examine changes in food environments around secondary schools in regional and metropolitan areas of New South Wales, Australia</i></p> <p>5.c Magda Roisin: <i>Food providers and public health professional's experiences with the adoption and implementation of the National Healthy Food and Drink Policy in New Zealand healthcare facilities</i></p> <p>Short oral presentations</p> <p>5.d Briar MacKenzie*: <i>Ultra-Processed Food Consumption in the Central Division of Fiji</i></p> <p>5.e Dave Monro*: <i>The influence of food prices on what we purchase, prepare and eat. Survey results and implications for the Heart Foundation's work.</i></p> <p>5.f Jacqueline Grey & Caitlin Haliburton*: <i>Supporting companies to reform nutrition policies and practices (REFORM): a multi-centre cluster RCT</i></p>	<p>6.a Jessica Biesiekierski: <i>Predicting symptom response and quality of life to the low FODMAP diet in irritable bowel syndrome: a 6-month longitudinal study</i></p> <p>6.b Chu Yao: <i>Perceived food intolerances and its impact on diet quality in patients with an ileoanal pouch</i></p> <p>6.c Michael Houghton: <i>A novel approach to the dual sugar test for the assessment of intestinal epithelium permeability in response to exertional heat stress and nutritional intervention.</i></p> <p>Short oral presentations</p> <p>6.d Denelle Cosier*: <i>Positive relationship between plant diversity dietary patterns and disease activity in Australian adults with Inflammatory Bowel Disease</i></p> <p>6.e Jia Yap*: <i>Inflammatory Bowel Disease exercise and diet (IBDeat) habits study: exploring lifestyle habits and cardiometabolic disease risk factors</i></p> <p>6.f Caroline Tuck*: <i>The relationship between the low food chemical diet and symptoms in irritable bowel syndrome: a cross-sectional survey</i></p> <p>6.g Nessmah Sultan*: <i>The impact of egg consumption on indices of gastrointestinal health; a systematic literature review</i></p> <p>6.h Hwei Min Ng*: <i>Dietary fibre intakes of two cohorts of New Zealand adults with and without constipation</i></p>	<p>7.a Annabel Porter Matison: <i>Is higher fruit and vegetable intake associated with a reduced risk of depression in middle-aged and older adults? Data from 10 diverse international cohorts</i></p> <p>7.b Naomi Kakoschke: <i>Snacking motivations and behaviour in Australian adults: The role of personality traits</i></p> <p>7.c Sharayah Carter: <i>Changes in psychological outcomes and sleep quality following energy restriction with and without almonds</i></p> <p>Short oral presentations</p> <p>7.d Hiba Jabeile*: <i>Change in symptoms of depression and eating disorders in adolescents with obesity participating in a clinical trial</i></p> <p>7.e Imogen Nelson*: <i>The effect of <i>Gymnema sylvestre</i> on motivations to consume sweet foods – a qualitative investigation</i></p> <p>7.f Graham Ellender*: <i>Does experience of music enhance olfaction: music as a potential nutrition intervention?</i></p>
Session	Australian Nutrition Society Room SNW300		
5:00-6:30	ANS Awards of Excellence		

Rāpare 30 Whiringa-ā-rangi, RĀ TUATORU - THURSDAY 30TH November 2023, **Day Three**

Session	Plenary 5: Gut Health Room: SNW 300		
9:00-10:30	<p>Prof Michael Schultz (University of Otago) <i>Inflammatory Bowel Diseases and Nutrition</i></p> <p>Prof Nicole Roy (University of Otago) <i>Diet, Gut Physiology, and the Microbiota-Gut-Brain Axis</i></p> <p>Dr Mathew Snelson (Monash University) <i>Reduction in systolic blood pressure following dietary fibre intervention is dependent on baseline gut microbiota composition</i></p> <p>Dr Yanan Wang (CSIRO) <i>Swapping white for high-fibre bread exceeds fibre target and improves microbiome diversity</i></p>		
10:30-11:30	 Paramanawa – Morning refreshments sponsored by Vegetables.co.nz, Posters 4A & 4B Session A: SNW 2.35 & Session B: SNW 2.36		
Session	Plenary 6: Women's Health Room: SNW 300		
11:30-12:30	<p>Associate Prof Lisa Moran (Monash University) <i>Evidence based lifestyle interventions in Polycystic Ovary Syndrome</i></p> <p>Dr Evangeline Mantzioris (University of South Australia) <i>Can the Mediterranean diet be a key to unlocking women's reproductive health?</i></p>		
Session	A8 Women's health SNW 300	A9 Infant & young child nutrition SNW 200	A10 Dietary patterns SNW 100
12:30-1:30	<p>8.a Danni Fletcher: Menstrual health knowledge amongst active females in NZ</p> <p>8.b Rebecca Branch: The effect of pre- and probiotic supplementation on inflammatory markers in postmenopausal women</p> <p>8.c Margaret McGowan: Understanding barriers and facilitators to diet and physical activity modification in people with PCOS</p> <p>Short oral presentations</p> <p>8.d Margaret McGowan*: Impact of COVID-19 restriction on weight, physical activity, diet & psychological distress on people with PCOS</p> <p>8.e Sophia Torkel*: Assessing the influence of preconception diet on female fertility: a scoping review of observational studies</p> <p>8.f Sophia Torkel*: Barriers and enablers to a healthy lifestyle in people with infertility</p>	<p>9.a Rosario Jupiterwala: Household food insecurity and associations with energy, nutrient intake, and sociodemographic characteristics in young NZ children</p> <p>9.b Meiliana Meiliana: A systematic review of nutritional guidelines for preterm infants</p> <p>9.c Sara Cooper: Insights into feeding preterm infants in NZ: a mixed-method study</p> <p>Short oral presentations</p> <p>9.d Teresa Gontijo de Castro*: Children's dietary patterns and their maternal determinants during the first 5 years of life</p> <p>9.e Sarah Agar*: Assessing the Impact of Reducing Food-Related Choking for Babies and Young Children at Early Learning Services Guidance</p> <p>9.f Jaz Lyons-Reid*: Comparison of body composition assessment tools in infancy</p>	<p>10.a Erin Clarke: Short-term skin carotenoid changes following consumption of a typical Australian diet versus a healthy Australian diet</p> <p>10.b Lara Ware: Can snacking on almonds displace discretionary foods in the diets of habitual snackers?</p> <p>10.c Cassandra Nikodijevic: Metabolisable energy from nuts and patterns of nut consumption in Australia: secondary analysis of the 2011-12 NNPAS</p> <p>Short oral presentations</p> <p>10.d Alexandria Mekanna*: COVID-19 lockdown impacts on eating patterns and lifestyle behaviours</p> <p>10.e Ella Bracci*: Mediterranean Diet adherence and wellbeing: a preliminary analysis of the MedWalk trial</p> <p>10.f Binyam Sisay*: Comparison of snack characteristics by diet quality in a nationally representative sample of Australian adolescents.</p> <p>10.g Nina Wilson*: Use of herbs and spices in cooking and food preparation in Australia</p>

Rāpare 30 Whiringa-ā-rangi, RĀ TUATORU - THURSDAY 30TH November 2023, Day Three cont'd			
1:30-2:30	 Pouputange o te rā - Lunch & Posters 5A & 5B Session A: SNW 2.35 & Session B: SNW 2.36		
	A11 Monitoring nutrition, health & sustainability SNW 300	Workshop 9 SNW 2.33	Workshop 10 SNW 2.31
2:30-4:00	11.a Laura Marchese: <i>Nutritional composition of plant-based meat and dairy alternatives: comparison of supermarket products to the Australian Food Composition Database</i> 11.b Celeste I Chapple: <i>The sports food buzz: Understanding consumption, motivations and perceptions in Australian adults.</i> 11.c Alison Hill: <i>Use of a novel algorithm to evaluate changes in diet quality following energy restriction</i> 11.d Katherine Livingstone: <i>Co-design of a personalised digital intervention to improve vegetable intake in adults living in Australian rural communities</i> Short oral presentations 11.e Christine Freer*: <i>Delivery of a telehealth supported home exercise program with dietary advice to increase plant-based protein in people with non-alcoholic fatty liver disease: a 12-week pilot RCT</i> 11.f Anna Worthington*: <i>Implementing eHealth-based behaviour change support within a nutrition intervention trial improves adherence to study-related behaviours in healthy young adults</i>	W9 Nutrition Society Mentoring Workshop Aimee Dordevic	W10 Exploring the NutriVerse Jess Danaher
		Workshop 11 SNW 2.32	Workshop 12 SNW 2.36
		W11 Co-creating nutrition interventions with indigenous communities - a how to Lisa Te Morenga	W12 Food for thought? Nutritional influences on mood, performance and neurocognitive function Andrew Scholey
Session	A12 Nutrition Careers SNW 300	A13 Nutrition & Ageing SNW 200	A14 Nutrition during pregnancy SNW 100
4:00-4:45	12.a Susan McLeod: <i>Nutrition students employability skills: need for a graduate employability framework</i> 12.b Melanie Vandegraaff: <i>Evaluation of the Nutrition Society of Australia Mentoring Program for Registered Nutritionists</i> 12.c Jennifer Donnelly: <i>Private practice dietetics workforce: a review of the literature</i>	13.a Ashlee Turner: <i>Scoping user for an online nutrition education resource for older adults</i> 13.b Sandra Iuliano: <i>Reducing hip & non-vertebral fractures in institutionalized older adults</i> Short oral presentations 13.c Zhaoli Dai-Keller*: <i>Diet, nutrition, and medication use among centenarians worldwide</i> 13.d Barbara Cardoso*: <i>Selenotranscriptome network in Alzheimer's disease</i> 13.e Hesti Retno Budi Arini*: <i>Association between protein intake, diet quality, and obesity in Australian adults: A comparison of measurement units</i> 13.f Susan Ward*: <i>Does adiposity influence the relationship between diet quality and bodily pain?</i>	14.a Bi Xue Patricia Soh: <i>Exploring the concerns, attitudes and experiences of health professionals regarding a vegan diet during pregnancy and early life: a mixed-method study</i> 14.b Elaine Rush: <i>Pacific Islands Families Study: Food insecurity during pregnancy and secondary school educational achievement.</i> 14.c Bereket Gebremichael: <i>Patterns and predictors of low-calorie sweetener consumption during pregnancy: findings from a national survey in Australia</i>
6:30	Conference Dinner sponsored by Beef + Lamb New Zealand		

Rāmere 1 Hakihea, RĀ TUAWHA - Friday 1st December 2023, DAY FOUR				
Session	A15 Impact of diet on non-communicable disease risk factors SNW 300	A16 Public health SNW 200	Workshop 13 SNW 2.34	Workshop 14 SNW 2.31
9:00-10:30	<p>15.a Allison Hodge: A low carbohydrate diet score is associated with a higher risk of developing type 2 diabetes in an Australian population: Melbourne Collaborative Cohort Study</p> <p>15.b Shabnam Jalili-Moghaddam: Baseline lifestyle and biomedical stroke risk factors among New Zealand participants in the PERsonalised Knowledge to reduce the risk of Stroke (PERKS-International) RCT.</p> <p>15.c Hoi Yan Wong: Does medication use affect blood pressure and lipid-lowering in tree nut and peanut interventions? A meta-analysis of randomised control trials</p> <p>15.d Anthony James: Chinese migrants exhibit impaired postprandial lipaemia compared to Caucasian counterparts following both high fat and high carbohydrate test meals.</p> <p>15.e Andrew Reynolds: A primary care-led weight management intervention for adults with diabetes and obesity: quantitative results from a randomised controlled trial of total meal replacement (DiRECT)</p> <p>Short oral presentations</p> <p>15.f Kate Campbell*: A primary care-led weight management intervention for adults with diabetes and obesity: qualitative results from a randomised controlled trial of total meal replacement (DiRECT)</p> <p>15.g Jordan Stanford*: Short-term impact of a healthy and typical Australian dietary pattern on cardiometabolic outcomes: insights from a randomised, cross-over feeding study.</p> <p>15.h Monal Velangi & Sweta Sharma*: Dietary fat consumption frequency and body mass index of middle-age adults in Mumbai city, India during COVID-19 pandemic</p>	<p>16.a Claire Hume: Examining the nutrition and packaging of foods promoted as 'Back to School' products for children's school lunchboxes</p> <p>16.b Jess Tater: Does continuous glucose monitoring influence adherence to time-restricted eating?</p> <p>16.c Briar Mackenzie: Strengthening national salt reduction strategies using mixed methods process evaluations – case studies from Malaysia and Mongolia</p> <p>16.d Kate Copeland: Effective methods for engaging with YOPI (Young, Old, Pregnant, Immunocompromised) on food safety matters</p> <p>16.e Joelle Mandzufas: Children are exposed to much more alcohol advertising when a liquor store is sited near a school</p> <p>Short oral presentations</p> <p>16.f Joelle Mandzufas*: 'I'm on board with the borg': encouraging risky alcohol use on TikTok</p> <p>16.g Katherine Kent*: Increasing food insecurity severity is associated with lower diet quality in Australian adults</p> <p>16.h Margaret Murray*: Mapping workforce contributions to the Sustainable Development Goals: a tool to enhance staff capacity and inspire action</p>	<p>W13. More than just "kai": Understanding community perspectives of food in West Auckland Michele Eickstadt</p>	<p>W14. Values-guided dietary behaviour Sara Styles</p>
			<p>Workshop 15 SNW 2.33</p>	<p>Workshop 16 SNW 2.32</p>
			<p>W15. Eating well for ageing well: what are the challenges, priority research areas, and methodology on sustainable diet in healthy ageing? Zhaoli Dai-Keller</p>	<p>W16. Design, assessment and interpretation of diet-microbiome interactions: using cutting-edge gut-brain studies as an exemplar Jessica Biesiekierski</p>

Rāmere 1 Hakihea, RĀ TUAWHA - Friday 1st December 2023, DAY FOUR cont'd	
10:30-11:30	 Paramanawa – Morning refreshments sponsored by The Crafty Weka bar, Posters 6A & 6B <i>Session A: SNW 2.35 & Session B: SNW 2.36</i>
Session	Plenary 7: Nutrition & wellbeing Room: SNW 300
11:30-1:00	Fuimaono Darryl Laifai Pupi (Ministry of Health Samoa) <i>Policy perspectives for lifestyle interventions in the Pacific</i> Dr Fa'asisila (Sila) Savila (University of Auckland) <i>Navigating Pacific People's nutrition and health research</i> Jenna Perry (University of the Sunshine Coast) <i>Exploring school food provision programs and links to local foods in Pacific Island countries</i> Dr Nikki Renall (Massey University) <i>Dietary fibre intake, adiposity, and metabolic disease risk in Pacific and New Zealand European women</i>
1:00-2:00	 Poupoutange o te rā - Lunch & Posters 7A & 7B <i>Session A: SNW 2.35 & Session B: SNW 2.36</i>
Session	Plenary 8: Monitoring healthy diets Room: SNW 300
2:00-3:30	Ms Renee Sobolewski (FSANZ) <i>Monitoring Australian foods and diets'</i> Dr Berit Follong (University of Auckland) <i>Adapting Intake24 for Aotearoa - New Zealand</i> Mr Joseph Nyemah Nyemah (FAO, Food & Agriculture Organization) <i>FAO's approach to addressing non-communicable diseases</i>
3:30-4:30	Hei korero whakakapi - Closing remarks and awards Karakia whakamutunga

*Short oral presentation (3minutes)



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Plenary Speakers



Plenary speakers



Professor Nick Rāhiri Roskruge

Professor in Ethnobotany
School of Agriculture and Environment
Massey University
New Zealand

Tēnā no tātou. Nick Rāhiri Roskruge (Ātiawa, Ngāti Tama-ariki) is a Professor in Ethnobotany and Horticulture at Massey University and a research fellow with Ngā Pae o Maramatanga (the National Māori Research Centre) and the Deputy Director for Māori and Pasifika at Bioprotection Aotearoa a Centre for Research Excellence based at Lincoln University in NZ.

Nick is from Taranaki in the North Island of New Zealand and continues to be involved in ongoing Māori development activities and tribal interests there. In 2013 he was awarded a Fulbright award and spent time at Cornell University (New York) and a number of other US state universities around ethnobotany and potato genomic programmes.

Nick is involved in a wide range of Māori and Pacific horticultural projects and is the Chairman of Tahuri Whenua (National Māori Horticultural Collective). His professional activities centre around farmer training, food security and crop systems aligned to New Zealand, the South Pacific nations especially Papua New Guinea, Fiji and Samoa and the Americas, particularly Chile and Peru.

Kei te mihi nui e tātou, pai marire.

Presentation Title:

Māori kai sovereignty to achieve food security

Abstract:

The FAO states that the term food sovereignty focuses on food for the people by placing people's need for food at the centre of policies and insists that food is more than just a commodity. Food Sovereignty also promotes knowledge and skills by building on traditional knowledge; using research to support and pass on this knowledge to future generations; and rejecting technologies that undermine local food systems. It is essentially a movement that "recognizes that control over the food system needs to remain in the hands of producers, and is clearly focused primarily on small-scale agriculture of a non-industrial nature, preferably organic" (FAO 2013). In Māori terms, Kai Sovereignty is drawn first from the relationship of foods to our needs; it is expressed through whakapapa, and has an overarching

contribution to food security. Traditional foods abound in Aotearoa. The relationships are longstanding, expressive and contribute to our wellbeing in various ways. But the true cultural value of traditional foods is diminishing as new foods, lifestyles and experiences succeed them. Kai sovereignty therefore is at risk of being relegated to historical discourse. The FAO acknowledgement of the intergenerational role of traditional knowledge to support food sovereignty aligns well to the Māori experience. This knowledge covers a myriad of food relationships including foraging, producing, harvesting, processing, cooking and manaakitanga. We are in a renaissance period that seeks to rediscover our relationship with the pātaka, the food store. So much knowledge has been lost, but much also remains. How we draw that together in a way that acknowledges the whakapapa or historical relationship alongside the present and future. The right to achieving kai sovereignty is yet to be properly understood within our communities. The first steps lie in the knowledge space; sharing and acknowledgement of our food traditions before they are lost or misinterpreted.



Dr Sam Murray

Senior Scientist – Marine Chemistry
Cawthron Institute
Nelson
New Zealand

Dr Sam Murray is a marine scientist with over 15 years' experience in research and commercial laboratories. He specializes in bioactive compounds produced from harmful algae, their accumulation in marine species, and the potential risk they pose to human health. This research spans multiple projects that cover existing and emerging risks to NZ, our Pacific neighbours, in particular ciguatera poisoning, and other coastal nations around the world.

His research uses a variety of techniques, including state-of-the-art analytical chemistry instruments, that he has used to develop a wide range of methods, and for compound discovery and structural characterization. He is also an avid free diver and spearfisherman and uses these techniques to collect his research samples.

Sam is passionate about helping our Pacific neighbours and has led several analytical laboratory capability and capacity building projects. The focus of these laboratories is to help improve public health and aid economic development via expanded/new trade agreements. He is also Cawthron's Science Impact Leader for the Pacific, a cross-institute multi-disciplinary team focused on supporting resilient communities in the Pacific.

Presentation Title:

Supporting resilient communities in the Pacific

Abstract:

Pacific Island communities are disproportionately impacted by the effects of climate change, and as teina (younger sibling) to our Pacific tuakana (older sibling), it is our responsibility to ensure these communities have resilience through co-developed solutions to these real-world problems. We focus on marine and freshwater ecosystems, understand their intrinsic links to Pacific communities, while, in partnership with science, empower and enable local knowledge to steer the waka. With more than 20 years' experience of supporting Pacific communities, we deliver our positive impact through knowledge exchange, capability and capacity development, and problem solving. We strive to learn and grow our own capability, while brokering knowledge between Aotearoa, the Pacific, and our world leading research partners. Our aim is that Pacific Island communities gain a deeper

scientific understanding of their aquatic systems, have the tools to rejuvenate and conserve these ecosystems, are empowered to transform their food systems towards more healthy, sustainable, and resilient pathways, and can adapt to the impacts of climate change. We take a systems approach that incorporates adaptive solutions, which are community-led, thereby ensuring a long-lasting positive impact into the future. Our Kete is filled with world-leading expertise from different organizations, which ensures a greater collective impact where it is needed most. This presentation will cover the seven themes within our Pacific Impact area, with a particular focus on food safety and security in relation to ciguatera poisoning (the number one cause of non-bacterial seafood illness affecting Pacific Island communities), analytical laboratory development, and transforming food systems.



Dr Ty Beal

Research Advisor

Knowledge Leadership

Global Alliance for Improved Nutrition (GAIN)

Washington DC

USA

Ty Beal, PhD, is a global nutrition scientist focused on helping to achieve healthy and sustainable diets for all. His research seeks to understand what people eat and how it impacts their health and the planet. Ty has led quantitative global analyses on diets, nutrient density, and micronutrient deficiencies and context-specific studies on nutrient gaps and the complex determinants of child growth and obesity. He works across the food system to help identify strategies for how to transform food systems for human and planetary health.

Ty is currently a Research Advisor on the Knowledge Leadership team at the Global Alliance for Improved Nutrition (GAIN) where he generates evidence to guide programs and mobilize knowledge related to global nutrition and food systems. He obtained a PhD from the University of California, Davis, where he was a National Science Foundation Graduate Research Fellow.

Presentation Title:

Achieving adequate nutrition in a malnourished world: the role of sustainable diets and animal source foods

Abstract:

Malnutrition affects over half the world's population, manifesting in myriad forms. Nearly 1 in 4 children never reach their full growth potential, while 1 in 2 lack key micronutrients essential for health and development. Furthermore, 1 in 3 women suffer from anemia, and 2 in 3 do not get enough vital micronutrients. At the same time, over 2 in 5 adults are overweight or obese, and 1 in 5 live with high blood pressure. These various forms of malnutrition lead to physical and cognitive impairments, increased susceptibility to infections and chronic diseases, and reduced quality and length of life. They also impose immense economic, social, and health burdens. In addition to harming human health, our food system damages the planet, generating greenhouse gas emissions that drive climate change and depleting freshwater reserves. It also causes deforestation and habitat destruction which drive species to extinction.

These grave harms to both human and environmental wellbeing demand urgent action. Transforming our food systems is imperative to promote nutritious diets that deliver adequate nutrition and protect against noncommunicable diseases, while

simultaneously protecting our planet, its biodiversity, and natural resources. As a response, many call for drastically limiting consumption of animal source foods like meat, eggs, and dairy. They argue that these foods jeopardize both human health and environmental sustainability. However, is it possible to meet the nutritional needs of the global population with few animal source foods? What are the full impacts, both positive and negative, of animal source foods on human health and the environment? In this presentation, I will review the latest scientific evidence surrounding these questions. I will examine whether mindfully produced and consumed animal source foods can be part of the solution. Join me to explore these critical issues concerning sustainable nutrition and the role of animal source foods in our food system transformation.



Dr Sarah Burkhart

Senior Lecturer
Nutrition and Dietetics
School of Health
University of the Sunshine Coast
Queensland
Australia

Dr Sarah Burkhart is a Senior Lecturer in Nutrition at the Australian Centre for Pacific Islands Research (ACPIR) and School of Health at the University of the Sunshine Coast. Dr Burkhart's current work spans the South Pacific region, where she contributes to a range of projects to promote nutrition-sensitive agriculture. A key focus of Sarah's work is school food and nutrition environments in the South Pacific and the potential these have for transformational food system change, improved nutrition and health, educational outcomes, and livelihoods.

Dr Burkhart is a co-founder and chair of the Pacific School Food Network (PSFN), a group that advocates for and supports school food activities throughout the Pacific Islands region to eliminate hunger and improve food security.

Presentation Title:

Feeding our Future: school food and local agriculture in the Pacific

Abstract:

Utilising local and traditional foods in schools presents a significant opportunity within our region to ensure food and nutritional security, support local livelihoods by driving markets and employment opportunities, increasing food literacy, and help students to understand the role of, and develop a preference for these foods. School meals programs (SMP) are increasingly touted as a strategy for food system transformation ⁽¹⁾, however, are not widely used in the Pacific Islands ⁽²⁾. Yet, there is increasing interest and momentum towards understanding school food and nutrition environments and the use of SMP in this region, especially with models that support and promote the integration of local, traditional climate-resilient, nutrient rich foods. When a large scale SMP may not be possible, other school food and nutrition activities can be utilised to support nutritious food choice. Evidence collected over the last five years provides information on the current situation, activities, and capacity for providing food in schools across the Pacific Islands ^(2,3,4). Activities across the region vary from national SMP to gardening programs, nutrition education, providing canteens/tuckshops and other ad hoc activities, for example events for World Food Day. Some activities have a requirement for the use of local food, while some prioritise local foods in gardening programs and work with local farmers. Recently it has been shown that youth are exposed to, and have access to

significant amounts of ultra-processed foods (UPF) around schools ⁽³⁾. Mapping of the foods available to students within a 400m radius of 88 schools in Fiji found that sugar sweetened beverages were available in 80%, and lollies/confectionary in just over 60% of outlets. Fresh fruit was available in just over 20% of outlets, while fresh vegetables were available in less than 20% of outlets ⁽³⁾. While there are many challenges to providing local, traditional, nutritious foods in schools, including access to financial, human, and physical resources, stakeholders have told us that one of the most significant is how modernisation and colonisation of food systems have resulted in a preference for hyperpalatable UPF and how this makes it more challenging to incorporate local produce in a way that is accepted by students. This provides an opportunity to further explore and share ways to integrate local, traditional, climate-resilient, nutrient rich foods in schools to support children and adolescents to value, utilise, prefer, and advocate for these foods. There is a need to support the utilisation of traditional, local foods in schools by advocating for policy (at various levels, right from a school level upwards) that drives the use of these foods and creates more supportive school food environments.

References

1. UNESCO, UNICEF, WFP (2023). <https://www.wfp.org/publications/ready-learn-and-thrive-school-health-and-nutrition-around-world-2023>
2. Burkhart, S. J., et al. (2022). Public Health Nutrition, 1-29.
3. Burkhart, S. J., et al. (2021). <http://www.fao.org/3/cb5194en/cb5194en.pdf>



Dr Pragya Singh

Associate Professor

Dietetics and Nutrition

College of Medicine Nursing and Health
Sciences

Fiji National University

Fiji

Dr Pragya Singh is an Associate Professor and Program Coordinator (Dietetics & Nutrition) in the School of Public Health & Primary Care, College of Medicine Nursing and Health Sciences, Fiji National University. She obtained her PhD in Human Nutrition in 2006 from G. B. Pant University of Agriculture and Technology, Pantnagar, India. Since then, she has worked on teaching and research positions in India, Ethiopia and Fiji, including teaching courses in Nutritional Assessment; Maternal, Infant & Child Nutrition; Community Nutrition; and Obesity Prevention and Management. She has experience in community development activities for designing, implementing and evaluating community nutrition projects in Ethiopia and Pacific Islands. Dr Singh has successfully completed two internationally funded collaborative projects to date, including being Project Leader for Healthy Child, Promising Future – Promoting health in primary school settings. This pilot project has been so successful in Fiji and Wallis & Futuna that she will head up the project to be taken, requested by country health representatives, to other Pacific islands.

She is currently the Deputy Chair for the College Health Research and Ethics Committee (CHREC) in the College of Medicine, Nursing and Health Sciences (CMNHS) at Fiji National University (FNU), Fiji. Dr Singh is also a member of numerous organizations including Nutrition Society of India, Indian Science Congress, Mobilisation (Society for Community Mobilization for Sustainable Development). Her research interest includes maternal and child nutrition, nutritional assessment, interventions for various lifestyle diseases, value added food product formulation.

Presentation Title:

Nutrition and physical activity in schools in Pacific Island Countries

Abstract:

The increasing rates of obesity among children and adolescents are significant issues worldwide and in the Pacific Island Nations. An energy imbalance between calorie intake and expenditure is linked to overweight and obesity for children and adolescents. Epidemiological, nutritional, and technological changes are linked to altered eating habits, including an increase in energy consumption. Conversely, technological advancements and market globalization are responsible for declines

in physical activity (PA). During COVID-19 outbreak a more sedentary lifestyle than before the outbreak has been adopted by children and adolescents as a result of lockdown measures, which include shutting of schools, restrictive travel outside the home, and limiting social interactions has made the issue worse. Studies have shown that 40% to 70 % of obese children become obese adults. Since children spend a large portion of their day in school and eat their main meals there, school settings are suitable for interventions aimed at preventing childhood obesity. Additionally, school environments will reduce the number of dropouts brought on by problems with accessibility or transit. The selection of primary school children is important for interventions as the dietary and physical activity habits acquired at this age are ingrained in children and continue into adulthood. So, it is important to have a robust nutrition and physical activity curriculum in all the primary schools. There are many challenges faced by the governments in implementing such curriculum which includes lack of trained in country staff, limited infrastructures in schools for physical activity, culturally relevant information which can be easily understood by local populations, proper monitoring, and evaluation of the existing guidelines. Community engagement and physical partnership with local health ministries and departments are crucial for the success of these curriculum. To fill this gap robust evidence on effectiveness and implementation of school-based wellness intervention programs in primary schools are in dire needs in Pacific Island nations. Given this, the project titled “Healthy Child Promising Future-Promoting health in primary school settings was conducted in all schools in Wallis & Futuna and piloted in one urban school in Fiji. A knowledge, attitude, practice (KAP) questionnaire was used to evaluate the effectiveness of the intervention which was conducted for all the children (7-9 years) and their care takers. Intervention was conducted on 15 pre identified themes by face-to-face sessions every week and 30 minutes physical activity session was conducted every day in all the schools for children. For caretakers intervention was conducted around 5 themes. In both the countries the intervention has shown significant improvement in KAP scores both for parents and children related to the healthy diet consumption and promotion of physical activity. The results indicate that the developed intervention package had a positive impact on KAP.



Dr Nick Smith

Research Officer
Sustainable Nutrition Initiative
Riddet Institute
Massey University
New Zealand

Dr Nick Smith is a Research Officer at the Riddet Institute, a New Zealand Centre of Research Excellence hosted by Massey University, where he works as part of the Sustainable Nutrition Initiative®, a program providing evidence for the sustainable food system debate and ensuring that human nutrition is seen as a key aspect of sustainability. Nick holds degrees in mathematics from Swansea University (UK) and in nutritional science from Massey University. His expertise is in mathematical modelling of complex systems, with a particular focus on human nutrition. His former research interest was in predictive models for dynamics in the human intestinal microbiome, and the influence on host health and wellbeing. He now studies the dynamics of global and national food systems and their impact on the nutrition of the global population.

Presentation Title:

Nutrient trade in Oceania

Abstract:

Human nutrition is a key component of the definitions of both sustainable food systems and sustainable healthy diets, and features prominently in the Sustainable Development Goals. However, progress towards complete nutrition and food security for the entire global population is poor, and the burden of malnutrition and food insecurity is felt in countries of all income levels, including in Oceania.

While countries like Australia and New Zealand (NZ) are widely perceived as sources of high-quality food exported overseas due to great surpluses above national requirement, this hides domestic issues. The international nutrition community recognises and are demanding that our food systems must be sustainable, which is not yet the case anywhere in Oceania. Food insecurity at the household level is not uncommon, nor are nutrient deficiencies.

It is often presumed that, should the inequitable distribution of food be balanced, these challenges would disappear. However, food supply and trade data show that even at the national and regional levels, insufficient food and nutrient supplies to meet population requirements are the established norm. For example, it has been demonstrated that domestic vegetable production falls short of NZ dietary recommendations, with imports making a negligible difference other than via energy

dense crops(1). Likewise, after consideration of trade, NZ has undersupplies of calcium, potassium, vitamins C and E, and dietary fibre compared to population requirements(2).

A wealth of data exists quantifying food production, trade, and availability and various scales. Increasingly, researchers are matching these to human requirements, whether at the food or nutrient level, to identify gaps(3). Insights generated from these data-driven approaches are being directed at trade policy, enabling decisions that can realise aspirational goals to reduce food insecurity through international trade.

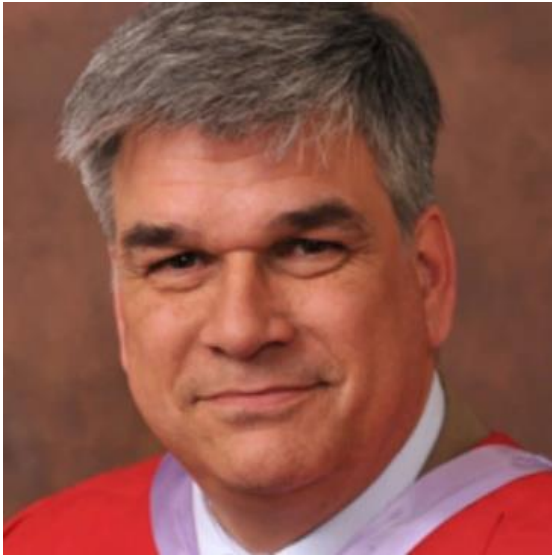
Making this data accessible to all via interactive user interfaces promotes wider engagement, understanding, and dissemination of findings. It also allows stakeholders in various countries to identify their own vulnerabilities, both as a result of current undersupplies, and due to high reliance on trading partners for food and nutrition security. Trade data can also be connected to environmental measures to identify scenarios where trade can be leveraged to the benefit of both nutrition and broader sustainability goals(4).

High level, data driven approaches are not a substitute for individual-based studies on nutrition, but are a useful complement to them. With regionally or nationally deficient food and nutrient supplies, complete nutrition for individuals cannot be attained. A holistic, system-wide understanding is necessary for any policy decisions to advance nutrition.

References

- Curran-Cournane F & Rush E (2021) *Earth* 2(4), 797-808
Sustainable Nutrition Initiative® (2023) DELTA Model®. www.sustainablenutritioninitiative.com (accessed October 2023)
Geyik O, Hadjidakou M, Karapinar B et al. (2021) *Glob Food Sec* 28, 100490
Geyik O, Hadjidakou M, Bryan BA (2023) *Nature Food* 4(1), 61-73





Professor Michael Schultz

Professor and Gastroenterologist
Department of Medicine (Dunedin)
University of Otago
New Zealand

I am a clinician-scientist dividing my time as the Clinical Director for the Te Whatu Ora Southern Department of Gastroenterology and as a Professor of Medicine for the University of Otago, Dunedin, New Zealand.

My research expertise is focused on clinical and basic scientific aspects of Inflammatory Bowel Diseases and current projects are together with the Department of Microbiology and Immunology on patient derived organoid cultures to develop systems for personalised treatment. On a more clinical focus, I am interested in health care delivery improvements using Health technologies but also looking at medicine adherence and diet & exercise in IBD.

Presentation Title:

Inflammatory Bowel Diseases and Nutrition

Abstract:

Inflammatory Bowel Diseases (IBD) are chronic intestinal disorders, characterised by periods of quiescent disease and episodes of heightened disease activity. The diseases mainly affect the gastrointestinal tract. Often, patients experience a limited quality of life as a result of dietary restrictions, fatigue and other factors leading to mood disturbances, malnutrition, and inactivity amongst others. This presentation will give an overview of work done to identify factors leading the above findings which in our view are to some degree modifiable. We will look at availability and expertise of dietitians supporting patients with IBD, dietary and lifestyle modifications aiming to reduce the Burden of Disease.



Professor Nicole Roy

Professor
Department of Human Nutrition
University of Otago
New Zealand

Nicole Roy is a Professor in the Department of Human Nutrition at the University of Otago with research interests in nutrition and health, host-microbiome interactions, gastrointestinal physiology, and gut-brain communication. She had science leadership roles in research programmes funded by the New Zealand Ministry of Business Innovation and Employment, Riddet Institute Centre of Research Excellence, the High-Value Nutrition National Science Challenge, and New Zealand and international food industries. Professor Roy was part of the team that established the High-Value Nutrition National Science Challenge.

Her current research as part of the Healthy Digestion priority research programme and other projects of the High-Value Nutrition Challenge focuses on clinical investigations of nutrition, microbe-host interactions, gastrointestinal function, and the gut-brain axis.

Professor Roy is also a Principal Investigator and leading research focusing on nutrition and food structure and their effects on digestion and host-microbe interactions as part of the Riddet Institute Centre of Research Excellence and a government-funded endeavour research programme New Zealand Milks Mean More.

Presentation Title:

Diet, Gut Physiology, and the Microbiota-Gut-Brain Axis

Abstract:

Diet is a large influencer of the gut microbiota composition and function across the lifespan. However, information on whether and how diet can affect the brain via bidirectional communication between the gut and the central nervous system (the microbiota-gut-brain axis) is emerging. Immune, endocrine, humoral, and neural connections between the gastrointestinal tract and the central nervous system are important to this axis. The gut microbiota can produce cytokines, neurotransmitters, neuropeptides, chemokines, endocrine messengers, and microbial metabolites (e.g., short-chain fatty acids, branched chain amino acids, and peptidoglycans), some of which can enter the brain, influencing the function of brain cells. Animal studies investigating the potential of nutritional interventions on this axis have advanced our understanding of the role of diet in this bidirectional communication.

This includes insights into microbial metabolites, immune, neuronal, and metabolic pathways amenable to dietary modulation. However, several aspects of the gastrointestinal tract and brain of animal models differ to humans, and it is important to consider these differences and similarities when evaluating the transability of the findings to the human context. Randomised clinical trials using dietary interventions in humans in this field are limited but have high potential application for clinical nutrition. In particular, several microbiota-targeted interventions have been explored as potential approaches for mental health. These approaches include probiotics, prebiotics, etc. as well as dietary approaches. However, there are limited clinical interventions with whole-dietary approaches. Most human studies used faecal samples to infer changes in microbiota parameters occurring in the gastrointestinal tract and do not consider the physiological changes in gastrointestinal physiology (e.g., transit time) that can directly or indirectly affect the diversity and composition of the gut microbiome. Future research considerations should include better characterisation of the participants at baseline (dietary patterns, gastrointestinal phenotype, and gut microbiota composition) to identify potential responders to dietary interventions. In addition to gut microbiota assessment, evaluations of physiological parameters, brain function and behavioural measurements should be considered as part of the study protocol. In this presentation, the current state of the literature triangulating the diet, the gut microbiota, and host behaviour/brain processes will be addressed. Future research considerations will also be discussed.



Associate Professor Lisa Moran

Healthy Lifestyle Research Program
Monash Centre for Health Research and
Implementation
Monash University
Australia

Associate Professor Moran leads the Healthy Lifestyle Research Program within the Monash Centre for Health Research and Implementation, Monash University. She is a research dietitian, Accredited Practicing Dietitian and clinical dietitian at Monash Health and an Affiliate staff member of the Robinson Research Institute at the University of Adelaide. She works in clinical, epidemiological and implementation nutrition research and clinical dietetics.

Her research skills include clinical trials, epidemiology and evidence-based medicine. Her area of interest is optimising weight management and nutritional status in women of reproductive age with the aim of reducing the impact of obesity-related disease in women and their families. Her specific areas of research within this field include working with women with conditions including infertility, polycystic ovary syndrome (PCOS) and cardiometabolic complications during pregnancy. It also includes working with women across key life stages for targeting lifestyle interventions including preconception, during pregnancy and post-partum.

She specifically focuses on clinically translatable interventions, reducing attrition, effective components within lifestyle interventions and mechanisms for action. By developing optimal obesity intervention methods for Australian women, her research will result in a reduced risk of pregnancy complications, reduced side-effects of conditions such as PCOS including diabetes, heart disease and depression and provide a foundation to secure a healthier future for newborn children.

Presentation Title:

Evidence based lifestyle interventions in Polycystic Ovary Syndrome

Abstract:

Polycystic ovary syndrome (PCOS) is a common endocrine condition which affects up to 13% of reproductive-aged women and is associated with reproductive, metabolic and psychological features. Women with PCOS have a higher prevalence of longitudinal weight gain in population-based cohort studies compared to women without PCOS. On meta-analysis, women with PCOS also have an increased prevalence of overweight, obesity and central obesity, compared with controls.

PCOS is therefore associated with an elevated prevalence of overweight and obesity which further worsen metabolic, reproductive and psychological dysfunction. Given the association between overweight and obesity and metabolic, reproductive and psychological dysfunction in women, weight management is a logical treatment strategy. This can be defined as prevention of excess weight gain, achieving a modest weight loss and sustaining a reduced weight long-term. This is best achieved through lifestyle management which traditionally refers to a complex multidisciplinary approach that combines dietary modification, physical activity and behavioural interventions. Lifestyle interventions and modest weight loss (5-10% of initial body weight) are associated with improvements in outcomes including central adiposity, hyperandrogenism, insulin resistance and cardiovascular risk factors. In PCOS specifically for dietary interventions, the majority of evidence indicates no differences between dietary approaches. Lifestyle management advice should therefore follow general population guidance which states that lifestyle intervention can be achieved through a variety of dietary approaches providing these are tailored to dietary preferences and ensure the nutritional and health status of the individual patient with referral to a nutrition professional where possible. These recommendations are summarised in the 2023 International Evidence-based Guidelines on the Assessment and Management of PCOS. These guidelines are now being translated and implemented internationally.



Dr Evangeline Mantzioris

Programme Director - Nutrition and Food
Sciences

Clinical & Health Sciences

University of South Australia

Australia

Evangeline is the Program Director of Nutrition and Food Sciences at the University of South Australia. She is an Accredited Practising Dietitian and Sports Dietitian with experience in clinical dietetics, clinical teaching, and private practice. Evangeline is on the NHMRC Expert Committee for the Revision of the Australian Dietary Guidelines. She is an Associate Editor of the journal, Nutrition and Dietetics, and an editor and author of a textbook, Nutrition for Sport, Exercise and Performance.

Evangeline enjoys communicating the science of food and nutrition to the public and speaks regularly to media including her own radio segment. She is also a regular contributor to The Conversation.

Evangeline's areas of research interests include the Mediterranean Diet through the lifespan, omega-3 fatty acids, nutrition for athletes and the nutrition – environment nexus.

Presentation Title:

Can the Mediterranean diet be a key to unlocking women's reproductive health?

Abstract:

The traditional Mediterranean Diet (MedDiet) is consistent with a dietary pattern and time-honoured eating behaviours by populations living in the olive-tree growing areas of the Mediterranean basin before the mid-1960's. The MedDiet is described in the literature as a plant-based dietary pattern, consistent with a high intake of vegetables, fruits, nuts, legumes, wholegrains cereals, and daily use of extra-virgin olive oil incorporated into all meals; moderate consumption of fish, shellfish, fermented dairy products (cheese and yogurt), and wine (typically during meals); and a low or infrequent consumption of meat and processed meat products, processed cereals, sweets, vegetable oils, and butter. (1) Being predominately plant-based, the MedDiet is naturally low in saturated fat, and rich in several functional components, including vitamins and minerals, carotenoids, unsaturated fatty acids, and phenolic compounds, depicted by antioxidant and anti-inflammatory properties.

As a result of its putative beneficial health effects, the MedDiet is one of the most widely evaluated dietary patterns in the scientific literature. (2) In both observational

and intervention studies, there is a large and consistent body of evidence to support that a MedDiet is protective against chronic and inflammatory conditions, including cardiovascular disease, metabolic syndrome, management and prevention of type 2 diabetes, central adiposity, cancer, neurodegenerative conditions, and frailty. (3)

The effect of the MedDiet on women's reproductive health is an emerging area in the literature. There have been a range of studies (observational and interventional) examining outcomes related to menarche, menstrual cycle, pregnancy, infertility, lactation, and menopause. The MedDiet has also been studied for the management of conditions such as polycystic ovary syndrome and endometriosis. These conditions are often associated with hormonal imbalances, inflammation, and oxidative stress, all of which can be influenced by the diet's key components. The MedDiet may be a promising nutritional strategy for promoting women's reproductive health. However, more extensive, and rigorous studies, including randomized controlled trials and longitudinal investigations, are necessary to establish a causal relationship between the MedDiet and women's reproductive health outcomes.

While the adoption of a MedDiet in non-Mediterranean populations is appealing, consideration needs to be given about potential barriers and enablers towards adherence (4). Furthermore, while the primary focus has been on nutritional strategies within the framework of the Mediterranean Diet, equal attention must be given to the eating behaviours and lifestyle factors associated with it.

References

- Trichopoulou A, Martínez-González MA, Tong TYN, et al.(2014) BMC Med. 12:112. doi: 10.1186/1741-7015-12-112
- A. Bach-Faig EM, Berry D, Lairon J, et al.(2011) Public Health Nutr 14, 2274–2284.
- M. Dinu G, Pagliai A, Casini F, Sofi F.(2018) Eur. J. Clin. Nutr 72,30–43.
- Scannell N, Villani A, Mantzioris E, Swanepoel L.(2020) IJERPH.17(24):9321.



Fuimaono Darryl Laifai Pupi

Principal NCD Coordinator
Ministry of Health
Samoa

Fuimaono Darryl Laifai Pupi, a High Chief from the village of Salani in Falealili, is a dedicated individual who has devoted his life to improving the health and well-being of the people of Samoa through Nutrition. Born and raised in Samoa, Fuimaono always had a deep desire to help his fellow Samoans in matters of health.

Fuimaono's journey began when he won a Manaaki Scholarship and moved to New Zealand in 2012 to pursue a Bachelor's degree in Human Nutrition at Otago University. Armed with knowledge and a passion for his field, he returned to Samoa and worked as a school nutritionist for five years in the Ministry of Health. During this time, Fuimaono also represented Samoa in various Pacific Region Nutrition platforms in Japan, Fiji, American Samoa, and the Philippines, showcasing his expertise and dedication on an international level.

Recognizing his talent and commitment, the Food and Agriculture Organization contracted Fuimaono to work as a Nutritionist for the Tokelauan islands. This opportunity allowed him to extend his reach and positively impact the health of Pacific communities beyond Samoa.

Driven by a desire to further his education, Fuimaono returned to Otago University during the challenging times of the COVID-19 pandemic to pursue a Master's degree. During his studies, he worked as a nutritionist at Pacific Trust Otago through a university-funded 10-week summer internship. His exceptional work in nutrition and health earned him recognition as the First Pacific by Otago University 20Twenty Awards, highlighting his significant contributions to improving the health of the Pacific region.

Fuimaono's dedication to his field took him to Wellington, where he worked as an intern for the Ministry of Health New Zealand. Here, he had the privilege of contributing to the creation of the New Zealand Pacific Nutrition Dietary Guidelines and worked closely with the Massey University Pacific Health Research team led by Dr. Riz Firestone, where he collaborated with the Tongan community in Wellington.

After completing his master's degree, Fuimaono returned to Samoa. However, due to travel restrictions during the COVID-19 pandemic, he faced challenges in returning home. Undeterred, he reached out to the Vice-Chancellor of Otago University, and through his efforts, the graduation ceremony for Fuimaono and his

fellow graduates was held at the National University of Samoa—an unexpected blessing in a difficult time.

Currently, Fuimaono serves as the Principal NCD Coordinator for the Ministry of Health Samoa, overseeing the coordination of all Non-Communicable Disease (NCD) programs. His position allows him to work with a dedicated Samoan Health team to make a significant impact on the health and well-being of the people of Samoa by implementing strategies to combat NCDs and improve public health outcomes.

Fuimaono Darryl Laifai Pupi's tireless dedication, extensive education, and hands-on experience as a nutritionist have positioned him as a respected leader in the field of health and nutrition. Through his various roles and accomplishments, he continues to make a profound difference in the lives of individuals and communities in Samoa and beyond.

Presentation Title:

Transforming Public Health in Samoa: Battling Non-Communicable Diseases through Dietary Interventions and Government Initiatives

Abstract:

Non-communicable diseases (NCDs) have become a major health concern worldwide, with Samoa being no exception. This presentation delves into the intricate dynamics of NCDs in Samoa, from the historical perspective before colonization to the contemporary challenges and initiatives taken by the government to address this pressing issue.

Samoa, before colonization, maintained traditional diets that were largely plant-based and rich in local fruits and vegetables. The evolution of these diets over time has played a significant role in the rise of NCDs. The incorporation of imported processed foods, high in sugars and unhealthy fats, has led to a shift in dietary patterns.

Recognizing the urgency of the situation, the Samoan government has initiated a series of policies aimed at addressing NCDs. These include the NCD Policy and Nutrition Policy, which focus on promoting healthier lifestyles through dietary changes and increased physical activity.

The Samoa Health System Strengthening Program for Results is a crucial component of the government's approach to combat NCDs. It encompasses several key areas, including the "First 1000 Days" initiative, emphasizing the importance of proper nutrition during pregnancy and early childhood, and breastfeeding promotion, vital for the health and development of infants.

Furthermore, the School Nutrition program is designed to instill healthy eating habits from a young age. Nutrition guidelines, monitored quarterly, are in place to ensure the quality of school meals, with a strong focus on reducing the consumption of instant noodles and sugary drinks among schoolchildren.

For adults, the "Healthy eating for Adults" program is pivotal. It introduces Food-Based Dietary Guidelines in Samoa that categorize foods into carbohydrates (energy foods), proteins (body-building foods), and fruits and vegetables (protective foods). These guidelines also recommend reducing the intake of sugary foods, salt, and foods high in fats and oils.

An intriguing approach to improving dietary habits is the "Grow the Colors of the Rainbow" initiative, which encourages the consumption of a diverse range of colorful fruits and vegetables. By emphasizing the importance of a balanced diet, this initiative aims to address the imbalance that has contributed to the NCD epidemic.

Through this presentation, attendees will gain a comprehensive understanding of the historical, dietary, and governmental aspects surrounding NCDs in Samoa. It highlights the urgency of addressing NCDs in the region and underscores the importance of ongoing efforts to promote healthier eating habits and lifestyle choices. By examining government policies and initiatives, as well as the challenges faced, we aim to shed light on the path toward a healthier, NCD-free Samoa.



Dr Fa'asisila (Sila) Savila

Senior Research Fellow – Pacific Health
Faculty of Medical and Health Sciences
Auckland University
New Zealand

Sila is a Senior Research Fellow in Pacific Health, at the School of Population Health, Faculty of Medical and Health Sciences, University of Auckland (UoA). His research interests are focused on understanding environmental and systemic factors impacting nutrition and physical activity for health and wellbeing for Pasifika and Māori. Sila's interest in nutrition and health date back some 20 years when working on the Diabetes, Heart and Health study (2001-2002) at the University of Auckland. In 2003, Sila earned a Wellcome Trust Master's of Public Health Fellowship while doing research on the Obesity Prevention in Communities (OPiC) study. His Master's thesis compared risk factor profiles for obesity between church-attending and non-attending adolescents, centering on nutrition and physical activity patterns.

From 2009, Sila was a researcher for 10 years on the Pacific Islands Families (PIF) Study at the Auckland University of Technology. During this work, he gained an HRC Pacific Doctoral award graduating with a PhD in Health and Environmental Sciences in 2018. His doctoral thesis examined associations of Pacific families' home environments, children's food patterns and physical growth.

In 2019, he accepted the Senior Research Fellow position at the University of Auckland and worked on primary and high school-based nutrition interventions to improve food knowledge and consumption. Since 2021, Sila has led an evaluation programme of a community-based, Pacific and Māori-led organisation, Brown Buttabean Motivation (BBM), based in Auckland. BBM aims to reduce the prevalence of Pacific and Māori people living with obesity. It provides cost-free programmes enabling healthy lifestyles for community. The study aims to evaluate the effectiveness of, and help to build sustainable systems for BBM's services. Objectives include tracking body weight, community outreach, and systems dynamics to develop organizational sustainability and positive health impacts.

Sila will talk about his research story with BBM, highlighting its unique approach and positive impact on social inequity in Tāmaki Makaurau.

Presentation Title:

**Navigating Pacific nutrition and health at Brown Buttabean Motivation (BBM):
Process evaluation and systems dynamics research at a flax-roots organisation**

Abstract:

Brown Buttabea Motivation (BBM) is a Māori and Pacific-driven community-based organisation operating in Tāmaki Makaurau (Auckland) and Tokoroa. It provides free community exercise bootcamps and other social and health support programs. BBM's foundational mission was to reduce, among Māori and Pacific people, the prevalence of obesity in Auckland through exercise and nutrition programs. This study aimed to understand participants' engagement with BBM, and the meaning it has had in their lives, with a focus on nutrition. Combining Pacific Fonofale and Te Whare Tapa Wha frameworks, this was a process evaluation to understand the impact of BBM's services on the community using qualitative methods and a systems analysis to identify program sustainability and improvement. Semi-structured interviews explored the benefits and values of engagement with BBM. Followed by cognitive mapping interviews (CMI) and group model building (GMB) to identify the motivations and challenges of sustained engagement. Participants described holistic health benefits and impacts on community wellbeing. BBM responds to inequitable nutrition contexts, through its FoodShare (food bank), community kitchen, and BBM Kai (nutrition literacy). Engagement changed family nutrition patterns, and benefits included healthier spending habits, and addressing food insecurity. Social inclusiveness represented the Fonofale foundation (family) and the roof (culture) was described as ethnic cultural practices and BBM culture. Nutrition was not highlighted by BBM participants in CMI or GMB activities. However, participants suggested BBM increase nutrition initiatives to enable all members to improve their health journeys. BBM was seen as not just an exercise program but their own and their family's new way of life, that health was a journey, not a destination. Moreover, although participants mentioned nutrition and health benefits, there was an overwhelming understanding that the values of BBM, Pacific culture, and social collectivism were the drivers of engagement, motivating healthier practices. BBM could leverage existing strengths by incorporating nutrition-enabling initiatives that are achieved collectively. Opportunities for systematic intervention will be presented.



Ms Renee Sobolewski

Senior Nutritionist

Food Standards Australia New Zealand

ACT

Australia

Renee is a senior nutritionist with almost 20 years' experience in the food regulatory environment. She has managed the Australian Food Composition Program at Food Standards Australia New Zealand (FSANZ) since 2008. Her team is responsible for generating, compiling and publishing data on the nutrient content of Australian foods to support FSANZ standards development work and monitoring and surveillance activities, and the development of nutrition and public health policies. Her team also maintains the online labelling tool the Nutrition Panel Calculator and provides technical support to the Health Star Rating calculator.

She has experience customising survey instruments for collecting 24-hour recall data from national nutrition surveys and developing datasets for estimating food, dietary supplement and nutrient intakes from these surveys to monitor the Australian diet.

Presentation Title:

Monitoring Australian Foods and Diets

Abstract:

Monitoring the food supply including composition and what people are eating is an important aspect of maintaining public health and safety. The Food Composition Program at Food Standards Australia New Zealand (FSANZ) is responsible for generating, compiling and publishing data on the nutrient content of Australian foods to support FSANZ standards development work and monitoring activities. This work also supports broader Government public health policies and initiatives such as National Nutrition Surveys, Front of Pack labelling and reformulation. Having robust up to date food composition and dietary intake data that represents the current food supply and consumption patterns provides the strong evidence base needed to support FSANZ activities.

FSANZ has been working with the Australian Bureau of Statistics since 2019 to support their work on the 2023 National Nutrition and Physical Activity Survey (NNPAS). Our role has been to assist in customising the survey instrument Intake24 used to collect the 24-hour recall data from the NNPAS and to generate the datasets

required to allow food, dietary supplement and nutrient intakes to be estimated from the survey and enable reporting against the Australian Dietary Guidelines.

This presentation will discuss FSANZ role in monitoring foods and healthy diets in Australia, with a particular focus on the methods and tools for generating and reporting data for the 2023 NNPAS.



Dr Berit Follong

National Institute for Health Innovation
University of Auckland
New Zealand

Dr Berit Follong is a nutrition researcher at the National Institute for Health Innovation in Auckland. She is passionate about promoting healthy eating habits, particularly among children, and firmly believes that early support for healthy nutrition can prevent many nutrition-related diseases later in life.

Originally hailing from the Netherlands, Berit's fascination with nutrition and health began to flourish during her time at Wageningen University. Equipped with two Master's degrees in Nutrition and Health Sciences, she embarked on an exciting research career in Newcastle, Australia. Through her PhD research, she developed a cross-curricular teaching program on nutrition and mathematics, as well as an innovative educational game using Augmented Reality.

Berit relocated to Aotearoa in 2021 and joined Prof Cliona Ni Mhurchu's team to develop the methods and tools for a national nutrition survey. Her present programme of research centres around identifying and adapting dietary assessment methods to be used within the unique and diverse population of New Zealand.

Presentation Title:

Adapting Intake24 for Aotearoa - New Zealand

Abstract:

National nutrition surveys play a pivotal role in shaping public health policies and programmes by providing valuable insights into dietary intake and the nutritional wellbeing of a population. A team from the University of Auckland and Massey University worked alongside the Ministry of Health and the Ministry for Primary Industries to develop the methods and tools for a future New Zealand Nutrition Survey. Throughout these developmental stages, we partnered and engaged with Māori as tangata whenua, and other key ethnic groups in Aotearoa - New Zealand, ensuring that their unique dietary practices and preferences were accurately captured. This presentation centres on the adaptation of Intake24, an innovative web-based 24-hour dietary recall tool, to optimize dietary data collection within the New Zealand context. The adaptation process involved several key steps including

rationalisation of a New Zealand-specific food list, incorporating cultural dishes, adding new portion size estimation aids, and further customisation of the user interface. We provide new insights into the user experience and the tool's functionality, sharing findings from field testing and valuable user feedback. This approach ensures collection of dietary data that is truly representative of the New Zealand population and acknowledges the rich diversity and dietary nuances within the country. As such, this adapted New Zealand version of Intake24 could serve as an essential tool for use in a future National Nutrition Survey or other research initiatives to collect accurate, culturally sensitive, and actionable nutrition data providing evidence to inform future public health programmes and policies.



Mr Joseph Nyemah Nyemah

Nutrition and Food Systems Officer
Food and Agriculture Organization
United Nations
Fiji

Joseph Nyemah Nyemah is the FAO Food and Nutrition Officer for the Pacific Islands. He had previous assignments with the United Nations World Food Programme and the One UN. Joseph also worked in the Canadian public service.

He began his career with the Paris based humanitarian agency, Action Contre La Faim. Joseph worked in several countries including Liberia, Ivory Coast, Sierra Leone, Ethiopia, Sudan, South Sudan, Sri Lanka, Mali, Malawi and 14 Pacific countries. A Canadian social scientist/development theorist from Dalhousie and ST Francis Xavier Universities, Joseph has published in several peer reviewed journals in Australia and North America.

Presentation Title:

FAO's approach to addressing non-communicable diseases

Abstract:

Non-Communicable Diseases (NCDs) constitute the most notable single killer of the population of Pacific Small Island Developing States (SIDS). It is therefore not surprising that the leaders of Pacific SIDS recognize NCDs as a crisis. But just as it is in many parts of the world, addressing NCDs in the Pacific is a complex challenge for many reasons. For example, and in the midst of recurrent climate change disasters, it would be fair to wonder if Pacific SIDS and development stakeholders – and academia included - have not become overwhelmed in obtaining more clarity about the main causes of NCDs, and tackling them with the relevant prioritization, policy environments that address economic and market forces, coordinated interventions, good examples from leaders, actions driven leadership, not blaming the victims, and a lot more. Maybe it is too uncritical and simplistic to continue to make the historical argument that the population of Pacific SIDS are obese, overweight, suffer from micronutrient deficiencies, stunting, and so forth because they choose poor diets and physical inactivity, or simply because all of this is cultural.

The foregoing context demands more criticality and contributes to the rise of several philosopher kings who so easily describe NCDs as a disease that requires a health approach in absolutism. But if we were to invest more into obtaining deeper insights about the causes of NCDs in the Pacific, there could be a possibility for

stakeholders to increasingly advocate for a systems approach to addressing NCDs in the Pacific. A systems approach would for example, recognize that as economic development receives more investments, people will conversely reduce walking in favor of vehicle transportation, children will spend less time playing outside in favor of watching television, more highly processed food of high salt, sugar and fat contents will be marketed and affordable than locally grown food, people will work in the service sector to the detriment of traditional gardening. A systems approach would account for a combination of biomedical, food systems, educational, religious, socio-cultural, recreational, etc... approaches.

As one of the development stakeholders, the Food And Agriculture Organization of the United Nations (FAO) joins efforts with others to address NCDs in the Pacific. The entry point for FAO is through promoting the production and consumption fresh, safe, nutritious and healthy foods. My intervention at the 2023 Joint Conference of the Nutrition Societies of New Zealand will provide insights into FAO's work from this vantage point.

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Abstracts



Nutrition in our land and water

Nutrition in our land and water

Abstract

Design of a multidimensional diet quality score for a global sustainable healthy diet based on plant food variety, intake of animal products and dietary contribution of ultra-processed foods (SUSDIET)

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A range of metrics have been developed and used to measure components of dietary patterns (e.g., adequacy, quality, diversity). However, no existing dietary metric simultaneously captures the three key dimensions of sustainable healthy diets recommended by the Food and Agriculture Organization of the United Nations and the World Health Organization: food processing; dietary diversity; and intake of animal products ⁽¹⁾. This study aimed to identify indicators of a global sustainable healthy diet and translate these features into a multidimensional diet quality score (SUSDIET). Informed by our scoping review ⁽¹⁾, a Delphi method was adopted in the form of a three-round online survey of 13 national and international experts in nutritional epidemiology, environmental health, dietary assessment and/or food and nutrition policy. Surveys were conducted between November 2022 and May 2023. Participants were asked about procedures to establish an operational definition for a global sustainable healthy diet. Based on consensus from global experts, we developed the SUSDIET, a food-based diet quality score incorporating variety of plant foods, intake of animal products, and dietary contribution of ultra-processed foods (the 'dimensions'). Categories and amounts of foods consumed were informed by the Global Diet Quality Score ⁽²⁾, EAT Lancet Planetary Health ⁽³⁾ and a meta-analysis of the relationship between ultra-processed foods and all-cause mortality ⁽⁴⁾. The variety of plant foods is measured based on 12 food groups (citrus fruits, deep orange fruits, other fruits, dark green leafy vegetables, cruciferous vegetables, deep orange vegetables, other vegetables, legumes, deep orange tubers, nuts and seeds, whole grains, white roots and tubers), animal intake based on 5 food groups (egg, dairy, poultry, fish and seafood, red meat), and ultra-processed foods as one food group. Three categories of consumed amounts (in grams per day) are defined for variety of plant foods and animal intake, scoring as 0, 0.5 or 1. Ultra-processed food consumption is scored as 0 or 1 using $\leq 10\%$ or $>10\%$ of total dietary intake as cut-offs. The components of each dimension are weighted so the three dimensions equally range from 0-5. SUSDIET overall score ranges from 0-15 (up to 5 points per dimension), with a higher score indicating a more healthy and sustainable diet. SUSDIET will be of immediate use for research aiming to assess the impact of diets on both health and environmental sustainability outcomes among the general adult population. This multidimensional diet quality score can also be used to inform and assess the effectiveness of policy actions that promote sustainable healthy diets, including the monitoring and surveillance of diets globally.

References

1. Machado P, McNaughton SA, et al. (2023) *Adv Nutr* 14, 147-60.
2. Bromage S, Batis C, et al. (2021) *J Nutr* 151, 75S-92S.
3. Hanley-Cook GT, Argaw AA, et al. (2021) *Br J Nutr* 126, 92-100.
4. Taneri PE, Wehrli F, et al. (2022) *Am J Epidemiol* 191, 1323-35.

Keywords: diet quality metrics; nutrition surveillance; sustainable healthy diets; sustainability

Ethics Declaration: Yes

Financial Support: PM receives income through a Postdoctoral Research Fellowship provided by Deakin University.

Abstract

Quantifying the greenhouse gas emissions of New Zealand households' food purchases: An analysis by sociodemographic variables

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New Zealand has committed to a 50% reduction in greenhouse gas emissions (GHGEs) from 2005 levels by 2030. Dietary changes within New Zealand could simultaneously improve population health and contribute towards the nation's emissions reduction target, as agricultural emissions are estimated to account for half of New Zealand's GHGEs⁽¹⁾. This research aimed to quantify the GHGEs associated with household purchases of major food groups in New Zealand and identify the sociodemographic characteristics that are associated with per capita household dietary emissions. Household dietary emissions were estimated using the NielsenIQ Homescan^(R) consumer panel — a large sample of households within New Zealand who report purchasing data of take-home food and beverages. The sample is nationally representative in terms of broad geographical regions and selected key demographic characteristics. Carbon emission estimates were assigned to 1,908,485 total food and beverage purchases from 1,775 households over one year (2019) using a process-based life cycle assessment (LCA) dataset initially constructed in the United Kingdom (UK) and adapted for New Zealand⁽²⁾. This LCA dataset contains estimates of greenhouse gas emissions generated over the life cycle of the production of food products from the following stages: farming and processing, transit packaging, consumer packaging, transport, warehouse and distribution, refrigeration, and overheads. Greenhouse gas emissions are expressed in kg of carbon dioxide equivalents per kg of food product over a 100-year time horizon. Total emissions from purchases of major food groups were then estimated. Multiple linear regression was used to examine the relationships between household variables and per capita dietary emissions. Overall purchases of red and processed meat (35%) and dairy products (19%) were responsible for the greatest proportion of emissions. The age group of the primary household shopper as well as household size were predictors of per capita dietary emissions — households with primary shoppers > 65 years had, on average, 33% (95% CI: 20% to 49%) higher per capita dietary emissions, compared to households with primary shoppers 34 years; and every additional household member was associated with, on average, 11% (95% CI: 9% to 13%) lower per capita dietary emissions. We have shown in this large representative sample of New Zealand households that purchases of just two food groups — red and processed meat, and dairy — were responsible for approximately half of dietary greenhouse gas emissions. Larger households had lower per capita dietary greenhouse gas emissions, and older shoppers had relatively higher greenhouse gas emissions. Whilst similar associations have been reported elsewhere more research is needed to confirm these latter findings. With enhanced understanding of the observed association between age of a household's primary shopper and per capita dietary emissions, interventions may be devised that encourage shoppers to purchase lower-emitting foods, particularly less meat and dairy.

References

1. Ministry for the Environment Manatu Mo Te Taiao (2022) <https://environment.govt.nz/assets/publications/Aotearoa-New-Zealands-first-emissions-reduction-plan.pdf>
2. Drew J, Cleghorn C, Macmillan A, et al. (2020) EHP 128, 17007.

Keywords: diet; greenhouse gas emissions; food purchases; climate impact

Ethics Declaration: Yes

Financial Support: This work was funded by an Early Career Research Excellence Award from the University of Auckland, and KEB is supported by a Sir Charles Hercus Health Research Fellowship from the Health Research Council of New Zealand [grant number 19/110]. Access to the NielsenIQ NZ Homescan dataset was funded via the DIET research programme (grant number 18/672)

Abstract

Modelling the replacement of red and processed meat with plant-based alternatives and the estimated effect on insulin sensitivity in a cohort of Australian adults

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Dietary guidelines are increasingly promoting plant-based diets, limits on red meat consumption, and plant-based sources of protein for health and environmental reasons ⁽¹⁾. It is unclear how the resulting food substitutions associate with insulin resistance, a risk factor for type 2 diabetes. Here, we modelled the replacement of red and processed meat with plant-based alternatives and the estimated effect on insulin sensitivity. We included 783 participants (55% female) from the Childhood Determinants of Adult Health (CDAH) study, a population-based cohort of Australians. In adulthood, diet was assessed at three time points using food frequency questionnaires: CDAH-1 (2004–06), CDAH-2 (2009–11), and CDAH-3 (2017–19). The median follow-up duration was 13 years. The cumulative average intake of each food group was calculated to reflect habitual consumption. Insulin sensitivity (%) was estimated from fasting glucose and insulin concentrations at CDAH-3 (aged 39–49 years) using homeostasis model assessment. Applying the partition model,⁽²⁾ we simulated the replacement of one food group with another by including both in the model simultaneously (e.g., red meat and legumes), along with potential confounders and energy intake. The difference between parameter estimates (i.e., regression coefficients and variances) and their covariance were used to estimate the “substitution” effect. We report the simulated percentage point change in log-transformed insulin sensitivity for a 1 serve/day lower intake of one food group with a 1 serve/day higher intake of another food group. Replacing red meat with a combination of plant-based alternatives was associated with higher insulin sensitivity ($\beta = 0.10$, 95% CI 0.04–0.16). Adjustment for waist circumference attenuated this association by 61.4%. On an individual basis, replacing red meat with legumes ($\beta = 0.12$, 95% CI 0.02–0.21), nuts and seeds ($\beta = 0.15$, 95% CI 0.06–0.23), or whole grains ($\beta = 0.11$, 95% CI 0.04–0.17) was likewise associated with higher insulin sensitivity. Point estimates were similar when replacing processed meat with plant-based alternatives, but more uncertain due to wide confidence intervals. Our modelling suggests that habitually replacing red meat, and possibly processed meat, with plant-based alternatives may associate with higher insulin sensitivity, and thus, a lower risk of type 2 diabetes. Abdominal adiposity was identified as a potentially important mediator in this relationship. In relation to insulin sensitivity, our findings support the recommendation to choose plant-based sources of protein at the expense of red meat consumption.

References

1. Blomhoff R, Andersen R, Arnesen EK, et al. (2023) Nordic Nutrition Recommendations. Copenhagen, Denmark: Nordic Council of Ministers.
2. Song M, Giovannucci E (2018) Eur J Epidemiol 33, 137–140.

Keywords: cohort studies; insulin resistance; meat; substitution analysis

Ethics Declaration: Yes

Financial Support: The Childhood Determinants of Adult Health study was funded by the National Health and Medical Research Council (grant numbers 211316, 544923, 1128373); National Heart Foundation (grant number GOOH 0578); Tasmanian Community Fund (grant number D0013808); Mostyn Family Foundation; and Veolia Environmental Services.

Nutrition in education settings

Nutrition in education settings

School food environment

School food environment

Abstract

Assessment of food availability in New Zealand primary schools

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Childhood obesity and overweight rates in New Zealand are considerably higher than that globally with one in three children aged between 2-14 years being overweight or obese ⁽¹⁾. Children's dietary knowledge and food preferences are influenced by various factors including the food environment. Schools are an excellent setting to influence children's dietary behaviours since they have the potential to reach almost all children during the first two decades of their lives. However, previous analyses indicate many school canteens and food providers do not supply foods that promote healthy eating and nutrition behaviours ^(2,3). The Ministry of Health (MoH) recently implemented a 'Food and Drink Guidance for Schools' which utilises a traffic-light framework dividing foods into three categories: 'green', 'amber', and 'red' ⁽⁴⁾. The aim of this study was to assess primary school canteen food menus against the newly implemented MoH Guidance. A convenience sample of 133 primary school canteen menus were collected in 2020 as part of the baseline evaluation of the Healthy Active Learning initiative across New Zealand. Four researchers (three nutritionists and one dietitian) developed a menu analysis toolkit to undertake the analysis of all menus collected. The toolkit provided a breakdown of commonly packaged foods and meals/menu items available to purchase within schools based on Health Star Ratings, ingredients, and/or standard recipes. Assumptions were created for menu items requiring additional detail to be categorised according to the guidance through consensus by all four researchers. Primary school menus were coded by two researchers, and intercoder reliability was ensured by independent coding and cross-checking of 10% of menus. Descriptive and inferential analyses were conducted using IBM SPSS and $P < 0.05$ denoted significance. Analyses of canteen menus revealed that most menu items belonged to the less healthy amber (41.0%) and red (40%) food categories. Low decile schools had a lower percentage of green food items (8.6%) and a higher percentage of red food items (48.3%) compared to high decile schools ($p = 0.028$). Similarly, schools in low deprivation areas had a significantly higher percentage of green food items (14.2%) compared to high deprivation areas (8.6%) ($p = 0.031$). Sandwiches, filled rolls, and wraps were the most commonly available items (86%) followed by baked foods and foods with pastry (71%). Sugar-sweetened beverages were just as prevalent as water on school food menus (54% each). Over half of in-house catered canteen menu items were classified as 'red' foods (55.3%). This study highlights that most school canteens were not meeting the guidelines for healthy food and drink provision outlined by the MoH. Improving school food availability for children in socioeconomically deprived areas needs to be prioritised to reduce inequities. Findings suggest the need for more robust national policies and mandated school guidance to improve the food environments in New Zealand schools.

References

1. Chiavaroli V, Gibbons J D, Cutfield W S, et al. (2019). World J Pediatr. 15(4):322-331.
2. D'Souza E, Vandevijvere S, Swinburn B (2021) Aust NZ J Public Health. 46(3): 325-331.
3. Carter M-A, Swinburn B (1999) Health Promot. Int. 14(4):307-316.
4. Ministry of Health (2020).

Keywords: food policy; menu audit; policy evaluation; traffic-light guidance

Ethics Declaration: Yes

Financial Support: This research uses data from the Healthy Active Learning evaluation, conducted by Massey University (A.A. is the principal researcher), and funded by Sport New Zealand, Ministry of Health and Ministry of Education.

Abstract

The barriers and enablers to providing healthy food in New Zealand secondary school canteens

O Coady¹, C Smith¹, S Styles¹

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Establishing healthy lifelong eating habits in young people is important for short and long-term health⁽¹⁾. Schools are ideal setting to improve diet. However, research shows that many school food environments are unhealthy⁽²⁾. In New Zealand (NZ), the canteen is a popular food provision, particularly in secondary schools. This research aimed to explore the barriers and enablers to providing healthy food and beverages in NZ secondary school canteens. In 2022, 6 secondary schools were purposively selected to participate in semi-structured interviews about foods and beverages sold in schools' canteens and the factors that influenced this. In total, 11 stakeholders representing six schools and one staff member of an external catering company completed interviews. The interviews were transcribed and analysed using a reflexive thematic analysis approach⁽³⁾. Four themes were developed. Theme 1 *Action-oriented school policies that are based on healthy eating principles can facilitate healthier canteens* highlighted the use and characteristics of policies. The subtheme highlighted that *Mandatory policies are more enforceable*. Theme 2 *Multiple component opt-in programs or interventions facilitate a healthier school food provision* shows that opt-in government interventions (e.g. Ka Ora, Ka Ako, the NZ free school lunch initiative) with funding, monitoring, and incentives can improve food provision. The subtheme *Health-enhancing changes in the school environment has flow-on effect to canteens* showed that these changes can affect the entire school food environment. Theme 3 *Healthy canteens get lost in the "pecking order" of what's important* highlights that while schools and key stakeholders may believe healthy eating is important, other factors related to well-being and education were more important to prioritise within the school's limited resources. Theme 4 *People's values, attitudes and beliefs may help and hinder the healthiness of canteens* and explores the role champions have in influencing the healthiness of the canteen. Champions were those with a positive, proactive attitude, value healthy eating and are capable. Subtheme 1 *Meet student preferences while providing healthy food* was a common barrier many champions worked hard to overcome. The final subtheme identified how *A collaborative approach within schools and their communities can overcome barriers to healthy canteens*. Government mandates and interventions can positively impact the canteen and other food provisions. This research supports a recommendation for schools to create and implement school policies around food encompassing a whole-school approach.

References

1. Micha R, Karageorgou D, Bakogianni I, et al. PLoS One. (2018) 13(3):1-27.
2. D'Souza NE, Vandevijvere S, Swinburn B. Aust N Z J Public Health. (2022) 46:325-31.
3. Braun V, Clarke V. Thematic analysis - a practical guide. London: SAGE Publications; 2021.

Keywords: canteen; food environment; School Food and Nutrition Policy; qualitative research

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

Victorian (Australian) parents are receptive to the idea of a primary school-provided lunch program: A mixed-method survey

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School-provided lunch programs offer numerous benefits to primary school students including improved school attendance and performance, reduced undernutrition, reduced food insecurity, the opportunity to learn healthy eating, and the development of healthy dietary habits⁽¹⁻³⁾. Australia does not have an ongoing national school-provided lunch program that provides food for all students. To successfully implement a school-provided lunch program in Australian primary schools, it is essential to obtain the opinions of all key stakeholders, including parents. This study aimed to examine Victorian primary school parents' opinions about a potential school-provided lunch program. An online cross-sectional survey with open- and closed-ended questions was conducted in Victoria, Australia, in 2022. Descriptive statistics and chi-square analyses were performed using SPSS software; thematic analysis was carried out using NVivo. Three hundred and fifty-nine parents responded to the survey. Fifty-seven percent of respondents said they would allow their child to participate in a school-provided lunch program, 34% were unsure and only 9% said they would not. The opportunity for hot-cooked lunches at school and the perceived convenience for parents were the top two reasons for favouring such a program. Fifty-eight percent were in favour of hybrid-type funding from both the government and parents, while 30% were in favour of being fully funded by the government. The most preferred amount to pay per meal was AUD5-6 (43%), followed by AUD3-4 (25%). When respondents were asked to rate the importance of six options in school-provided lunches (vegetarian, nut-free, dairy-free, gluten-free, egg-free, and vegan options), almost one-third of them selected having 'vegetarian' options as important or very important, whilst one-fifth selected 'nut-free', 'dairy-free', and 'gluten-free' options as important or very important. There were no associations between the parents' or children's socio-demographic characteristics and the likeliness of letting their children use school-provided lunches, funding preference, the amount willing to pay for school lunches, and the importance of different options. Respondents' written responses revealed that they expected school-provided lunches to be healthy and made from whole food and cater to the special dietary and cultural needs of their children. Their other expectations included food being tasty and offered in a child-friendly way, having a variety of food offered, and having backup options if the children would/ could not eat those meals. They also expected enough time to be provided for eating lunches so children could eat and enjoy the meals. The findings of this study suggest that Victorian primary school parents are open to the idea of a school-provided lunch program, but they do have several expectations regarding the menu and time for eating. Program planners could use the findings of this study to create a school lunch program that aligns with the parents' expectations and preferences.

References

1. Lucas PJ, Patterson E, Sacks G, et al. (2017) *Nutrients* 9,736.
2. Oostindjer M, Aschemann-Witzel J, Wang Q, et al. (2017) *Crit Rev Food Sci Nutr* 57,3942-58.
3. Waling M & Olsson C (2017) *Health Edu* 117, 540-50.

Keywords: school lunch program; cooked school lunches; school lunch menu; primary school

Ethics Declaration: Yes

Financial Support: This study was supported by an internal grant from Institute for Physical Activity and Nutrition, Deakin University.

Abstract

Parents' perceptions of the Tasmanian School Lunch Project - interim findings

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Most Australian school students take a packed lunch to school ⁽¹⁾. However, parents have reported many barriers to packing a healthy lunch ⁽²⁾. Subsequently, foods eaten during school hours are not consistent with the Australian Dietary Guidelines, with discretionary foods providing about 44% of energy consumed during this time ⁽³⁾. In addition, some children go to school without any food for lunch or money to buy lunch. The Tasmanian School Lunch Project provides free nutritious cooked lunches for Kinder to Year 10 students attending 30 government schools (15 commenced 2022, 15 commenced 2023) in areas of high socioeconomic disadvantage. The lunches were provided 1-3 days/week. The menu and recipes were designed by dietitians. This analysis aimed to describe parents' perceptions of the School Lunch Project during the first year. Six of the 15 schools that commenced in term 2 2022 were invited, and agreed, to participate in the evaluation. During term 3 or 4 2022, parents completed online or written surveys (n=159) and/or participated in discussion groups (n=26) to share their thoughts on the menu, their concerns, likes, and willingness to pay. Survey data were analysed descriptively and open-ended survey responses and discussion group data thematically. During 2022, 78,832 nutritious cooked lunches were provided to 1,678 students. Most parents felt there was enough variety on the menu (66%) and the right amount of food was served (69%). Most students (79%) ate the lunches every day they were provided yet 52% of parents continued to provide a packed lunch. Parents enjoyed that their child was having a healthy lunch (66%) and trying new foods (74%). Some parents in the discussion groups indicated positive flow on effects at home with students trying new foods and sitting down together as a family to eat the evening meal. Half the parents (50%) had no concerns about the school providing lunches. The most commonly reported concerns were their child might not like the food (36%) or their child does not try new foods (8.6%). These concerns were also raised in the discussion groups. Most parents (93%) were prepared to pay for the lunches in future (median \$3, range \$1-\$12) and 85% thought there should be a family discount. Parents acknowledged some payment was necessary for the sustainability of the program but some expressed concern for those who may struggle to pay. More direct communication with families about the meals offered, the availability of bread (from term 4 2022) for students who choose not to eat the cooked lunch or want more to eat, and allowing families time to adjust to the new lunch system, may address some of the concerns raised. Further data on parents' perceptions of the school lunches will be collected during term 3 2023.

References

1. Bell A, Swinburn B (2004) *Euro J Clin Nutr* 58, 258–63.
2. Bathgate K, Begley A (2011) *Nutr & Diet* 68, 21–6.
3. Manson AC, Johnson BJ, Zarnowiecki D et al. (2021) *Public Health Nutr* 24, 5985-94.

Keywords: cooked school lunches; parents; perceptions

Ethics Declaration: Yes

Financial Support: Funding for this evaluation was from School Food Matters, who have provided input into the conceptualization and design of the evaluation but were not involved in the analysis. The evaluation has also been supported by the Tasmanian Government Department of Health. Two of the authors are supported by Heart Foundation Fellowships (V.C., ID number 104892 and B.F., ID number 106588).

Abstract

Mealtime and food provision environments in primary schools – an opportunity for nutrition intervention?

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Mealtime environments and food provision contexts in primary school influence students' food behaviours ⁽¹⁾ and are an opportunity for nutrition intervention ⁽²⁾. This study aims to explore primary school food provision contexts including eating environments and food provision models and policies. A quantitative cross-sectional online survey of Australian primary school teachers undertaken between August 2022-July 2023 collected data about: (1) designated eating times and locations for lunch and snacks; (2) teacher use of mealtimes for food and nutrition education; and (3) presence of food services and food-related policies. Descriptive statistics were generated using Stata 17.0 statistical software. Participants were 239 teachers recruited via social media advertising and education/nutrition networks. The majority of teachers reported their school provided allocated time for children to eat a morning snack (n=201, 84%) and lunch (n=234, 98%). Around three quarters of teachers reported an allocated eating time of 10 minutes or less for morning snack (n=146, 73%) and 15 minutes or less for lunch (n=174, 74%). Teachers stated lunch was most commonly eaten in the classroom with time to finish in the yard (n=90, 38%) or in the yard as a group (n=70, 30%). It was most common for morning snack to be eaten in the classroom (n=119, 59%). Most teachers stated they had the opportunity to eat lunch with their students at least sometimes (n=159, 67%). Of these teachers, 31% (n=50) reported they used this time to teach students about food and nutrition, for example, in a pedagogical lunch. Of 109 teachers who did not use lunch time to teach students about food and nutrition, 43% (n=69) stated they would be interested in doing this in the future. When asked about the availability of food services at their school, 62% (n=147) of teachers reported their school had a canteen, 28% (n=67) reported their school offered lunch orders via an external food outlet and 35% (n=83) reported their school had a breakfast program. Only 34% of teachers reported their school had policies about the foods available from school food services. From these findings we conclude that a variety of mealtime and food provision contexts exist within Australian primary schools, and that there is opportunity to leverage eating occasions and food provision models and policies for nutrition intervention. This includes the opportunity to utilise mealtimes for delivering food and nutrition education, for example, through the concept of a pedagogical lunch.

References

1. Cohen JFW, Jahn JL, Richardson S, et al. (2016) *J Acad Nutr Diet*, 116(1), 123-279.
2. Waling M & Olsson C (2017) *Health Educ* 117(6), 540-550.

Keywords: food education; primary school; pedagogical lunch; food literacy

Ethics Declaration: Yes

Financial Support: The research received no external funding

Abstract

Exploring the use of school-based infrastructure in healthy and sustainable food education

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Food-related infrastructure in primary schools can be used to deliver healthy and sustainable food education from a young age¹, though little is known about the presence and use of such infrastructure in primary schools. The aim of this study is to explore the use of physical infrastructure in healthy and sustainable food education in Australian primary schools. A quantitative cross-sectional online survey of primary school teachers undertaken between August 2022-July 2023 collected data about the presence and teaching-related use of food gardens, cooking facilities and food waste management systems in primary schools. Descriptive statistics were generated using Stata 17.0 statistical software. Participants were 239 teachers recruited via social media advertising and education/nutrition networks. The majority of teachers agreed that primary schools should have a food garden (n=194, 81%), cooking facilities (n=196, 82%) and a food waste system (n=205, 86%) that can be used for teaching. Whilst three quarters of participants stated their school had a food garden (n=181, 76%), just over half reported their school had cooking facilities (n=130, 54%) or a food waste system (n=131, 55%) that could be used for teaching purposes. More than 60% of participants reported they used such infrastructure within their teaching when it was available. Food waste systems were most commonly reported to be used more than once a week (n=30, 33%) to teach students about food waste (n=69, 77%), food sustainability (n=65, 72%) and the environment (n=63, 60%). Food gardens were most commonly reported to be used once a week (n=33, 30%) to teach students about gardening skills (n=97, 87%), the environment (n=77, 69%), healthy eating (n=67, 60%) and food sustainability (n=67, 60%). Cooking facilities were most commonly reported to be used once or twice a term (n=21, 23%) to teach students about food preparation and cooking (n=71, 84%) and healthy eating (n=62, 73%) and for tasting food (n=55, 64%). From these findings we conclude that primary school teachers consider food gardens, cooking facilities and food waste systems to be important for delivering healthy and sustainable food education. Whilst food gardens appear to be common in Australian primary schools, there is variability in their use as an educational resource. Further variability exists regarding the presence and use of cooking facilities and food waste systems in primary school settings. There is future scope to (1) extend the presence of food-related infrastructure in primary schools; and (2) develop resources and training opportunities for teachers to support their use of such infrastructure in delivering healthy and sustainable food education for primary school students.

References

1. Dudley DA, Cotton WG & Peralta LR (2015) *Int J Behav Nutr Phys Act* 12, 28.

Keywords: food education; food sustainability; primary school; critical food literacy

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Intakes from healthy and unhealthy food groups and obesity among 5- to 9-year-old South African children

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The global pandemic of paediatric overweight and obesity, along with undernutrition among children in low-income countries pose challenges for future health. Unhealthy dietary intake among children is of great concern ⁽¹⁾. The aim of this study was to determine the association between intakes from healthy and unhealthy food groups and adiposity among 5- to 9-year-old South African children (n=920). Conventional dietary intake assessment methods are burdensome; therefore, a short unquantified food frequency questionnaire was developed based on the WHO Global school-based student health survey, which focused on healthy and unhealthy food groups. The new questionnaire includes four healthy food groups (fruits, vegetables, milk, meats) and six unhealthy food groups (hot sugar-sweetened beverages (SSBs), cold SSBs, cookies, candies, salty snacks, fast foods) with five different responses of frequency of intake per week. The food groups reflect foods generally eaten by South African school children. The questionnaire was completed by the parents. Weight and height were measured and WHO BMI z-score (BAZ) was calculated ⁽²⁾. Descriptive statistics were reported using median and interquartile range. Frequency of intakes from food groups were compared across tertiles of BAZ using the Kruskal-Wallis test. The correlation between frequency of intakes from different food groups, and between the food groups and BAZ was calculated. The children reported similar daily intakes from the milk (35.3%), cold SSBs (33%) and hot SSBs groups (27%). Fruit (14%) and vegetables (9.6%) were consumed daily by a small percentage of children, while animal source protein foods (meat, fish, poultry, eggs) were consumed daily by 39% of children. The most frequent daily consumed snacks were salty snacks, e.g. crisps (13.2%), candy (11.1%) and cookies (5.3%), while fast foods were consumed once per week by the largest proportion of children (60.7%). Based on the WHO BMI z-scores, 15.2% of children were overweight, 4.4% were obese and 3.8% were underweight. Children in the highest two tertile groups of BAZ had a higher median weekly frequency of SSB intake (5, IQR 1,7), compared to those in the lowest BAZ tertile (3, IQR 1,7). No other differences were found between frequency of food group intake across BAZ tertiles. There was a weak positive correlation between BAZ and the frequency of SSB intake ($r = 0.08$, $P = 0.015$), as well as between frequency of milk intake and frequency of SSB intake ($r = 0.13$, $P < 0.001$), but a weak negative correlation between the frequency of vegetable intake and frequency of SSB intake ($r = -0.08$, $P = 0.01$). In conclusion, low fruit and vegetable intakes, combined with regular SSB intakes are evident in this group of children. The frequency of SSB intake was positively associated with adiposity, and SSB intake apparently replaced vegetable intake, but not milk intake among the children.

References

1. NCD Risk Collaboration (2023) Nature 615, 874-883.
2. Kruger R, Kruger HS, Monyeki MA et al. (2021) J Hypertension 39, 2190-2199.

Keywords: healthy foods; children; obesity; snacks

Ethics Declaration: Yes

Financial Support: This work was supported by the South African Medical Research Council (SA MRC) Extra Mural Unit; the National Research Foundation (NRF) of South Africa for Competitive Support for Y-Rated Researchers (Grant Number: 112141); the SA MRC under a Self-Initiated Research Grant; the South African Research Chairs Initiative (SARChI) of the Department of Science and Innovation; and the National Research Foundation (NRF) of South Africa (Grant Number: 86895).

Sustainable diets

Sustainable diets

Abstract

An audit of plant-based, ultra processed vegan foods in New Zealand

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As concerns grow about the impact of animal farming on the environment, the appeal of plant-based diets has increased⁽¹⁾. The most extreme of these diets is the vegan diet which excludes all animal and insect sourced products. The vegan diet is often lauded as being beneficial for cardiovascular health, with the exclusion of saturated fats from animal meats, and the high intake of fibre from fruit and vegetables. More lately, however, there has been an exponential increase in the availability of vegan ultra-processed (UPFs), ready to eat foods which may not be so heart healthy. This study aimed to audit the vegan-labelled, plant-based meat and dairy analogues (PBMA and PBDA) available in New Zealand supermarkets. The objective was to compare the nutrient content against foods of animal origin that these products emulate. The audit was completed between March and June 2022 using a combination of on-site data collection and online sources. Data were collected from New Zealand's five major supermarkets, Countdown, Fresh Choice, New World, Pak'nSave and Four Square. The audit recorded vegan and plant-based labelled products imitating animal meats (chicken, mince, beef, sausage, burgers, bacon, nuggets), and dairy (milk, cheese, yoghurt). Nutrient composition was taken from the Nutrition Information Panel (NIP) for each product and then a mean (SD) derived from a sample of each category. Nutrient composition for the comparison meat and dairy products was taken from NZ FOODfiles⁽²⁾. All nutrients were reported per 100g or 100ml. The PBMA generally had higher energy, sodium and fibre, and lower protein than their meat counterparts. For example, plant-based burgers compared with beef burgers had 863kJ vs 761kJ energy, 436g vs 130g sodium, 2.3g vs 1.2g fibre, 15g vs 19g protein per 100g. Total fat and saturated fat were mostly lower in the meat products than in PBMA, except for sausages. The plant-based milk analogues were lower in protein and fat than dairy milk, except soy (protein) and coconut (fat) milks. PBDA were either completely lacking in calcium or were fortified to a similar level as dairy milk. Most plant-based cheeses and yoghurts were not fortified with calcium and were higher in energy, total fat and saturated fat than dairy. Vitamin B12 fortification of all plant-based products varied widely but contained less than meats and dairy. The wide range of plant-based UPFs included in this audit demonstrated little or no health advantage over animal derived meats and dairy products. The high salt and saturated fat content of these products suggest increased cardiometabolic risk if consumed as a regular part of the vegan diet despite higher fibre content.

References

1. Saari UA, et al. (2021) Trends Food Sci Tech 107, 161-167.
2. New Zealand Food Composition Database. 2022. New Zealand FOODfilesTM. NZ PFRL and MoH www.foodcomposition.co.nz/foodfiles ISBN 978-0-473-60858-3

Keywords: vegan; ultra processed foods; plant-based meat analogues; plant-based dairy analogues

Ethics Declaration: Yes

Financial Support: This research received no funding

Abstract

Adherence and eating experiences differ between participants following a flexitarian or vegetarian diet in a 10-week randomised dietary intervention trial.

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Flexitarian, vegetarian and vegan diets are increasingly popular, particularly amongst young adults. This is the first randomised dietary intervention to investigate the health, wellbeing, and behavioural implications of consuming a basal vegetarian diet that additionally includes low-to-moderate amounts of red meat compared to one containing plant-based meat alternatives (PBMA) in young adults (NCT04869163) (1). The objective for the current analysis is to measure adherence to the intervention, nutrition behaviours, and participants' experience with their allocated dietary group. Eighty healthy young adults participated in this 10-week dietary intervention as household pairs. Household pairs were randomised to receive approximately three serves of beef and lamb meat (average of 390 g total cooked weight per person per week, flexitarian group) or PBMA (350–400 g, vegetarian group) on top of a basal vegetarian diet. Participants were supported to adopt healthy eating behaviours, and this intervention was developed and implemented using a behaviour change framework (2). Diet adherence (eating allocated meat or PBMA, abstaining from animal-based foods not provided by researchers) was monitored daily, with total scores calculated at the end of the 10-week intervention period. Eating experiences were measured by the Positive Eating Scale and a purpose-designed exit survey, and a food frequency questionnaire measured dietary intake. Analyses used mixed effects modelling taking household clustering into account. The average total adherence score was 91.5 (SD = 9.0) out of a possible 100, with participants in the flexitarian group scoring higher (96.1, SD = 4.6, compared to 86.7, SD = 10.0; $p < 0.001$). Those receiving meat were generally more satisfied with this allocation compared to those receiving the PBMA, even though a leading motivation for participants joining the study was an opportunity to try plant-based eating (35% expressed that that interest). Participants in both intervention groups had increased vegetable intake ($p < 0.001$), and reported more positive eating experiences ($p = 0.020$) and satisfaction with eating ($p = 0.021$) at the end of the 10-week intervention relative to baseline values. Behavioural methods to encourage engagement with the trial were successful, as participants demonstrated excellent adherence to the intervention. The flexitarian and vegetarian diets elicited different responses in adherence and eating experience. This holds relevance for the inclusion of red meat and PBMA in healthy, sustainable dietary patterns beyond this study alone.

References

1. Braakhuis A, Gillies N, Worthington A, et al. (2021) JMIR Res Protoc 10, e30909.
2. Worthington A, Gillies N, Roy R, et al. (2023) J Nutr Educ Behav 55, 38-47.

Keywords: adherence; eating behaviours; flexitarian; vegetarian

Ethics Declaration: Yes

Financial Support: This research was funded by the New Zealand National Science Challenge (High Value Nutrition) and the New Zealand Ministry of Business, Innovation and Employment National [including funds from the Meat Industry Association Innovation Limited (a subsidiary of the New Zealand Meat Industry Association) and Beef and Lamb New Zealand Limited].

Abstract

An overview of labelling and environmental claims on fish and seafood products in New Zealand supermarkets

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Fish and other seafood are a major component of New Zealanders' diet; the 2018/2019 and 2019/2020 New Zealand Health Survey found that nearly three quarters of New Zealanders eat seafood at least once a week.⁽¹⁾ Environmental and ethical factors influence New Zealand consumers' purchase of seafood and consumers prefer to get their information about seafood at the point of purchase⁽²⁾. However, environmental claims are not regulated under the Australia New Zealand Food Standards Code, unlike health and nutrition claims. Some seafood products are certified by programmes (e.g. Best Aquaculture Practice (BAP)), ensuring the seafood was sourced according to specific criteria related to environmental management, but other products carry self-declared environmental claims that have not been independently verified. This study aimed to describe labelling practices, including environmental claims, on fish and seafood packaged products sold in major New Zealand supermarkets and available in the 2022 Nutritrack database. Nutritrack is an annual survey conducted by trained fieldworkers who take photographs of all packaged food and beverage products displaying a nutrition information panel (NIP) from 4 major supermarkets in New Zealand. Information from the photographs, including the NIP and the ingredients list is entered into the Nutritrack database. For this study, data (including fish species, harvest location, processing country, fishing method, environmental certifications and self-declared environmental claims) were extracted from the archived photographs of all sides of the packaged fish and seafood products in the 2022 Nutritrack database. Self-declared environmental claims were assessed against the ISO 14021 standard for "Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)" on specific criteria that were relevant for seafood products, including if the self-declared claim mentioned the word "sustainable" (as this term is difficult to substantiate and should be avoided); was vague and non-specific; or overstated the benefits (to imply multiple benefits from a single environmental change). There were 369 fish and seafood products included in this study. Eighty-eight products (23.8%) displayed a certification; the Marine Stewardship Council's certification (MSC) for wild fish was the most common and was featured by 72 products (19.5%). One hundred and fifty-two products (41.2%) displayed at least one self-declared claim. Thirty-three distinct self-declared environmental claims were identified, 16 (48.5%) of which breached the ISO 14021 standard for environmental declarations because they used the term "sustainable" and 26 (78.8%) of which breached the ISO 14021 standard because they were vague. This analysis suggests that stricter regulation is needed for self-declared environmental claims on fish and other seafood products available for purchase in New Zealand, to prevent greenwashing and to provide consumers transparent, accurate and substantiated information.

References

1. Greenwell J & Grant M Adults' Dietary Habits: Findings from the 2018/19 and 2019/20 New Zealand Health Survey. Manatu Hauora, Ministry of Health, 2022.
2. Economic Intelligence Unit. New Zealand Seafood Consumer Preferences, a Snapshot. Ministry for Primary Industries, Nov. 2019.

Keywords: seafood; environmental claims; labelling; standards

Ethics Declaration: —

Financial Support: This work was supported by a Sir Charles Hercus Health Research Fellowship from the Health Research Council of New Zealand (K.E.B., grant number 19/110)

Abstract

Increasing the proportion of plant to animal protein in hospital patient menus: what do stakeholders think?

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Replacing dietary animal protein with plant protein has a positive impact on greenhouse gas emissions ⁽¹⁾ and preventing death from chronic disease ⁽²⁾. Despite being ideally situated to re-design menus, foodservices in hospitals have not focused on changing protein sources ⁽³⁾. Implementation in hospitals requires cooperation from stakeholders across the foodservice system e.g., managers, dietitians, menu planners, purchasers, cooks. A qualitative descriptive study design using semi-structured interviews explored perspectives of hospital foodservice stakeholders on increasing the proportion of plant to animal protein in hospital patient menus and outlined actions required to do this. Interviews were based on participatory backcasting with a “desirable future” defined as hospital patient menus containing, on average, more plant-based protein foods (PBPF) (i.e., legumes, nuts, plant-based meat alternatives) than animal-based protein foods (ABPF) (i.e., beef, lamb, pork, poultry, fish, eggs, dairy) by the year 2050. Analysis was completed using a general inductive approach. Thirty-five stakeholders participated (foodservice dietitians n=10; foodservice managers, n=6; dietetic professional leads n=4; chef/cooks n=4; information technology n=4; manager [contracts] n=4; manager [other] n=3). Most (n=25) supported patient menu changes to increase the proportion of plant to animal protein foods, though all described barriers. Common concerns were that patients wouldn’t eat the meals (n=32), that menu re-design would have a negative impact on protein intake and malnutrition rates (n=30), and that cost of PBPF was too high making the change unfeasible (n=25). Benefits were an improvement in the nutrition profile of the menu and subsequent improvement to health (n=16), lower cost of legumes compared to meat (n=10), improvements in greenhouse gas emissions (n=10) and opportunity to use the menu as an education tool (n=8). We developed a model describing the required actions which began with a trigger for change followed by a cyclical design process, preparation, implementation and monitoring. The cyclical design process included stakeholder consultation, setting a target, choosing a strategy, developing a menu and recipes, finding product, planning the system and operation, and checking it worked. Participants valued gradual changes and maintaining choice during the change process. When prompted about specific strategies, stakeholders were most supportive of replacing ABPF with PBPFs in familiar recipes or replacing entire menu items (n=21), adding PBPF options (n=25), and moving PBPFs before ABPF-based items on the menu (n=22). Hospital foodservices and policy makers wishing to increase the proportion of plant to animal protein in hospital patient menus can use the process and actions identified to plan pathways and communicate these to stakeholders. Future research should explore strategies for increasing the proportion of plant to animal protein while maintaining some ABPF on hospital menus, and evaluating effects of changes uptake, cost, estimated greenhouse gas emissions, satisfaction, dietary intake and health outcomes.

References

1. Kesse-Guyot E, Fouillet H, Baudry J, et al. (2021) *Sci Total Environ* 789, 147901.
2. Sun Y, Liu B, Snetselaar LG, Wallace RB, et al. (2021) *J Am Heart Assoc* 10(5), e015553.
3. Stephens LD, Porter J, & Lawrence M (2021) *Sustainability* 13(20), 11207.

Keywords: plant-based; hospital; menus; foodservice

Ethics Declaration: Yes

Financial Support: This study was supported by a postgraduate fund from Massey University and completed as part of GS's doctoral study, which is funded by Massey University.

Abstract

Towards sustainable diets – interventions and perceptions amongst adolescents: a scoping review

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Adolescence is an important life-stage during which shifts towards more healthy and sustainable diets can be promoted. Adolescents have increasing influence over their food choices informed by their developing personal knowledge and values, impacting long-term dietary behaviours into adulthood ⁽¹⁾. We aimed to review the recent literature regarding adolescents' perceptions of environmentally sustainable diets, and interventions to support adolescents to eat sustainably. We reviewed published literature that focussed on adolescent participants and their perceptions of, or interventions to support, sustainable dietary habits. Five electronic databases were searched to include studies published since 2012 that met the inclusion criteria. The JBI approach and PRISMA-Sc checklist⁽²⁾ was used for source screening, data extraction and presentation of data. Data was extracted including study characteristics, methodology and results in relation to each research question. The extracted data was reported, synthesised and discussed in the context of the food system framework⁽³⁾ and broader research. Twenty-eight articles were included in the review. Findings suggest that adolescents' understanding of what constitutes sustainable eating is low. Most adolescents, when asked, were unsure of what constitutes sustainable eating, or a plant-based diet. The environmental impact of the production methods, transport and packaging of foods was most commonly reported when adolescents considered the environmental impact of their foods. The most commonly perceived barrier to consuming sustainable foods mentioned was cost, particularly by adolescents from lower socioeconomic backgrounds. Other barriers include unappealing taste, appearance or smell of 'sustainable' food items (particularly those that were vegetarian). Geographical limitations impacting the ability to grow or purchase local and organic products were also mentioned as barriers to consuming sustainable foods. Adolescents reported a lack of understanding of sustainable diets, and distrust of sustainability-related claims from fast-food outlets regarding the quality or source of ingredients, making it difficult to make informed food choices. Additionally, behaviours conflicting with personal and/or group norms were noted as barriers to adopting sustainable dietary habits. Adolescents that had previously received relevant education, valued nature and health, or were from a rural or indigenous community, were more likely to value environmentally sustainable food choices. Interventions which target adolescents' cognitive understanding and aspiration to make sustainable food choices appear to improve their attitudes towards sustainable food, whereas interventions to increase the availability of sustainable foods improved the environmental sustainability of adolescents' dietary intake. Multicomponent, tailored and community-based interventions were most effective however the long-term effect of these interventions remains unclear. More research is needed in diverse countries and settings, with consideration of adolescents' level of autonomy in food choice and long term-effectiveness of interventions.

References

1. Hargreaves D, et al. (2022) *The Lancet* 399(10320):198-210.
2. Global Alliance for Improved Nutrition (GAIN) and John Hopkins University. The Food Systems Dashboard. 2020. <https://www.foodsystemsdashboard.org>.
3. Tricco AC, et al. (2018) *Ann of Intern Med* 169(7):467-47.

Keywords: adolescents; sustainable diets; scoping review; interventions

Ethics Declaration: —

Financial Support: This research received no external funding

Abstract

Development of the iOTA Model®; a dietary optimisation tool for assessing nutrient adequacy, environmental impact and acceptability of diets in New Zealand

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Based on the World Health Organization's definition¹, sustainable healthy diets are “dietary patterns that promote all dimensions of an individuals' health and well-being; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable”. Over the past decade, there has been an increasing interest in the environmental sustainability of diets, but little attention has been paid to the nutrient adequacy, consumer acceptability and affordability of such diets. Such knowledge is particularly scarce in New Zealand where approximately 40% of adults and 20% of children may live under severe to moderate food insecurity^{2,3}. The iOTA Model® is a dietary optimisation tool designed to fill this gap by bringing the various aspects of diet sustainability together and providing evidence-based knowledge on not just the environmental impact of food but also its economic and nutritional sustainability at a national level. The iOTA Model® was constructed using mixed integer linear programming by integrating New Zealand-specific dietary data. This underlying data was obtained from various open-access sources including but not limited to New Zealand's Food Composition Database, New Zealand Total Diet Study and the nutrient reference values published by the Ministry of Health. Diet-related greenhouse gas emissions were also incorporated into the model based on the data obtained from the scientific literature. Results derived from the preliminary development of the iOTA Model® suggest that meeting nutrient adequacy is possible with minimal dietary pattern changes in New Zealand. It is also evident that adhering to dietary guidelines may provide 26% reduction in dietary greenhouse gas emissions. This is consistent with the findings of previous studies showing that following dietary guidelines alone assists reduction of dietary greenhouse gas emissions. Further features such as digestibility and bioavailability considerations have also been incorporated as part of the iOTA Model®, allowing for a more accurate estimation of nutrient supply. The model will be available as an open-access tool and will allow users to explore various sustainability implications of their diet.

References

1. WHO & FAO (2019) Sustainable healthy diets: guiding principles. FAO; WHO.
2. University of Otago & MoH (2011) A Focus on Nutrition: Key findings of the 2008/09 New Zealand Adult Nutrition Survey. Wellington: MoH.

Keywords: dietary optimisation; sustainable diets; diet modelling; environmental footprint

Ethics Declaration: No

Financial Support: This research was funded by the Global Dairy Platform.

Abstract

Identifying the barriers and facilitators to fruit and vegetable consumption in rural Australian adults

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Within rural Australia, only 47% and 9% of adults meet recommendations for fruit and vegetable intake, respectively, which is a leading contributor to the increased risk of non-communicable disease. Previous literature has identified barriers and facilitators to increasing fruit and vegetable intake in rural Australian settings, such as having greater access to fresh produce.⁽¹⁾ However, this literature is limited by observing fruit and vegetables as a single food group and small sample sizes. This study aimed to determine the barriers and facilitators to meeting fruit and vegetable recommendations (as separate food groups) in rural Australian adults. It was hypothesised that barriers and facilitators to consumption of fruits and vegetables would be identified at the individual, social-environmental and physical-environmental levels of a socio-ecological framework and these would differ between fruit and vegetables.⁽²⁾ Data from the 2019 Active Living Census were used, completed in the Loddon Campaspe region of north-west Victoria, Australia. Data were available at the level of the individual (socio-demographic characteristics, health behaviours, education level, financial stability), social-environment (household size), and physical-environment (use of community gardens). Information on fruit and vegetable consumption was collected using two open-ended questions asking how many serves were consumed each day. Survey weighting was used to account for the survey design. Descriptive statistics were reported for continuous (mean and standard errors [SE]) and categorical (frequencies) data. Multivariate logistic regression analyses were used to determine odds ratios (OR) and 95% confidence intervals (CI) for meeting fruit and vegetables recommendations according to barriers and facilitators at the individual, social-environmental and physical-environmental level. A total of 13,464 adults with complete data were included in the analysis (51% female; mean age 48 (0.17) years). Mean fruit intake was 2.85 (0.02) serves per day and mean vegetable intake was 1.56 (0.01) serves per day. A total of 48% of participants consumed the recommended two serves of fruit daily, while 19% consumed the recommended five serves for vegetables. Multivariate analyses determined distinct barriers and facilitators to consumption between fruit and vegetables. For example, a larger household size facilitated meeting vegetable recommendations (OR: 1.41; 95% CI: 1.22, 1.63), but not fruit, and greater alcohol consumption was a barrier to meeting fruit recommendations (OR: 1.47; 95% CI: 1.31, 1.64), but not vegetables. Common facilitators across both fruit and vegetables included higher age, lower BMI, being a non-smoker, and engaging in more vigorous activity. The results of this research will help inform future policies to increase both fruit and vegetable intake in rural communities, therefore contributing to efforts to improve the health of rural Australians.

References

1. Livingstone KM, Burton M, Brown AK, et al. (2020) *Appetite* 153, 104750.
2. Story M, Kaphingst KM, Robinson-O'Brien R, et al. (2008) *Annu. Rev. Public Health* 29, 253-272.

Keywords: fruits; vegetables; rural Australia

Ethics Declaration: Yes

Financial Support: This work is supported by a Deakin University Scholarship for Excellence (Honours) (B.T.C); a Deakin University Postgraduate Research Scholarship (L.E.M.); a CSIRO R+ top-up scholarship (L.E.M); and a National Health and Medical Research Council Emerging Leadership Investigator Grant (K.M.L., grant number APP1173803).

Eating patterns & weight management

Eating patterns & weight management

management

Abstract

Mapping the potential of meal kits to influence parental food literacy: an application of behaviour change frameworks

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Cooking at home and eating together provide opportunities to improve family nutrition and promote healthy dietary habits. Commercial meal kit subscription services (MKSSs) (e.g. HelloFreshTM, Marley SpoonTM, EveryPlateTM) may support parents to overcome obstacles to family meal provisioning and facilitate food literacy development. A gap exists in our understanding of how and why meal kits may elicit behaviour change, and opportunities to increase their behaviour change capability. This study aimed to examine the theoretical potential of Australian MKSSs to promote parental food literacy using the Behaviour Change Wheel (BCW)(1) and associated Theoretical Domains Framework (TDF)(1) and Behaviour Change Technique Taxonomy v1 (BCTTv1) (2). A one-week subscription was purchased for all Australian-based MKSSs (n=9) and key meal kit components (subscription and meal planning features, meal kit delivery and website content) were coded using the retrospective application of these behaviour change frameworks. Parental food literacy-related behaviours were informed by a Food Literacy framework (3). Identified BCTs were mapped to the TDF using the Theory and Techniques Tool to identify theoretical mechanisms of action. The key meal kit components identified mapped to eight of the nine BCW intervention functions. These components primarily served the functions of enablement and environmental restructuring to support cooking at home. Thirty-five of the 93 possible BCTs were identified across the nine MKSSs reviewed, ranging from 19 to 29 BCTs per company, and linked to 13 of the 14 TDF domains. The most frequently identified mechanisms of action (TDF) targeted changes in motivation (n=27) and capability (n=19) to influence parental food literacy. Australian-based MKSSs incorporate a wide range of BCTs that target mechanisms of action associated with food literacy-related behaviours. These findings provide a strong theoretical evidence-base for the potential of commercial MKSSs to enhance parental food literacy. However, the extent to which these services may influence behaviour change or impact family food intakes is currently unknown. Therefore further research is required to evaluate the healthfulness and effectiveness of MKSSs.

References

1. Michie S, Atkins L, West R (2014) Silverback Publishing.
2. Michie S, Richardson M, Johnston M, et al. (2013) *Ann Behav Med* 46, 81-95.
3. Vidgen HA, Gallegos D (2014) *Appetite* 76, 50-59.

Keywords: meal kits; nutrition, food literacy; behaviour change techniques

Ethics Declaration: —

Financial Support: This research received no external funding

Abstract

Impact of a Mediterranean diet on food cravings in an Australian population

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Food cravings are one of several important complexities between psychological and physiological triggers for food consumption. Cravings are commonly cited as contributing to over-consumption of hyperpalatable foods (sugary, salty, and fatty foods) and may be causal in obesity¹. The Mediterranean dietary pattern (MedDiet) is linked to reduced disease risk and improved health and wellbeing². Despite a lower intake of sugary and salty foods compared to a Western diet, free-living adults switching to the MedDiet find it satiating and achieve high adherence in Western countries. The MedDiet is known to improve mood and wellbeing, is high in fibre, monounsaturated fat and low in added sugar, and has a low glycaemic load, which could separately and synergistically reduce food cravings. The relationship between adherence to the MedDiet and food cravings has never been investigated. In the MedLey randomised controlled trial, we investigated the effects of a MedDiet on food cravings, compared with a habitual Australian diet (HabDiet)³. Adherence to the MedDiet was scored out of 15 (maximum adherence). Participants completed three food cravings questionnaires at baseline and 6-months. The State questionnaire measures momentary cravings and has a maximum score of 75, indicating maximum food cravings. The Trait-reduced questionnaire measures general cravings and has a maximum score of score of 126, indicating more frequent and intense cravings for foods. The Food Cravings Inventory (FCI) measures cravings for four food domains: fatty foods, fast foods, sugary foods, and high carbohydrate (CHO) foods. MedDiet group (n=58) responses were compared with the HabDiet group (n=53) across visits using linear mixed effects modelling. Predicted differences were obtained for adherence scores of ≤ 8 (median adherence) and ≥ 9 . Means \pm SD or CIs are presented. Mean adherence increased from 7.1 ± 1.8 to 10.7 ± 1.48 in the MedDiet group ($P < 0.01$), with no change in the HabDiet group ($P = 1.00$). Trait-reduced scores were not significantly different between groups at 6-months ($P = 0.11$), although there was a 5.57-point reduction within the MedDiet group (CI -12.56, -1.96, $P = 0.04$). State score was significantly lower in the MedDiet group than the HabDiet at 6-months (-4.4 (CI -7.53, -0.39), $P = 0.03$), and was significantly lower than at baseline (-5.9 (CI -9.33, -0.24,) $P = 0.04$). There were no differences between groups for the four domains of the FCI ($P > 0.05$). Cravings for sugary foods was significantly reduced within the MedDiet group (-0.26 (CI -0.46, -0.05) $P = 0.01$). The predictive modelling suggested moving from an adherence score of 8 to 9 was associated with lower cravings for sugar (-0.03 ± 0.01 , $P = 0.03$), fast food (-0.04 ± 0.02 , $P = 0.02$) and CHO foods (-0.05 ± 0.02 , $P = 0.02$). These results are suggestive that higher adherence to a MedDiet could reduce cravings compared to the Australian diet and suggest that the MedDiet may specifically reduce sugar cravings. Further investigation is warranted, through observational and intervention trials.

References

1. Chao A, Grilo CM, White MA, Sinha R. (2014) *Eat Behav* 15(3):478-82.
2. Guasch-Ferré M, Willett WC. (2021) *JIM* 290(3):549-566.
3. Davis C, Hodgson JM, Woodman R, et al. (2017) *AJCN* 105(6):1305-1313.

Keywords: food cravings; Mediterranean diet

Ethics Declaration: Yes

Financial Support: This work was supported by the National Health and Medical Research Council (grant #APP1050949)

Abstract

The influence of chronotype on temporal patterns of eating and diet composition in shift and non-shift workers

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When and what you eat can be linked to circadian preference (i.e., chronotype) and occupation (e.g., shift worker). Evening chronotypes, with a later circadian preference, tend to have meals later, distribute energy intake toward the end of the day⁽¹⁾, and more unhealthy eating habits than morning chronotypes⁽²⁾; whereas night shift work is associated with later mealtimes and poor diet quality as a result of circadian disruption due to their work⁽³⁾. What is unclear is whether chronotype influences the occupation-induced dietary patterns observed in shift workers. This study aimed to investigate associations between chronotype, temporal patterns of eating and diet composition in shift and non-shift workers. Adults from shift (SW) and non-shift (N-SW) populations were recruited. A Chrononutrition Questionnaire captured chronotype, duration of eating window (DEW), time of first eating occasion (FEO) and last eating occasion (LEO) while diet composition (energy, protein, total fat, saturated fat, carbohydrate, fibre, alcohol) was extracted from 7-day food diaries. Associations between chronotype and DEW/FEO/LEO, and between DEW/FEO/LEO and diet composition were determined by Spearman Rank Coefficients. 95 participants were enrolled (N-SW: n=39; SW: n=56); predominantly female (71%), morning chronotype (37%), on average 40.46 ± 15.08 years with BMI of 27.04 ± 5.77 kg/m². 84 returned food diaries. Later chronotype was positively associated with later times of FEO (N-SW: $r=.50$, SW: $r=.69$) and LEO (N-SW: $r=.63$, SW: $r=.54$) on free (non-work) days ($p \leq .002$), and longer DEW ($r=.42$) and later LEO ($r=.60$) on workdays for non-shift workers ($p < .01$). However, there were no significant differences in diet composition by day/shift type between chronotypes across the study population. On afternoon shifts, longer DEW was associated with greater energy ($r=.60$) and total fat intake ($r=.60$) and later LEO with greater alcohol intake ($r=.59$) ($p < .05$). On night shifts, a longer DEW was associated with lower alcohol intake ($r=-.45$, $p < .05$). Amongst non-shift workers, later FEO was associated with lower fibre intake on workdays ($r=-.58$, $p < .001$). Additionally, non-shift workers who were later chronotypes had later LEO, which on workdays associated with lower fibre ($r=-.45$) and alcohol intake ($r=-.43$); and on work-free days, associated with lower alcohol intake ($r=-.45$) ($p < .05$). Not surprisingly, evening chronotypes across the study population had longer and/or later eating windows on work-free days (i.e., free of constraints), as did non-shift workers on workdays, while the influence of chronotype on DEW, FEO, and LEO across shifts were less clear. Hence, for shift workers, occupation appeared to be a greater driver of temporal eating patterns than chronotype. Additionally, later eating times of evening chronotypes was not associated with negative diet composition. The exception was lower fibre intake amongst non-shift workers; but regardless of chronotype, shift workers may benefit from having a shorter and earlier DEW on afternoon shifts to minimise energy, fat, and alcohol intake.

References

1. Phoi YY, Rogers M, Bonham M, et al. (2022) *Nutr Res Rev* 35 (1), 112-135.
2. Teixeira GP, Guimaraes KC, Soares AGNS, et al. (2023) *Nutr Res Rev* 81 (1), 75-90.
3. Hemmer A, Mareschal J, Dibner C, et al. (2021) *Nutrients* 13, 4178.

Keywords: Chrononutrition; temporal eating patterns; chronotype; diet composition

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

The nutritional adequacy of popular weight loss diets - do they meet the requirements for dairy foods and calcium?

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Weight loss or fad diets are often promoted for rapid weight loss and by unqualified individuals and celebrities. There is sometimes limited information around the nutritional adequacy of the diet. Some diets require fasting, some modify macronutrient composition, and some restrict food groups, such as dairy foods, resulting in suboptimal intake of nutrients like calcium, potentially leading to nutrient deficiencies and disease such as osteoporosis if followed long-term. We assessed the total dairy food and calcium content of five popular weight loss diets (Intermittent Fasting, Ketogenic, Optifast, Paleolithic, 8 Weeks to Wow; 8WW), and two government recommended healthy eating principles (Australian Guide to Healthy Eating; AGHE, and Mediterranean diet; MedDiet, for weight loss). Meal plans from each diet were analysed using Foodworks Dietary Software and compared with government recommendations and dietary reference values (DRV) in Australia, the United States and Ireland to give the percentage of the recommended intake of dairy food and calcium, met by each diet (1). Intermittent Fasting, Ketogenic and AGHE provided the most serves of dairy foods with 2.8, 2.3 and 2.2 serves/d, respectively, whilst 8WW, MedDiet, and Optifast provided 1.4, 1.3 and 1 serve/d each, respectively, and Paleolithic 0.02 serves/d. None of the dietary patterns met all government recommendations for dairy serves. Milk was the most common source of dairy food in all dietary patterns except for Ketogenic (cheese), MedDiet (yoghurt) and Paleolithic. The Ketogenic diet provided the highest calcium content (1293mg/d), followed by Intermittent Fasting (1230mg/d) and Optifast (1212mg/d). Non-dairy sources contributed to 93% of the calcium content (385mg/d) of the Paleolithic diet, 70% for Optifast and 61% in the MedDiet (631mg/d). None of the dietary patterns met all dietary reference values for calcium. There are no universal dietary recommendations for dairy foods or calcium, making cross country comparisons of dietary recommendations difficult. Only the Intermittent Fasting diet met the dietary recommendations in Australia for dairy serves for males 19-70 and females 19-50 years. None of the other diets met any recommendation for Australia, the US and Ireland. Most dietary patterns met the estimated average requirement for age and gender, for calcium for Australia, the US and Ireland, apart from the Paleolithic diet which eliminates dairy foods and the MedDiet which is naturally low in dairy foods. These data indicate that several popular weight-loss diets do not meet dietary recommendations for dairy foods or calcium. Therefore, when considering a weight loss diet or dietary pattern, it is crucial to consider the nutritional adequacy, to ensure macro and micronutrient requirements are met for health and avoidance of nutritional deficiencies, particularly if followed long-term.

References

1. Bracci EL, Keogh JB, Milte R & Murphy KJ (2022) *Br J Nutr* 128, 1357-70.

Keywords: dietary patterns; dairy; calcium; weight-loss

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Risk of low energy availability and level of nutrition knowledge in recreational trail runners in Aotearoa/New Zealand

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Trail running is an endurance sport growing in popularity. It is characterised by long event durations and extreme environments that are likely to result in high exercise energy expenditure. Energy availability is defined as the amount of energy available to support normal physiological functions after subtracting the energy cost of exercise from energy intake. Insufficient energy intake, increased exercise, or a combination of both can result in a state of low energy availability (LEA). While research shows a weak positive association between nutrition knowledge and diet quality, results are conflicting regarding associations between nutrition knowledge and LEA. Research has demonstrated a high prevalence of risk of LEA (~33%-85%) among both elite and recreational athletes, across both sexes and in endurance sports such as running. However, little is known about risk of LEA and nutrition knowledge in trail runners. The aim of this study was to determine the risk of LEA prevalence in recreational trail runners and investigate associations with nutrition knowledge. Risk of LEA was assessed using the 'Low Energy Availability in Females Questionnaire' (LEAF-Q), (1) and the 'Low Energy Availability in Males Questionnaire' (LEAM-Q). (2) Nutrition knowledge was measured via the 'Platform for Evaluating Athlete Knowledge in Sports – Nutrition Questionnaire' (PEAKS-NQ). (3) Demographics and trail-running experience questions were integrated into the survey. Data was analysed in SPSS version 29 (IBM Corporation). Comparisons between groups (e.g. 'low risk' vs 'not low risk') were performed using a chi-square test for categorical variables, and an independent samples t-test for continuous variables. The final survey sample was 217 (140 females, 42.01 ± 10.72 years; 77 males, 47.86 ± 12.05 years) for the LEAF-Q, LEAM-Q, and trail running questions; and 152 for the PEAKS-NQ. Thirty-one percent of females (n=43) were classified as 'not low risk' of LEA based on the LEAF-Q cut-off of ≥8. Twenty-three percent of males (n=18) were identified as having low sex drive, a marker of LEA risk. The LEAF-Q/sex drive score was higher in those 'not at low risk' (10.72 ± 2.28 / 4.50 ± 1.95) compared to those at low risk (3.94 ± 2.34 / 1.53 ± 1.12, p<0.001). Three quarters of general nutrition knowledge responses were correct (females, 78.60 ± 10.09%; males, 75.78 ± 10.67%). However, sports nutrition scores were lower (females, 66.31 ± 13.44%; males, 63.18 ± 15.53%) with the lowest mean scores observed for 'fuel for during events'. There was no significant association between nutrition knowledge and risk of LEA in both sexes. The findings suggest that recreational trail runners are a group of active individuals who are at risk of LEA and that they might benefit from more sports-specific nutrition education.

References

1. Melin A, Tornberg ÅB, Skouby S, et al. (2014) *BJSM* 48, 540-545.
2. Lundy B, Burke LM, Torstveit MK, et al. (2022) *Nutrients* 14, 1-19.
3. Tam R, Beck KL, Newton Scanlan J, et al. (2021) *Br. J. Nutr.* 126, 561–571.

Keywords: energy availability; RED-S; nutrition knowledge; trail runners

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Dietary intake of adolescent rowers - analysis of energy intake

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Adequate energy intake (EI) is essential for adolescent athletes to support health, performance, and growth⁽¹⁾. Rowing is a physically demanding sport where intense training begins in adolescence. Research is needed to assess whether current EI is sufficient to support healthy physiological functions and training in adolescent rowers. The aim of this study was to evaluate the energy status (energy availability (EA) or energy balance (EB)) including EI and exercise energy expenditure (EEE) of adolescent rowers in New Zealand. A total of 35 rowers (23 females, 16.8yrs \pm 1.9yrs; 12 males, 17.3yrs \pm 1.6yrs) who had been rowing for at least one season participated. A bioimpedance analyser measured body composition in 11 participants (8 females, weight 63.0 \pm 7.0kg, fat free mass (FFM) 50.8 \pm 6.5kg; 3 males, weight 78.5 \pm 15.9kg, FFM 70.7 \pm 12.2kg) enabling calculation of EA. Due to COVID-19 restrictions, the remaining 24 participants (15 females, 9 males) provided estimated body weight (74.7 \pm 9.2kg) and EB was then used to evaluate energy status. All participants completed four days of food and training diaries, two 'recovery' and two 'hard' training days. EI was determined in FoodWorks10 software using the New Zealand Food Composition Database. For training, metabolic equivalent of tasks (MET)⁽²⁾ were assigned using bodyweight, heart rate, and rating of perceived effort to estimate EEE. Paired sample t-tests or Wilcoxon Signed Rank test (non-parametric data) was used to determine differences between EI, EEE, EA, and EB on the high and low training days for each gender. Significance was set at $p < 0.05$. The average EI for females on hard and recovery days was 10837 \pm 3304kJ and 10461 \pm 2882kJ respectively, and for males was 15293 \pm 3971kJ and 13319 \pm 4943kJ, respectively. No significant differences were found between EI on hard vs. recovery days in both genders. Significant differences between average EEE on hard vs. recovery days were found in both genders (females, hard day 4609 \pm 2446kJ, recovery day 3146 \pm 1905kJ, $p < 0.001$; males, hard day 6589 \pm 1575kJ, recovery day 3326 \pm 2890kJ, $p = 0.001$). EA on hard and recovery training days was classified as suboptimal at 142 \pm 80kJ/FFMkg/day and 167 \pm 79kJ/FFMkg/day respectively with no significant difference in EA between hard and recovery days ($p = 0.092$). Average EB on hard training days was -484 \pm 4267kJ and on recovery training days was 572 \pm 3265kJ, with no significant difference between training days ($p = 0.177$). Both genders showed no significant difference in EB between hard and recovery training days (females $p = 0.221$, males $p = 0.978$). The results suggest that adolescent rowers do not adjust their nutritional intake to match EEE. This may increase the risk of adolescent rowers presenting with suboptimal EB or EA, with females being at a greater risk than males.

References

1. Desbrow B, McCormack J, Burke L, et al. (2014). *Int J Sport Nutr Exerc Metab* 24, 570–584.
2. Jetté M, Sidney K & Blümchen, G (1990). *Clin Cardiol*, 13(8), 555–565.

Keywords: energy availability; adolescent athletes; low energy availability; periodised nutrition

Ethics Declaration: Yes

Financial Support: This work was supported by the Massey University Research Fund, College of Health, grant number NA.

Abstract

Macronutrient intakes of adolescent rowers for growth, development and sports performance

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Dietary intake plays a key role in athletic performance in rowing ⁽¹⁾. Suboptimal nutrition within the adolescent rowing population may negatively affect performance, normal growth and development, professional athlete development, and career longevity. Previous research has indicated that suboptimal carbohydrate intakes are a common issue in rowing ⁽²⁾. The quality of nutritional intake in adolescent rowers has seldom been explored. During moderate training, adolescent athletes should aim for 5-7g.kg⁻¹ of carbohydrates, 1.3-1.8g.kg⁻¹ of protein, and 20-35% energy from fat ⁽³⁾. This study aimed to examine the dietary intake of adolescent rowers in New Zealand and compare it with nutritional guidelines for normal growth, development, and sports performance. A cross-sectional study design involved data collection on two 'hard' training days, and two 'recovery' days from rowers (14-21 years) recruited from clubs and secondary schools around New Zealand. Participants completed four 24-hour collection periods, recording food intake, training duration and intensity. The food records were verified for accuracy, and dietary data was entered into Foodworks software for nutritional analysis. IBM SPSS software was used to calculate mean intakes for carbohydrate, protein, fat, and standard deviations. Independent t-tests were used to compare carbohydrate and protein intakes between males and females. Of the initial 40 participants, 35 fully (n=23 females, 16.8 ± 1.9 years and n=12 males, 17.3 ± 1.6 years) completed the study. Participants consumed 319 ± 116g (4.5 ± 1.7g.kg⁻¹/day) of carbohydrates, 121 ± 56 g (1.7 ± 0.7 g.kg⁻¹/day) of protein and 113 ± 46 g (1.6 ± 0.6g.kg⁻¹/day) of fat per day. Females consumed 290 ± 80g (4.4 ± 1.3g.kg⁻¹/day) of carbohydrates and males consumed 400 ± 78 g (5.0 ± 1.4g.kg⁻¹/day) per day, with no significant difference between males and females intake per kilogram of bodyweight per day (p=0.165). Minimum carbohydrate levels of 5g.kg⁻¹ per day were only achieved by 7 females (30.4%) and 4 (33.3%) males. Females consumed significantly less protein per day, 106 ± 38g (1.6 ± 0.6 g.kg⁻¹/day), in comparison to males who consumed 164 ± 46 grams (2.0 ± 0.5 g.kg⁻¹/day) per day (p=0.04). Fourteen females (60.9%) and 10 males (83.3%) consumed more than the minimum requirement of 1.3g.kg⁻¹ of protein per day. The findings suggest that 2 out of 3 adolescent rowers in New Zealand fail to reach the minimum recommendations for carbohydrate intake ⁽³⁾, and males more readily meet the recommended intakes of protein when compared to females. Nutrition education for adolescent rowers in New Zealand should emphasise adequate carbohydrate and protein intakes that meet sports nutrition guidelines in order to support normal growth, development and optimised performance for these athletes.

References

1. Cornford E, Metcalfe R (2019) Eur J Sport Sci 19, 33-40.
2. Baranauskas M, Tubelis L, Stukas R, et al. (2014) Balt J Sport Health Sci 92, 16-25.
3. Desbrow B, McCormack J, Hislop M, et al. (2014) Int J Sport Nutr Exerc Metab 24, 570-84.

Keywords: adolescent athletes; sports nutrition guidelines; carbohydrate; protein

Ethics Declaration: Yes

Financial Support: This work was supported by the Massey University Research Fund, College of Health, grant number NA.

Food, bioactives & mechanisms

Food, bioactives & mechanisms

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Abstract

Changes in liver health biomarkers following consumption of energy restricted diets containing almonds compared with carbohydrate-rich snack foods for 9 months

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Energy restricted diets improve liver function ⁽¹⁾ and habitual nut consumption has been associated with a lower prevalence of fatty liver ⁽²⁾. This study examined the effect of incorporating almonds in an energy restricted diet on liver health biomarkers. One Hundred and forty adults (42M:98F, 47.5 ± 10.8 years, BMI 30.7 ± 2.3 kg/m²) enrolled in a 9-month (9M) dietary intervention comprising 3 months (3M) weight loss (30% energy restriction) followed by 6 months (6M) of weight maintenance. Participants were randomly assigned to consume almonds (n=68, AED) or isocaloric carbohydrate-rich snacks (n= 72, CRD) which provided 15% of total daily energy. At baseline (BL), 3M and 9M, fatty liver index (FLI) scores (0-100) ⁽³⁾ were calculated using body mass index (BMI), waist circumference (WC), fasting serum gamma-glutamyl transferase (GGT) and triglyceride (TAG) levels, and other liver health biomarkers were assessed by ultrasound (volume, visual appearance and elastography (a marker of stiffness due to fibrosis)). Intention to treat analyses were conducted using mixed effects modelling (fixed effects group and time, with participants as the random effect). Significant reductions from BL occurred over time (all p<0.001 for 3M and 9M) with no difference between groups (AED vs CRD, P>0.05) in BMI (3M: -2.44 ± 0.20 vs -2.32 ± 0.20, 9M: -2.83 ± 0.19 vs -2.81 ± 0.19 kg/m²), WC (3M: -8.04 ± 0.79 vs -7.00 ± 0.81, 9M: -8.72 ± 0.83 vs -9.14 ± 0.81 cm), TAG (3M: -0.24 ± 0.08 vs -0.22 ± 0.09, 9M: -0.37 ± 0.09 vs -0.21 ± 0.09 mmol/L), FLI score (3M: -23.8 ± 2.0 vs -17.6 ± 2.1, 9M: -23.8 ± 2.0 vs -17.6 ± 2.1), and liver volume (3M: -134.56 ± 38.30 vs -100.96 ± 37.25, 9M: -113.68 ± 37.42 vs -110.64 ± 35.47cm³). Significantly greater reductions occurred for AED compared to CRD at 3M and 9M in GGT (p=0.003) (3M: -9.68 ± 1.93 vs -0.01 ± 2.00, 9M: -7.75 ± 2.06 vs -2.78 ± 2.15 IU/L) and liver visual assessment scores (p=0.03) (3M: -0.58 ± 0.24 vs -0.45 ± 0.23, 9M: -1.33 ± 0.23 vs -0.50 ± 0.22). There were no significant changes in liver elastography over time or between groups. Energy restriction improved body composition and reduced the extent of fatty liver and liver size but did not change liver stiffness. The inclusion of almonds in an energy restricted diet demonstrated additional benefits to some liver health biomarkers providing support for almonds being incorporated into lifestyle interventions to improve liver function.

References

1. Koutoukidis DA, Astbury NM, Tudor KE, et al. (2019). JAMA Intern Med 179(9), 1262-1271.
2. Cardoso BR, Tan S-Y, Daly RM, et al. (2021). J Nutr 151(11), 3507-3515.
3. Bedogni G, Bellentani S, Miglioli L, et al. (2006). BMC Gastroenterol, 6(1):33.

Keywords: weight loss; liver health; obesity; dietary interventions

Ethics Declaration: Yes

Financial Support: This work was funded by the Almond Board of California. This funding source had no role in the design of this study or the analysis and interpretation of the data.

Abstract

Anthocyanins attenuate vascular and inflammatory responses to a high fat high energy meal challenge in overweight older adults: A cross-over, randomised, double-blind clinical trial

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Postprandial metabolic imbalances are important indicators of later developing cardiovascular disease (CVD)¹. This study investigated the effects of food anthocyanins on vascular and microvascular function, and CVD associated biomarkers following a high fat high energy (HFHE) meal challenge in overweight older adults. Sixteen subjects (13 female, 3 male, mean age 65.9 SD 6.0 and body mass index 30.6 kg/m² SD 3.9) participated in a crossover, randomised, controlled, double-blind clinical trial (Australian New Zealand Clinical Trials Registry # ACTRN12620000437965). Participants consumed a HFHE breakfast meal (65g total fat; 33g saturated fat) together with a 250 mL dose of either intervention (Queen Garnet Plum providing 201 mg anthocyanins) or control (apricot) juice. A wash-out period of 14 days occurred between meal challenges, with a 4-day run-in period for juice consumption before each challenge. Blood samples and blood pressure measures were collected at baseline, 2 h and 4 h following the HFHE meal. Vascular function, assessed using flow mediated dilatation (FMD), and microvascular cutaneous vascular reactivity, measured using Laser Speckle Contrast Imaging (LSCI), were evaluated at baseline and 2 h after the HFHE meal. Participants had a higher 2 h postprandial FMD (+1.14%) and a higher microvascular post-occlusive reactive hyperaemia (+0.10 perfusion units per mmHg) when allocated to the anthocyanin compared to the control arm ($P = 0.019$ and $P = 0.049$, respectively). C-reactive protein was lower 4 h postprandially in the anthocyanins (1.80 mg/L, IQR 0.90) vs control arm (2.30 mg/L, IQR 1.95) ($P = 0.026$), accompanied by a trend for lower concentrations of interleukin-6 ($P = 0.075$). No significant postprandial differences were observed between treatments for blood pressure, triacylglycerol, total cholesterol, serum derivatives of reactive oxidative metabolites, tumor necrosis factor α , interleukin-1 β , or maximum microvascular perfusion following iontophoresis of acetylcholine. Fruit-based anthocyanins attenuated the potential postprandial detrimental effects of a HFHE challenge on parameters of vascular and microvascular function, and inflammatory biomarkers in overweight older adults. Anthocyanins may reduce cardiovascular risk associated with endothelial dysfunction and inflammatory responses to a typical high fat 'Western' meal.

References

1. Botham KM, Wheeler-Jones CPD (2013) Prog Lipid Res 52(4):446e64.

Keywords: anthocyanins; postprandial; meal challenge; vascular function

Ethics Declaration: Yes

Financial Support: This work was supported by a Collaborative Health and Medical Small Grant, Faculty of Science, Medicine and Health, University of Wollongong

Abstract

Phytochemicals from Monty's Surprise apple are absorbed in humans, increase plasma antioxidant response, and inhibit lung and breast cancer proliferation *in vitro*

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Apples consumption is associated with improved health and reduced risk of cancer which is attributed to its phytochemical content [1]. Evidence suggests that apple phytochemicals affect different Hallmarks of cancer and reduce oxidative stress, which is involved in the pathology of cancer [2]. The limiting factor to obtain these effects in the human body is apple phytochemicals' low bioavailability. Our study is focused on a heritage apple cultivar discovered in New Zealand - Monty's Surprise. Based on our previous liquid chromatography–mass spectrometry (LC-MS) analysis this apple contains high phytochemical (mainly flavonoids) concentrations when compared to some other commercial apple cultivars available in New Zealand. This study aims to evaluate the bioavailability of Monty's Surprise apple phytochemicals in humans and Monty's Surprise phytochemicals' effects on blood total antioxidant capacity and lung, and breast cancer cell proliferation. Twelve healthy participants received either apple puree or a placebo as a control in a randomised crossover human study. Blood samples were collected after overnight fasting and at regular intervals up to eight hours post-meal consumption. The main phytochemical metabolites in the participant's plasma were evaluated by LC-MS-MS. Plasma total antioxidant capacity was evaluated by Ferric Reducing Antioxidant Power. Based on the results from the metabolomics analysis we then created a synthetic mixture of the Monty's Surprise apple phytochemical metabolites and evaluated their effects on cell proliferation using SYBR green assay *in vitro*. We were able to detect twenty-seven different phytochemical metabolites in the participant's plasma after consumption of Monty's Surprise apple puree. The main metabolites detected were metabolites of phenolic acids, and phase II metabolites, but also phloretin metabolites. Moreover, Monty's Surprise apple puree consumption significantly increased ($p < 0.001$) plasma total antioxidant capacity 30 minutes post-meal intake (from the baseline to $170.76 \mu\text{mol/L} \pm 34.58$), when compared to the placebo consumption. In addition, Monty's Surprise apple phytochemical metabolites inhibited lung and breast cancer cell proliferation at different concentrations. Results from this study demonstrated that Monty's Surprise apple phenolic compounds are absorbed and enter the systemic circulation after apple puree ingestion and their absorption improves plasma antioxidant status. Moreover, Monty's Surprise apple blood metabolites inhibit lung and breast cancer cell growth *in vitro*. These findings suggest that incorporating Monty's Surprise apple into the diet may improve human health and prevent cancer development.

References

1. Fabiani R, Minelli L, Rosignoli P (2016) Public Health Nutr 19, 2603-2617.
2. Nezbedova L, et al. (2021) Nutrients 13, 4025.

Keywords: apple; phytochemicals; bioavailability; cancer

Ethics Declaration: Yes

Financial Support: This research was funded by Heritage Food Crops Research Trust. Doctoral scholarship was funded by Massey University.

Abstract

Australian native grain reduces blood glucose response and Glycemic Index

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Australian Aboriginal and Torres Strait Islander peoples are disproportionately affected by diet-related disease such as type 2 diabetes, the rate of which is 20 fold higher than that of non-Indigenous young Australians¹. Before colonisation, Gomeri and other First Nations people harvested, threshed and ground native grass seeds with water into a paste before cooking². The introduction of white refined flour has meant that time-consuming grass seed processing has mainly ceased, and native grains are no longer eaten habitually. The aim of this study was to determine the effect of 10% incorporation of two native grain flours on postprandial blood glucose response and Glycemic Index (GI). Five male and five female subjects, with a mean age of 30 ± 0.9 and BMI of 21.6 ± 0.4 and normoglycemic, participated in GI testing of three flour + water pancake compositions matched for available carbohydrate: 100% wheat (Wheat) and 90% wheat:10% native grains (Native_a and Native_b). Effect on satiety was determined using subjective ratings of hunger/fullness over the time course of the GI testing. In comparison to the plain flour pancake, replacing 10% plain wheat flour with Native_b flour significantly reduced the GI by 28.8% from 73 ± 5 to 48 ± 5 , having a profound effect on postprandial blood glucose levels in 9 of 10 subjects ($p < 0.05$, paired t-test). The GI of 10% Native_a flour pancake was not different from 100% wheat flour pancake (75 ± 5). Satiety tended to be greater when native grains were incorporated but this study was not powered to detect effect on satiety. In conclusion, replacing only 10% of plain wheat flour with Native_b flour was sufficient to significantly reduce the blood glycemic response to the pancake. This replacement could be easily implemented for prevention and treatment of type 2 diabetes. For Aboriginal people with access to grain Country, the nutritional health benefits associated with eating native grains, as well as the cultural benefits of caring for Country, will have a direct transformational impact on local communities. Our vision is to revitalise Gomeri grains and to guide a sustainable Indigenous-led industry to heal Country and people through co-designed research.

References

1. Haynes A, Kalic R, Cooper M, et al. (2016) MJA 204: 303–303.
2. Pattison A, McGee K, Birch J, et al. (2023) JEthnobiol accepted

Keywords: native grains; type 2 diabetes; Glycemic Index; satiety

Ethics Declaration: Yes

Financial Support: This work was supported by a philanthropic gift from Jackie Vidor.

Abstract

Evaluating the effect of replacing wheat flour with legume flour on ileal amino acid digestibility in healthy adults with an ileostomy

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Protein-rich animal foods are highly digestible, high-quality sources of protein, whereas the protein quality of plant-based foods can vary considerably. Given the growing interest in alternative non-animal-based sources of protein, it is important to establish the protein digestibility of these new foods and protein concentrates which have important health implications especially for vulnerable groups who don't consume sufficient dietary protein. The human ileostomy model is ideal for measuring protein digestibility as it enables protein digestion to be quantified independent of protein degradation in the large intestine. The aim of this study was to determine the protein digestibility and quality of a wheat-based food containing legume flours. This randomised, double-blinded, controlled cross-over intervention was conducted in 4 proctocolectomised adults with conventional and well-functioning permanent ileostomies. The study was conducted over 2 weeks and on each testing day, the participant consumed 2 test muffins (125 g each) or 2 protein-free cookies in the morning (breakfast and morning tea) followed by a standardised low-protein lunch and afternoon tea. Test muffins were made using a standard muffin recipe using wheat flour and for 2 of the test muffins 50% of the flour was substituted with soy or lupin flour. An indigestible marker, titanium dioxide was added to the muffins so that the completeness of muffin recovered in ileal digesta could be calculated. The digestible indispensable amino acid score (DIAAS) was determined by comparing concentrations of true ileal digestible indispensable amino acids to recommended amino acid requirements (1). Data was reported as mean \pm SD and repeated measures ANOVA was used to compare means between treatment groups with significance reported at $P < 0.05$. Substituting 50% of wheat flour in muffins with soy or lupin flour doubled the protein content of muffins (soy 11.8 g/100g and lupin 10.6 g/100g) compared to muffins that only contained wheat flour (wheat 5.1 g/100g). However, substituting wheat with legume flour did not affect protein digestibility which was similar for all muffin types; wheat ($76.8 \pm 7.0\%$), soy ($77.9 \pm 7.4\%$) and lupin ($81.6 \pm 6.9\%$) ($P=0.181$). The DIAAS values for all muffins were below 75% which is classified as the cut off for a good quality protein food. In conclusion, substitution of wheat-based muffins with soy and lupin flour increased the protein content of wheat-based muffins but protein digestibility and overall protein quality was similar.

References

1. Food and Agriculture Organization of the United Nations (FAO). Dietary Protein Quality Evaluation in Human Nutrition. Report of an FAO Expert Consultation. Rome: FAO; 2013.

Keywords: legume; protein; amino acid; digestibility

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Resistant starch content of selected Australian foods

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A growing body of research has identified interactions between microorganisms and nutrients within the gut, collectively referred to as the 'gut microbiome' (1). Alongside this, distinct structural characteristics/components of dietary fibre have been recognised to exhibit various physiological effects on the body (1). These inherent physiological properties have the potential to result in diverse health benefits through the consumption of resistant starch, a specific form of dietary fibre (2). It is important to note that the laboratory-based techniques employed to assess resistant starch content from current Australian dietary composition data are antiquated and have not been conducted using updated testing methods (3). Results from updated testing methods may contribute to and inform nutritional recommendations to support and improve health outcomes. To assess the resistant starch content of starch-containing Australian foods using the updated Association of Analytical Chemists (AOAC) 2002.02 testing methods approved by Food Standards Australia New Zealand (3). Standardised kits (K-RSTAR) and control flours were used for assaying. Forty commonly consumed and available Australian foods were tested in duplicate for their resistant starch content. Calculated resistant starch values (in grams) were recorded using calculation tools provided by Megazyme. Means, standard deviations, and coefficient of variations between duplicate samples were recorded in a Microsoft Excel spreadsheet. The resistant starch content of foods varied from 0-13.72g/100g for rice crackers, beetroot, and hi-maize pancakes, respectively. Foods with the highest resistant starch were hi-maize flour pancakes, red kidney beans, Lebanese bread, and Cornflakes cereal, which ranged from 2.30-13.72g/100g. The lowest resistant starch foods included beetroot, rice crackers, All Bran cereal, and Nutri-grain cereal, ranging from 0-0.04g/100g. Changes in the foods' natural chemical, physical, and enzymatic qualities may have led to slight batch variations and deviations from the literature available. This study is the first known Australian study to investigate the resistant starch content of selected Australian foods using the AOAC 2002.02 assay method. This data can be used to assess resistant starch consumption in the Australian population, inform gut microbiome research, and guide clinical practice recommendations for fibre intake.

References

1. Gagnon E, Mitchell PL, Manikpurage HD, et al. (2023). J Trans Research. 2023;21(1):60.
2. Roberfroid M, Gibson GR, Hoyles L, et al. (2010) B J Nutr. 2010;104(S2):S1-S63.
3. FSANZ, n.d. (2017) Supporting document 1 Application A1142. Canberra, Australia: FSANZ; 2017.

Keywords: resistant starch; gut microbiome; nutrition; fibre

Ethics Declaration: Yes

Financial Support: Microba Life Science

Abstract

SunGold Kiwifruit and Psychological Health (GoKiPH): a randomised, crossover trial

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Gold kiwifruit consumption and increased vitamin C intake have been associated with improved mood, vitality, and wellbeing in healthy individuals^(1,2). However, to date, no studies have focussed exclusively on the efficacy of gold kiwifruit for improving such outcomes in participants with disturbed mood. A randomised crossover trial was undertaken to examine the efficacy of Zespri™ SunGold™ kiwifruit for improving psychological wellbeing and vitamin C concentrations in adults with sub-clinical levels of mood disturbance. In a two-period, non-blinded crossover trial, N=26 adults aged 21 to 60 years ($M = 36.1$, $SD = 11.0$) with mild to moderate mood disturbance were randomised to a counter-balanced sequence. Participants consumed 2x SunGold kiwifruit daily or their typical diet for four weeks, with a two-week washout between periods. The primary outcome was change in mood disturbance, with secondary outcomes including plasma vitamin C, wellbeing, vitality and gut health. Results indicated a significant time x treatment interaction effect for mood disturbance ($F(2,107.3)=6.19$, $p=.003$) with significant improvements in mood disturbance scores between baseline and post-intervention during the SunGold kiwifruit period. A significant time x treatment interaction effect for blood plasma vitamin C ($F(2,98.5)=3.65$, $p=.029$) also demonstrated increased vitamin C concentrations during the SunGold kiwifruit period. A significant time x treatment interaction effect for wellbeing ($F(2,104.7)=4.5$, $p=.013$) was evident with wellbeing significantly improved between baseline and post-intervention during the SunGold kiwifruit period. The time x treatment interaction for vitality approached significance ($F(2,104.7)=2.89$, $p=.06$) with increases in vitality following SunGold kiwifruit consumption. These results provide preliminary evidence that SunGold kiwifruit consumption improves psychological wellbeing in mood-disturbed adults, which corresponds to increased plasma vitamin C concentrations. Future research is required to replicate this effect and to further demonstrate the potential benefit of whole-food interventions for treating mood-disturbance.

References

1. Carr AC, Bozonet SM, Pullar JM & Vissers C (2013) J Nutr Sci 2, e24.
2. Conner TS, Fletcher BD, Pullar JM, Spencer E, et al. (2020) Nutrients 12, 9, 2898-2917.

Keywords: kiwifruit; mood; psychological wellbeing; vitamin C status

Ethics Declaration: Yes

Financial Support: This research was co-funded by the University of Adelaide; Commonwealth Scientific and Industrial Research Organisation (CSIRO); and Zespri International Ltd.

Abstract

The balance of evidence on 100% juice & health: A systematic umbrella review of meta-analyses

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Fruit and vegetable intakes are major modifiable determinants of risk for non-communicable disease⁽¹⁾, yet intake levels remain low⁽²⁾ and multiple barriers (cost, access, perishability, preparation skills) exist^(3,4). 100% fruit and vegetable juices contain key micronutrients and bioactive compounds⁽⁵⁻⁷⁾ and may help circumvent these barriers to consumption^(6,7). However, their role in dietary guidelines and models of healthy eating remains controversial due to their free sugars and reduced dietary fibre content, relative to whole fruits and vegetables^(6,7). Therefore, we conducted a systematic umbrella review of systematic literature reviews (SLRs) with meta-analyses assessing the relationships between 100% juice consumption and human health outcomes. Four databases (Medline, Cochrane Library, EMBASE, and CINAHL) were systematically searched for SLRs with meta-analyses of human prospective cohort, case-control, and intervention studies examining the relationship between 100% juice and any health outcome through to 20th October 2022. Screening (Covidence), quality (GRADE)⁽⁸⁾, risk of bias (ROBIS)⁽⁹⁾ and content overlap (corrected covered area⁽¹⁰⁾) tools were applied, and extracted data were narratively synthesised. The protocol was pre-registered (PROSPERO) and conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklists. 15 SLRs on 100% fruit juice including 51 primary meta-analyses, 6 dose-response analyses, and 87 sub-analyses were eligible for inclusion. No eligible studies on vegetable juice were found. Included studies represented data from almost 2 million subjects with a range of doses (50-1200mL/day) and timeframes (hours to years). Significant improvements in health outcomes were found in 19.6% of included meta-analyses (blood pressure, flow-mediated dilation, IL-6, c-reactive protein, and stroke mortality), and increased disease risks were found in 5.9% of included meta-analyses (CVD mortality, prostate cancer, and type II diabetes). The remainder (74.5%) found no significant difference (blood lipids, weight, liver function, metabolic markers, colorectal and breast cancers, and multiple inflammatory markers). The ROBIS quality assessment rated nine SLRs as low risk of bias, three as unclear and three as high. Using GRADE, confidence in the body of evidence ranged from very low (27 primary and 79 secondary meta-analyses) to low (19 primary and 13 secondary meta-analyses), and medium (4 primary and one secondary meta-analyses.) Findings show 100% juice consumption has limited risks of harm and some potential benefits, over a broad range of doses, including some that are relatively high, and time periods. The positive associations between 100% juice consumption and specific health outcomes relevant to population health may be explained by multiple mechanisms, including the vitamin, mineral, and bioactive contents. The balance of evidence suggests that 100% may have a neutral or beneficial place in general, population-level dietary guidelines.

References

1. Lancet (2020). [https://doi.org/10.1016/s0140-6736\(20\)30752-2](https://doi.org/10.1016/s0140-6736(20)30752-2)
2. Micha BMJOpen (2015). <https://doi.org/10.1136/bmjopen-2015-008705>
3. Wellard-Cole NutrDiet (2022). <https://doi.org/10.1111/1747-0080.12735>
4. Wolfson PrevMedRep (2019). <https://doi.org/10.1016/j.pmedr.2019.01.023>
5. Benton NutrRev (2019) <https://doi.org/10.1093/nutrit/nuz031>
6. Clemens AdvNutr (2015). <https://doi.org/10.3945/an.114.007328>
7. Guyatt JClin Epidemiol (2013). <https://doi.org/10.1016/j.jclinepi.2012.01.006>
8. Whiting JClin Epidemiol (2016). <https://doi.org/10.1016/j.jclinepi.2015.06.005>
9. Pieper JClin Epidemiol (2014). <https://doi.org/10.1016/j.jclinepi.2013.11.007>

Keywords: Juice; dietary guidelines; chronic disease; nutritional epidemiology

Ethics Declaration: Yes

Financial Support: This study received funding from Ausveg and Hort Innovation, research grant CT21004.

Abstract

Relative bioavailability of lutein and zeaxanthin in the presence of Omega-3- supplements and oxidative stress levels in humans

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Lutein and zeaxanthin (LZ) are the major constituents of macular pigment (MP), helping to protect the human retina from blue light and oxidative damage ⁽¹⁾. Many studies have suggested that higher concentrations of retina LZ may reduce the risk of age-related macular degeneration (AMD) and improve retinal health ⁽¹⁻³⁾. MP and serum L have shown positive linear response with L dose ⁽⁴⁾ but the combined effect (LZ + omega-3 suppl) has not been fully explored in healthy Australian adults. Understanding their bioavailability in relation to the effect of omega-3 fatty acid intakes along with LZ supplements could provide a useful indication of the potential to reduce the risk of AMD, preserve vision, and improve retinal health. LZ uptake and the associated oxidative stress levels were evaluated in two groups fed with commercially sourced supplements. The control group was given only LZ, while the intervention group was given LZ combined with omega-3 supplements containing Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA). 10 men and 6 women with an average age of 31.4 ± 1.3 yrs participated in this randomised, non-blinded controlled study for a total of 19-d. The control group (9) consumed the LZ supplement (12mg/d) only, while the intervention group (7) consumed the LZ supplement along with 900mg/d of an omega-3 supplement (540mg EPA + DHA 360mg). Each group adhered to a comprehensive low-carotenoid and omega-3 diet list for the 12-d intervention period and the 7-d washout period. Participants reported daily foods consumed in their diet logbooks, and Automated Self-Administered 24 diet assessment log over the study period. The body composition of each subject from the two groups was assessed before and after the study using a SECA body composition analyser and blood samples (2-time point) collected over a 12-d test period. Mean \pm SEM for serum LZ ranged from $2.23 \pm 0.24 - 2.98 \pm 0.24 \mu\text{g/ml}$ for the control group and $1.10 \pm 0.21 - 3.02 \pm 0.73 \mu\text{g/ml}$ for the intervention group. Percentage change in serum LZ concentration from (T₀-T_{312h}) and (T_{312h}-T_{456h}) were 26% and 34% (control) and 139% and 175% for (intervention), respectively. The Area Under the Curve (AUC_{0-456h}) differed significantly (P<0.0469) during the entire study period (between groups) and related to the cumulative effect of intakes at various times of blood draw. LZ from the intervention group was 68% more bioavailable than the control group. The highest peak relative response in subjects in the control group was \approx 33% (a 9.1-fold increase from baseline) at AUC_(168-312h) and \approx 46% (a 6.6-fold increase from baseline) at AUC_(312-456h) for the intervention group. No significant (p>0.05) effect of omega-3-supplement addition on oxidative stress levels was observed. Omega-3-addition to intakes of supplement LZ was responsible for the increased absorption (intervention) observed but did not affect oxidative stress levels and the Red Blood Cell omega-3-status.

References

1. Lima VC, Rosen RB, Farah M (2016) Int J of Ret and Vitr 2,9.
2. Zimmer JP, Hammond Jr BR (2007) Clin Ophth 1,25-35.
3. Bone RA, Landrum JT, Mayne ST et al. (2001) Invest Ophth & Visl Sci 42, 235-40.
4. Bone RA, Landrum JT (2010) Arch of Bioch and Biophy 504, 50-5.

Keywords: lutein; zeaxanthin, bioavailability; Omega-3-fatty acid

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Exploring the potential of objective metabolite measures in dietary assessment: randomised cross over feeding study

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Reliable dietary assessment is key to our understanding of diet-health interactions^[1]. Most current dietary assessment methods are self-reported, making them prone to a range of biases^[2]. Objective markers, such as certain metabolite concentrations in human tissue, may prove a more reliable method of dietary assessment in the future while reducing participant burden^{[2],[3]}. An example of these metabolite markers are alkylresorcinols, a family of compounds found in the bran layer of common grains. High concentrations of alkylresorcinols reflect high wholegrain intakes, very low levels indicate only refined grain intake, while no alkylresorcinols would indicate a gluten-free diet. We conducted a randomised crossover feeding study of three interventions (one standardisation day followed by a feeding day where known amounts were consumed under observation). Each feeding day differed by which food groups were provided (e.g., chicken, legumes, and fruit) or entirely absent (e.g., grains, fish, and dairy). Participants provided 24-hour urine samples on all six days (standardisation days and feeding days), as well as a 24-recalls and fasted blood samples the morning after each day. Known metabolite markers of dietary intake (approximately 70) were identified in blood and urine with LC-MSqToF, and semi-quantified with a known standard. Twenty-four hour urine sodium content was also measured as the current best known objective marker of dietary intake^[4]. Twenty-four participants (74% female, age (SD) 24.8 (6.1), BMI 24.1 (4.0)) commenced the study, with 21 (88%) completing all three interventions. Mean energy intake on feeding days (11720 kJ (2943.01)) was higher than self-reported energy intake on standardisation days (9243.57 kJ (3582.92)). Meals were well tolerated, with mean (range) intakes of 9.8 (6.3 – 16.1) serves whole grains, 2.4 (1.6 – 4.8) serves fish, 3.1 (1.9 – 5.5) serves dairy, 5.6 (4.5 – 9.1) serves chicken, 8.2 (7.0 – 14.1) serves legumes, 3.1 (1.3 – 4.6) serves fruit, 3.9 (2.6 – 6.4) serves red meat, 1.7 (1.35 – 2.6) serves nuts and seeds, or 13.4 (9.4 – 19.5) serves vegetables on their respective feeding days. The three feeding days provided clearly identifiable clusters when assessing the overall metabolic profile, both in terms of what was measured on the feeding days, and the difference in metabolite concentrations between standardisation day and feeding day. The relative correlations between self-reported intakes and individual metabolite concentrations reflecting specific foods or food groups with the known dietary intakes from feeding days will be presented first at the conference.

References

1. LeVatte M, Keshteli AH, Zarei P, et al. (2022) *Lifestyle Genom.* 15(1),1-9.
2. Gibson R. (2005) OUP.
3. McNamara AE, Walton J, Flynn A, et al. (2021) *Front Nutr* vol. 7 577720.
4. McLean RM, Farmer VL, Nettleton A, et al. (2017) *J Clin Hypertens* 19, 1214–1230.

Keywords: dietary assessment; feeding study; metabolites; objective dietary assessment

Ethics Declaration: Yes

Financial Support: This trial was funded by the HRC (emerging first grant 20/591) and the Riddet Centre of Research Excellence (project 1.6)

Abstract

Investigating the effect of polyphenols from nuts on human carbohydrate digestion *in vitro*

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Recent studies have documented the importance of postprandial hyperglycaemia in the incidence of chronic diseases, including type 2 diabetes. Inhibition of digestive enzymes, including membrane-bound brush-border α -glucosidases, leads to slowed carbohydrate digestion and absorption, and reduced postprandial glycaemia. Nuts are widely eaten around the world and have the potential to inhibit α -glucosidases through their content of polyphenols and other bioactive compounds. According to our recent systematic review⁽¹⁾, no study has investigated the inhibitory effects of nut extracts on human α -glucosidase activities. Almost all studies in this area have been conducted on yeast α -glucosidase, with only a few using rat α -glucosidase. While there is no sequence homology between yeast and human α -glucosidase, there is 74% to 78% sequence homology between rat and human α -glucosidases⁽¹⁾. The lack of studies on the effect of bioactive compounds from nuts on human α -glucosidases, along with the growing attention to nuts as an important component of a healthy diet with the potential to reduce the risk of chronic diseases⁽²⁾, highlights the need for research to evaluate the inhibitory effect of nut extracts on human α -glucosidases. The aim of the current study is to explore the inhibitory effect of extracts from nuts on human carbohydrate digestive enzymes. Walnuts and almonds were ground and defatted with hexane, extracted in 80% (v/v) acetone, and further purified using solid-phase extraction to obtain phenolic-rich extracts. The Folin–Ciocalteu assay was used to approximate the polyphenol content of the samples. Following our recently published detailed protocol⁽³⁾, cell-free extracts from human intestinal Caco-2/TC7 cells were used as a source of α -glucosidase in enzyme inhibition assays, with sucrose, maltose and isomaltose as substrates and appropriate controls. The assay products were quantified using high-performance anion exchange chromatography with pulsed amperometric detection (HPAEC-PAD). Glucose production in the presence of various concentrations of phenolic-rich nut extracts was compared using a one-way ANOVA and half-maximal inhibitory concentration (IC₅₀) values were calculated. The Folin–Ciocalteu data demonstrate that walnut extracts comprise a relatively high polyphenol content, with 18.1 ± 0.23 mg (epigallocatechin gallate [EGCG] equivalent) per gram of fresh weight, while almond extracts contain 0.87 ± 0.03 mg EGCG equivalent/g of fresh weight. The walnut phenolic-rich extract dose-dependently inhibited human intestinal sucrase and maltase activities (both $p < 0.01$), with IC₅₀ values of 1.67 mg/mL and 2.84 mg/mL, respectively. We demonstrate that phenolic-rich walnut extracts can inhibit human α -glucosidases *in vitro* and therefore walnuts may contribute to slowing carbohydrate digestion in humans. As such, we plan to assess the effects of walnuts on postprandial glycaemia *in vivo*.

References

1. Farazi M, et al. (2023) Food Funct, 14(13), 5962-5976.
2. Lovejoy JC (2005) Curr Diab Rep, 5(5), 379-84.
3. Barber E, Houghton MJ, et al. (2022) Nat Protoc, 17(12), 2882-2919.

Keywords: enzyme inhibition; walnut; α -glucosidase; postprandial glycaemia

Ethics Declaration: —

Financial Support: Monash University International PhD Scholarship

Abstract

Minerals and trace elements in broad-leaved Geebung (*Persoonia stradbokensis*), an underutilised native Australian fruit

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Minerals and trace elements are essential for human health and wellness. Fruits can be an important dietary source of these micronutrients. For centuries, native Australian fruits have been a vital source of nutrition and well-being for the Indigenous Communities ⁽¹⁾. However, comprehensive information on the mineral and trace element composition of these native fruits, including broad-leaved Geebung (*Persoonia stradbokensis*), is lacking. Therefore, the aim of the present study was to determine the mineral and trace element composition of broad-leaved Geebung, an important but still underutilised native Australian fruit, at different maturity stages. Inductively coupled plasma mass spectrometry (ICP-MS) and inductively coupled plasma-optical emission spectroscopy (ICP-OES) were used to analyse the fruit. Statistical analysis was performed using one-way ANOVA and the means (n=3) were compared by Tukey's multiple comparison post hoc test with $p < 0.05$ as significant. Calcium and potassium could be identified as the main minerals, and iron, zinc and manganese as the main trace elements. The calcium content in broad-leaved Geebung was lower than Australian desert lime, kakadu plum, and riberry, respectively (35.7-271.5 vs. 384.2 vs. 282.5 vs. 307.7 mg/100g dry weight (DW)) ⁽²⁾. Potassium has a vital role in the prevention of bone loss and is essential for the heart, kidney, and blood pressure. The potassium content of broad-leaved Geebung fruit was lower than Australian desert lime, kakadu plum, lemon aspen, quandong and riberry (average 516.4 vs. 1287.8 vs. 1905.5 vs. 1512.9 vs. 3456.2 vs. 1715.7 mg/100g DW) ⁽²⁾, which contributes to approximately 15% recommended dietary allowance (RDA). Iron is the main element in the production of hemoglobin and is important for maintaining healthy blood. Iron content in the fruit ranged from 0.8-2.6 mg/100g DW, which was higher than that of Davidson's plum (1.2 mg/100g DW), but lower than the Green Plum, Australian desert lime, and kakadu plum (3.8 vs. 4.7 vs. 4.0 mg/100g DW) ^(2,3). Besides, the manganese levels were relatively high in broad-leaved Geebung fruit and considerably higher than in other native Australian fruits such as Kakadu plums, Desert limes and Quandongs (11.2-26.4 vs. 3.5 vs. 0.9 vs. 0.3 mg/100 g DW) ⁽²⁾. Interestingly, the mineral and trace element content decreased ($p < 0.05$) during fruit maturity. In general, broad-leaved Geebung fruit can provide considerable amounts of essential minerals and trace elements and its potential as a healthy "snack" alternative should be investigated further.

References

1. Brand-Miller J, & Holt S (1998) Nutr Res Rev, 11, 5-23.
2. Konczak I, Zabaras D, Dunstan M, et al. (2009) https://www.researchgate.net/publication/285127462_Health_benefits_of_australian_native_foods_-_An_evaluation_of_health-enhancing_compounds
3. Fyfe SA, Netzel ME, Tinggi U, et al. (2018) Diet, 75, 527-532.

Keywords: native fruit; Australian; micronutrients; nutrition

Ethics Declaration: No

Financial Support: This work was supported by the Australian Research Council (ARC) Industrial Transformation Training Centre (ITTC) for Uniquely Australian Foods (Grant number IC180100045); Indigenous Plants for Health Association (IPHA)

Abstract

Bioactive compounds of spent coffee grounds and their potential use as functional food

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Hot brewed coffee is the most popular hot beverage in the world, and its health properties have been published in the literature ⁽¹⁾. Conversely, over the past decade, cold-brewed coffee has gained popularity, but its eventual nutritional properties are unclear. Both hot and cold brewed coffee produces over 6 million tons of spent coffee grounds (SCG) yearly disposed in landfills ⁽¹⁾. Interestingly, studies have shown that SCG can improve several metabolic parameters via changes in the gut microbiome in obese and diabetic rats ⁽²⁾, and reduce energy consumption in overweight humans ⁽³⁾. However, studies investigating the nutritional properties of SCG are lacking in the literature. Hence, in this study, we aimed to identify, quantify and compare two main bioactive compounds in hot- and cold-brewed coffee as a beverage, as well as in the SCG. Samples from hot and cold coffee beverages and SCG were obtained from a local coffee shop (n=3 per group). The coffee beans were composed of *Coffea arabica* from Papa New Guinea, Brazil, Ethiopia, and Colombia (in order from highest to lowest proportion). All samples were analysed by high-performance liquid chromatography and mass spectrometry (HPLC-MS). The analyses focused on two main bioactive compounds; trigonelline and chlorogenic acid (CGA). Statistical analyses were performed using an unpaired *t*-test with Welch's correction and two-way ANOVA with Tukey's post-hoc test ($p < 0.05$). When compared to hot-brewed coffee beverages, cold-brewed coffee beverages have shown lower ($p < 0.05$) levels of trigonelline (17.26 mg/g + 1.305 vs. 8.46 mg/g + 0.74, respectively) and CGA (9.82 mg/g + 0.93 vs. 5.31 mg/g + 0.48, respectively). In SCG obtained from hot-brewed coffee, a higher concentration of CGA was found (0.12 mg/g + 0.006), when compared to SCG obtained from cold-brewed coffee (0.10 mg/g + 0.03). However, trigonelline in cold-brewed SCG was found in higher ($p < 0.05$) concentration, when compared to hot-brewed SCG (0.11 mg/g + 0.03 vs. 0.09 mg/g + 0.017, respectively). Moreover, hot-brewed coffee beverages showed higher ($p < 0.05$) concentrations of trigonelline and CGA, when compared to hot-brewed SCG. Similarly, cold-brewed coffee beverages showed higher ($p < 0.05$) concentrations of both bioactive compounds, when compared to cold-brewed SCG. Our results indicated that hot brewed coffee beverage contains high concentrations of bioactive compounds (CGA and trigonelline), which possibly explain its health properties. Although SCG obtained from hot and cold-brewed coffee showed lower concentrations of both bioactive compounds than coffee beverages, our results shed light on the possible health benefits of SCG consumption. In a world seeking more sustainable solutions, further studies investigating the potential use of SCG as a functional food are required.

References

1. Bevilacqua E, Cruzat V, Singh I, et al. (2023) *Nutrients*, 15.
2. Bhandarkar N.S, Mouatt P, Goncalves P, et al. (2020) *Faseb j* 34, 4783-4797.
3. Campos-Vega R, Arreguin-Camposet A, Cruz-Medrano AA, et al. (2020) *Food Bioche* 44, e13204.

Keywords: sustainability; coffee; mechanism; gut health

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

The effectiveness of a *Lactobacillus* probiotic on measures of psychosocial health in adults diagnosed with subthreshold depression: a double-blind, randomised, placebo-controlled trial

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Depression is the leading cause of disability worldwide.⁽¹⁾ The microbiota-gut-brain axis may play a role in the aetiology of depression, and probiotics show promise for improving mood and depressive state.⁽²⁾ Further evidence is required to support mechanisms and in high-risk populations, such as those with sub-threshold depression (which may be 2-3 times more prevalent than diagnosed depression).⁽³⁾ The aims were to assess the efficacy of a probiotic compared with placebo in reducing the severity of depressive symptoms in participants with subthreshold depression, and to investigate potential mechanistic markers of inflammatory, antioxidant status and stress response. A double-blind, randomised, placebo-controlled trial was conducted in participants meeting diagnosis of subthreshold depression (DSM-5); aged 18-65 years; ≥ 18.5 kg/m² body mass index; not taking antidepressants, centrally acting medications, probiotics nor antibiotics for at least 6 weeks. The probiotic (4×10^9 AFU/CFU, 2.5 g freeze-dried powder containing *Lactobacillus fermentum* LF16 (DSM26956), *L. rhamnosus* LR06 (DSM21981), *L. plantarum* LP01 (LMG P-21021), *Bifidobacterium longum* BL04 (DSM 23233)) or placebo was taken daily for 3-months. Data was collected at 3 study visits (pre-, mid- (6 weeks), post-intervention). Self-reported questionnaires measured psychological symptoms (Beck Depression Inventory, BDI; Hospital Anxiety Depression Scale, HADS) and quality of life. Blood and salivary samples were collected for biomarkers including cortisol awakening response (CAR). General linear models examined within-group and between-group differences across all time points. Thirty-nine participants completed the study (n=19 probiotic; n=20 placebo) using intention-to-treat analysis. The probiotic group decreased in BDI score by -6.5 (95% CI -12.3; -0.7) and -7.6 (95% CI -13.4; -1.8) at 6 and 12 weeks, respectively. The HADS-A score decreased in the probiotic group by -2.8 (95% CI -5.2; -0.4) and -2.7 (95% CI -5.1; -0.3) at 6 and 12, respectively. The HADS-D score decreased in the probiotic group by -3.0 (95% CI -5.4; -0.7) and -2.5 (-4.9; -0.2) at 6 and 12 weeks of intervention, respectively. No between group differences were found. There were no changes in perceived stress or quality of life scores. The probiotic group had reduced hs-CRP levels (7286.2 ± 1205.8 ng/dL vs. 5976.4 ± 1408.3 ; $P=0.003$) and increased total glutathione (14.2 ± 8.9 ng/dL vs. 9.3 ± 4.7 ; $P=0.049$) compared to placebo, post intervention. Lower levels of CAR were found in the probiotic compared to placebo (-0.04 ± 0.17 μ g/dL vs. 0.16 ± 0.25 ; $P=0.009$). A significant reduction in depressive symptoms and anxiety was observed within the probiotic group only. These results were supported by improvements observed in biomarkers, suggesting probiotics may improve psychological wellbeing in adults experiencing sub-threshold depression, by potential pathways involved in central nervous system homeostasis and inflammation. Future analyses are required to understand changes within the intestinal microbiota and to clarify how their metabolites facilitate emotional processing.

References

1. WHO (2017) Depression and other common mental disorders: Global health estimates. <http://apps.who.int/iris/bitstream/10665/254610/1/WHO-MSD-MER-2017.2-eng.pdf?ua=1>
2. Goh KK, Liu YW, Kuo PH, et al. (2019) *Psychiatry Research* 282, 112568.
3. Marotta A, Sarno E, Del Casale A, et al. (2019) *Front Psychiatry* 10, 164.

Keywords: probiotics; depression; anxiety; *Lactobacillus*

Ethics Declaration: Yes

Financial Support: This work was supported by Probiotal Spa; and Biome Australia Trading Pty Ltd.

Food environments

Food environments

Abstract

What's in store for you? Identifying effective initiatives used in supermarkets to improve consumer purchasing: a systematic review

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Supermarkets have been described as having unprecedented and disproportionate power in the food system, influencing population diets through the products they have for sale, their price, store layouts, and other marketing activities.⁽¹⁾ There is growing evidence to suggest that changing the retail food environment to be more health-enabling via in-store interventions is possible. The purpose of this study was to review the available high-quality evidence reporting on the effectiveness of real-world supermarket-based interventions on improving the healthiness of consumer purchases and consumption. First, a systematic search across seven electronic databases was completed in April 2023 to identify reviews describing the effects of intervention strategies that aimed to improve the healthiness of consumer purchasing in supermarkets and grocery stores (overview of reviews). The methodological quality of reviews was assessed using the Risk of Bias In Systematic Reviews for systematic and scoping reviews, and the Scale for the Assessment of Narrative Review Articles for narrative reviews. Review findings were synthesised narratively. Next, high-quality, primary studies from these reviews were further inspected (review of primary studies). In-store interventions were categorised by strategy type,⁽²⁾ and outcome effects were coded as effective (positive/promising), ineffective or mixed/unclear.⁽³⁾ Results were synthesised narratively, and separately for population subgroups. Thirty-eight reviews published between 1989 and 2023 met the inclusion criteria. Most were systematic reviews (n = 29, 76%). The number of primary studies included in reviews ranged between eight and 211. Prompting (n = 19, 50%) and pricing (n = 15, 40%) were the most assessed strategy type, either alone or in combination with another strategy. From the overview of reviews, pricing strategies appeared to be the most promising at improving consumer purchasing. Twenty-three high-quality primary studies met the inclusion criteria for further review. In most studies (n = 21, 91%), the goal was to increase sales of healthy products, most commonly fruit and vegetables, or products with a higher nutritional ranking. Only two studies (9%) aimed to exclusively reduce sales of unhealthy/less healthy products. Promotion was the most assessed strategy type (n = 11, 48%), either alone or in combination with another strategy. Common promotion strategies included providing education to customers about the health benefits of selected products, offering samples of products and giving food demonstrations. From the review of primary studies, promotional strategies used in combination with another strategy appeared to be most successful in the general population, and pricing was successful in subgroups of the population, including socioeconomically disadvantaged individuals, and those living in regional/remote areas. Overall, the evidence reviewed shows that the implementation of health-promoting supermarket interventions are more likely to be successful if they include a substantial pricing initiative (particularly for some subgroups), or the inclusion of promotion in combination with another strategy.

References

1. Pulker CE, Trapp GSA, Scott JA, et al. (2018) *Obes Rev* 19, 198-218.
2. Slapø H, Schjøll A, Strømgren B, et al. (2021) *Foods* 10, 922.
3. Chan J, McMahon E & Brimblecombe J. (2021) *Obes Rev* 22, e13311.

Keywords: supermarket; retail food environment; public health; health promotion

Ethics Declaration: —

Financial Support: This work was supported by the Healthy Supermarkets grant from Wellbeing SA.

Abstract

Using Google Street View to examine changes in food environments around secondary schools in regional and metropolitan areas of New South Wales, Australia

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Food environments surrounding secondary schools are a known influence on the purchasing and consumption habits of adolescents⁽¹⁾. Understanding their obesogenic potential is important for informing strategies to create more healthful food environments for adolescents, particularly for those living in regional areas, and is a key component of Australia's National Obesity Strategy⁽²⁾. This repeated cross-sectional study examined the food environment surrounding secondary schools in regional and metropolitan New South Wales from 2007-2023. Google Street View was used to collect data regarding food outlets within a walkable distance (1.6 km) of all secondary schools in Wagga Wagga and Blacktown, our regional and metropolitan case study areas respectively, over 17 years. A Food Environment Score⁽³⁾ tool was used to characterise the healthfulness of food environments by categorising food outlets into Food Outlet Type categories (e.g. Cafés, Fast-Food Franchises, Restaurants etc.) and Healthfulness categories ("Healthful", "Less Healthful", "Unhealthful"). Descriptive statistics were used to characterise changes in the food environments by Food Outlet Type and Healthfulness categories from 2007-2023. Chi-Squared tests were used to determine any significant differences in the proportion of healthful, less healthful and unhealthful food outlets between the regional and metropolitan study areas and between 2007 and 2023 in both areas. In both Wagga Wagga and Blacktown, the most common food outlet types surrounding secondary schools from 2007-2023 were classified as less healthful or unhealthful. As of 2023, less healthful food outlets [restaurants (19.4%), cafes (16.8%)] and unhealthful food outlets [fast-food franchises (15.1%), independent takeaway (14.1%)] were the most common food outlet types in Wagga Wagga, making up 52% and 36% of all identified food outlets respectively. These outlet types have remained the most prevalent over the 17-year period, though restaurants and cafes have since surpassed fast-food franchises and independent takeaway stores, by proportion, which were the most common in 2007. Similarly in Blacktown, 2023, less healthful [restaurants (21.1%), cafés (11.1%)] and unhealthful [fast-food franchises (17.4%)] were the most common food outlets, making up 41% and 37% of all identified food outlets. Restaurants, cafés and fast-food franchise outlets were consistently observed to be the most prevalent in Blacktown food environments over the 17-year study period. No significant difference was found when comparing the healthfulness profiles of regional and metropolitan food environments nor were significant changes observed between 2007 and 2023 in Wagga Wagga and Blacktown ($p > 0.05$ for all). The prevailing high proportion of less healthful and unhealthful food outlets near secondary schools in regional and metropolitan areas upholds the need for public health policies and planning strategies to address the obesogenic potential of school food environments.

References

1. Neufeld LM, Andrade EB, Ballonoff Suleiman A et al. (2022) Lancet 399, 185-197.
2. Commonwealth of Australia (2022) National Obesity Strategy.
3. Moayyed H, Kelly B, Feng X et al. (2017) Nutr Diet 74, 29-35.

Keywords: food environment; adolescents; secondary schools; Google Street View

Ethics Declaration: No

Financial Support: This research received no external funding

Abstract

Food providers and public health professional's experiences with the adoption and implementation of the National Healthy Food and Drink Policy in New Zealand healthcare facilities

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Publicly-funded healthcare facilities in Australia⁽¹⁾ and New Zealand⁽²⁾ have adopted healthy food and drink policies to enable staff and visitors to choose and consume healthier options. However, adopting such policies does not translate to their full implementation and compliance by food providers, who face barriers to providing healthier food and drinks.⁽³⁾ As part of the wider HealthY Policy Evaluation (HYPE) study, we interviewed hospital food providers and public health dietitians/professionals to understand their experiences implementing the voluntary National Healthy Food and Drink Policy introduced in New Zealand in 2016. Semi-structured interviews focused on the awareness, understanding of, and attitudes towards the Policy; level of support received; perceived customer response; tools and resources needed to support implementation; and unintended or unforeseen consequences. All semi-structured interviews were transcribed verbatim, inductively coded with the assistance of QSR's NVivo software, and analysed using the reflexive thematic analysis method by Braun and Clarke.⁽⁴⁾ Twelve participants from across New Zealand were interviewed. Time in their roles ranged from one to 14.5 years, and many were not in the position when the Policy was first adopted. There was a discrepancy in the awareness of the voluntary Policy. However, there was agreement that hospitals should be healthy eating role models for the wider community. Reflexive thematic analysis identified three themes relating to the implementation of the Policy in New Zealand: 1) complexities of operating food outlets under the Policy in hospitals; 2) adoption, implementation and monitoring of the Policy as a series of incoherent ad-hoc actions; and 3) the Policy as (currently) not achieving the desired impact. Participants recognised that the current food supply, presence of food outlets nearby hospitals serving unhealthy foods and culture of unhealthy eating, combined with the difficulty of changing people's eating habits, leaves doubts if the Policy and healthier options served in the healthcare facilities have any tangible positive impact on staff or visitors. Key suggestions to promote successful Policy implementation included adoption of a mandatory National Policy, funding of central government support for implementation (including supportive implementation tools), regular and systematic monitoring of food availability in each region, and frequent and ongoing communication with staff and visitors using positive messaging around healthy eating and non-health related benefits (e.g. sustainability) to increase their buy-in. Findings from stakeholder interviews and the remaining parts of the HYPE evaluation study are informing the update of the National Policy and associated supportive tools, and highlight the potential positive impact a comprehensive policy evaluation could have on improving policy implementation.

References

1. Rosewarne E, Hoek AC, Sacks G, et al. (2020) BMC Public Health 20, 1038.
2. Gerritsen S, Kidd B, Rosin M, et al. (2021) N Z Med J 135, 67-76.
3. Rosin M, Mackay S, Gerritsen S, et al. (2023) Nutr Rev nuad062.
4. Braun V & Clarke V (2022) SAGE Publications

Keywords: hospitals; interviews; staff meals; nutrition

Ethics Declaration: Yes

Financial Support: This study was funded by the National Science Challenge Healthier Lives He Oranga Hauora as part of the HYPE (Healthy Policy Evaluation) study, evaluating the implementation and impact of the National Healthy Food and Drink Policy (PI: Cliona Ni Mhurchu).

Abstract

Ultra-Processed Food Consumption in the Central Division of Fiji

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Availability of ultra-processed foods is likely to be high in the Pacific (1) however, information on consumption is limited. This study aimed to assess consumption levels and dietary sources of ultra-processed foods (UPFs) in a population of adults in the Central Division of Fiji. A random sample of 700 adults was selected from two statistical enumeration areas (one semi-urban, one rural) in Fiji. Participant characteristics were collected, along with a three-pass 24-hour diet recall. Foods consumed were coded based on level of processing, in alignment with the NOVA categorisation system (1= unprocessed, 2= minimally processed, 3= processed and 4= ultra-processed). UPF contribution to total energy, salt, fat, and sugar intake were estimated. Main sources of UPFs were then estimated by food group. 534 adults participated (76% response rate, 50% female). Preliminary results suggest that UPFs contributed 21.5% (%95 CI, 19.5% to 23.4%) of total energy intake. Further, UPFs contributed to 22.8% (%95CI 20.5% to 25.1%) of total salt intake, 24.0% (%95 CI, 21.4% to 26.6%) of fat intake and 18.6% (%95 CI, 16.5% to 20.7%) of sugar intake. UPFs contributed over 20% of total energy intake in this sample of Fijian adults and over 20% of salt, fat, and sugar. Messages and interventions that encourage consumption of minimally processed foods while reducing consumption of UPFs are likely needed to improve the healthiness of diets.

References

1. Sievert K, Lawrence M, Naika A & Baker P. (2019). *Nutrients*. 1(1328).

Keywords: ultra-processed foods, Fiji, small island developing states, non-communicable diseases

Ethics Declaration: Yes

Financial Support: This research was funded by the National Health and Medical Research Council as part of the Global Alliance for Chronic Diseases program on Scaling up Policy to reduce hypertension and diabetes (APP1169322). BM is supported by a National Heart Foundation of Australia Postdoctoral Fellowship (APP106651). AP is supported by a UNSW Research Training Program (RTP) PhD Scholarship.

Abstract

The influence of food prices on what we purchase, prepare and eat. Survey results and implications for the Heart Foundation's work

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Healthy eating is a struggle for many families in New Zealand when they cannot adequately afford food. Statistics New Zealand has shown that the food price index rose 12.5 percent over the past year with an increase of 22 percent for fruit and vegetables prices ⁽¹⁾. Food prices now rate as the number one concern for New Zealanders ⁽²⁾. To understand the changes households are making in response to increasing food prices 109 main household shoppers were surveyed. The survey was administered via Qualtrics in May/June 2023. Participants were recruited via social media and by direct email from researchers and Heart Foundation staff. Survey participants were asked about food prices, shopping behaviours and changes within specific food categories. Two thirds of the participants were female. The predominant age groups were 20-29 years (29%) and 60 and above (28%). The major ethnicities were European (53%), Pasifika (20%) and Māori (8%). Around 46% of people lived in Auckland with the next highest area being Nelson (and wider Tasman). The results showed 85% of participants expected food prices to get worse over the next year. To manage rising food prices 70% people had changed where they shopped or how they accessed food, 90% changed what they buy and 67% had changed the way they eat (e.g., cooking more at home). The most substantial changes were in the fruit and vegetable category where people changed the types purchased (73%) and purchased less (63%). In many food categories buying cheaper brands, in bulk and when foods were on special were common responses. Rationing or going without was a consistent theme highlighted with meat/poultry, eggs, fish, alcohol and more expensive snack foods. The implications for the Heart Foundation's work include (1) reinforcing the importance of fruits and vegetables in the diet and to provide tips and tools around ingredient substitution, (2) promote alternative protein sources (e.g., beans and legumes) as an affordable ingredient and recipes to support their use and (3) supporting companies to improve the composition of cheaper brands through food reformulation. With this being a small sample size, it may not be fully generalisable to the entire population however given the survey found a high percentage of people making changes it does indicate the important role health agencies can play providing information, and advice to support people to manage high food prices.

References

1. Food price index: June 2023, Stats NZ <https://www.stats.govt.nz/news/food-prices-increase-12-5-percent-annually/>

2. Canstar consumer pulse report, March 2023 Food price index: June 2023. <https://www.canstar.co.nz/wp-content/uploads/2023/03/Consumer-Pulse-Report-NZ-2023-Final-4.pdf>

Keywords: food prices; healthy eating; heart health

Ethics Declaration: —

Financial Support: No external funding

Abstract

Supporting companies to reform nutrition policies and practices (REFORM): a multi-centre cluster randomised controlled trial

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Unhealthy food environments are major drivers of obesity and diet-related diseases¹. Improving the healthiness of food environments requires a widespread organised response from governments, civil society, and industry². However, current actions often rely on voluntary participation by industry, such as opt-in nutrition labelling schemes, school/workplace food guidelines, and food reformulation programmes. The aim of the REFORM study is to determine the effects of the provision of tailored support to companies on their nutrition-related policies and practices, compared to food companies that are not offered the programme (the control). REFORM is a two-country, parallel cluster randomised controlled trial. 150 food companies were randomly assigned (2:1 ratio) to receive either a tailored support intervention programme or no intervention. Randomisation was stratified by country (Australia, New Zealand), industry sector (fast food, other packaged food/beverage companies), and company size. The primary outcome is the nutrient profile (measured using Health Star Rating [HSR]) of foods and drinks produced by participating companies at 24 months post-baseline. Secondary outcomes include company nutrition policies and commitments, the nutrient content (sodium, sugar, saturated fat) of products produced by participating companies, display of HSR labels, and engagement with the intervention. Eighty-three eligible intervention companies were invited to take part in the REFORM programme and 21 (25%) accepted and were enrolled. Over 100 meetings were held with company representatives between September 2021 and December 2022. Resources and tailored reports were developed for 6 touchpoints covering product composition and benchmarking, nutrition labelling, consumer insights, nutrition policies, and incentives for companies to act on nutrition. Detailed information on programme resources and preliminary 12-month findings will be presented at the conference. The REFORM programme will assess if provision of tailored support to companies on their nutrition-related policies and practices incentivises the food industry to improve their nutrition policies and actions.

References

1. Swinburn B, Sacks G, Hall K et al. (2011) *The Lancet* 378(9793), 804-814.
2. Swinburn B, Kraak V, Rutter H, et al. (2015) *The Lancet* 385(9986), 2534-2545.

Keywords: fast food companies; packaged food and beverage manufacturers; nutrition policies; nutrition practices

Ethics Declaration: Yes

Financial Support: This project is funded by the Health Research Council of New Zealand, the Australian National Health & Medical Research Council, the Victorian Health Promotion Foundation (VicHealth) and the Australian Government Department of Health (DoH).

Gut health

Gut health

Abstract

Reduction in systolic blood pressure following dietary fibre intervention is dependent on baseline gut microbiota composition

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Uncontrolled hypertension is a primary cause of non-communicable diseases and death globally ⁽¹⁾. The gut microbiota plays a role in hypertension and dietary interventions high in fibre have been shown to lower blood pressure (BP) ⁽²⁾. Not all participants respond to dietary fibre interventions, for reasons which are unclear. Here we aimed to identify responders of a high fibre intervention based on their baseline gut microbiome. Twenty treatment-naive participants with hypertension received either placebo or 40g per day of prebiotic acetylated and butyrylated high amylose maize starch (HAMSAB) supplementation for 3 weeks in a phase II randomised cross-over double-blind placebo-controlled trial. Blood pressure was monitored at baseline and each endpoint by 24-hour ambulatory BP monitoring, with those experiencing a reduction between timepoints of ≥ 2 mmHg classified as responders. Baseline stool samples were collected and the V4-V5 region of the 16S gene sequenced. Taxonomy was assigned by reference to the SILVA database. The MaAsLin2 package was used for assessing the relationship between baseline gut microbiota and response to dietary intervention. Overall participants had significant reduction in 24-hour systolic BP (-6.1 mmHg, $p=0.03$), with 14 individuals classified as responders and six individuals as non-responders. 13 genera were found to be differentially abundant between responders and non-responders. Genera significantly enriched in responders included *Dialister* ($\beta = 1.29$, $q=1.921 \times 10^{-134}$), *Coprococcus* ($\beta = 1.26$, $q=3.282 \times 10^{-121}$), *Bifidobacterium* ($\beta = 1.67$, $q=1.11 \times 10^{-81}$), *Ruminococcus* ($\beta = 0.161$, $q=1.11 \times 10^{-8}$) and *Roseburia* ($\beta = 0.82$, $q=4.275 \times 10^{-2}$). Participants who experienced a decrease in systolic BP following a dietary fibre intervention had increased level of bacterial genera known to contain species that produce short-chain fatty acids (e.g. *Bifidobacterium*, *Roseburia* and *Ruminococcus*) at baseline. These data suggest that baseline microbiota composition contributes to the response to dietary fibre intervention trials in people with hypertension.

References

1. Murray, CJL et al. (2020) Lancet 396, 1223–1249.
2. Muralitharan RR et al. (2020) Hypertension 76(6):1674-1687.

Keywords: hypertension; dietary fibre; microbiota

Ethics Declaration: Yes

Financial Support: This work was supported by a National Heart Foundation Vanguard grant (102182), a National Health & Medical Research Council (NHMRC) of Australia project grant (GNT1159721). M.S. is supported by a National Heart Foundation Postdoctoral Fellowship (106698). F.Z.M. is supported by a Senior Medical Research Fellowship from the Sylvia and Charles Viertel Charitable Foundation Fellowship and by National Heart Foundation Future Leader Fellowships (101185 and 105663).

Abstract

Swapping white for high-fibre bread exceeds fibre target and improves microbiome diversity

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A majority of Australians consume a limited range of different dietary fibres and insufficient total dietary fibre ⁽¹⁾. This contributes to low intestinal microbial diversity and impaired microbial function, such as capability in producing beneficial metabolites like short-chain fatty acids (SCFA). This diet-induced dysbiosis is associated with poor gastrointestinal health and a broad range of non-communicable diseases ⁽²⁾. Our study aimed to determine whether one dietary change, substitution of white bread with a high fibre bread improves faecal microbial diversity and butyrate-producing capability. Twenty-six healthy adults completed a randomised, cross-over, single-blinded intervention. Over the two intervention phases separated with a 4-wk washout, participants consumed either 3 slices of a high fibre bread (Prebiotic Cape Seed Loaf with BARLEYmax®) or control white bread as part of the usual diet, each for 2 weeks. At the beginning and end of each intervention period, participants completed a 24-h diet recall, a gut symptoms rating questionnaire and provided a faecal sample for microbiome analysis. The composition of faecal microbiome was characterised using 16S rRNA amplicon sequencing (V3-V4) and a marker of butyrate synthesis capability, the faecal content of butyryl-CoA:acetate CoA-transferase (BCoAT) gene was assessed using Real-time PCR. The high fibre bread intervention increased the servings of whole grain from 1.5 to 4 per day and increased total dietary fibre intake to 40 g/d which was double the amount of fibre consumed by participants at baseline or during the white bread intervention. Compared to white bread, the high fibre bread increased richness and evenness (Shannon, $p = 0.014$) of the gut microbiota and increased the relative abundance of SCFA producing taxa Lachnospiraceae ND3007 group ($p < 0.001$, FDR = 0.019). In addition, the high-fibre bread tended to increase relative abundance of butyrate-producing genus *Roseburia*, and microbial BCoAT gene content compared to white bread. In conclusion, the substitution of white bread with high-fibre bread improved the diversity of gut microbiota, specific microbes involved in SCFA production and may enhance the butyrate production capability of gut microbiota in healthy adults.

References

1. Fayet-Moore F, Cassettari T, Tuck K, et al. (2018) *Nutrients* 10(5):599.
2. Cronin P, Joyce SA, O'Toole PW, et al. (2021) *Nutrients* 13(5):1655.

Keywords: dietary fibre; gut microbiome; microbiome diversity; butyrate

Ethics Declaration: Yes

Financial Support: This research was funded by Bakers Delight and an Entrepreneurs' Programme grant provided by the Australian Government Department of Industry, Science and Resources.

Abstract

Predicting symptom response and quality of life to the low FODMAP diet in irritable bowel syndrome: a 6-month longitudinal study

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The low fermentable oligosaccharide, disaccharide, monosaccharide and polyol (FODMAP) diet is recommended as a first line therapeutic management strategy for irritable bowel syndrome (IBS).⁽¹⁾ The low FODMAP diet is supported by meta-analytical evidence,⁽²⁾ and demonstrates acceptability and effectiveness for improving symptoms and quality of life (QoL) in 50-75% of individuals with IBS. However, a subset of individuals (25-50%) do not respond to the diet.⁽³⁾ The identification of individual-level predictors of treatment response across all three phases of the low FODMAP diet is currently lacking. The study aims were to assess psychological predictors of symptom and QoL response to the low FODMAP diet in patients with IBS. Adults with IBS underwent a three-phase low FODMAP diet, guided by individualised dietetic education. Predictor variables included levels of depressive, anxiety, and extraintestinal somatic symptoms, stress, treatment beliefs and expectations, behavioural avoidance, and illness perceptions. Symptom severity and QoL were the main outcomes. Questionnaires assessing psychological predictors, symptoms and QoL were administered at five points: pre-dietitian (week 0), post-dietitian, end of elimination (week 5), end of reintroduction (week 13), and end of personalisation (week 25) phases. Latent class growth analysis was used to identify classes of response trajectories for symptoms. Linear mixed models were used to test the effect of baseline psychological scores on symptoms and QoL over time. Cross lagged panel models determined the directional predictive relationship between psychological predictors and symptom severity. 112 participants (89% F) median age 30 ± 17 years were included. There were three classes of symptom response trajectories, including 'non-improvers' (21.3% of participants) with high initial symptom severity and minimal improvement, 'improvers' (22.5% of participants) with low initial symptom severity and significant improvement, and an 'intermediate' group (56.2% of participants) with moderate initial symptom severity and significant improvement. Higher treatment beliefs predicted a stronger initial symptom response (effect on linear slope $p=0.036$). Lower gut-specific anxiety, as well as higher levels of personal and treatment control at baseline predicted a stronger reduction in IBS symptom severity and improved QoL from week 0 to week 25. Participants with higher levels of baseline psychological symptoms and negative illness perceptions (i.e., lower emotional representations) predicted a stronger initial and later QoL response (effect on linear ($p=0.006$) and quadratic ($p=0.049$) slopes). Increased cyclical time beliefs predicted poorer initial and later QoL response (effect on linear ($p=0.015$) and quadratic ($p=0.029$) slopes). Individuals experiencing lower to mid-range symptom severity at baseline had greater improvement with the low FODMAP diet. Lower anxiety, positive illness views and higher treatment beliefs predict better QoL and symptom response. Personalised strategies are crucial for optimising low FODMAP diet effectiveness in IBS.

References

1. Vasant DH, Paine PA, Black CJ, et al. (2021). Gut 70, 1214-1240.
2. Black CJ, Staudacher HM, Ford AC (2022) Gut 71, 1117-1126.
3. Wilson B, Cox SR, Whelan K (2021) Proc Nutr Soc 80, 19-8.

Keywords: irritable bowel syndrome; predictors; low FODMAP diet

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

Perceived food intolerances and its impact on diet quality in patients with an ileoanal pouch

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Restorative proctocolectomy with ileal pouch-anal anastomosis is the surgical treatment of choice for patients with medically-refractory ulcerative colitis (UC) and familial adenomatous polyposis (FAP). Whilst quality of life is generally good, as many as 83% of patients associate dietary factors with the onset of symptoms⁽¹⁾ and around two-thirds employ some form of dietary restriction post-pouch creation^(2,3). There is growing interest to understand the role of diet (as a whole) on pouch function and how it can be used therapeutically. It is imperative that we know the dietary characteristics of pouch patients before attempting to introduce strategies altering their food choice. Since there is good rationale to assess overall diet quality to identify potential avenues for targeting dietary strategies, this study aimed to examine the frequency of perceived food intolerances and diet quality in patients with an ileoanal pouch and the relationship between these two indices. In this cross-sectional study, patients with an ileoanal pouch completed a food intolerance questionnaire and a validated 297-item semi-quantitative food frequency questionnaire (Monash Comprehensive Nutritional Assessment Questionnaire). Dietary data was used to score diet quality using the 2013 Dietary Guidelines Index (DGI), a scoring system which compares how closely an individual's dietary intake aligns with the Australian Dietary Guidelines (ADG). The DGI also comprises of 11 subcomponents (scored out of 10 respectively) based on each of the ADG guidelines and provides a total score of 110, with higher scores reflecting greater compliance to the ADG. In order to determine if perceived dietary intolerances was negatively associated with the intake of specific dietary factors, univariable and multivariable linear regression analysis of the correlation of intolerance and diet quality was performed. Of the 58 (10 FAP and 48 UC) patients studied, 81% of UC and 80% of FAP patients reported dietary intolerances. Mean total DGI score was 78 (95% CI: 74-80) of 110 in the overall pouch cohort with no differences across pouch sub-groups. However, only 5% of patients achieved a full score for food variety. Both uni- [OR -0.94 (-1.7,-0.10); $p=0.02$] and multivariable analysis (adjusting for age and sex) showed that only intolerances to dairy products were associated with reduced intake of lactose-containing dairy [OR -0.29 (-1.8,-0.08); $p=0.03$]. No other significant correlations were found for overall or subcomponents of DGI scores. High rates of perceived food intolerances were observed in patients with an ileoanal pouch. However, only those with perceived dairy intolerances restricted their intake of lactose-containing dairy products. Additionally, patients with ileoanal pouch scored highly for overall diet quality but specific gaps in achieving better diet quality, particularly for diet variety were observed. These results provide some starting points for targeted dietary counselling to optimise nutritional health and potentially to improve pouch function these patients.

References

1. Ardalan Z, Yao C, Sparrow M, et al. (2020) APT 52, 1323-1340.
2. Steenhagen E, de Roos NM, Bouwman CA, et al. (2006) J Am Diet Assoc.106, 1459-1462.
3. Wolf ND, Kadmon M, Wolf RC, et al. (2011) Colorectal Dis.13, e358-e365.

Keywords: diet quality; food intolerances; ileoanal pouch; ulcerative colitis

Ethics Declaration: Yes

Financial Support: Crohns Colitis Australia Angela Mcavoy Research Scholarship. KML is supported by a National Health and Medical Research Council Emerging Leadership Fellowship (APP1173803).

Abstract

A novel approach to the dual sugar test for the assessment of intestinal epithelium permeability in response to exertional heat stress and nutritional intervention.

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An acute increase in intestinal epithelium permeability is induced by prolonged exertion in the heat, resulting in the translocation of pathogenic bacteria and endotoxins from the lumen into the circulation, causing a systemic inflammatory response and debilitating symptoms⁽¹⁾. Acute exercise-induced gastrointestinal syndrome mimics chronic health conditions with which an impaired intestinal barrier function is associated, including coeliac disease, inflammatory bowel disease, diabetes, Alzheimer's and liver diseases⁽²⁾. Intestinal epithelium permeability is typically assessed using a dual sugar absorption test, by administering a drink containing non-metabolisable sugars (e.g. lactulose [L] and L-rhamnose [R]) that can enter the circulation by paracellular translocation when the epithelium is compromised, and are subsequently excreted and measured cumulatively in the urine⁽³⁾. We aimed to demonstrate that our recently developed ion chromatography protocol⁽⁴⁾ can be used to accurately quantify L/R ratio in the plasma of participants exercising in hot ambient conditions and to determine the impact of nutritional intervention on intestinal epithelium permeability. Further, we hypothesised that measuring L/R in plasma collected at intervals during the post-exercise recovery period would reveal more information about intestinal permeability compared to previously published cumulative urine L/R data⁽³⁾. Endurance-trained participants completed a set of randomised crossover studies, consisting of 2 h running at 60% $\dot{V}O_{2max}$ in temperate, warm and hot ambient conditions (n=8) and/or in the heat while consuming water, carbohydrate or protein (n=9). The dual sugar solution was ingested at 90 min of exercise and blood was sampled at 0, 1, 2 and 4 h post-exercise. Plasma sugars were quantified by high-performance anion exchange chromatography with pulsed amperometric detection (HPAEC-PAD) and L/R ratios were compared by two-way repeated measures ANOVA with Tukey's multiple comparisons. Plasma L/R increased immediately post-exercise in the heat (0.15 ± 0.11) compared with temperate (0.06 ± 0.04 , $p < 0.001$) and warm (0.09 ± 0.08 , $p < 0.01$) conditions, while consuming glucose before and during exercise alleviated this (0.02 ± 0.02 , $p < 0.001$), and this novel information was otherwise missed when measuring urine L/R. Consuming glucose or whey protein hydrolysate during exercise attenuated intestinal permeability from exertional heat stress throughout recovery, with the mean plasma L/R over 4 h reduced from 0.11 ± 0.05 to 0.04 ± 0.03 ($p < 0.001$) and 0.06 ± 0.04 ($p < 0.01$) with glucose and protein, respectively. We recommend using the dual sugar test with quantification of plasma sugars at intervals by HPAEC-PAD to maximise intestinal permeability data collection in exercise gastroenterology research and beyond, as this gives additional acute response information compared to urinary measurements. Our approach can be employed to investigate and develop personalised nutrition strategies that prevent intestinal hyperpermeability during exertional heat stress. This has implications for athlete performance and safety, and can also build upon occupational health and safety practices and inform chronic disease management.

References

1. Costa RJS et al. (2022) *Int J Sport Nutr Exerc Metab* 32(5), 387-418.
2. Vanuytsel T et al. (2021) *Front Nutr* 8, 717925.
3. Snipe RMJ et al. (2017) *Appl Physiol Nutr Metab*, 42(12), 1283-1292.
4. Barber E, Houghton MJ et al. (2022) *Nat Protoc*, 17(12), 2882-2919.

Keywords: leaky gut; gastroenterology; exercise; HPAEC-PAD

Ethics Declaration: Yes

Financial Support: This work was supported by the 'Monash University Faculty of Medicine Nursing and Health Sciences Strategic Grant Scheme', and GW's Monash University Establishment Fund.

Abstract

Positive relationship between plant diversity dietary patterns and disease activity in Australian adults with Inflammatory Bowel Disease

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Diet is implicated in the development of Inflammatory Bowel Disease (IBD). However, the role of diet in reducing inflammation and managing prevalent disease is unclear⁽¹⁻³⁾. Previous studies have analysed the relationship between dietary patterns and occurrence of flares or symptoms, but not disease activity or inflammation⁽⁴⁻⁵⁾. It is important to explore the role of habitual diet in management of IBD to provide targeted dietary recommendations. We explored the relationship between dietary intake with disease activity and inflammation in an Australian adult cohort with and without IBD. We analysed dietary and clinical data from the Australian IBD Microbiome (AIM) study. AIM is a prospective longitudinal cohort study of adults and children with Crohn's Disease (CD), Ulcerative colitis (UC) and healthy controls (HC). Habitual dietary intake of food groups, fibre, polyphenols and fermented foods was collected by merging dietary data from 3-day food records and food frequency questionnaires with PhenolExplorer and the Australian Fibre Categories Database. Dietary patterns were explored using Principal Component Analysis (PCA) and cluster analysis (CA) in IBM SPSS Statistics (V29). Associations between dietary intake, clinical disease activity categorised as remission or active, and faecal calprotectin (FCAL) were explored in adult participants. A total of 412 participants (IBD = 223, HC = 189) were included. FCAL data was available for 211 participants (HC = 100, CD = 49, UC = 62). Median (IQR) FCAL at baseline was 20 (20) mg/kg for HC and 33 (127) mg/kg for IBD, indicating clinically irrelevant inflammation (FCAL >50mg/kg = clinical inflammation). PCA identified 7 distinct dietary patterns for adults with IBD. A dietary pattern of high plant diversity was associated with active CD. In the total IBD cohort, low association to a 'Prudent' pattern was positively associated with low FCAL, and high association to a 'Meat-eaters' dietary pattern was positively associated with moderate FCAL. CA revealed 3 distinct clusters amongst participants with IBD. No significant difference between diet cluster and disease activity or FCAL was seen. There were no significant differences in intake of fibre or polyphenols between remission vs active disease in participants with IBD. A significant difference between total, soluble and insoluble fibre and FCAL categories was seen with a higher fibre intake associated with lower FCAL. Higher plant-diversity and 'Prudent' dietary patterns are associated with active disease and higher FCAL in Australian adults with IBD. Reverse causality cannot be ruled out, with analysis of larger cohorts and clinical trial data needed to clarify this.

References

1. Peters V, et al. (2022) J Crohns Colitis 16, 931-939.
2. Hou JK, et al. (2011) AJG 106, 563-573.
3. Bischoff SC, et al. (2020) Clinical Nutrition 39, 632-653.
4. Limketkai BN, et al. (2022) Inflamm Bowel Dis 28(11)
5. Peters V, et al. (2021) J Crohns Colitis 15(8)

Keywords: inflammatory bowel disease; dietary pattern; inflammation; Crohn's Disease

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Inflammatory Bowel Disease exercise and diet (IBDeat) habits study: exploring lifestyle habits and cardiometabolic disease risk factors

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Patients with inflammatory bowel disease (IBD) have higher risk of developing cardiometabolic diseases due to chronic gut and systemic inflammation which promotes atherogenesis. Adopting healthy lifestyle habits can prevent development of cardiometabolic diseases, but can be challenging for people with IBD. The IBD exercise and diet (IBDeat) habits study describes the lifestyle habits and cardiometabolic disease risk factors of adults with IBD in Aotearoa, New Zealand (NZ).

This is a cross-sectional study including adult NZ IBD patients recruited online via Crohn's and Colitis NZ and Dunedin hospital from 2021 to 2022. An online questionnaire collected demographics, smoking status, comorbidities, medications, disease severity scores, quality of life, physical activity, and dietary intake. The Dunedin cohort had physical measurements taken including anthropometrics, handgrip strength, blood pressure, body composition (bioelectrical impedance), blood nutritional markers, and faecal calprotectin. Data were compared to established reference values and linear regression analysis investigated associations between lifestyle habits and cardiometabolic risk factors. The study received University of Otago ethical approval (reference: H21/135). A total of 213 adults with IBD (54% Crohn's disease; 46% ulcerative colitis) completed the online questionnaire and a subset of 102 from Dunedin provided physical measurements. Participants characteristics were: median age 37 (IQR 25, 51) years, 71% female, 82% NZ European, 4% smokers, and 1.4% had active IBD. Thirty-five percent of participants had at least one comorbidity and 34% of participants had poor quality of life. Known dietary risk factors associated with cardiometabolic diseases were common: low intakes of vegetables (77%), fruit (51%), fibre (35%) and high intakes of total fat (84%) and saturated fat (98%). Physical activity recommendations were met by 61% of participants and 63% reported barriers to being more active from fatigue (63%) and joint pain (54%). Other cardiometabolic risk factors were common in the Dunedin cohort: high LDL (79%) and total cholesterol (76%), central adiposity (64%), high body fat percentage (44%), high blood pressure (26%), and low handgrip strength (25%). Regression analysis showed that vegetable (per serve) and carbohydrate (per 5% of total daily energy intake (TE)) were associated with 0.22 mmol/L (95%CI 0.43, 0.013) and 0.20 mmol/L (95%CI 0.34, 0.057) lower LDL cholesterol. Discretionary food items were associated with higher LDL cholesterol, 0.11 mmol/L per daily serve (95%CI 0.028, 0.19). A 5% difference in TE intake from carbohydrate was associated with 1.11% (95%CI 2.22%, 0.0038%) lower body fat percentage while protein was associated with 3.1% (95%CI 0.81%, 5.39%) higher body fat percentage. Physical activity had weak associations with cardiometabolic disease risk factors. Adults with IBD have multiple modifiable risk factors for cardiometabolic diseases. Vegetable and carbohydrate intake were associated with lower LDL cholesterol concentration while discretionary food items showed otherwise. Protein intake was associated with higher body fat percentage.

References

1. Feng W, Chen G, Cai D, et al. (2017). J Am Heart Assoc 6(8), 1–9.

Keywords: inflammatory bowel disease; nutrition; physical activity; LDL-cholesterol

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

The relationship between the low food chemical diet and symptoms in irritable bowel syndrome: a cross-sectional survey

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Dietary therapies have revolutionised treatment for irritable bowel syndrome (IBS). However, response rates to the diet with the highest evidence of efficacy (the low FODMAP diet) remain at 50-75%, suggesting other potential drivers of symptom onset. A low food chemical elimination-rechallenge diet targeting bioactive food chemicals (including salicylates, amines, glutamate and other additives), is commonly applied in Australia in patients exhibiting both gastrointestinal and extra-intestinal symptoms. One key food chemical, salicylate, has been shown to elicit symptoms in IBS patients with aspirin-sensitivity⁽¹⁾, and 77% of IBS patients have reported amine-rich foods trigger symptoms⁽²⁾. However, data supporting the full low chemical diet is scant, and safety concerns exist due to its restrictive nature potentially causing nutritional deficiencies and disordered eating. This cross-sectional survey aimed to evaluate the frequency of co-existing extra-intestinal symptoms, as well as explore patient perceptions and use of the low chemical diet in those with IBS and healthy controls. Participants with IBS (IBS-Severity Scoring System (IBS-SSS) >75), and healthy controls (not meeting Rome IV and IBS-SSS ≤75) were recruited via online advertisement. Validated questionnaires were used to assess gastrointestinal symptoms (IBS-SSS), extraintestinal symptoms (extended PHQ-12), nutrient (Comprehensive Nutritional Assessment Tool) and food additive intake (IBD-Food additive questionnaire). Additional questionnaires assessed use of dietary therapies with specific focus on food chemicals. Data was analysed using independent samples t-test and chi-square test. 204 IBS (Total IBS-SSS, 277 ± 79) and 22 healthy controls (36 ± 28, $p < 0.01$) completed the study. IBS participants were more likely to report extra-intestinal symptoms including headaches ($p < 0.01$), migraines ($p = 0.03$), fatigue ($p < 0.01$), difficulty sleeping ($p = 0.03$), rhinitis ($p = 0.02$), urticaria ($p = 0.04$) and mood disturbance ($p < 0.01$). IBS participants were more likely to report at least one food chemical as a trigger for gastrointestinal (38% vs 13%, $p = 0.03$) and/or extra-intestinal (30% vs 9%, $p = 0.04$) symptoms. In the IBS group, the most common suspected dietary triggers for gastrointestinal symptoms were salicylates (19%) followed by MSG (17%) and artificial colours (14%); while for extra-intestinal symptoms, MSG (15%) was most common, followed by amines (14%), and sulphites (12%). There was no significant difference in consumption of ultra-processed, additive containing foods. Twenty-one (10%) IBS participants were following a low chemical diet, with dietary advice provided by a dietitian ($n = 13$), general practitioner ($n = 6$), gastroenterologist ($n = 6$), naturopath ($n = 3$), family/friend ($n = 4$) and/or the diet was self-initiated ($n = 7$). Fourteen of the 21 (67%) reported following both a low food chemical and low FODMAP diet. Patients with IBS are more likely to report extra-intestinal symptoms compared to healthy controls. Despite limited evidence, a low food chemical diet is utilised to manage both gastrointestinal and extra-intestinal symptoms. Of concern, many respondents following a low food chemical diet reported also following a low FODMAP diet, which may have implications for nutritional adequacy.

References

1. Tuck C, Malakar S, Barrett J, et al. (2021) JGH Open 5, 871-878.
2. Larussa T, Abenavoli L, Corea A, et al. (2021) Eur Rev Med Pharmacol Sci 25(10).

Keywords: dietary therapy; disorders of gut-brain interaction; extra-intestinal symptoms; bioactive food chemicals

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

The impact of egg consumption on indices of gastrointestinal health: a systematic literature review

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Eggs are highly digestible, nutrient-rich and are a valuable source of protein and choline, thereby promoting a range of health benefits. Several studies have found an association between protein intake and gastrointestinal microbial diversity⁽¹⁾, while bacterial fermentation of undigested protein in the large bowel can produce short-chain fatty acids, such as butyrate, positively influencing host metabolic health, gut integrity and immune function⁽²⁾. On the other hand, dietary choline stimulates gastrointestinal bacterial production of trimethylamine and the prothrombotic compound trimethylamine-N-oxide (TMAO)⁽³⁾. Despite these established links, limited studies have explored the effects of whole egg intake on indices of gastrointestinal health. This systematic literature review aimed to synthesise research that has investigated the impact of egg-supplemented diets or egg consumption on markers of gastrointestinal health including microbiome, function and symptoms. This review was conducted in accordance with PRISMA guidelines. Five databases (Ovid Medline, Embase, CINAHL Plus, SCOPUS, and PsychInfo), and reference lists of relevant papers, were searched from inception until April 2023. Studies were included if they examined the link between whole chicken egg consumption and gastrointestinal health in healthy adults (aged >16). Indices of gastrointestinal health were defined as any outcomes related to gastrointestinal factors, including symptoms, microbiome, inflammation, colonic fermentation and TMAO. Reviews and case studies were excluded. All studies underwent risk of bias assessment. Overall, 548 studies were identified and 19 studies were included after screening. Eight of these were randomised controlled trials (RCTs), 8 cross-sectional and 3 prospective cohort studies. Participants ranged in number between 20–32,166 and in age between 18–84 years. Study periods varied between 3–14 weeks for RCTs and 6 months–12.5 years for prospective cohort studies. RCTs examined intakes between 1–4 eggs/day, with the majority examining 3 eggs/day (n=6). The primary outcome across 15 articles was TMAO levels, with most reporting no significant associations (n=13). Five studies examined inflammation with inconsistent findings ranging from no alterations (in TNF- α , IL-8, CRP), increases (in anti-inflammatory marker LTB5, TNF- α), and decreases (in IL-6, CRP). Lastly, 7 studies explored alterations in microbiome. Two RCTs and 2 cross-sectional trials reported no alterations in microbial diversity in response to eggs. Meanwhile, 2 cross-sectional and 1 prospective study linked specific bacteria to consistent egg intake. Eggs were associated with species that produce butyrate (*E.rectale*, *F.prausnitzii*, *M.smithii*, and *R.bromii*), and protect against metabolic syndrome (*A.muciniphila*). This systematic review found that egg consumption did not increase levels of the undesirable biomarker TMAO and were associated with butyrate-producing bacteria. Evidence regarding the effect of egg intake on inflammation was inconsistent. This review revealed the general lack of available research investigating whole eggs and gastrointestinal health. Future carefully designed RCTs are required to improve understanding of how eggs may influence the gastrointestinal microbiome and colonic fermentation.

References

1. Cryan J, O'Riordan K, Cowan C, et al. (2019) *Physiol Rev* 99, 1877-2013.
2. Liu J, Tan Y, Cheng H, et al. (2022) *Aging Dis* 13, 1106-1126.
3. Velasquez MT, Ramezani A, Manal A, et al. (2016) *Toxins (Basel)* 8, 326.

Keywords: eggs; gastrointestinal system; gut microbiome; inflammation

Ethics Declaration: No

Financial Support: This research received no external funding

Abstract

Dietary fibre intakes of two cohorts of New Zealand adults with and without constipation

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Adequate dietary fibre (DF) intake is recommended to relieve constipation and improve gut health⁽¹⁾. It is often assumed that individuals with constipation have relatively low DF intake and do not meet the recommended adequate intake of 25 g and 30 g for females and males, respectively. The 2008/09 New Zealand Adult Nutrition Survey confirmed that the mean DF was 17.9 grams (g) per day for females and 22.8 g per day for males, which was well below the recommended adequate intake⁽²⁾. With the continuous shift of dietary patterns over time, we sought to compare the current usual DF intake of two cohorts of New Zealand adults: those who have constipation with those without constipation but with relatively low DF intake. We report baseline dietary data from two randomised controlled dietary studies (Kiwifruit Ingestion to Normalise Gut Symptoms (KINGS) (ACTRN12621000621819) and Bread Related Effects on microbial Distribution (BREAD) (ACTRN12622000884707)) conducted in Christchurch, New Zealand in 2021 and 2022, respectively. The KINGS study included adults with either functional constipation or constipation-predominant irritable bowel syndrome to consume either two green kiwifruit or maltodextrin for four weeks. The BREAD study is a crossover study and included healthy adults without constipation but with relatively low DF intake (<18 g for females, <22 g for males) to consume two types of bread with different DF content, each bread for four weeks separated by a two-week washout period. All participants completed a non-consecutive three-day food diary at baseline. Dietary data were entered into FoodWorks Online Professional (Xyris Software Australia, 2021) to assess mean daily DF intake. Fifty-six adults from the KINGS study ($n= 48$ females, $n= 8$ males; mean age \pm standard deviation: 42.8 ± 12.6 years) and BREAD study ($n= 33$ females, $n= 23$ males; mean age: 40.4 ± 13.4 years) completed a baseline food diary. In the KINGS study, females with constipation had a daily mean DF intake of 25.0 ± 9.4 g whilst male participants consumed 26.9 ± 5.0 g per day. In the BREAD study, females without constipation had a mean daily DF intake of 19.4 ± 5.8 g, whereas males had 22.6 ± 8.5 g per day. There was a statistically significant difference in the mean daily DF intake between females with constipation and those without constipation ($p < 0.001$) but not between males ($p = 0.19$). These two studies found that DF intakes among females with constipation were not as relatively low as previously assumed, as they met their adequate intake of 25 g. Further data analysis from the KINGS and BREAD studies will reveal the effects of using diet to manage constipation and promote better gut health in these two cohorts of New Zealand adults.

References

1. Jones JM. (2014) Nutr J. 12, 13:34.

2. University of Otago and Ministry of Health. A Focus on Nutrition: Key findings of the 2008/09 New Zealand Adult Nutrition Survey 2011 [Available from: <https://www.health.govt.nz/system/files/documents/publications/a-focus-on-nutrition-v2.pdf>].

Keywords: dietary fibre intake; New Zealand; adults; constipation

Ethics Declaration: Yes

Financial Support: Funding from the BREAD study had come from the High-Value Nutrition National Science Challenge, which was funded by the New Zealand Ministry of Business, Innovation and Employment (MBIE), contract number (UOAX1902). Goodman Fielder provided approximately 10 percent of cash co-funding and in-kind contributions. For the KINGS study, funding had also come from the High-Value Nutrition National Science Challenge; and Zespri International Ltd.

Nutrition, psychology & mental health

Nutrition, psychology & mental health

Abstract

Is higher fruit and vegetable intake associated with a reduced risk of depression in middle-aged and older adults? Data from 10 diverse international cohorts

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Depression is the largest global contributor to non-fatal disease burden ⁽¹⁾. A growing body of evidence suggests that dietary behaviours, such as higher fruit and vegetable intake, may be protective against the risk of depression ⁽²⁾. However, this evidence is primarily from high-income countries, despite over 80% of the burden of depression being experienced in low- and middle-income countries ⁽¹⁾. There are also limited studies to date focusing on older adults. The aim of this study was to prospectively examine the associations between baseline fruit and vegetable intake and incidence of depression in adults aged 45-years and older from 10 cohorts across six continents, including four cohorts from low and middle-income countries. The association between baseline fruit and vegetable intake and incident depression over a 3–6-year follow-up period was examined using Cox proportional hazard regression after controlling for a range of potential confounders. Participants were 7771 community-based adults aged 45+ years from 10 diverse cohorts. All cohorts were members of the Cohort Studies of Memory in an International Consortium collaboration ⁽³⁾. Fruit intake (excluding juice) and vegetable intake was collected using either a comprehensive food frequency questionnaire, short food questionnaire or diet history. Depressive symptoms were assessed using validated depression measures, and depression was defined as a score greater than or equal to a validated cut-off. Prior to analysis all data were harmonised. Analysis was performed by cohort and then cohort results were combined using meta-analysis. Subgroup analysis was performed by sex, age (45 – 64 versus 65+ years) and income level of country (high income countries versus low- and middle-income countries). There were 1537 incident cases of depression over 32,420 person-years of follow-up. Mean daily intakes of fruit were 1.7 ± 1.5 serves and vegetables 1.9 ± 1.4 . serves. We found no association between fruit and vegetable intakes and risk of incident depression in any of the analyses, and this was consistent across the subgroup analyses. The low intake of fruit and vegetables of participants, diverse measures used across the different cohorts, and modest sample size of our study compared with prior studies in the literature, may have prevented an association being detected. Further investigation using standardised measures in larger cohorts of older adults from low- to middle-income countries is needed. Future research should consider the potential relationship between different types of fruits and vegetables and depression.

References

1. World Health Organisation. Depression and other common mental disorders: global health estimates. 2017.
2. Lassale C, Batty GD, Baghdadli A, et al. (2019) *Mol Psychiatry* 24(7):965-86.
3. Sachdev PS, Lipnicki DM, Kochan NA, et al. (2013) *BMC Neurol* 13:165.

Keywords: fruit; vegetables; depression; older adults

Ethics Declaration: Yes

Financial Support: Funding for COSMIC comes from the National Institute on Aging of the National Institutes of Health (Award number: RF1AG057531).

Abstract

Snacking motivations and behaviour in Australian adults: The role of personality traits

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Snacking, namely, consuming food and beverages in-between main meals, especially snacks with a high fat, salt and/or sugar content, is a major contributor to excessive energy intake and long-term weight gain ⁽¹⁾. There are many potential drivers of snacking behaviours, including physiological (e.g., hunger) as well as social, psychological, and emotional reasons ⁽²⁾. Individual differences, such as personality traits, have been linked to unhealthy snacking. Nevertheless, it is important to examine the potential explanatory pathways, such as motivations for snacking and habit strength, that may explain this relationship between personality and snacking. This cross-sectional study investigated the associations between personality traits, habit strength, motivations for snacking, and snacking behaviour, including choice and consumption. Participants were $n = 230$ Australian adults (female: $n = 164$; 71.3%) aged 18-77 years old ($M = 34$ years, $SD = 13.4$) who completed an online survey. The survey included assessments of personality traits (The Big Five Inventory 2), habit strength (the Self-Report Habit Index), motivations for snacking (The Eating Motivation Survey), momentary snack food choice (Snack Preference Task), and habitual snack food consumption (Snack Frequency Questionnaire). Overall, the most frequently selected motivations for snacking were 'liking', 'convenience', and 'habit'. Correlation analyses were conducted to examine the relationship between motivations for snacking and snacking behaviour. We found that health motivation for snacking was negatively correlated with momentary choice ($r = -.042$, $p < .01$) and habitual consumption ($r = -.033$, $p < .01$) of unhealthy snack foods and beverages. Hierarchical multiple regression analyses were used to examine whether habit strength and the Big Five personality traits predicted both motivations for snacking and snacking behaviours after controlling for demographic variables. For health motivations for snacking, habit strength ($\beta = -0.15$, $p = .025$), openness ($\beta = 0.50$, $p = .003$), and conscientiousness ($\beta = 0.58$, $p = .001$) were significant predictors. For momentary choice of unhealthy snacks, health motivation ($\beta = -4.35$, $p = .004$), pleasure ($\beta = 3.53$, $p = .029$), and visual appeal ($\beta = 5.29$, $p < .001$) were significant predictors. For habitual consumption of unhealthy snacks, health motivation ($\beta = -5.39$, $p = .001$), habit strength ($\beta = 2.89$, $p = .045$) and neuroticism ($\beta = 5.16$, $p = .045$) were significant predictors. These findings indicate that health motivation for snacking predicts both momentary snack preference and habitual snack food consumption. Moreover, personality traits may be linked with habitual unhealthy snacking behaviour via their association with specific motivations for snacking. Overall, these findings suggest that health promotion messages focusing on health motivation may be important for increasing healthier momentary and habitual snack choices to improve dietary intake and support weight management.

References

1. Bellisle F (2014) *Phys & Beh* 134, 38-43.
2. Verhoeven A, Adriaanse M, de Vet E, et al. (2015). *Appetite* 84, 20-27.

Keywords: snacking; dietary behaviour; habit strength; personality traits

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

Changes in psychological outcomes and sleep quality following energy restriction with and without almonds

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Associations between obesity and mental illness have been identified, but they are complex and bidirectional ⁽¹⁾. Weight loss interventions have been proposed as a potential strategy to improve mental health in individuals with overweight or obesity, but the evidence remains inconclusive ⁽²⁾. Additionally, the role of specific foods in a weight loss diet and mental health outcomes is not well understood ⁽³⁾. This study aimed to explore the association between weight loss (with and without almonds) and self-administered psychological and sleep assessments, including the Profile of Mood States (POMS), the Perceived Stress Scale (PSS), the Zung Self-Rating Depression Scale (ZSDS), and the Pittsburgh Sleep Quality Index (PSQI). Participants (n=140, 47.5 ± 10.8 years) with overweight or obesity (BMI: 30.7 ± 2.3 kg/m²) were randomised to an energy-controlled almond-enriched diet (AED) or nut-free diet (NFD). Psychological and sleep assessments were conducted at baseline, after 3 months of weight loss, and after 6 months of weight maintenance. Data were analysed using mixed-effects models and linear regression. For POMS, total mood disturbance score (TMDS) (60.2%, p=0.01), fatigue-inertia (21.2%, p=0.003), and vigor-activity (19.9%, p<0.001) improved over time (with no difference between groups), with improvements associated with the magnitude of weight loss (TMDS: β=0.059, p=0.02; fatigue-inertia: β=0.268, p=0.016; vigor-activity: β=-0.194, p=0.048). No significant changes were observed in tension-anxiety, depression-dejection, anger-hostility, or confusion-bewilderment. A significant group x time interaction (p=0.048) was found for the PSS, which increased in the NFD group (10.1%) and decreased in the AED (1%) during the weight maintenance phase. No significant changes were observed for the ZSDS. The PSQI demonstrated significant improvement in both groups over time for sleep quality (11.3%, p<0.001), sleep latency (24.3%, p<0.001), sleep disturbance (39.2%, p=0.04), and daytime dysfunction (290.4%, p<0.001), but not for sleep duration or habitual sleep efficiency. Summed scores, generating the global sleep score (GSS), demonstrated an overall significant improvement in both groups over time (33.5%, p<0.001), and these improvements were associated with weight loss (GSS: β=0.863, p<0.001). The findings emphasise the importance of evaluating mental health outcomes in weight loss interventions and highlight the potential influence of weight management on mood and sleep quality. Further research is warranted to explore the impact of diet composition on perceived stress and other mental health outcomes.

References

1. Cameron A, Magliano DJ, Dunstan D, et al. (2012) *Int J Obes* 36(2), 295-303.
2. Sarwer DB & Polonsky HM (2016) *Endocrinol Metab Clin North Am* 45(3), 677-688.
3. Fernández-Rodríguez R, Jiménez-López E, Garrido-Miguel M, et al. (2022) *Nutr Rev* 80(10):2076-2088.

Keywords: obesity; weight loss; sleep; mental health

Ethics Declaration: Yes

Financial Support: This work was funded by the Almond Board of California. This funding source had no role in the design of this study or the analysis and interpretation of the data.

Abstract

Change in symptoms of depression and eating disorders in adolescents with obesity participating in a clinical trial

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Depression and eating disorder (ED) risk are heightened during adolescence⁽¹⁾ and both were exacerbated during COVID-19 lockdowns. This analysis reports changes in self-reported symptoms of depression and eating disorders throughout the Fast Track to Health trial. Fast Track to Health was a 52-week multi-site randomised-controlled trial, conducted 2018-2023, comparing intermittent (IER) and continuous energy restriction (CER) in adolescents with obesity and ≥ 1 associated comorbidity⁽²⁾. The Centre for Epidemiologic Studies Depression Scale-revised 10-item version for adolescents (CESDR) was used to assess symptoms of depression (no symptoms, sub-threshold, or possible, probable, major depressive episode). Eating Disorder Examination Questionnaire (EDE-Q) was used to assess ED risk; defined as global score ≥ 2.7 , ≥ 2 episodes of binge eating with/without loss of control, or ≥ 1 episode of purging within the last 28-days. The Binge Eating Scale (BES) assessed severity of binge eating (no binge eating, mild/moderate, severe). Adolescents were monitored for disordered eating during dietetic consults. Linear mixed models, retaining all data consistent with intention-to-treat analysis, were used to estimate the change in outcomes from baseline to week-52. Descriptive statistics were used to describe the number of participants meeting screening criteria at baseline and week-52. One hundred and forty one adolescents were enrolled and 97 completed the trial, with median (IQR) EDE-Q score 2.28 (1.43 to 3.14), CESDR 9.00 (4.0 to 14.5) and BES 11.0 (5.0 to 17.0) at baseline. EDE-Q (change in estimated marginal means [SE]), IER -0.63 [0.18], CER -0.56 [0.17] and CESDR (IER -2.70 [1.15], CER -3.87 [1.07]) scores reduced between baseline and week-52 in both groups ($p < 0.05$) with no difference between groups. There was a between group difference ($p = 0.019$) in change in BES. The IER group had a reduction between baseline and week-52 (-3.72 [1.27]) and the CER group had no change. At baseline, 31 (22%) adolescents were classified as having a possible/probable/major depressive episode, 110 (78%) met ≥ 1 ED criteria and 28 (21%) as mild/moderate or severe binge eating, reducing to 8 (9%), 56 (61%) and 15 (16%) respectively at week-52. A small sub-group of adolescents required additional support for disordered eating. Overall, treatment-seeking adolescents with obesity have symptoms of depression and ED. Although symptoms reduce for most, some required additional support. Screening and monitoring for depression and ED are important to ensure early intervention.

References

1. Jebeile H, et al. (2021) *Obesity* 29(9), 1413-1422.
2. Lister NB, et al. (2020) *Obes Res Clin Pract* 14(1), 80-90.

Keywords: obesity; diet intervention; disordered eating; depression

Ethics Declaration: Yes

Financial Support: This work is supported by the Australian National Health and Medical Research Council (grant number 1128317, N.B.L. grant number 1145748, M.L.G. grant number 1158876, H.J. grant number 2009035).

Abstract

The effect of *Gymnema sylvestre* on motivations to consume sweet foods – a qualitative investigation

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Global consumption of sugar-sweetened foods (SSF) is high, despite being linked with obesity⁽¹⁾. Motivations to eat SSF may contribute to high sugar intakes⁽²⁾. The herb *Gymnema sylvestre* (GS) may reduce SSF consumption⁽³⁾, but its effects on motivations to eat SSF are unknown. This study aimed to investigate effects of GS on adult's motivations to eat SSF. The study used a placebo-controlled randomised cross-over method, of which seven participants (mean age of 34 ± 13.8 years; two males, five females) who self-identified as having a sweet tooth agreed to interview. A placebo mint was tested three times daily in-between meals (i.e., PLAC-SYS) for 14 days, before random allocation to one of two GS treatments for a second 14-day period, crossing over GS treatments in a final 14-day period. The GS treatments were identical GS-containing mints, administered systematically three times daily in-between meals (i.e., GS-SYS); or ad-libitum up to six times daily (i.e., GS-ADLIB). Each participant completed four 30-minute interviews – at baseline and after each 14-day testing period – to capture perspectives on changes in motivations, and the effects of treatments on SSF intake. Interviews occurred on Zoom software or in person, according to participant preference. Interview transcripts were uploaded to NVivo, and themes regarding motivations to eat SSF were identified and explored to ascertain effects on participant's behaviour during each treatment, and what influenced their motivations. Baseline motivations to eat or to avoid SSF were categorised in psychological, external, habitual, hedonistic and physiological themes (except none habitually avoided SSF). Baseline motivations to eat and avoid SSF were influenced by deliberate decisions to change lifestyles and external factors (e.g., occupations). During testing of PLAC-SYS, GS-SYS and GS-ADLIB, participants' motivations were affected by each treatment and external factors. At all stages participants were still motivated hedonistically to eat SSF. Compared to PLAC-SYS, both GS treatments were more effective because they reduced pleasure derived from SSF more and enhanced mindful eating. Four participants preferred GS-SYS to GS-ADLIB because of taste preference, and because it was more effective at changing behaviours around eating SSF. Participants also reported self-control of SSF intake changed because of GS-ADLIB (but not GS-SYS or PLAC-SYS) and external factors. Overall, reported self-control levels varied during the study, mostly because of external factors rather than the effects of GS-ADLIB. Compared to PLAC-SYS, both GS treatments may increase motivations to avoid SSF. The herb may be useful in interventions already utilising mindful eating by increasing the time between initial motivations to eat, and actually eating SSF. External factors also affect how in control individuals feel over SSF intake; GS-ADLIB may enhance self-control. Interventions supporting navigation of changing external factors, combined with GS, could be particularly effective in reducing SSF intake.

References

1. Torres-Fuentes C, Schellekens H, Dinan TG, et al. (2015) *Nutri Neurosci* 18, 49-65.
2. Mann T, Tomiyama AJ, Westling E, et al. (2007) *Am Psychol* 62, 220.
3. Turner S, Diako C, Kruger R, et al. (2020) *Nutrients* 12, 1046.

Keywords: sugar-sweetened foods; motivations; mindfulness; sugar-reduction

Ethics Declaration: Yes

Financial Support: GS-containing mints and placebo mints were provided by Nu Brands Inc. (Los Angeles, CA, USA)

Abstract

Does experience of music enhance olfaction: music as a potential nutrition intervention?

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Olfaction, the sense of smell, is under recognised and underappreciated despite being vital in wellbeing. It confers a major influence on the feeding process being the major contributor of flavour and has a direct involvement in the cephalic phase responses. Along with its influence on food and nutrition, olfaction is directly associated with cognitive function and impacts social communication and safety ⁽¹⁾. Loss of olfactory acuity, commonly occurring in aging and frailty, significantly influences dietary behaviour and food selection ⁽²⁾. Unlike the senses of vision and audition, interventions are lacking. We propose in a proof-of-concept that crossmodal integration of olfaction and audition could inhibit olfactory decline in lifelong musicians through encouraging neuroplasticity of the olfactory brain centres. Ethical approval was obtained from The University of Adelaide Human Research Ethics Committee. Male musicians with a lifetime experience of music (ME) and naïve non-musicians (NM) aged 55 years and over were recruited through music organisations and controls through the Australian Men's Shed network. The initial target sample size was twenty per cohort. Olfactory acuity was assessed with Sniffin' sticks® (Odofin, Groningen, The Netherlands), a well validated system of a battery of three tests regimes. Sniffin' sticks represent 'felt tipped pens' impregnated with odourants presented 20mm below the nose of participants who were then prompted to 'sniff'. Assays determined participant 'Threshold', 'Discrimination' and 'Identification' of test odours ⁽³⁾. Measurement of Threshold and Discrimination were undertaken in triplet fifteen seconds apart with eyes closed; measurement of Threshold being conducted in an ascending 'staircase' to detect lowest odour concentration detectable, whereas measurement of Discrimination selected the 'odd-man-out' of a triplet comprising two identical and one different odour. Measurement of Identification, with eyes open, selected the odour of a single 'pen' from a prompt list of four. All tests demanded selection. Each of the test batteries were scored out of sixteen along with total aggregate of Threshold, Discrimination, and Identification (TDI). Twenty-six participants completed the study (18 ME and 8 NM); numbers were limited owing to active COVID-19. Mean and standard deviations (SD) of Threshold, Discrimination, Identification and TDI were derived and compared between groups using 't'-test. For ME, Threshold, Discrimination, and Identification values were 6.2 (SD ± 3.7), 10.6 (SD ± 1.9), and 12.9 (SD ± 1.6). The respective values for NM were 5.0 (SD ± 2.3), 8.8(SD ± 2.9), and 10.8 (SD ± 2.5). The ME group showed a significantly higher Discrimination (p=0.164). Significant differences were not seen for Threshold, Identification, and overall TDI scores, however the small sample size may have accounted for this. Based on this proof-of-concept, further exploration of music is warranted as an intervention to enhance olfactory acuity to potentially improve the intake of food and nutrition, and enrich pleasure of eating and drinking, and quality of life.

References

1. Boesveldt S & Parma V (2021) *Cell and Tissue Res* 383, 559-67.
2. Toussaint N, de Roon M, van Campen JP, et al. (2015) *Chem Senses* 40(3),197-203.
3. Rumeau C, Nguyen D & Jankowski R (2016) *Eur Ann Otorhinolaryngol Head Neck Dis.* 133(3), 203-6.

Keywords: olfactory acuity; music; nutrition

Ethics Declaration: Yes

Financial Support: This research received no external funding

Nutrition and women's health

Nutrition and women's health

Abstract

Menstrual health knowledge amongst active females in Aotearoa/New Zealand

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Poor menstrual health literacy is a factor that contributes to females not seeking medical help for abnormal menstrual symptoms that may impact their mental, social, and physical health ⁽¹⁾. Few studies have focused on testing baseline functional knowledge of the menstrual cycle (MC) outside the context of pregnancy and menopause. The primary objective of this study was to investigate MC knowledge levels of physically active females residing in New Zealand. A secondary objective was to understand where females get their MC information from, what sources they consider to be trustworthy and what information on the MC they would like to know more about. A MC knowledge questionnaire was developed by the research team (n=3), and reviewed by academics (n=4), medical experts (n=4), sporting organisation staff (n=5), and target population (n=10) to ensure content validity. Active females (n=203) between the ages of 16-40 years completed an online questionnaire. The questionnaire included a total of 25 knowledge questions and was split into four categories: menstrual cycle (Q=9), menstruation (Q=7), symptoms (Q=5), and health outcomes (Q=6). Responses (single and multiple answer multi-choice questions) were analysed using descriptive statistics which were presented as mean, SD and frequency (%). The overall knowledge score was 51.8% (22.8 ± 3.4). The highest knowledge scores were noted for symptoms (80.5%), followed by menstruation (79.8%), and the menstrual cycle (64.2%). Females scored poorly when asked about health outcomes related to the MC (20.4%). 61.5% of participants (n=123) identified the internet as their main source of MC information. Friends (n=82, 41%), school sex education (n=73, 36.5%) and social media (n=73, 36.5%) were the next most common sources of MC information. The most trustworthy sources of information were doctors/GPs (n= 96, 48%) and healthcare professionals (n=70, 35%). The most common topics that females wanted to know more about were diet and the MC (n=115, 57.5%), training and the MC (n=115, 57.5%), MC tracking (n=78, 39%), MC and mood (n=75, 37.5%) and RED-S/LEA/Female athlete triad (n=71, 35.5%). Overall functional knowledge levels of the MC and associated health outcomes is low in active females. Healthcare professionals and doctors are the most trustworthy sources of information; however, they are not the most common sources of information that females will engage with. Developing online educational resources on the MC, associated health outcomes and lifestyle factors (diet, physical activity) with medical and healthcare professionals may be considered in future female health education.

References

1. Garside R, Britten N, Stein K. (2008) *Journal of Advanced Nursing* 63(6):550-62.

Keywords: Menstrual cycle; awareness; education sources; premenopausal females

Ethics Declaration: Yes

Financial Support: This research received no funding

Abstract

The effect of pre- and probiotic supplementation on inflammatory markers in postmenopausal women

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Chronic inflammation is linked with several deleterious diseases, including cardiovascular disease, obesity, diabetes mellitus, irritable bowel disease, and osteoporosis^{1,2}. Post-menopausal women are at a heightened risk of developing these diseases due to the remission of oestrogen, further amplifying a pro-inflammatory state^{3,4}. This study aimed to critically examine the combined effect of pre- and probiotic supplementation (synbiotics) and exercise in the form of $\geq 7,000$ steps per day on inflammatory markers hs-CRP, IL-1 β , IL-6, IL-8, IL-10, INF- γ and TNF- α in sedentary post-menopausal women. Eighty-seven healthy post-menopausal women were allocated to receive either a synbiotic supplement or placebo for 12 weeks. Participants' demographics and physical activity levels were determined using questionnaires, and their diet was assessed using self-reported 3-day diet records. Body composition measures of height, weight and BMI were measured at baseline, while total body mass, lean body mass, total fat mass and total body fat percentage at baseline and week 12 using dual-energy X-ray absorptiometry. Fasted venous blood samples were collected to analyse inflammatory status before and after the intervention. Statistical analysis was performed using SPSS version 24, where outcome variables with multiple time points, were analysed using repeated measures ANOVA with the model, including time (baseline vs 12 weeks), intervention group (placebo vs synbiotic), and their interaction as fixed effects. The results showed no significant differences between the intervention group's demographics, physical activity levels, and dietary intake ($p > 0.05$). The 12-week study duration (time) was found to have had a statistically significant effect on lowering hs-CRP ($p < 0.018$), IL-8 ($p < 0.001$), INF- γ ($p < 0.001$), TNF- α ($p < 0.001$) and increasing IL-6 ($p < 0.001$) and IL-10 ($p < 0.001$) in both groups. However, the observed decrease in IL-1 β ($p < 0.348$) over time was not significant. The intervention type (synbiotic or placebo) significantly impacted IL-10 ($p < 0.003$). No significant interactions between time and group were observed across all other inflammatory markers ($p > 0.05$). The study duration increased total lean body mass ($p < 0.015$) and decreased total body fat percentage ($p < 0.022$) in both the placebo and synbiotic groups. At the same time, the intervention type (synbiotic or placebo) had no effect on total lean body mass, total fat mass, total body mass and percentage body fat in both groups ($p > 0.05$). The current study showed no notable differences between the placebo and synbiotic groups suggesting synbiotic supplementation is likely ineffective at reducing chronic inflammation in overweight, sedentary post-menopausal women living in New Zealand. However, future studies are needed to confirm these findings. Additionally, studies should investigate the effects of exercise and synbiotic supplementation separately in this population.

References

1. Nathan C, Ding A (2010) *Cell* 140, 871-82.
2. Furman D, Campisi J, Verdin E, et al. (2019) *Nature Medicine* 25, 1822-32.
3. Burch J, Rice S, Yang H, et al. (2014) *Health Technology Assessment* 18, 1-180.
4. Neyrinck AM, Rodriguez J, Taminiou B, et al. (2021) *Scientific Reports* 11.

Keywords: Synbiotics; post-menopausal; inflammation; cytokines

Ethics Declaration: Yes

Financial Support: Massey University Research Funding; Fonterra Cooperative Ltd.

Abstract

Understanding barriers and facilitators to diet and physical activity modification in people with polycystic ovary syndrome: a mixed method systematic review

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Polycystic Ovary Syndrome PCOS is an endocrine disorder affecting 8 to 13% of reproductive aged women ⁽¹⁾. Dietary and physical activity changes are the first-line therapy to assist with symptom and weight management and to reduce the risk of reproductive, metabolic and psychological comorbidities ⁽²⁾. However, women with PCOS have a higher weight, experience weight gain, and a higher prevalence of living in a larger body. Health care professionals (HCPs) play a crucial role in delivering diet and physical activity advice for people with PCOS. Thus, the aim of this systematic review is to understand the barriers, facilitators, experiences, and perceptions of engagement and compliance with diet and physical activity modifications in people with PCOS and in HCPs providing or referring people with PCOS to diet and physical activity modifications. A mixed-method systematic review was conducted with quantitative studies narratively synthesised and all studies thematically analysed. There were 68 eligible papers, including n=59 (n=5198) people with PCOS and n=17 (n=2,622) HCPs. Several themes were identified as impacting people with PCOS' ability to make diet and physical activity changes. HCP education on PCOS management through diet and physical activity was viewed by HCPs and people with PCOS to be inadequate, further impacting the quality of care and health outcomes. Dietary and physical activity advice delivered by a multidisciplinary team, including dietitians, was identified as a key component for change. Both people with PCOS and HCPs agreed that there was a need for individualised and PCOS-specific diet and physical activity advice. However, HCPs viewed that there was limited evidence supporting these recommendations and a lack of time to deliver this care. Weight stigma was identified as impacting both those in larger and smaller bodies with PCOS, reducing the quality of care and affecting self-perception and mental health. People with PCOS perceived that diet and physical activity are overly focused on weight loss and fertility, independent of their own personal motivations and goals. Systemic changes, including receiving diet and physical activity advice that meet the individual's needs, are necessary for leading to long-term sustainable changes and improvements in health outcomes. A multidisciplinary team approach and an overhaul of HCPs' perceptions and mentality of weight and weight-centric care for those with PCOS are essential in delivering effective diet and physical activity advice.

References

1. Lim SS, Hutchison SK, Van Ryswyk E, et al. (2019) *Cochrane Database Syst Rev* 3.
2. Teede HJ, Misso ML, Boyle JA, et al. (2018) *Med J Aust* 209, S3-s8.

Keywords: polycystic ovary syndrome; weight; physical activity; diet

Ethics Declaration: No

Financial Support: M.M. is funded by Ph.D. scholarships from the Monash Centre for Health Research and Implementation.

Abstract

Impact of COVID-19 restriction on weight, physical activity, diet and psychological distress on people with polycystic ovary syndrome

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People with polycystic ovary syndrome (PCOS) have higher weight gain and psychological distress compared to those without PCOS⁽¹⁾. While COVID-19 restrictions led to population level adverse changes in lifestyle, weight gain and psychological distress⁽²⁾, their impact on people with PCOS is unclear. The aim of this study was to investigate the impact the 2020 COVID-19 restrictions had on weight, physical activity, diet and psychological distress for Australians with PCOS. Australian reproductive-aged women participated in an online survey with assessment of weight, physical activity, diet and psychological distress. Multivariable logistic and linear regression were used to examine associations between PCOS and residential location with health outcomes. On adjusted analysis, those with PCOS gained more weight (2.9%; 95% CI; 0.027–3.020; $p = 0.046$), were less likely to meet physical activity recommendations (OR 0.50; 95% CI; 0.32–0.79; $p = 0.003$) and had higher sugar-sweetened beverage intake (OR 1.74; 95% CI 1.10–2.75; $p = 0.019$) but no differences in psychological distress compared to women without PCOS. People with PCOS were more adversely affected by COVID-19 restrictions, which may worsen their clinical features and disease burden. Additional health care support may be necessary to assist people with PCOS to meet dietary and physical activity recommendations.

References

1. Lim SS, Hutchison SK, Van Ryswyk E, et al. (2019) *Cochrane Database Syst Rev* 3.
2. Stanton R, To QG, Khaledi S, et al. (2020) *Int. J. Environ. Res. Public Health* 17, 4065.

Keywords: polycystic ovary syndrome; COVID-19; weight; physical activity

Ethics Declaration: Yes

Financial Support: M.M. is funded by Ph.D. scholarships from the Centre for Research Excellence in Women's Health in Reproductive Life and Monash Centre for Health Research and Implementation. L.J.M. was funded by the Heart Foundation Fellowship. C.L.H. is supported by the National Health and Medical Research Council (NHMRC), CRE Health in Preconception and Pregnancy Senior Postdoctoral Fellowship (APP1171142). H.T. is funded by a fellowship from the Australian National Health and Medical Research Council (2009326).

Abstract

Assessing the influence of preconception diet on female fertility: a systematic scoping review of observational studies

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Preconception diet is a proposed modifiable risk factor for infertility.⁽¹⁾ However, there is no official guidance for women in the preconception period as to which dietary approaches may improve fertility. A comprehensive synthesis of the relevant evidence is key to determine the potentially effective dietary patterns and components as well as evidence gaps, and to provide information for nutritional recommendations for couples planning a pregnancy. In this systematic scoping review, four electronic databases (Medline and EMBASE via Ovid processing, CAB Direct, and CINAHL via EBSCO) were searched for observational studies (prospective and retrospective cohort, cross-sectional, and case-control studies) from inception to 27 September 2021. Eligible studies included women of reproductive age during the preconception period, and evaluated exposures related to preconception diet and outcomes related to fertility. Results were synthesised using a descriptive approach. A total of 36 studies were eligible for inclusion (31 prospective, 3 cross-sectional, and 2 case-control studies) and were published between 2007 and 2022. Of the assessed dietary exposures, increased adherence to the Mediterranean diet displayed the strongest and most consistent association with improved clinical pregnancy rates. Reducing trans fatty acids (TFAs), saturated fatty acids, and discretionary food intake (fast food and sugar-sweetened beverages) were associated with improvements in live birth, clinical pregnancy rates, and related ART outcomes. The dietary components of seafood, dairy, and soy demonstrated inconsistent findings across the few included studies. Due to heterogeneity and the limited available literature on most exposures, there is insufficient evidence to support any specific dietary approach for improving fertility. However, following some of the dietary approaches outlined in this review (anti-inflammatory diets, reducing TFA, and discretionary food intake) are consistent with broad healthy eating guidelines, have little to no associated risk, and offer a plausible set of possible benefits. This warrants further exploration in randomised controlled trials.

References

1. Panth N, Gavarkovs A, Tamez M, Mattei J (2011) *Front Public Health*. 2018 6:211.

Keywords: preconception diet; female infertility; Mediterranean diet; macronutrients

Ethics Declaration: —

Financial Support: This work received no specific funding. S.A. is supported by a Monash University Faculty Graduate Research Stipend. L.M. is supported by a Heart Foundation of Australia Future Leader Fellowship. A.M. is supported by a Peter Doherty Biomedical Research Fellowship provided by the National Health and Medical Research Council (NHMRC) of Australia. J.G. is supported by a National Health and Medical Research Council (NHMRC) grant (APP2000905).

Abstract

Barriers and enablers to a healthy lifestyle in people with infertility: a mixed-methods systematic review

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While there is a recognised role of optimising lifestyle behaviours such as diet and physical activity in the management of infertility, the best practice for lifestyle management of infertility remains unknown, and factors influencing the lifestyle behaviours of people with infertility are not well understood. The aim of this systematic review is to evaluate the barriers and enablers to a healthy lifestyle in people with infertility, from the perspectives of people with infertility and health professionals, in order to inform optimal behavioural change strategies for lifestyle management of infertility. Ovid MEDLINE(R), PsycINFO, EMBASE, EBM Reviews, and CINAHL Plus were searched from inception to 12th September 2022. Eligible studies were qualitative, quantitative or mixed-methods primary studies which explored barriers and/or enablers to lifestyle for infertility management, from the perspectives of people with infertility and/or health professionals. Two independent reviewers performed quality assessment, using the Centre for Evidence-Based Management Critical Appraisal of a Survey Tool (quantitative and mixed-methods studies) and the Critical Appraisal Skills Programme Qualitative Checklist (qualitative and mixed-methods studies). Data were analysed by inductive thematic analysis with themes mapped to the Capability, Opportunity, Motivation and Behaviour (COM-B) model⁽¹⁾ and Theoretical Domains Framework (TDF).⁽²⁾ Relevant behaviour change techniques (BCTs)⁽³⁾ to target the identified enablers and barriers were suggested. After screening 10703 citations and 82 full-texts, 22 studies were included (12 quantitative, 7 mixed-methods and 3 qualitative) with 18 studies including women with infertility (n = 2442), 10 including men with infertility (n = 1372) and 6 including health professionals (n = 261). From the perspectives of people with infertility, themes related to capability (e.g. strategies for behaviour change), opportunity (e.g. limited time, resources and money) and motivation (e.g. interplay between lifestyle and emotional state); themes mapped to 8 TDF domains. From the perspectives of health professionals, themes related to capability (e.g. identification of patients appropriate for lifestyle intervention), opportunity (e.g. mode of delivery) and motivation (e.g. professional responsibility); themes mapped to 6 TDF domains. 34 BCTs were identified across the suggested interventions. This systematic review found that several interacting factors influence lifestyle in people with infertility as well as health professional behaviour with regards to provision of lifestyle interventions for infertility. These factors can be targeted for optimisation of interventions. In light of the limited number of qualitative studies, there is a need for more qualitative research to gain deeper insights into the perspectives of people with infertility and health professionals for further exploration of the complex and interacting factors which shape lifestyle during the fertility journey.

References

1. Michie S, Van Stralen MM, West R (2011) *Implement Sci* 6(1):42.

2. Atkins L, Francis J, Islam R, et al. (2017) *Implement Sci* 12(1):77.

3. Michie S, Richardson M, Johnston M, et al. (2013) *Ann Behav Med* 46(1):81-95.

Keywords: COM-B model; lifestyle behaviours; infertility; theoretical domains framework

Ethics Declaration: —

Financial Support: No funding was obtained for this specific review. S.T. is supported by a Centre of Research Excellence Health in Preconception & Pregnancy (CRE HiPP) PhD Scholarship.

Infant & young child nutrition

Infant & young child nutrition

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Abstract

Household food insecurity and associations with energy, nutrient intake, and sociodemographic characteristics in young New Zealand children

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Although food insecurity affects a significant proportion of young children in New Zealand (NZ), ⁽¹⁾ evidence of its association with dietary intake and sociodemographic characteristics in this population is lacking. This study aims to assess the household food security status of young NZ children and its association with energy and nutrient intake and sociodemographic factors. This study included 289 caregiver and child (1-3 years old) dyads from the same household in either Auckland, Wellington, or Dunedin, NZ. Household food security status was determined using a validated and NZ-specific eight-item questionnaire. ⁽²⁾ Usual dietary intake was determined from two 24-hour food recalls, using the multiple source method. ⁽³⁾ The prevalence of inadequate nutrient intake was assessed using the Estimated Average Requirement (EAR) cut-point method and full probability approach. Sociodemographic factors (i.e., socioeconomic status, ethnicity, caregiver education, employment status, household size and structure) were collected from questionnaires. Linear regression models were used to estimate associations with statistical significance set at $p < 0.05$. Over 30% of participants had experienced food insecurity in the past 12 months. Of all eight indicator statements, "the variety of foods we are able to eat is limited by a lack of money," had the highest proportion of participants responding "often" or "sometimes" (35.8%). Moderately food insecure children exhibited higher fat and saturated fat intakes, consuming 3.0 (0.2, 5.8) g/day more fat, and 2.0 (0.6, 3.5) g/day more saturated fat compared to food secure children ($p < 0.05$). Severely food insecure children had lower g/kg/day protein intake compared to food secure children ($p < 0.05$). In comparison to food secure children, moderately and severely food insecure children had lower fibre intake, consuming 1.6 (2.8, 0.3) g/day and 2.6 (4.0, 1.2) g/day less fibre, respectively. Severely food insecure children had the highest prevalence of inadequate calcium (7.0%) and vitamin C (9.3%) intakes, compared with food secure children [prevalence of inadequate intakes: calcium (2.3%) and vitamin C (2.8%)]. Household food insecurity was more common in those of Māori or Pacific ethnicity; living in areas of high deprivation; having a caregiver who was younger, not in paid employment, or had low educational attainment; living with ≥ 2 other children in the household; and living in a sole-parent household. Food insecure young NZ children consume a diet that exhibits lower nutritional quality in certain measures compared to their food-secure counterparts. Food insecurity was associated with various sociodemographic factors that are closely linked with poverty or low income. As such, there is an urgent need for poverty mitigation initiatives to safeguard vulnerable young children from the adverse consequences of food insecurity.

References

1. Ministry of Health (2019) Household Food Insecurity Among Children: New Zealand Health Survey. Wellington: MoH. Available from <https://www.health.govt.nz/system/files/documents/publications/household-food-insecurity-among-children-new-zealand-health-survey-jun19.pdf>
2. Parnell W & Gray A (2014) *Br J Nutr* 112(8), 1393–1401.
3. Harttig U, Haubrock J, Knüppel S, et al. (2011) *Eur J Clin Nutr* 65, S87-S91.

Keywords: diet; children; food insecurity; nutrient intake

Ethics Declaration: Yes

Financial Support: The authors acknowledge support from the New Zealand Ministry for Primary Industries (MPI) with funding number 406047, and Massey University for the first author's doctoral scholarship.

Abstract

A systematic review of nutritional guidelines for preterm infants

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The estimated global preterm birth rate in 2020¹ was more than 10% of livebirths or 13.4 million infants. Nutrition in the neonatal period is a key factor to optimise growth, neurodevelopment, and later metabolic disease risk². There is no consensus on optimal nutrition for preterm infants, leading to substantial practice variation³. We aimed to assess the quality of nutritional guidelines for preterm infants, the consistency of recommendations, and the gaps in these recommendations. This review is reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2020 checklist. The study protocol was registered with PROSPERO (CRD42022327248). We searched six databases and 44 websites for nutritional guidelines for preterm infants before first hospital discharge, which were endorsed, prepared, or authorised by a regional, national, or international body, written in English, and published between 2012-2023. Two reviewers independently screened articles and extracted relevant data including nutritional recommendations (ranges or descriptions), the quality of recommendations (certainty of evidence and strength of recommendation), and gaps in recommendations, defined as those identified by the guidelines or when recommendations were based on very low certainty evidence. Disagreements were resolved by discussion or a third reviewer. Four reviewers appraised the included guidelines using AGREE II. We identified 7051 records, 27 guidelines were included in the review, 26% of which were of high quality. Most guidelines lacked stakeholder involvement and rigour of development. Twelve guidelines had recommendations for macronutrient intake, 18 for micronutrient intake, 12 for feeding, eight for fortification, and 14 for monitoring of nutritional adequacy. Only two guidelines provided recommendations for all five of these aspects. We found considerable variation in recommendations, many of which lacked details of certainty of evidence and strength of recommendation. Recommendations for feeding types and breastmilk fortification were consistent among high quality guidelines, but recommendations varied for intakes of almost all nutrients and monitoring of nutritional adequacy. Different guidelines gave different certainty of evidence for the same recommendations. Most gaps in recommendations were due to a very low certainty of evidence. Future development of nutritional guidelines for preterm infants should follow the standard guideline development method and ensure rigorous process including stakeholders' involvement to improve the reporting of strength of recommendation, certainty of evidence, and gaps in recommendation. Evidence is needed to support recommendations about macro and micronutrient intakes, breastmilk fortification, and markers on adequacy of intake of different nutrients.

References

1. WHO (2023) <https://www.who.int/news-room/fact-sheets/detail/preterm-birth> (last accessed August 2023)
2. Harding JE, Cormack BE, Alexander T, et al. (2017) *Lancet* 389, 1660-1668.
3. McLeod G, Farrent S, Gilroy M, et al. (2021) *Front Nutr* 8:642474.

Keywords: preterm; neonates; nutrition; guidelines

Ethics Declaration: Yes

Financial Support: This work was supported by the University of Auckland doctoral scholarship (M.M.), the Health Research Council of New Zealand (J.E.H., F.H.B., T.A., grant number 16/609, 1 October 2016); the Aotearoa Foundation (L.L., 9909494, 1 August 2019); and the University of Auckland (B.E.C., O.W.)

Abstract

Insights into feeding preterm infants in Aotearoa, New Zealand: a mixed-method study

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Optimal nutrition is essential for preterm infants as they face many barriers to achieving exclusive breastfeeding (EBF) and successfully introducing complementary foods (CF)⁽¹⁾. There is limited evidence of early feeding practices of preterm infants in Aotearoa, New Zealand (NZ). We aimed to investigate the facilitators and barriers to EBF and CF introduction in preterm infants in NZ. A nationwide self-completed electronic questionnaire was disseminated via social media to mothers of preterm infants. The survey collected quantitative data on hospital feeding practices, breastfeeding rates, timing of CF introduction, and fussy eating behaviours. Relationships between feeding practices and maternal and infant characteristics, such as ethnicity and level of prematurity, were explored using the Chi-Square statistical test in SPSS. Qualitative information regarding mothers' experiences with breastfeeding, CF introduction, type of education and support received about the nutrition of preterm infants were collected for thematic analysis using Nvivo. The survey started in April and will close on 20th August 2023. Here we present preliminary findings of a subset of responses collected to date, and full results will be available for the conference. Up to 1st August 2023, 201 mothers had completed the survey. Most mothers self-identified as of New Zealand European (58%) and Māori (13%) background. Most infants (39%) were older than 12 months of chronological age (CA) and born moderate or late preterm (32⁺⁰ – 36⁺⁶ weeks' gestation, 70%). Almost 50% of mothers required in-hospital supplementation of mothers' milk (infant formula, 28% and donor breastmilk, 20%), and 44% of mothers were EBF at the time of hospital discharge. EBF for 5-6 months of CA was reported by 21% of mothers, and 46% provided any breastmilk for more than 6 months of CA. Among mothers who had introduced CF (n=138), 74% reported introducing CF between 5-8 months of CA, and the infant's first foods were primarily vegetables (65%) and fruits (60%). Fussy eating behaviour was reported by 47%, and food fussiness was significantly associated with a decreased frequency of vegetable (p<0.001) and fruit (p=0.004) consumption. Challenges with breastfeeding included the infant's feeding difficulties, low milk supply, maternal stressors, lack of support and education from health professionals. Challenges to CF introduction included fussiness and maternal fears such as choking and lack of confidence. Support from lactation consultants and previous experience with introducing CF were the most common enablers for breastfeeding and timely CF introduction, respectively. Our findings provide the first insight into the early feeding practices of preterm infants in Aotearoa, New Zealand. This information will support strategies to improve the nutritional management of preterm infants by increasing awareness of common challenges mothers face to achieve the recommended breastfeeding guidelines and CF practices in this vulnerable population.

References

1. Baldassarre et al. (2022). *Italian Journal of Pediatrics* 48:143.

Keywords: breastfeeding; introducing complementary foods; fussy eating; preterm infants

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

Children`s dietary patterns and their maternal determinants during the first 5 years of life: Information from the Growing Up in New Zealand cohort

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Monitoring indicators of children`s diet quality at the national level is imperative to examine if a country is on track to achieving children`s global nutrition targets and fulfilling the related Sustainable Development Goals. Despite the importance of diet quality in early life and its impact in health and wellbeing throughout the life course, Aotearoa New Zealand has limited information that is nationally representative or generalizable on children`s diet quality, especially among children under 5 years old. The only national child nutrition survey conducted to date took place two decades ago and involved children 5 years of age and older. We have previously used data collected by the Growing in Up in New Zealand cohort study, which is nationally generalizable, to partially fill historic gaps in knowledge of children`s diet and feeding practices in the first five years of life. Information on breastfeeding initiation, duration and exclusivity, timing of food introduction and whole-of-diet adherence to National Food and Nutrition Guidelines have been previously published ¹⁻³. This work intends to complement information on NZ children`s diet quality by examining the cohort`s dietary patterns (DPs) at 9- (n=6,259), 24- (n=6,292), and 54-months (n=6,131) and their maternal sociodemographic and health behaviour determinants. At all time-points, children`s DPs were identified using principal components analyses. Multivariate linear regressions were performed to examine the associations between each DP and the maternal variables. At 9-, 24- and 54-months two distinct DPs were identified, explaining, 36.4%, 35.3% and 33.6% of children`s intake variability, respectively. The *Refined high in sugar and salt* DP, at all time-points, was characterised by high positive loadings in white/refined breads and cereals and items with high content of sugar, sodium, and fat. At 24-months, the *Refined high in sugar and salt* DP also had high positive loading in the protein group. The *Fruit/Vegetables* DP, at all time-points, had high positive loadings for fruits and vegetables (with type varying across time-points). The *Fruit/Vegetables* DP had high loading in whole grain options of breads and cereals at 24-months and positive loading in the protein group at 9- and 54-months. High scores on the *Refined high in sugar and salt* DP at the three time-points were associated with maternal smoking habits, maternal education level, ethnicity, and maternal scores in the “*Junk*” and “*Traditional/White bread*” DPs (obtained at the antenatal maternal interview). High children`s scores on the *Fruit/Vegetables* DP, at all time-points, were associated with the maternal antenatal score in the “*Health Conscious*” DP. Findings support that policies and interventions aiming to improve early life diets in NZ should be culturally safe and support mothers` access to formal education, healthy diets, and smoking cessation.

References

1. Ferreira SS, Marchioni DML, Wall CR, et al. (2023) *Br J Nutr* 129,491-502.
2. Castro TG, Gerritsen S, Teixeira JA, et al. (2022) *Br J Nutr* 127, 1073-1085.
3. Castro TG, Gerritsen S, Santos LP, et al. (2023) *Matern Child Nutr* 18, e13402.

Keywords: children`s diets; dietary patterns; inequities in diet quality

Ethics Declaration: Yes

Financial Support: TGC received salary support to conduct this study from the Discipline of Nutrition and Dietetics (Faculty of Medical Sciences, University of Auckland, New Zealand).

Abstract

Assessing the Impact of Reducing Food-Related Choking for Babies and Young Children at Early Learning Services Guidance: Online survey in four regions of New Zealand

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Young children, especially those under one year of age, are at higher risk of choking on food due to their body's immature physiology and chewing, swallowing and coughing ability⁽¹⁾. In 2020, the Ministry of Education mandated the Ministry of Health's food-related choking guidance for babies and young children at early learning services (ELS), adding it to the licensing criteria⁽²⁾. Some ELS managers reported that this policy may negatively influence the food and nutrition environment within ELS⁽³⁾. This study aimed to assess the impact of the food-related choking policy on the food and nutrition environment within ELS. Data were collected using an online Qualtrics questionnaire from ELS in four District Health Board regions: Waikato, Bay of Plenty, Lakes, and Auckland (N=1066), sourced from the Ministry of Education, *Education Counts* database. Responses were received from 179 ELS (17%) and most reported making changes due to the food-related choking guidance. The main changes were to the food provided by the ELS (75%), education for whānau/family (73%), and supervision of children (70%). Over half of the centres reported adjusting staff duties to allow for increased supervision of eating (60%) and changed/ceased celebrations or fundraisers (58%). Over half of the respondents (55%) reported that changes to reduce the risk of food-related choking had affected the 'cultural kaupapa' (plan/policy) of the ELS. A key theme from written responses was that centres had 'not come together as whānau', which refers to reduced hosting of centre events/celebrations within the centre and externally with children and whānau (families). The main reason appeared to be that the food restrictions in the guidance made the management of 'shared kai (food)' too difficult. Approximately two-thirds of centres (61%) reported removing foods from menus, and around half (49%) modified the texture of foods. Fifty-one per cent of ELS reported that there had been no change in parent-supplied food. The main foods removed from ELS menus were fruit, vegetables, hard crackers, sausages/other meats, and popcorn. Soft fruit, e.g., canned fruit, soft crackers, and soft meats (hamburger patties, mince, luncheon, and ham), were the main foods added to menus. ELS have responded to most of the new food-related choking guidance requirements regarding food provision, texture modification, and supervision; however, some ELS may need support to implement fully. Ceasing shared kai events at ELS has reduced opportunities to engage with whānau and limits cultural expression, connection and reciprocal learning and teaching about food and nutrition between the centre and whānau as outlined in Te Whariki Early Childhood Curriculum. Improved communication and support for parents and ELS to implement the recommendations for home and centre-supplied foods is needed. Together with sufficient funding for supervision and nutrition education to support children's learning and cultural needs around food.

References

1. Sidell DR, Kim IA, Coker TR, et al. (2013) *Int J Pediatr Otorhinolaryngol* 77(12):1940-6.

2. MoH (2020) *Reducing food-related choking at ELS*. Wellington: MoH.

3. McKelvie-Sebileau P, D'Souza E, Tipene-Leach D, et al. (2022) *Int J Environ Res Public Health* 19(8):4709.

Keywords: food-related choking; early childhood education; food environment; young children

Ethics Declaration: —

Financial Support: This work was supported by the National Heart Foundation of NZ (L. Y., grant number 1830).

Abstract

Comparison of body composition assessment tools in infancy

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The prevalence of childhood obesity is increasing globally.⁽¹⁾ While BMI is commonly used to define obesity, it is unable to differentiate between fat and muscle mass, leading to calls to measure body composition specifically⁽²⁾. While several tools are available to assess body composition in infancy, it is unclear if they are directly comparable. Among a subset of healthy infants born to mothers participating in a randomised controlled trial of a preconception and antenatal nutritional supplement⁽³⁾, measurements were made at ages 6 weeks (n=58) and 6 months (n=70) using air displacement plethysmography (ADP), whole-body dual-energy X-ray absorptiometry (DXA), and bioelectrical impedance spectroscopy (BIS). Estimates of percentage fat mass (%FM) were compared using Cohen's kappa statistic (κ) and Bland-Altman analysis^(4,5). There was none to weak agreement when comparing tertiles of %FM ($\kappa=0.15-0.59$). When comparing absolute values, the bias (i.e., mean difference) was smallest when comparing BIS to ADP at 6 weeks (+1.7%). A similar bias was observed at 6 months when comparing DXA to ADP (+1.8%). However, when comparing BIA to DXA at both ages, biases were much larger (+7.6% and +4.7% at 6 weeks and 6 months, respectively). Furthermore, there was wide interindividual variance (limits of agreement [LOA] i.e., ± 1.96 SD) for each comparison. At 6 weeks, LOA ranged from ± 4.8 to $\pm 6.5\%$ for BIA vs. DXA and BIA vs. ADP, respectively. At 6 months, LOA were even wider, ranging from ± 7.3 to $\pm 8.1\%$ (DXA vs. ADP and BIA vs. DXA, respectively). Proportional biases were apparent when comparing BIS to the other tools at both ages, with BIS generally overestimating %FM more among infants with low adiposity. In addition to differences according to tool type, within-tool factors impacted body composition estimation. For ADP measurements, the choice of FFM density reference (Fomon vs. Butte) had minimal impact; however, choice of DXA software version (GE Lunar enCORE basic vs. enhanced) and BIS analysis approach (empirical equation vs. mixture theory prediction) led to very different estimates of body composition. In conclusion, when comparing body composition assessment tools in infancy, there was limited agreement between three commonly used tools. Therefore, researchers and clinicians must be cautious when conducting longitudinal analyses or when comparing findings across studies, as estimates are not comparable across tools.

References

1. Ng M et al. (2013) *Lancet* 384, 766-81.
2. Toros-Ramos T et al. (2015) *Eur J Clin Nutr* 26, 1279-89.
3. Godfrey KM et al. (2021) *Diabetes Care* 44, 1091-9.
4. McHung ML (2012) *Biochem Med (Zagreb)* 22, 276-82.
5. Bland JM & Altman DG (1986) *Lancet* 1, 307-10.

Keywords: air displacement plethysmography, bioelectrical impedance, body composition, dual-energy X-ray absorptiometry

Ethics Declaration: Yes

Financial Support: KMG is supported by the National Institute for Health Research (NIHR Senior Investigator (NF-SI-0515-10042) and NIHR Southampton Biomedical Research Center (IS-BRC-1215-20004)), British Heart Foundation (RG/15/17/3174) and the European Union (Erasmus+ Programme ImpENSA 598488-EPP-1-2018-1-DE-EPPKA2-CBHE-JP). SYC is supported by a Singapore NMRC Clinician Scientist Award (NMRC/CSA-INV/0010/2016; MOH-CSAINV19nov-0002). WSC is supported by A Better Start National Science Challenge Research Programme. Funding for aspects of the NiPPeR study has been provided by Société Des Produits Nestlé S.A under a Research Agreement with the University of Southampton, Auckland UniServices Ltd, SICS, National University Hospital Singapore PTE Ltd, and NUS. Public good funding for the investigator-led NiPPeR study is through the UK Medical Research Council (as part of an MRC award to the MRC Lifecourse Epidemiology Unit (MC_UU_12011/4)); the Singapore National Research Foundation, National Medical Research Council (NMRC, NMRC/TCR/012-NUHS/2014); the National University of Singapore (NUS) and the Agency of Science, Technology and Research (as part of the Growth, Development and Metabolism Programme of the Singapore Institute for Clinical Sciences (SICS) (H17/01/a0/005); and as part of Gravida, a New Zealand Government Centre of Research Excellence.

Dietary patterns

Dietary patterns

Abstract

Short-term skin carotenoid changes following consumption of a typical Australian diet versus a healthy Australian diet: findings from a randomised crossover feeding trial

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Carotenoids, a group of phytochemicals found in plant-based foods with yellow, red, or orange pigments, have been shown to be stored in the skin upon consumption of carotenoid-rich foods ⁽¹⁾. Skin carotenoid levels can be measured using skin reflectance spectroscopy, which assesses skin lightness (L^*), redness (a^*), and yellowness (b^*) ⁽²⁾. Previous research has demonstrated significant increases in skin yellowness (b^*) after a 4-week high-carotenoid diet ⁽²⁾. The aim was to examine shorter-term changes (two weeks) in skin yellowness following the consumption of a Healthy Australian Diet rich in carotenoids compared to a Typical Australian Diet with low carotenoid content. The study analysed data from an eight-week randomised, cross-over feeding trial involving 34 adults (53% female, aged 38.44 ± 18.05 years). Participants were randomly assigned to each diet for two weeks, separated by a two-week washout period. The Healthy Australian Diet adhered to the Australian Dietary Guidelines ⁽³⁾, emphasising the consumption of carotenoid-rich fruits and vegetables such as carrots, pumpkin, tomatoes, red capsicum, and sweet potatoes. In contrast, the Typical Australian Diet was formulated based on apparent consumption patterns in Australia ⁽⁴⁾ and emphasised the intake of fruits and vegetables low in beta-carotene, such as white potatoes, onions, cauliflower, and pears. Skin carotenoids were measured using skin reflectance spectroscopy at three sites (palm, inner and outer arm), and each measurement was taken thrice. Overall skin yellowness (b^*) was calculated as the average of all three measurements at all three sites. Measurements were conducted at four key visits: week 0 (end of run-in; baseline 1), week 2 (post-feeding phase 1), week 4 (end of washout; baseline 2), and week 8 (post-feeding phase 2). Differential changes in skin carotenoid levels between intervention groups were assessed using linear mixed-effect models, adjusting for diet sequence, feeding phase, body fat percentage, total fat intake, and subject ID as a random variable to account for potential autocorrelation. Post-hoc pairwise comparisons were conducted to evaluate the relative effects of each diet. Although there was a trend towards higher skin yellowness (0.215 ± 0.517 ; $p=0.41$) following consumption of the Healthy Australian diet relative to baseline, and an inverse trend following the Typical Australian Diet (-0.118 ± 0.539 , $p=0.56$), the difference in change between the two diets was not statistically significant ($p=0.32$). Notably, baseline values within this participant cohort were higher than previously reported at $b^*=16.7^{(1)}$ (baseline 1 b^* : 17.57 ± 2.23 , baseline 2 b^* : 17.71 ± 2.26), which may influence the magnitude of observable change. The findings suggest that the two-week intervention duration may be insufficient to achieve statistically significant changes in skin carotenoid levels. Future investigations into whether plasma carotenoids increase first, with skin changes occurring later, could offer valuable insights into the potential utility of this as a biomarker validation of change in fruit and vegetable intake.

References

1. Ashton LM, Pezdir KB, Hutchesson MJ, et al. (2017) *Nutrients* 10,11.

2. Pezdir K, Hutchesson MJ, Williams RL, et al. (2016) *J Acad Nutr Diet* 116,1257-65.

3. NHMRC (2013) <https://www.nhmrc.gov.au/adg> (last accessed 8 August 2023)

4. ABS (2022) <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/apparent-consumption-selected-foodstuffs-australia/latest-release> (last accessed 8 August 2023)

Keywords: carotenoids; skin reflectance spectroscopy; dietary intake; randomised controlled trial

Ethics Declaration: Yes

Financial Support: This work was supported by a National Health and Medical Research Council (NHMRC) Leadership Research Fellow Investigator Grant (APP2009340).

Abstract

Can snacking on almonds displace discretionary foods in the diets of habitual snackers?

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Snacking frequency has increased in recent years, with many snack options being nutrient-poor and likely contributing to excessive energy intakes^(1,2). At the same time, nut intakes have remained low⁽³⁾. While almonds, like many other snacks, are high in fat and energy, they are rich in beneficial unsaturated fats, fibre, vitamins, minerals, and phytonutrients. Snacking on almonds may offer substantial health advantages, including improving energy balance and overall diet quality, compared to typical modern snack foods. The healthier diets observed among nut consumers may be partially explained by addition of nuts to the diet leading to displacement of other, less desirable foods. We aimed to compare the effects of consuming a snack of almonds vs sweet biscuits or savoury crackers daily for one year on displacement of discretionary foods and food group patterns. We used a randomised controlled parallel study design involving 136 non-obese habitual discretionary snack consumers aged 18–65. Participants were randomly assigned to receive a snack of either almonds, or biscuits, daily for one year. These isocaloric snacks provided either 10% of participants' total energy requirements or 1030 kJ (equivalent to 42.5 g almonds), whichever was higher. Dietary intake was measured using three-day weighed diet records record at baseline, 3, 6, and 12 months. Of the participants, 101 (74%) were female, with a mean (SD) age of 35.6 (13.4) years and BMI of 23.7 (3.0) kg/m². Those assigned to the almond group increased their percentage total energy (%TE) from nuts and seeds from 1.4% (baseline) to 13.8% (12 months), while those assigned to the biscuit group increased %TE from biscuits and crackers from 5.1% to 12.4%. There was a non-statistically significant ($p=0.053$) decrease in %TE from discretionary foods to 12-months for almond group compared to the biscuit group. %TE from discretionary foods decreased significantly in the almond group from baseline to 12-months (mean (95% CI) difference: -4.9% (-8.3, -1.5) $p=0.005$), with no evidence of a change observed in the biscuit group (-0.0% (-3.6, 3.6) $p=0.994$). Regular consumption of nuts as a snack food may improve diet quality by displacing discretionary food intake among regular discretionary snack consumers. However, the observed displacement was incomplete relative to the energy provided by the study snack. Snacking is driven by factors beyond simply satisfying hunger, including flavour, texture, and overall eating experience. We hypothesise that – among this group of discretionary snack consumers – partial displacement, and hence the continued consumption of other snack foods, was likely due to the sensory properties of consuming almonds alone being insufficient to fulfil hedonic satiation. Strategies to improve sensory appeal of almonds to discretionary snack consumers may assuage subsequent snack-seeking behaviour and provide important advantages in terms of both energy balance and diet quality.

References

1. Mattes RD (2018) *Physiol. Behav.* 193 (Pt B), 279–283.
2. Piernas C, Popkin BM (2010) *J Nutr.* 140(2), 325–332.
3. Brown RC, Yong LC, Gray AR, et al. (2017) *Nutrients.* 9(3), 220.

Keywords: almonds; nuts; snack foods; food displacement

Ethics Declaration: Yes

Financial Support: This research was funded by the Almond Board of California (grant number RGA-18-BROWN-01)

Abstract

Metabolisable energy from nuts and patterns of nut consumption in Australia: secondary analysis of the 2011-12 National Nutrition and Physical Activity Survey

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Nut consumption in Australia does not meet recommended levels, and concern regarding the impact of nuts on body weight is a reported barrier to regular intake, due to their high energy content ⁽¹⁾. Nut intake is not associated with higher body weight ⁽²⁾, which may be explained by their lower metabolisable energy ⁽³⁾. Hence, total energy intake may be overestimated among nut consumers. Nut consumption patterns in Australia are also unknown. This study aimed to describe the metabolisable energy from nuts, and nut consumption patterns of the Australian population. A previously developed nut-specific database was expanded to include the metabolisable energy of nuts based on nut type and form, and applied to the 2011-12 National Nutrition and Physical Activity Survey (NNPAS). Mean metabolisable energy was compared to mean energy intake determined using Atwater factors for nut consumers. Additionally, nut consumption patterns were also explored, including the proportion of nuts consumed at meals and snacks, proportion of nuts consumed alone or combined with other foods, and timing of nut intake. Among nut consumers, the mean metabolisable energy from nuts, based only on nut type, was 241.24 (95% CI: 232.00, 250.49) kJ/day. The mean metabolisable energy when considering both nut type and form was 260.69 (95% CI: 250.18, 271.21) kJ/day, while energy from nuts using Atwater factors was 317.60 (95% CI: 304.85, 330.35) kJ/day. Nuts were more likely to be consumed as snacks, with approximately 63% of all nut intake (in grams) occurring as a snack. Nuts were frequently consumed with other foods and beverages, with only 27% of nuts consumed alone or with plain water. Furthermore, nuts were most often consumed after midday (68% of intake) rather than in the morning (32% of intake). Application of metabolisable energy data to the 2011-12 NNPAS has a significant impact on the calculation of energy intake from nuts. Nut consumption patterns identify most nut consumption occurring as snacks and two-thirds of nut intake occurring in the afternoon and evening. These findings may inform strategies to promote nut consumption in Australia.

References

1. Neale EP, Tran G & Brown RC (2020) *Int J Environ Res Public Health* 17(23) 9127.
2. Guarneiri LL & Cooper JA (2021) *Adv Nutr* 12, 384-401.
3. Nikodijevic CJ, Probst YC, Tan SY & Neale EP (2023) *Adv Nutr* 14, 796-818.

Keywords: metabolisable energy; nut consumption.

Ethics Declaration: Yes

Financial Support: This work was supported by Nuts for Life and Horticulture Innovation Australia Limited. Nuts for Life had no role in the design, analysis or writing of this article. This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Abstract

COVID-19 lockdown impacts on eating patterns and lifestyle behaviours of residents of Western Sydney: Fact not Fiction

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Lockdown measures imposed in Australia to slow the transmission of COVID-19 protected most Australians from the virus⁽¹⁾. In some areas in NSW, specifically Western Sydney areas, more stringent lockdown regulations were implemented from July to September 2021, referred to as local governmental areas (LGAs) of concern. ⁽²⁾ Preliminary evidence showed that people's lifestyle such as dietary and physical activity behaviours and mental health during lockdown were altered from before lockdown. ⁽³⁾ However, intermediate and longer-term impacts on nutrition and physical health are unclear, especially in LGAs of concern. We aimed to examine the impacts of the lockdown on nutritional behaviour of residents of Western Sydney. Mixed methods were employed including quantitative surveys such as ASA-24 and qualitative focus groups, using R software for quantitative analysis. Data was collected from 523 survey participants in addition to 42 focus group participants. The sample was representative of age, gender, county of birth and area of residence. Sixty-two percent reported decreases in their physical activity level post-lockdown compared with pre-lockdown, and 15% reported increases in their physical activity level post-lockdown compared with pre-lockdown. Sixty-nine percent reported increases in their physical activity levels post-lockdown compared with during the lockdown, and 12% reported decreases. Self-reported weight increased in 50% of the participants post-lockdown compared with pre-lockdown and decreased in 13% of the participants. Forty percent self-reported a decrease in their body weight post-lockdown compared with during the lockdown while 16% self-reported an increase in their body weight post-lockdown compared with during the lockdown. Food security status was reported as much worse in seven percent of the participants post-lockdown compared with pre-lockdown while being unvaried in 93% of the participants. Food security status remained unvaried post-lockdown compared with during the lockdown in 93% of the participants but much better in six percent. Eating habits were self-reported as much worse by 52% of the participants post-lockdown compared with pre-lockdown and much better by nine percent. Forty-eight percent of the participants self-reported their eating habits as much better post-lockdown compared with during the lockdown and 10% as much worse. COVID-19 lockdown negatively impacted eating behaviours, physical activity and body weight of Western Sydney residents with minimal impacts on food security. Further analyses are required to examine the associations between eating patterns, physical activity, body weight and food security and age, gender, country of birth and area of residence of participants. These findings can later be used to draft policies that can be put in practice in case of future pandemics in Australia, or in the case of other common natural disasters, such as bushfires and floods.

References

1. Adekunle A, Meehan M, Rojas-Alvarez D, et al. (2020) *Aust N Z J Public Health* 44, 257-259.
2. King CB, Tame L, Ergler C, et al. (2023) *AJSI* 1-18.
3. Mekanna AN, Panchal SK & Li L (2022) *Nutrition Reviews* 81, 790-803.

Keywords: COVID-19 lockdown; Western Sydney; nutritional impacts; lifestyle behaviours

Ethics Declaration: Yes

Financial Support: Western Sydney University

Abstract

Mediterranean Diet adherence and wellbeing: a preliminary analysis of the MedWalk trial

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Diet and diet quality have been linked to improvements to psychosocial health and wellbeing (1). However, data from national health surveys indicate that most Australian's have poor diet quality and consume a Western style diet high in saturated fat, discretionary foods and added sugars and salt (2). The Mediterranean Diet (MedDiet), a predominantly plant-based diet rich in bioactive foods and nutrients, has been shown to improve mood and wellbeing. However, long-term effects beyond 6-months have not been thoroughly explored in older adults. MedWalk compares a 12-month MedDiet and Walking intervention with habitual lifestyle (HabDiet) in 160 older adults residing in retirement villages across South Australia and Victoria. Data from the South Australian cohort at baseline (n=83) and 6-months (n=74) are presented in this preliminary analysis.

To determine dietary compliance, participants completed the 14-point MedDiet Adherence (MEDAS) questionnaire which assesses the intake of key MedDiet foods such as legumes, fish, and extra virgin olive oil; higher scores reflect higher adherence. Wellbeing was assessed using the Flourishing Index, which assesses life satisfaction, relationship satisfaction, happiness, mental and physical health. The total flourishing score includes 10 questions with a maximum of 100 points reflecting highest flourishing, while the secure flourishing score includes two additional questions related to safety, housing, and access to food with a maximum of 120 points to indicate highest flourishing. Group and time interactions for MEDAS and flourishing scores were analysed using linear mixed effects modelling. There were no significant differences between groups for MEDAS score at baseline (MedDiet 5.78 ± 0.34 vs HabDiet 5.74 ± 0.32). At 6 months, the MedDiet group had significantly increased their MEDAS by 4.16 points ($P < 0.001$), (MedDiet 10.0 ± 0.42 vs HabDiet (5.85 ± 0.39). At baseline there were no significant differences between groups for the total 10-point flourishing score (MedDiet 83.5 ± 2.01 vs HabDiet 82.1 ± 2.0) or 12-point secure flourishing score (MedDiet 100.6 ± 2.2 vs HabDiet 100.4 ± 2.2). At 6 months there was a significant between-group difference in total flourishing index scores with a mean difference of 6.97 points in the MedDiet group (MedDiet 85.8 ± 1.9 vs HabDiet 78.8 ± 1.8 , $P = 0.010$). Similarly, the secure flourishing index score was 6.18 points higher in the MedDiet group compared to the HabDiet at 6-months (MedDiet 102.9 ± 2.2 vs HabDiet 96.8 ± 2.07 , $P = 0.046$). Adhering to a MedDiet and walking intervention may lead to positive improvements to wellbeing in an older population. The flourishing index may need to be compared with other wellbeing questionnaires and instruments to better understand the relationship between wellbeing and MedDiet adherence as there was a cross-sectional association but no positive correlation at 6-months.

References

1. Firth J, Gangwisch JE, Borsini A, et al. (2020) *BMJ* 369:m2382.
2. Australian Bureau of Statistics. *Australian Health Survey: Nutrition First Results - Foods and Nutrients [Internet]*. Canberra: ABS; 2011 December [cited 2023 August 9].

Keywords: Mediterranean diet; wellbeing; psychosocial health; older adults

Ethics Declaration: Yes

Financial Support: This work was supported by an Australian Government Research Training Program (RTP) and the NHMRC (GNT1171300).

Abstract

Comparison of snack characteristics by diet quality: findings from a nationally representative sample of Australian adolescents

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Snacking is a common eating behaviour among adolescents accounting for more than a quarter of their total energy intake but the relationship between snacks and overall diet quality remains unclear.⁽¹⁾ Hence, the aim of this study was to examine characteristics of snacks among Australian adolescents (12-18 years) according to their level of diet quality. This secondary analysis uses one day of 24-hour dietary recall data from the 2011 - 2012 National Nutrition and Physical Activity Survey (n= 935). Snacks were defined based on participant-identified eating occasions.⁽²⁾ The Dietary Guideline Index for Children and Adolescents (DGI-CA) was used to assess adherence to the Australian Dietary Guidelines,⁽³⁾ with the highest tertile of the DGI-CA score indicating high adherence. The means (95% confidence intervals [CI]) for daily snack frequency and snack energy density (ED; kJ/g) were estimated for boys and girls, using linear regression, adjusted for age, area-level disadvantage, and energy misreporting. The differences in means and proportions across tertiles of DGI-CA scores were tested by using F- and Chi square-tests, respectively. The results show no significant differences in the mean frequency of snacks across tertiles of DGI-CA scores in either boys (lowest tertile mean = 2.2, 95% CI [2.0, 2.4] snacks/day, highest tertile = 2.1 [1.9, 2.3]) or girls (lowest tertile = 1.9 [1.7, 2.1] snacks/day, highest tertile = 2.2 [1.9, 2.4]). The mean ED of snacks decreased as DGI-CA scores increased in both boys (lowest tertile = 8.42, 95% CI [7.1, 10] kJ/g, highest tertile = 6.32 [5.4, 7.4] kJ/g) and girls (lowest tertile = 8.99 [7.8, 10.3] kJ/g, highest tertile = 5.92 [5.1, 6.9] kJ/g). As DGI-CA scores increased, the proportion of both boys and girls consuming discretionary foods at snacks (such as soft drinks) decreased, while foods from the five food groups (such as apples) increased (p-values < 0.05). In conclusion, snack ED, but not frequency, and the types of foods consumed by adolescents at snacks varied by a level of diet quality. Snack ED decreased with increasing diet quality and adolescents with higher diet quality had higher intakes of foods from the five food groups and lower intakes of discretionary foods at snacks. Encouraging the consumption of lower-ED foods from the five food groups at snacks presents an opportunity to enhance adolescent diet quality. Future studies should explore snack-specific strategies to improve overall diet quality of adolescents.

References

1. Hess JM, Jonnalagadda SS, Slavin JL (2016) *Adv Nutr* 7, 466-475.
2. Leech RM, Spence AC, Lacy KE, et al. (2021) *Int J Behav Nutr Phys Act* 18, 165.
3. Wilson JE, Blizzard L, Gall SL, et al. (2019) *Nutr Res* 65, 43-53.

Keywords: snacks; adolescents; energy density; diet quality

Ethics Declaration: Yes

Financial Support: RML is supported by National Health and Medical Research Council Emerging Leadership Fellowship L1 (APP1175250)

Abstract

Use of herbs and spices in cooking and food preparation in Australia

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The Mediterranean diet (MedDiet) is largely a plant-based dietary pattern which is associated with a reduced risk of numerous chronic diseases^(1,2). A traditional MedDiet contains a wide variety of wild herbs and spices, which are frequently used in cooking and food preparation^(3,4), and are a valuable source of antioxidants. However, little is known about herbs and spices use in Australian households. Therefore, the aim of this study was to determine the types of herbs and spices used in cooking and food preparation in Australian households. A cross-sectional study was undertaken amongst Australian adults aged ≥ 18 years. Participants were recruited via social media platforms requesting voluntary participation in an online survey. The survey tool included questions related to the types of herbs and spices used and consumed in Australian households, frequency of use, and the perceived level of confidence for use of herbs and spices in cooking and food preparation. Given the lack of a previously validated and reliable survey instrument, the authors developed a prototype questionnaire that was initially piloted against a separate representative sample for face validity. A total of $n = 400$ participants responded and completed the survey. Participants were mostly female ($n = 340$; 85.0%) with a mean age of 46.5 ± 14.7 years and were overweight (BMI: 26.4 ± 6.0 kg/m²). In the previous 12 months, two-thirds of participants ($n = 258$; 64.8%) reported consuming herbs and spices 1-2 times per day, which were most commonly consumed as part of lunch or dinner meals ($n = 372$; 94.2%). Basil ($n = 391$; 97.8%), pepper ($n = 390$; 97.5%), and garlic ($n = 387$; 96.8%) were the most frequently used and consumed herbs and spices. A quarter of participants reported using basil 1-3 times per month ($n = 104$; 26%), while a quarter reported using pepper ($n = 104$; 26%) and garlic ($n = 103$; 25.8%) daily. The majority of participants identified that they were extremely confident ($n = 159$; 39.8%) or very confident ($n = 149$; 37.3%) using herbs and spices in cooking and food preparation. Most participants ($n = 282$; 70.5%) reported growing herbs and spices in their own homes. This cross-sectional analysis of Australian households shows that most Australian adults consume herbs and spices daily, with basil, pepper, and garlic being the most frequently consumed. Further investigation into the quantities needed to elicit potential health benefits of herbs and spices when incorporated into a healthy dietary pattern warrants future research.

References

1. *Franquesa M et al. (2019) Nutrients 11, 655.*
2. *Rees K, Hartley L, Flowers N, et al. (2013) Cochrane Database Syst Rev 8, Cd009825.*
3. *Nestle M (1995) Am J Clin Nutr 61, 1313-1320.*
4. *Bower A, Marquez S & de Mejia EG (2016) Crit Rev in Food Sci and Nutr 56, 2728-2746.*

Keywords: herbs; spices; cooking; health

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Monitoring nutrition, health & sustainability

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Abstract

Nutritional composition of plant-based meat and dairy alternatives: comparison of supermarket products to the Australian Food Composition Database

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Consumer interest in plant-based diets has increased, alongside significant growth in the availability of plant-based meat and dairy alternatives in supermarkets ⁽¹⁾. The nutritional profile of these products is likely to vary due to the broad range of ingredients used ⁽²⁾. Food composition databases, such as the Australian Food Composition Database (AFCD), are used extensively in research, practice, and policy, including by nutrition and dietetics researchers and health professionals to identify the nutrient content of foods. However, it is unclear if, and to what extent, the AFCD data on plant-based alternatives reflects the current food supply. This study aimed to examine the range and composition of plant-based meat and dairy alternatives available in Australian supermarkets and compare this with the AFCD. Data on core plant-based meat and dairy alternatives were collected from eight Melbourne supermarkets between June and October 2022 using the CSIRO FoodTrack™ database methodology ⁽³⁾. Products were included if they were i) meat or dairy substitutes outlined in the AFCD; or ii) plant-based alternatives for core meat and dairy included in the Australian Dietary Guidelines. Product images were taken, and data was transcribed. Products collected in supermarkets were then 'matched' to the most appropriate reference item in the AFCD. In total, 455 meat alternatives (n=219 legumes/pulses; n=178 meat substitutes; n=38 tofu/tempeh; n=20 sausages) and 249 dairy alternatives (n=157 milk; n=52 cheese; n=40 yoghurt) were identified. Over half of the plant-based meat substitutes (n=102; 57%) were made from a soy/wheat/pea base protein. Of the dairy alternatives, just over half of the cheese substitutes had coconut as their main ingredient (n=28; 54%), and almost two-thirds of yoghurts were coconut-based (n=28; 70%). The majority of the 157 milks were oat-based (n=57; 37%), followed by almond (n=45; 29%), and soy (n=27; 17%). Many supermarket products were not reflected in the AFCD, including over two-thirds of dairy alternatives (n=159; 67%), and one-third of meat alternatives (n=150; 33%). This was due to more product options within categories, such as the variety of canned beans/legumes (n=96) and flavoured milk substitutes (n=34) available in supermarkets, and a greater variety of main ingredients used, most notably for cheese substitutes (n=52). This study highlights that the range of plant-based meat and dairy alternatives available in Australian supermarkets is diverse, with many different base ingredients used, and a great range of products available in-store than in the AFCD. Findings highlight the challenges of food composition databases in keeping up to date with the fast-growing plant-based sector. Outcomes from this study have implications for the monitoring of the food supply and population level dietary data.

References

1. Australian Bureau of Statistics. *Apparent Consumption of Selected Foodstuffs, Australia. 2019-20 financial year ed.* Canberra: ABS; 2020.

2. Brooker PG, Hendrie GA, Anastasiou K et al. (2022) *Int J Food Sci Nutr* 73, 1067-79.

3. Commonwealth Scientific and Industrial Research Organisation (CSIRO). FoodTrack™ food & nutrient database: <https://www.csiro.au/en/research/health-medical/nutrition/FoodTrack>

Keywords: plant-based; nutrient reference database; supermarkets; alternative proteins

Ethics Declaration: Yes

Financial Support: L.E.M is supported by a Deakin University Postgraduate Research Scholarship and a CSIRO R+ top-up scholarship.

Abstract

The sports food buzz: Understanding consumption, motivations and perceptions in Australian adults

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Sports foods are formulations of protein powders, carbohydrate gels and other nutrients such as creatine and pre work out, that are designed for athletes to provide additional nutrients for optimum performance. ⁽¹⁾ These contain specific amounts of nutritive substances not meant for non-athletes ⁽²⁾. However, over the last decade there has been a substantial increase in the availability, types, and sales of sports foods in mainstream retailers ^(3,4), likely driven by non-athlete consumption. Increased consumption could lead to nutrient intake above recommendations ⁽⁵⁾ or unwanted side effects (e.g. caffeine overload) due to consumption of multiple products. ⁽⁶⁾ Little is known about the characteristics and motivations of non-athletes and it is important to understand the drivers of this increase, to ensure appropriate and safe consumption. This study aims to investigate characteristics and motivations, consumption patterns, exercise participation, reasons for product selection and perception of risks and side effects of non-athlete sports food consumers. In 2022, non-athlete Australian adults (18-65) completed a purpose designed online cross-sectional survey. Closed ended questions collected demographic characteristics, sports food consumption (type, frequency, amount, cost), exercise participation (type, frequency, duration), purchase location, recommendation source (friends, family social media) and use of packaging attributes (e.g. claims) to inform decision making. Open-ended questions captured reasons for consumption, perceptions of any risks and side effects experienced. Descriptive statistics were performed for participant characteristics and open-ended questions were analysed using inductive thematic analysis. Participants (n=307) were predominately female (56%), middle aged (45%), moderate income earners (53%) and tertiary educated (54%). Protein products were most consumed (powder 82%, bar 61%, snack 37%), with over two thirds (65%) consuming 2 or more products. Walking was the most frequent exercise performed (65%), supermarkets the most common purchase location (52%) and media the most frequent recommendation source (39%), with on-pack nutrition information being used by most respondents (95%) to inform product selection. Just over half (52%) stated perceived risks and more than a third (35%) reported experiencing side effects from sports food consumption. The main reasons for consuming sports foods were for protein intake, muscle recovery, stamina and energy. The key risks stated were kidney/liver/organ effects, caffeine overdose and gut/digestion problems. The main side effects reported were bloating, tingling, anxiety (jitters, shaking, trembling), nausea or stomach upsets. Despite the consumer characteristics and their stated awareness of the risks, and side effects experienced, they continue to consume sports foods for their many perceived benefits. This is potentially driven by on-pack nutrition information and claims, which appear particularly influential in purchasing. Previous research shows that on-pack information can be inaccurate, or misleading. ⁽⁴⁾ Tighter regulation and enforcement would benefit non-athletes, ensuring safer and more informed consumption.

References

1. ASC, AIS (2022). *Nutrition*
2. FSANZ (2021) *FSC, FSSF, vol. Standards 2.9.4*
3. *Euromonitor International (2021) Sports Nutrition in Australia.*
4. Chapple C et al. (2023) *Front Nutr* 10:1042049.
5. NHMRC (2015). *Nutrient Reference Values*
6. FSANZ (2013) *Sports Food Consumption in Australia New Zealand.*

Keywords: sports foods; food regulation; claims; marketing and advertising

Ethics Declaration: Yes

Financial Support: This research was supported through an Australian Government Research and Training Scholarship and undertaken as part of CC's Ph.D.

Abstract

Use of a novel algorithm to evaluate changes in diet quality following energy restriction

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Dietary strategies for weight loss typically place an emphasis on achieving a prescribed energy intake. Depending on the approach taken, this may be achieved by restricting certain nutrients or food groups, which may lower overall diet quality. Various studies have shown that a higher quality diet is associated with better cardiovascular (CV) health outcomes¹. This study aimed to evaluate the effect of an energy restricted diet on diet quality, and associated changes in cardiovascular risk factors. One hundred and forty adults (42 M:98 F, 47.5 ± 10.8 years, BMI 30.7 ± 2.3 kg/m²) underwent an energy restricted diet (30% reduction) with dietary counselling for 3 months, followed by 6 months of weight maintenance. Four-day weighed food diaries captured dietary data at baseline, 3 and 9 months and were analysed using a novel algorithm to score diet quality (based on the Dietary Guideline Index, DGI)². Total DGI scores ranged from 0-120, with sub scores for consumption of core (0-70) and non-core foods (0-50). For all scores, a higher score or increase reflects better diet quality. The CV risk factors assessed included blood pressure (SBP and DBP) and fasting lipids (total (TC), high and low-density lipoprotein cholesterol (HDL-C, LDL-C) and triglycerides (TAG). Mixed model analyses were used to determine changes over time (reported as mean ± standard error), and Spearman rho (r_s) evaluated associations between DGI score and CV risk factors. Dietary energy intake was significantly restricted at 3 months (-3222 ± 159 kJ, $P < 0.001$, $n = 114$) and 9 months (-2410 ± 167 kJ, $P < 0.001$, $n = 100$) resulting in significant weight loss (3 months -7.0 ± 0.4 kg, $P < 0.001$; 9 months -8.2 ± 0.4 kg, $P < 0.001$). Clinically meaningful weight loss (>5% body mass) was achieved by 81% of participants by 3 months. Diet quality scores were low at baseline (scoring 49.2 ± 1.5), but improved significantly by 3 months (74.7 ± 1.6, $P < 0.000$) primarily due to reductions in the consumption of non-core i.e. discretionary foods (Core sub-score +4.0 ± 0.7, Non-core sub-score +21.3.1 ± 1.6, both $P < 0.001$). These improvements were maintained at 9 months (Total score 71.6 ± 1.7, $P < 0.000$; Core sub-score +4.4 ± 0.7 from baseline, $P < 0.000$; Non-core sub-score +17.9 ± 1.6 from baseline, $P < 0.000$). There were significant inverse relationships between changes in Total DGI score and changes in DBP ($r_s = -0.268$, $P = 0.009$), TC ($r_s = -0.298$, $P = 0.004$), LDL-C ($r_s = -0.224$, $P = 0.032$) and HDL-C ($r_s = -0.299$, $P = 0.004$) but not SBP and TG at 3 months. These data emphasise the importance of including diet quality as a key component when planning energy restricted diets. Automated approaches will enable researchers to evaluate subtle changes in diet quality and their effect on health outcomes.

References

1. Petersen KS, Kris-Etherton PM (2021) *Nutrients* 13 (12):4305.
2. Ward SJ, Coates AM, Hill AM (2019) *Nutrients* 11:1286.

Keywords: diet quality; algorithm; energy restriction; cardiovascular risk factors

Ethics Declaration: Yes

Financial Support: This work was funded by the Almond Board of California. This funding source had no role in the design of this study or the analysis and interpretation of the data.

Abstract

Co-design of a personalised digital intervention to improve vegetable intake in adults living in Australian rural communities

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Diets low in vegetables are a main contributor to the health burden experienced by Australians living in rural communities. Given the ubiquity of smartphones and access to the Internet, digital interventions may offer an accessible delivery model for a dietary intervention in rural communities. However, no digital interventions to address low vegetable intake have been co-designed with adults living in rural areas ⁽¹⁾. This research aims to describe the co-design of a digital intervention to improve vegetable intake with rural community members and research partners. Active participants in the co-design process were adults ≥ 18 years living in three rural Australian communities (total $n=57$) and research partners ($n=4$) representing three local rural governments and one peak non-government health organisation. An iterative co-design process ⁽²⁾ was undertaken to understand the needs (pre-design phase) and ideas (generative phase) of the target population through eight online workshops and a 21-item online community survey between July and December 2021. Prioritisation methods were used to help workshop participants identify the 'Must-have, Should-have, Could-have, and Won't-have or will not have right now' (MoSCoW) features and functions of the digital intervention. Workshops were transcribed and inductively analysed using NVivo. Convergent and divergent themes were identified between the workshops and community survey to identify how to implement the digital intervention in the community. Consensus was reached on a concept for a digital intervention that addressed individual and food environment barriers to vegetable intake, specific to rural communities. Implementation recommendations centred on i) food literacy approaches to improve skills via access to vegetable-rich recipes and healthy eating resources, ii) access to personalisation options and behaviour change support, and iii) improving the community food environment by providing information on and access to local food initiatives. Rural-dwelling adults expressed preferences for personalised intervention features that can enhance food literacy and engagement with community food environments. This co-design process will inform the development of a prototype (evaluation phase) and feasibility testing (post-design phase) of this intervention. The resulting intervention is anticipated to reduce barriers and support enablers, across individual and community levels, to facilitate higher consumption of vegetables among rural Australians. These outcomes have the potential to contribute to improved wellbeing in the short term and reduced chronic disease risk in the long term, decreasing public health inequities.

References

1. Livingstone KM, Rawstorn JC, Partridge SR, et al. (2023) *Int J Behav Nutr Phys Act* 20, 36.
2. Sanders EBN, Stappers PJ (2014) *CoDesign* 10, 5-14.

Keywords: co-design; digital health; behaviour change; vegetable intake

Ethics Declaration: Yes

Financial Support: KML is supported by a National Health and Medical Research Council Emerging Leadership Investigator Grant (APP1173803). LCB is supporting by a National Health and Medical Research Council Emerging Leadership Investigator Grant (APP1172987) and a National Heart Foundation of Australia Post-Doctoral Research Fellowship (ID102498). SRP is supported by a National Heart Foundation Future Leader Fellowship (ID106646). This research received seed funding from the Institute for Physical Activity and Nutrition (IPAN).

Abstract

Delivery of a telehealth supported home exercise program with dietary advice to increase plant-based protein in people with non-alcoholic fatty liver disease: a 12-week pilot feasibility randomised controlled trial

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Telehealth overcomes common geographical barriers to community/clinic-based healthcare and lifestyle interventions,^(1,2) but whether it is a feasible and safe mode of healthcare service delivery for lifestyle-based interventions in those with non-alcoholic fatty liver disease (NAFLD) remains unknown. This study evaluated the feasibility and safety of a home exercise program with dietary advice to increase plant-based protein delivered and monitored by healthcare professionals via telehealth in adults with NAFLD. Secondary aims were to assess changes in macronutrient intake including protein from plant and animal sources, body weight, physical activity and physical function. This was a 12-week pilot feasibility randomised controlled trial conducted in 28 inactive adults (>45 years) with NAFLD. Participants were randomly allocated to receive: 1) a home-based, muscle strengthening exercise program (3 days/week) delivered and monitored remotely by an exercise physiologist using the TeleHab exercise platform/app (VALD Health) plus support from a nutritionist to increase daily protein intake to ~1.2-1.5 g/kg/day from predominately plant-based sources and behavioural change support delivered via 3-4 weekly text messages (Pro-Ex, n=14) or 2) usual care (UC, n=14). Feasibility was assessed via retention (defined as ≤10% attrition), adherence [≥66% to the muscle strengthening program and ≥80% to the recommended daily protein serves [total (≥3-3½), plant (≥2) and animal (≤1-1½) per day (via protein checklist)] and safety (intervention-related adverse events). Secondary outcomes included macronutrient intake (3x24-hour records), weight (self-reported), habitual physical activity (PA) [moderate-to-vigorous (MVPA), minutes/week via the Short International Physical Activity Questionnaire], and physical function [30-second sit-to-stand (STS) performance]. Since this was a pilot feasibility study, mean group differences (6 and 12-weeks) were estimated, with 95% confidence intervals, and standardised effects [Cohen D, effect size (ES)] reported for secondary outcomes. Overall, 25 participants (89%) completed the intervention. In Pro-Ex, mean adherence to the exercise program was 52%, while adherence to the recommended plant, animal and total protein serves/day was 32%, 42% and 14% of participants, respectively. One minor exercise-related adverse event occurred from 241 completed sessions over 12 weeks. Relative to UC, Pro-Ex experienced a mean 2.7 (95%CI: 0.9, 4.4; large ES d=1.29) increase in 30-sec STS number, 46 minute (95%CI: -153, 245; small ES d=0.19) increase in MVPA, 1.7kg (95%CI: -3.5, 0.2; moderate ES d=0.54) decrease in body weight, 35.2g (95%CI: 11.0, 59.3; large ES d=1.23) increase in protein and 8.3g (95%CI: -20.5, 4.0; moderate ES d=-0.57) reduction in saturated fat. In middle-aged and older adults with NAFLD, a home exercise and plant-based dietary protein intervention delivered via telehealth was safe, but not feasible in terms of achieving the desired level of adherence. Despite this, exploratory analysis indicates this mode of healthcare service delivery could play a role to support weight management and improve physical activity and physical function in adults with NAFLD.

References

1. Howland C, Wakefield B (2021) *Res Nurs Health* 44, 92-110.
2. Stine JG, Soriano C, Schreibman I, et al. (2021) *Dig Dis Sci* 66, 3604-11.

Keywords: non-alcoholic fatty liver disease; telehealth; plant-based protein; resistance exercise

Ethics Declaration: Yes

Financial Support: Christine Freer was supported by a Deakin University Higher Degree by Research Scholarship.

Abstract

Implementing eHealth-based behaviour change support within a nutrition intervention trial improves adherence to study-related behaviours in healthy young adults

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Nutrition intervention trials play a key role in informing clinical and dietary guidelines. Within these trials, we need participants to change their behaviours; however, researchers seldom systematically consider how to support participants with these changes, contributing to poor adherence. Here we evaluate how using a behaviour change framework to develop support within a dietary intervention impacts young adults' adherence to required trial behaviours. In the Protein Diet Satisfaction (PREDITION) trial, 80 young adults were randomised to a flexitarian or vegetarian diet for 10-weeks to investigate the psychological and cardiometabolic effects of moderate lean red meat consumption as part of a balanced diet⁽¹⁾. To understand these outcomes, it was key that participants within the trial (i) ate a healthy, basal vegetarian diet (excluding meat, poultry, and fish not provided by research team) and (ii) reported their dietary intake daily on a smartphone application (required to evaluate intervention compliance). To enhance adherence to these behaviours the Nine Principles framework was used to develop behaviour change support (BCS)⁽²⁾. Key components of the BCS included access to a dietitian-led Facebook group, text reminders, and food delivery. Effectiveness was measured using the following analyses of the 78 participants who completed the study: pre-post change in targeted dietary habits over time using a subscore of the Healthy Diet Habits Index, adherence score to reporting over 10-weeks, Facebook group engagement, and impact evaluation. Analysis included linear imputation modelling, t-tests, and chi-square analysis. The total Healthy Diet Habits Index subscore out of 16 significantly increased from baseline to week 10 (10.6 ± 2.6 to 11.2 ± 2.6 , $p=0.011$), demonstrating maintenance of a healthy diet. Overall adherence to reporting was high across the 10 weeks, with the total population mean reporting score 90.4 ± 14.6 out of a possible 100. This strengthens study validity, allowing us to confidently report if participants complied with study requirements of consuming the intervention protein (red meat or plant-based meat alternatives) on top of a basal vegetarian diet. Although relatively low active Facebook engagement was observed (on average <1 'react' per post), most participants agreed the text messages and Facebook groups supported them to adhere to recording (63%) and eating healthily (60%), respectively. This is the first study to provide an example of how a framework can be used to systematically develop, implement, and assess BCS within a nutrition trial. This appears to be a promising way to enhance adherence to study-related behaviours, including the burdensome task of reporting dietary intake. We believe this has great potential to improve research validity and decrease resource waste, not only for the PREDITION trial but in future dietary intervention trials.

References

1. Braakhuis A, Gillies N, Worthington A, et al. (2021) *JMIR Res Protoc.* 10(12):e30909.
2. Worthington, A, Gillies, N, Roy, R, and Braakhuis, A. (2023) *J Nutr Educ Behav.* 55:38–47.

Keywords: behaviour change techniques; adherence; eHealth; health behaviour

Ethics Declaration: Yes

Financial Support: The PREDITION trial research was funded by the New Zealand National Science Challenge (High Value Nutrition, 3723714) and the New Zealand Ministry of Business, Innovation and Employment National (including funds from the Meat Industry Association Innovation Limited (a subsidiary of the New Zealand Meat Industry Association) and Beef and Lamb New Zealand Limited).

Nutrition careers

Nutrition careers

Abstract

Nutrition students employability skills: need for a graduate employability framework

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For a qualified nutritionist to obtain registration with the Nutrition Society of Australia they must first demonstrate that they meet a set of competencies relating to required nutrition knowledge and skills⁽¹⁾. However, theoretical knowledge and a technical skillset may not be enough to actively contribute to the workforce as a new graduate⁽²⁾. Employers have previously expressed a desire for nutrition graduates to also develop employability skills in undergraduate studies to be better prepared for the workforce⁽³⁾. Universities across Australia appear to have heterogeneous approaches to building nutrition students employability skills. To better understand student workforce readiness and employability skills, the research team undertook a mixed-methods study. A validated work-ready tool was used to survey undergraduate nutrition students self-perception of work readiness (n= 88) and semi-structured interviews of students pre/post nutrition industry placements (n=18) were conducted to assess factors impacting student understanding and development of work readiness. Preliminary data from the survey showed higher levels of perceived ability related to higher age in, written communication (P<0.05), decision making (P<0.05), working unsupervised (P<0.05) and managing challenges (P<0.05). Lower age showed lower perceived ability in understanding how to apply skills (P<0.001). Lower levels of work experience showed lower perceived ability to work in a team (P<0.01), collaborate (P<0.01), work under pressure (P<0.05), and identify problems (P<0.01). Thematic analysis from interviews revealed themes related to improved confidence following a placement experience, communicating to stakeholders, the importance of translation skills, the benefits of networking and self-efficacy. The results suggest there are numerous identified gaps and significant room for improvement. To have a systematic approach to skill development, universities training nutrition students should consider developing a framework that builds understanding and scaffolds skill development across year levels. An employability framework has the potential to increase students employability skills and knowledge, enhance student confidence and increase graduate employment.

References

1. Lawlis T, Coates AM, Clark K, et al. (2019) *Asia Pac J Clin Nutr*, 28(1), 166-176.
2. Murray E, McLeod S, Biesiekierski J, et al. (2020) *Journal of Teaching and Learning for Graduate Employability*, 11(1), 63-80.
3. Croxford S, Stirling E, McLeod S, et al. (2022) *Nutr Diet*, 79(4), 447-455.

Keywords: graduate employability; nutrition undergraduate; employability framework; work ready skills

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Evaluation of the Nutrition Society of Australia Mentoring Program for Registered Nutritionists

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Mentoring is an established method of promoting networking, professional growth and learning, and career development in many health professions⁽¹⁾. For a non-vocational profession such as nutrition with a diverse scope of practice, the impact of mentoring remains unclear. In 2020, the Nutrition Society of Australia (NSA) developed and implemented a mentoring program for registered nutritionists. The individually matched mentoring facilitates a 12-month relationship between nutritionists who opted-in to the program. This qualitative case study research aimed to understand the conceptualisation and development of the NSA mentoring program and explore the experience from the viewpoints of both mentors and mentees in the program. First, a 60-minute focus group was conducted with the NSA program organising committee to explore the initial conceptualisation, objectives of the program, expected outcomes, and related training provided to mentors and mentees. Then, a 34-item questionnaire was sent to 63 participants from the first three program cohorts to collect their demographic information as well as expectations, perception and experience of the mentoring. Twenty-one questionnaire responses from 10 mentors and 11 mentees were collected. Participants were from a range of nutrition professions across NSW, VIC, QLD, and WA. Ten questionnaire participants (four mentors and six mentees) further participated in in-depth interviews to provide narratives of their experience. Thematic analysis was conducted with employment of theory-building structure within the case study⁽²⁾. Our findings indicated that despite an explicit discussion of mentoring focus on employability skills, e.g. communication, professionalism, advocacy, etc., many mentees perceived mentoring as a gateway to employment and career pathway development. The perceived benefits of mentoring were highly dependent on matching of mentor/mentee, which was complicated by the diversity of practice within the profession, and unstated expectations of individual mentees. Regardless of the perceived quality of their mentoring experience, participants reported that the NSA mentoring program added value to the society's membership and were supportive of program continuity. In conclusion, the NSA mentoring program was a value-adding strategy to the society membership and it could play an important role in career pathway support into the diverse areas of practice in the nutrition profession. More explicit discussion of expectations between mentors and mentees at the beginning of mentoring could enhance the mentoring experience.

References

1. Bayley H, Chambers R, Donovan C. *The good mentoring toolkit for healthcare*. Radcliffe Publishing; 2004.
2. Yin RK. *Case study research: Design and methods*. Sage; 2009.

Keywords: mentoring; continuous professional development; qualitative; case study research

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Private practice dietetics workforce: A review of the literature

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Private practice is the fastest growing employment sector for dietitians in Australia, including for new graduates ⁽¹⁾. There is an anecdotal concern that current graduate cohorts are not adequately prepared for private practice. The present study aims to assess the existing literature relevant to workforce development specific to private practice dietetics, including areas such as workforce size, distribution, competency, practices and global challenges. The secondary aim is to identify gaps in the literature to inform future priority areas and to inform private practice dietetics workforce development research. Five databases were systematically searched from inception to August 2023 and grey-literature was searched using the Google search engine using key search terms to identify studies for inclusion. Of the 2361 peer-reviewed publications and 1800 grey literature, eighty were included. Directed content analysis and qualitative constant comparison technique were used to deductively extract data from eligible private practice literature. Intelligence sources covering the following themes proved to be limited: workforce size, distribution, attributes, demography, supply/preparation, competencies, continued professional development and challenges. However, clear structural issues present workforce challenges for private practice dietitians. There is an overwhelming paucity of comprehensive literature on the private practice dietetics workforce across the world. Private practice dietetics workforce development research is warranted to address current research gaps in a coordinated, collaborative approach to ensure this rapidly expanding workforce is well supported.

References

1. Heafala A, Mitchell LJ, Williams LT (2021) *Nurs & Health Sci* 23, 723-32.

Keywords: private practice dietitian; workforce; dietetics; education

Ethics Declaration: No

Financial Support: This research is supported by an Australian Government Research Training Program Scholarship

Nutrition and ageing

Nutrition and ageing

Abstract

Scoping user needs for an online nutrition education resource for older adults

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As the global population continues to age, strategies that promote health and wellbeing among older adults are urgently required. This demographic faces an increasing burden of chronic diseases linked to inflammation,⁽¹⁾ often associated with diets that are energy dense and nutrient poor.⁽²⁾ Importantly, the impact of these conditions can be minimised by adopting an anti-inflammatory dietary pattern, such as the Mediterranean diet.⁽³⁾ While there are numerous predictors of behaviour and an individual's capacity for behaviour change, nutrition knowledge is a fundamental influencer of eating behaviours.⁽⁴⁾ However, knowledge of anti-inflammatory diets generally and the Mediterranean diet specifically is lacking among older adults,⁽⁵⁾ highlighting the need for effective educational programs targeting this group. Digital health technologies have the potential to provide cost-effective and accessible nutrition education, however, few technologies have been developed to meet older adults unique needs and preferences. To address this gap, this study aimed to explore the specific needs and design preferences of older adults for an online nutrition education resource. A total of 20 adults aged 55 years and older participated in one of four 2-hour participatory design workshops, where prompted discussion questions were used to explore their use of technology and scope their needs and preferences for an online nutrition education resource. All participants were regularly using a range of different devices (e.g., smartphones, tablets, and computers) and reported being comfortable doing so. Participants wanted a website that could be accessed across devices (i.e., desktop and mobile friendly) that provided practical nutrition advice, recipes, and information on the link between diet and disease. A number of design principles were identified as essential to optimise the user experience, including large and simple fonts, use of dark type on a light background, and clear categories for easy navigation. To enhance engagement, participants sought a personalised resource that could be adjusted to suit their needs, provided up-to-date information, and allowed for easy content sharing with others, such as by exporting information as a PDF. Participatory design methods offer new knowledge for developing and refining existing and future digital health technologies that are appropriate and useful for the target audience. Specifically, the older adult participants were motivated to access a user-friendly web-based nutrition resource provided it was able to be personalised to their health and nutrition needs, offered practical solutions such as adaptations to portion size or in relation to cost, and was easily shareable with others. Given the limited availability of online, self-directed and evidence-based nutrition education resources for older adults, these findings provide valuable insights to shape digital health resources that cater to the needs and preferences of this population and have the potential to support healthy eating habits and contribute to reducing diet-related chronic disease burden.

References

1. Libby P. (2002) *Nature* 420, 868-74.
2. Ruiz-Nunez B, et al. (2013) *J Nutr Biochem* 24, 1183-1201.
3. Shivappa N. (2019) *Nutrients* 11, 1639.
4. Rustad, C & Smith, C (2013) *J Nutr Educ Behav* 45, 490-8.
5. Turner, A et al. (2023) *J Community Health*, 1-12.

Keywords: ageing; technology; participatory design; Mediterranean diet

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

Reducing hip and non-vertebral fractures in institutionalised older adults by restoring inadequate intakes of protein and calcium is cost-saving

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Older adults in aged care homes account for 30% of the population burden of hip fractures. Nutritional interventions to correct protein and calcium inadequacies reduce these and other debilitating fractures, perhaps partly by reducing falls and slowing deterioration in bone morphology. We aimed to determine whether a nutritional approach to fracture risk reduction in aged care homes is cost-effective. Costing was estimated based on results of a prospective two-year cluster-randomised controlled trial involving 3313 residents in 27 aged care homes (intervention using high dairy menus), 3911 residents in 29 aged care homes (controls consuming from normal menus) and cost of ambulance, hospital, rehabilitation, and residential care incurred after fracture. The incremental cost-effectiveness ratios per fracture averted within a 2-year time horizon were estimated from the Australian healthcare perspective applying a 5% discount rate on costs after the first year. Intervention resulted in a total of 3.5 servings of milk, yoghurt and/or cheese daily, achieving 1,142mg calcium and 69g protein versus usual daily intakes of 700mg calcium and 58g protein consumed by controls. This intervention reduced all fractures by 33% at a daily cost of AU\$0.66 per resident. The base-case results showed that intervention was cost-saving per fracture averted, with robust results in a variety of sensitivity and scenario analyses. Scaling the benefits of intervention to the Australian community equated to a saving of AU\$66,780,000 annually in Australia and remained cost saving up to a daily food expenditure of AU\$1.07 per aged care resident. Averting hip and other non-vertebral fractures in older adults in aged care homes by restoring nutritional inadequacies of protein and calcium is cost saving and supports the wide-spread implementation of this type of nutritional intervention in similar settings.

References

NA

Keywords: aged care; cost-effectiveness; fracture prevention; nutrition

Ethics Declaration: Yes

Financial Support: The overall study was supported by grants from Dairy Australia [grant number TP 701722]; California Dairy Research Foundation; National Dairy Council; Aarhus University Hospital and Danish Dairy Research Foundation; Fonterra Co-operative Group Ltd; Dutch Dairy Association; Dairy Council of California; Dairy Farmers of Canada; the Centre national interprofessionnel de l'économie laitière; University of Melbourne; Austin Hospital Medical Research Foundation and Sir Edward Dunlop Medical Research Foundation.

Abstract

A systematic review of diet, nutrition, and medication use among centenarians and near centenarians worldwide

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Centenarians represent a phenomenon of successful aging, yet little is known about their lifestyle and health practices, including diet/nutrition, medication use, and health conditions. A protocol for this systematic review was registered previously (1). We systematically searched Medline, CINAHL, Scopus, and grey literature from 2000 to 2022, limited to quantitative studies published in English among adults aged 95 years or above. Two reviewers independently screened 3,392 records and identified and extracted data from 34 eligible studies. Additionally, they independently assessed the study quality using the Modified Newcastle-Ottawa Scale (mNOS) (2). Any disagreement was discussed and resolved with a third reviewer. In analysis, pooled prevalence was provided for categorical variables on demographics, lifestyles, medications, and diseases using % (95%CI); mean or median was provided for continuous variables. Due to study heterogeneity, we conducted a narrative synthesis for the associations between the exposures and outcomes. Over 70% of the included studies met 6/8 criteria based on the mNOS; nearly half did not mention or control for confounders in statistical analyses. The age ranged from 95-118y (32 studies: 100y+; 2 studies: mean age 97-98 y); the majority were females (75%;95%CI: 71%,78%). Most centenarians did not smoke or drink [current smokers: 7% (5%,9%); former smokers:16% (12%,19%); daily drinkers: 27% (20%, 34%); former drinkers:21% (13%,30%)]. Most centenarians were physically inactive (23%; 20%,26%). Over 50% had normal weight (52%;42%,61%), 33% (14%,52%) underweight, and 14% (8%,20%) overweight. Regarding nutrition, the narrative synthesis suggests that centenarians had normal levels of albumin (3.8g/dL), total triglycerides (111mg/dL), total (188mg/dL), and HDL cholesterol (54mg/dL) but high levels of LDL cholesterol (109mg/dL). Regarding medications, nearly 50% took antihypertensive medications (49%;14%,84%) or other cardiovascular drugs (48%; 24%,71%); they took a median of 5 (range: 2-7) drugs. Common conditions included impairment of basic activities of daily living (ADL) (54%;33%,74%), hypertension (43%;21%,65%), and diabetes (22%;9%,52%). In regression analyses among centenarians, high dietary diversity, lower salt preference, and weight status were significant factors for more independence in basic ADL, lower mortality, and greater longevity. For example, a high dietary diversity score was associated with a low mortality risk [0.93 (0.92, 0.94) per unit increase]; those who preferred salty food versus those who did not had a 3.6-fold risk of impaired ADL [adj.OR: 3.59 (1.14,11.25)]. Being overweight vs. normal weight reduced the risk of ADL impairment [adj.OR: 0.84 (0.78, 0.91)] while underweight increased this risk [adj.OR:1.34 (1.28,1.41)]. Also, overweight [adj.OR: 0.92 (0.90,0.94)] or abdominal obesity [adj.OR:0.72 (0.52,0.996)] reduced the likelihood of longevity per kg increase. This systematic review suggests a healthy lifestyle, good nutrition, and normal body weight may contribute to extreme longevity. Interpreting these summary findings should be cautious due to potential recall bias and heterogeneity of the included studies.

References

1. Dai Z, Lee SY, Sharma S, Ullah S, & Tan EC. (2023). A systematic review of diet, nutrition, and medication use among centenarians around the world: <https://osf.io/ey38d>
2. The University of Pennsylvania Health System Center for Evidence-based Practice (2016). Modified Newcastle-Ottawa scale for appraisal of non-randomised controlled studies: <https://www.med.upenn.edu/CEP/assets/user-content/documents/modified-newcastle-ottawa.pdf>

Keywords: longevity; extreme longevity; oldest old; healthy ageing; diet

Ethics Declaration: Yes

Financial Support: This research received no external funding, except for a small amount of summer scholarship to SYL and SS (each received \$1000) from Flinders University.

Abstract

Selenotranscriptome network in Alzheimer's disease

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The interplay between selenoproteins, oxidative stress, and cell death pathways holds promise in unravelling novel therapeutic targets for Alzheimer's disease (AD) in the future. Nonetheless, further comprehensive investigations are warranted to fully comprehend the precise contributions of selenoproteins in the aetiology and potential therapeutic strategies for Alzheimer's disease. Previous work into gene expression networks in AD has included analysis of the entire transcriptome and, as of yet, has not yielded consistent insight into pathological pathways.¹ Despite the comprehensive assessment of the transcriptome enabled by current technologies, one drawback of the whole transcriptome analysis is the risk of overlooking subtle yet significant variations in metabolic pathways.² Thus, we aimed to assess gene expression of known selenoprotein and selenium-containing pathways in two different brain regions (dorsolateral prefrontal cortex (DPC) and posterior cingulate cortex (PCC)) across the AD spectrum. We used RNA sequencing data from The Rush University's Religious Orders Study and Memory and Aging Project (ROSMAP) cohort available in the AD Knowledge Portal (<https://www.synapse.org/>).³ This study included data available for a total of 889 DPC and 647 PCC samples. Four pathological phenotypes were determined based on pathology (CERAD) and clinical (CDR) status: AD ([[+ pathology, (+ clinical)], prodromal disease, corresponding to donors that have not received a clinical diagnosis despite the presence of pathological alterations ([[+ pathology, (-) clinical)], controls [[(-) pathology, (-) clinical] and non-AD dementia [[+ pathology, (+) clinical]. This last group was excluded from the analysis as it is assumed they may have been misdiagnosed or presented with non-AD dementia. Six selenium or AD-related pathways were assessed, accounting for 421 unique genes. Group comparisons were performed using linear mixed modelling adjusted for age, sex, *APOEε4* status and batch via DESeq2 package with Benjamini-Hochberg adjustment for multiple testing. A total of 18 genes significantly differed between AD and controls in both brain areas (same direction in both brain areas; $P < 0.05$), including eight selenoprotein genes or genes directly associated with selenoprotein synthesis. Fifteen of them were also different (same direction) in PCC (seven selenoprotein/selenoprotein synthesis genes), and four were different in DPC (four selenoprotein/selenoprotein synthesis genes) between AD and prodromal. Only three genes significantly differed between prodromal and control samples (DPC), including the selenoprotein *DIO3* and the transcription factor *SP3*. Our findings indicate a progressive change in gene expression across the different stages of AD. These findings shed light on critical genes involved in selenoprotein synthesis that play a role in AD pathogenesis. Restricting the analysis to a subset of pathways enabled the detection of smaller alterations between groups, which is particularly appropriate in trace element homeostasis, where small alterations may have significant downstream effects.

References

1. Wan YW, et al. (2020) *Cell Rep* 32, 107908.
2. Portbury SD, Adlard PA (2017) *Int J Mol Sci* 18, 2506.
3. Allen M, et al. (2016) *Scientific Data* 3, 160089.

Keywords: selenium; selenoproteins; selenoproteome; Alzheimer's disease

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Association between protein intake, diet quality, and obesity in Australian adults: A comparison of measurement units

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The role of protein in decreasing the risk of cardiometabolic diseases has been proposed, yet the findings are inconsistent, possibly due to how protein intake was expressed.⁽¹⁾ This study aimed to examine how different ways of expressing protein intake may influence its relationships with diet quality and obesity. This study used data from the Australian National Nutrition and Physical Activity Survey (NNPAS) 2011-12, focusing on adults aged ≥ 19 years, excluding those who were pregnant or lactating, and had both anthropometric and dietary data ($n = 7637$). Total protein intake was assessed by up to two 24-hour dietary recalls and reported in two measurement units, namely g/day and % of energy intake. Usual protein (g) and energy intakes (kJ) were modelled using the Multiple Source Method.⁽²⁾ Diet quality was assessed using the Dietary Guidelines Index (DGI).⁽³⁾ Body mass index (BMI) and waist circumference were used as measures of obesity. Multiple linear regressions were performed stratified by sex, and adjusting for age, country of birth, Socio-economic Indexes for Areas, physical activity level, energy misreporting, usual energy intake (for diet quality), and non-protein energy intake (for obesity). Positive associations between protein intake and diet quality were confirmed across measurement units. Protein intake expressed in % of energy intake (β -coefficient: men = 0.97; women = 1.21, $p < 0.001$) had a higher β -coefficient than those reported in g/day (β -coefficient: men = 0.19; women = 0.30, $p < 0.001$). Linear regression models showed a positive association between protein intake and BMI for men and women, either expressed in g/day (β -coefficient: men = 0.02, $p < 0.001$; women = 0.03, $p = 0.001$) or % of energy intake (β -coefficient: men = 0.14, $p < 0.001$; women = 0.12, $p = 0.002$). The relationship between protein intake expressed in g/day and waist circumference was also statistically significant (β -coefficient: men = 0.04, $p = 0.004$; women = 0.05, $p = 0.035$). However, protein intake expressed as % of energy intake was correlated with waist circumference for men only (β -coefficient: men = 0.26, $p = 0.001$; women = 0.19, $p = 0.075$). The consistent findings across measurement units suggested that the unit of g/day and % of energy intake can be used for examining associations between protein intake and diet quality. However, associations between protein intake and measures of obesity varied between protein units and sex. These findings suggest that the selection of protein measurement units in relation to obesity outcomes might need to consider the characteristics of study population (e.g., sex, energy intake). Overall, the outcomes of this study suggest that how protein is expressed may impact the associations between protein intake, diet quality, and obesity, and therefore require further considerations when examining the role of protein in cardiometabolic health.

References

1. Hruby A & Jacques PF (2018) *Public Health Nutr* 21, 2998-3010.
2. Harttig U, Haubrock J, Knüppel S, et al. (2011) *Eur J Clin Nutr* 65, S87-S91.
3. Livingstone KM, Milte CM, Torres SJ, et al. (2022) *J Nutr* 152, 805-815.

Keywords: Protein; diet quality; obesity; measurement unit

Ethics Declaration: Yes

Financial Support: RML is supported by National Health and Medical Research Council Emerging Leadership Fellowship L1 (APP1175250).

Abstract

Does adiposity influence the relationship between diet quality and bodily pain in Australia adults?

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Chronic pain affects 20-30% of people worldwide ⁽¹⁾. While the impact of nutrition and dietary patterns on bodily pain has gained attention in recent years, the underlying linking mechanisms remain poorly understood; it is possible that body weight, specifically adiposity, may be a mediating factor ⁽²⁾. Thus, the primary aim of this study was to explore whether adiposity mediates the relationship between diet quality and bodily pain. This cross-sectional analysis included 654 adults (57% women, mean age 50.4 ± 1.1 years, BMI 29.0 ± 6.2 kg/m²) with complete diet, adiposity, and pain measures from the Whyalla Intergenerational Study of Health (2008-09). Diet quality was calculated using the Dietary Guideline Index (DGI total score, core and non-core scores) ⁽³⁾, and pain assessed via the Short Form-36 bodily pain scale (SF36-BPS) transformed percent score. Adiposity was determined from body mass index (BMI), waist circumference (WC), and body fat percent (BF, via dual energy x-ray absorptiometry). Mediation analyses determined the role of adiposity in the direct and indirect relationships between diet quality and pain in the whole population, then stratified by sex (self-report). There were no significant indirect or direct effects between DGI total scores and SF36-BPS, for any measure of adiposity. Direct effects were observed for DGI core-food scores on SF36-BPS for each measure of adiposity (BMI, $\beta=0.258$, 95% CI 0.048, 0.467; WC $\beta=0.246$, 95% CI 0.037, 0.455; BF $\beta=0.247$, 95% CI 0.040, 0.454; all $p<0.05$). Each measure of adiposity accounted for <10% of the relationship between diet quality and pain, with a better-quality diet associated with less bodily pain (higher SF36-BPS). Relationships differed by sex; with no direct or indirect effects seen between DGI scores and SF36-BPS for men while, in women, there was non-mediation with direct positive effects between DGI total score and SF36-BPS for each measure of adiposity (BMI, $\beta=0.362$, 95% CI 0.132, 0.591; WC $\beta=0.345$, 95% CI 0.116, 0.574; BF $\beta=0.357$, 95% CI 0.130, 0.584; all $p<0.05$). Also in women, body fat mediated 85% of the relationship between DGI non-core scores on bodily pain (indirect effect $\beta=-0.242$, 95% CI -0.358, -0.126, $p <0.05$). While adiposity did not mediate the relationship between diet quality and pain, this study highlights that diet quality plays a role in the pain experience with higher consumption of core foods showing direct associations with lower levels of bodily pain. Moreover, sex differences were observed, with less bodily pain in women associated with higher overall diet quality. Interestingly, body fat drove the relationship between higher pain scores and greater consumption of non-core foods (discretionary), but body fat alone was associated with consumption of fewer discretionary foods. This anomaly requires further investigation.

References

1. World Health Organisation. *Musculoskeletal Conditions: WHO*, (2021). <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>.
2. Elma Ö, Brain K, Dong H-J *J Clin Med* (2022) 11:5950.
3. McNaughton SA, Ball K, Crawford D, Mishra GD (2008) *J Nutr* 138:86-93.

Keywords: diet quality; adiposity; pain; mediation

Ethics Declaration: Yes

Financial Support: Susan Ward is supported by a University of South Australia Research Training Program domestic (RTPd) Fee Offset Scholarship and Australian Government Research Training Program (RTP) scholarship.

Nutrition during pregnancy

Nutrition during pregnancy

Abstract

Exploring the concerns, attitudes and experiences of health professionals regarding a vegan diet during pregnancy and early life; a mixed-method study

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Vegan diet consumption is gaining popularity globally and in New Zealand. However, plant foods provide absent or limited quantities of important micronutrients such as vitamin B12, iron, zinc, and omega-three fatty acids. ⁽¹⁾ A restrictive and unplanned vegan diet may thus increase risks of nutrient deficiencies especially during pregnancy and early life if the nutrient demands are not fulfilled. Health professionals who provide primary support for pregnant women and their children are important figures in monitoring the nutritional statuses during the antenatal and postnatal periods. ⁽²⁾ Being knowledgeable about the nutritional risks of poorly-planned vegan diets, and having access to appropriate educational resources would support vegan mothers and children to achieve a well-balanced diet. Currently, there are insufficient studies investigating the perspectives of New Zealand's health professionals within the realm of vegan diets during pregnancy and early life. The aim of the research is to utilise a mixed-methods approach to explore these concerns, attitudes, and experiences. Healthcare professionals, including dietitians, nurses, general practitioners and midwives were invited to participate in the study. Knowledge and attitude scores were collected with an online questionnaire and scores were recorded as a proportion of the participants. Subsequently, descriptions of experiences, concerns, and perspectives about the adoption of vegan diets during pregnancy and early life were collected with semi-structured interviews. A total of 14 health professionals completed the study. All health professionals showed positive attitudes towards the adoption of vegan diets during pregnancy but some exhibited greater concern about their restrictive nature especially in early childhood. Achieving intake adequacy and subjecting young children to intensive assessments for nutrient adequacy were among the concerns raised. More than 90% of health professionals were concerned about iron and vitamin B12 deficiencies while less than 50% were concerned about deficiencies in protein, omega-three fatty acids, iodine, zinc and vitamin D. Less than 50% of participants were aware that plant foods do not provide sufficient vitamin B12. More than 50% disagreed that sufficient information about vegan diets during pregnancy and early life is available. Insufficient evidence-based consensus and government guidelines, and limited access and referrals to dietitians for guidance on vegan diets were highlighted as challenges that reduce the overall knowledge and confidence. Hence, continual professional education and updated evidence-based resources would be important steps to support health professionals in providing guidance to individuals on vegan diets.

References

1. Sebastiani G, Herranz Barbero A, Borrás-Novell C, et al. (2019). *Nutrients*, 11(3), 557.
2. Baroni L, Goggi S, Battaglino R, et al. (2018). *Nutrients*, 11(1), 5.

Keywords: vegan diets; pregnancy; early life; health professionals

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract

Pacific Islands Families Study: Food insecurity during pregnancy and secondary school educational achievement

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The nutritional environment in early life is a key factor for brain development and function. It is important to understand the relationship between early life nutrition and academic achievement in adolescence. The Pacific Islands families (PIF) birth cohort ⁽¹⁾ were born in the year 2000. When their child was 6 weeks old mothers were asked questions concerning food security over the last year. Two binary measures of food security were derived as previously used in PIF and also by the Ministry of Health (MOH). Records of academic achievement for 649 youth were obtained from the National Certificate of Educational Achievement database in 2019. Highest qualifications and a composite ranking score allowed achievement to be assessed at levels 1, 2 and 3 of NCEA and for University Entrance (UE, lowest to highest). More females (27%) than males (18%) achieved UE as their highest qualification and more males (40%) than females (31%) achieved level 1 or 2 as their highest qualification. UE was achieved by 25% of those born into food secure households and 17% from food insecure households. Logistic regression demonstrated that being female increased the odds of achieving UE 1.8 fold and food security a further 1.6 fold. The prevalence of food insecurity was not different by sex but high at 29% and 42% using the PIF and MOH measure of food insecurity respectively. This work emphasises the importance of maternal and early life food security for subsequent academic achievement and the well-being of future generations.

References

1. Paterson J, Tukuitonga C, Abbott M, et al. (2006). The New Zealand Medical Journal 119 (1228) U1814.

Keywords: food insecurity, birth cohort, academic achievement, Pacific Islands

Ethics Declaration: Yes

Financial Support: Foundation for Science, Research and Technology; the Health Research Council of New Zealand; and the Maurice and Phyllis Paykel Trust.

Abstract

Patterns and predictors of low-calorie sweetener consumption during pregnancy: findings from a national survey in Australia

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Emerging evidence has indicated that perinatal exposure to low-calorie sweeteners (LCSs) might be associated with adverse pregnancy outcomes and offspring health ⁽¹⁾. The aim of the study was to examine the patterns and predictors of LCS consumption among pregnant women in Australia. A web-based survey was conducted among 422 pregnant women aged 18-50 years between September and October 2022. Participants were recruited by a reputable consumer panel provider, Qualtrics. Sociodemographic, lifestyle, dietary intake (including LCS consumption), pregnancy-related characteristics, and participants' awareness regarding the potential health effects of LCS were assessed. We assessed LCS consumption from twelve food groups that are common sources of LCS ⁽²⁾. To identify LCS consumption patterns and predictors of the patterns, a latent class analysis and hierarchical multinomial logistic regression was employed, respectively. The women's mean (SD) age was 30 (4.6) years. Overall, 95% of the women reported consuming any LCS in the current pregnancy. Three different LCS consumption patterns were identified. Infrequent or non-consumers, representing 50% of the women, included those who rarely or never consumed LCS-containing foods and beverages (with a probability of less than 10%). The second pattern, moderate consumption, which encompassed 40% of the women, indicated low to moderate consumption of LCSs (for instance, the likelihood of consuming LCS-containing drinks ranged from 18% to 50%). The third pattern highlighted habitual consumption. These individuals (10%) had a high likelihood (ranging from 75% to 95%) of consuming foods from all food groups that contained LCS. The majority of women (71%) were unaware of the potential adverse effects of LCS, and only 25% expressed concerns about the potential impacts of LCS on their health and the health of their offspring. Moreover, women who frequently consumed sugar-sweetened beverages (SSBs) (≥ 2 times/week) or had gestational diabetes were over three times more likely to adopt a habitual LCS consumption pattern compared to those who consumed SSBs less often [adjusted relative risk ratio (aRRR) = 3.17, 95% CI: 1.39-7.21] and those without gestational diabetes [aRRR = 3.53, 95% CI: 1.03-12.10]. Additionally, having a medical condition was linked to a 55% lower chance of moderate LCS consumption compared to infrequent or non-consumption. These findings indicate LCS consumption is widespread, but awareness of its potential adverse health effect is low among pregnant women in Australia. Public health interventions to increase the awareness of potential adverse effect of LCS consumption, particularly among pregnant women with moderate and habitual consumption are warranted.

References

1. Cai C, Sivak A & Davenport MH (2021) *Public Health Nutr* 24, 5024-5033.

2. Conway MC, Cawley S, Geraghty AA, et al. (2022) *Eur J Clin Nutr* 76, 227-234.

Keywords: non-nutritive sweetener; pregnancy; consumption pattern; Australia

Ethics Declaration: Yes

Financial Support: No funding to declare. BG is supported by the University of Adelaide research scholarship.

Impact of diet on non-communicable disease risk factors

Impact of diet on non-communicable disease risk factors

210161

Abstract

A low carbohydrate diet score is associated with a higher risk of developing type 2 diabetes in an Australian population: Melbourne Collaborative Cohort Study

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Evidence suggests that low carbohydrate eating patterns are effective for rapid weight loss ¹, however, little is known about their long-term effects on the risk of chronic diseases. We assessed the association of a low carbohydrate diet score (LCD) with the incidence of type 2 diabetes using Melbourne Collaborative Cohort Study (MCCS) data. Between 1990 and 1994, the MCCS recruited 41,513 people aged 40 to 69 years. The first and second follow-ups were conducted in 1994-1998 and 2003-2007, respectively². We analysed data from 39,185 participants. LCD at baseline was calculated as the percentage of energy from carbohydrate, fat, and protein. The higher the score the less carbohydrate contributed to energy intake. The association of LCD quintiles with the incidence of diabetes was assessed using modified Poisson regression, adjusted for lifestyle, obesity, socioeconomic and other confounders. LCD was positively associated with diabetes risk. Higher LCD score (p for trend=0.001) was associated with increased risk of type 2 diabetes. Quintile 5 (38% energy from carbohydrates) versus quintile 1 (55% energy from carbohydrates) showed a 20% increased diabetes risk (incidence risk ratio (IRR) =1.20 (95% CI: 1.05-1.37)). A further adjustment for BMI and WHR eliminated the association. Mediation analysis demonstrated that BMI attributed 76% of the LCD & diabetes association. Consuming a low carbohydrate diet, reflected as a high LCD score, may increase the risk of type 2 diabetes which is largely explained by obesity. Results imply the need for further studies, including clinical trials investigating the effects of a low carbohydrate diet in type 2 diabetes.

References

1. Hession M, Rolland C, Kulkarni U, et al. (2009) *Obesity Review* 10:36-50.

2. Milne RL, Fletcher AS, MacInnis RJ, et al. (2017) *International Journal of Epidemiology* 46(6):1757-i.

Keywords: low carbohydrate diet; type 2 diabetes; cohort; carbohydrate restriction

Ethics Declaration: Yes

Financial Support: The Melbourne Collaborative Cohort Study (MCCS) cohort recruitment was funded by VicHealth and Cancer Council Victoria. The MCCS was further augmented by Australian National Health and Medical Research Council grants 209057, 396414 and 1074383 and by infrastructure provided by Cancer Council Victoria

Abstract

Baseline lifestyle and biomedical stroke risk factors among New Zealand participants in the PERsonalised Knowledge to reduce the risk of Stroke (PERKS-International) randomised controlled trial –preliminary results

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Stroke ranks as the world's second leading cause of death and third in causing disabilities, a preventable disease affecting people of all demographics. Primary prevention is crucial to mitigate its impact by addressing modifiable risk factors such as poor diet, low physical activity (PA), obesity, smoking, high blood pressure (BP), elevated cholesterol, and blood glucose levels. This study evaluated quality of diet and other stroke modifiable risk factors among New Zealand (NZ) participants recruited at the baseline phase of the PERKS-International trial. PERKS is a Phase III, multicentre, prospective, pragmatic, open-label, single-blinded endpoint, two-arm randomised controlled trial conducted across Australia and NZ⁽¹⁾. Participants aged >35 and ≤75 years with ≥2 modifiable risk factors for stroke were assessed using the Life's Simple 7 (LS7) score. LS7 includes seven components (BMI, BP, total cholesterol, blood glucose, dietary pattern, smoking, and PA) categorising into *ideal*, *intermediate*, and *poor* level. Height, weight, and BP were measured. Total cholesterol and blood glucose were measured via CardioChek PA Analyser. An online FFQ and Physical Activity Questionnaire were administered. Descriptive analyses and correlation coefficients were used to examine the characteristics of participants at the baseline. In NZ, out of 395 targeted participants, 375 (Female=230, mean age=57yrs) from diverse ethnic groups (NZ European=204, Māori=35, Pacific=17) were recruited and assessed. Among LS7 metrics, smoking had the highest proportion of those in the *ideal* category (88%), followed by blood glucose (62%), total cholesterol (49%), dietary pattern (34%), BP (22%) and BMI (13%). Nearly 64% consumed <5 portions of fruits and vegetables per day. Almost half of the participants consumed beans and pulses less than once a week. About 43% and 31% consumed fibre-rich breakfast cereal and wholemeal bread less than once a week. Almost 10% drank fizzy drinks ≥4 times/week. Nearly 40% consumed sweets such as biscuits, cakes, and chocolate at least twice a week. Over half of the participants consumed red meat and chicken 2-3 times/week. In terms of other risk factors, over half of the participants were obese (BMI ≥ 30 kg/m²). Only 12% were current smokers. About 10% drank alcohol 5-7 days/week. Physical activity expenditure (MET minutes/week) showed no significant sex difference. The LS7 factors correlated significantly were BMI and blood glucose ($r=0.157$, $p<0.01$), total cholesterol and smoking ($r=-0.129$, $p<0.01$), BP and BMI (with a moderate correlation of $r=0.308$, <0.001). The NZ participants in the PERKS-International trial, had poor diets, along with suboptimal lifestyle and biomedical stroke risk factors, reflecting the inclusion criteria for the study. Urgent action is required for the primary stroke prevention at population-level. The results of the trial, expected in 2024, will show the benefit of a mobile phone app on reducing these stroke risk factors.

References

1. Gall SL, Feigin V, Thrift AG, et al. (2023) *Int J Stroke* 18(4), 477-483.

Keywords: diet; stroke; prevention; risk factors

Ethics Declaration: Yes

Financial Support: This work was funded by Australian National Health and Medical Research Council through a Synergy Grant - Synergies to Prevent Stroke (STOPstroke, APP1182071)

Abstract

Does medication use affect blood pressure and lipid-lowering in tree nut and peanut interventions? A meta-analysis of randomised control trials

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Including nuts in the diet has been associated with improvements in cardiovascular disease (CVD) risk factors including high blood pressure (BP) and hyperlipidaemia⁽¹⁻²⁾. However, few studies have investigated if the same benefits exist for medicated and unmedicated populations. This systematic review and meta-analysis investigated the effects of nut intake on BP and lipids, with a sub-analysis evaluating response differences according to BP and lipid-lowering medication usage. MEDLINE, EMBASE, Scopus and Web of Sciences databases were searched for randomised controlled trials (RCTs) of longer than 3 weeks duration that assessed the effects of whole tree nuts or peanuts on BP and lipid responses. The American Diabetes Association Quality Criteria checklist was used to assess the risk of bias, and studies with a negative rating were removed from the meta-analysis. A random-effects meta-analysis was conducted, with subgroup analyses performed based on medication use (medicated, unmedicated, unreported, and mixed-use). Inter-study heterogeneity was estimated using the I^2 test statistic. Data from 107 articles describing 98 studies (61 parallel, and 37 cross-over designs) were included in the meta-analysis. Overall, significant benefits of nut consumption were observed for triglycerides (TG) (mean difference [MD]: -0.11 mmol/L, 95% confidence intervals [CI]: -0.16, -0.06, $p < 0.01$, I^2 : 32.95%), total cholesterol (TC) (MD: -0.15 mmol/L, 95% CI: -0.22, -0.08, $p < 0.01$, I^2 : 61.84%), and low-density lipoprotein cholesterol (LDL-C) (MD: -0.12 mmol/L, 95% CI: -0.19, -0.06, $p < 0.01$, I^2 : 52.7%), but not high-density lipoprotein cholesterol, systolic BP, or diastolic BP. Among unmedicated populations, nut intake resulted in a significant decrease in TG (MD: -0.16 mmol/L, 95% CI: -0.30, -0.03, I^2 : 75.93%), and TC (MD: -0.21 mmol/L, 95% CI: -0.39, -0.03, I^2 : 86.59%), while in those with unreported medication use, there were significant decreases in TG (MD: -0.08 mmol/L, 95% CI: -0.15, -0.01, I^2 : 0%), TC (MD: -0.15 mmol/L, 95% CI: -0.22, -0.07, I^2 : 0%) and LDL-C (MD: -0.12 mmol/L, 95% CI: -0.19, -0.06, I^2 : 0.44%). No significant effects were observed for BP and lipids in the mixed medication group. While there were significant improvements in lipid profiles overall with tree nuts and peanuts consumption, we observed no benefits for BP. Furthermore, significant beneficial effects on lipids were only observed in those with unreported and no medication use. Few studies investigated effects in medicated participants only ($n=1$ study for lipids), and the precise proportion of medication use within the mixed medicated group remains unclear. Consequently, it remains uncertain whether the lipid-lowering properties of consuming nuts remain when hyperlipidaemia is managed with medications. Further studies are needed to explore the influence of medication in combination with dietary approaches on responses to additional CVD risk factors.

References

1. Altamimi M, Zidan S, & Badrasawi M (2020) *Nutr Metab Insights* 13, 1–10.
2. Mohammadifard N, Salehi-Abargouei A, Salas-Salvadó J, et al. (2015) *Am J Clin Nutr* 101, 966-982.

Keywords: cardiovascular diseases; blood pressure; cholesterol; nuts

Ethics Declaration: —

Financial Support: This research received no external funding.

Abstract

Chinese migrants exhibit impaired postprandial lipaemia compared to Caucasian counterparts following both high fat and high carbohydrate test meals.

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People of Chinese ethnicity develop type 2 diabetes mellitus (T2DM) at a younger age and lower body mass index (BMI) than their Caucasian counterparts. Furthermore, Chinese migrants to Westernised countries have an increased risk of metabolic diseases compared to those in their country of origin^(1,2). We propose that this increased risk is due to a greater manifestation of metabolic abnormalities in response to altered diet and lifestyle behaviours. Although fasting lipaemia and glycaemia are commonly used to predict risk of CVD and T2DM, assessment of impaired postprandial metabolism has been found to be a more sensitive indicator of risk⁽³⁾. We hypothesised that Chinese migrants, at risk of T2DM, exhibit impaired postprandial lipid and lipoprotein metabolism compared to Australian-born Caucasian counterparts. Chinese and Caucasian adults at risk of T2DM were recruited to the study in which postprandial lipaemia and glycaemia were monitored following consumption of a high fat and high carbohydrate breakfast meal followed by a mixed, lunch meal. In a nonrandomised acute crossover trial, 15 adults (n = 8 Chinese and n = 7 Caucasian) aged ≥ 18 and ≤ 65 years at risk of T2DM (AUSDRISK score > 12 (median = 14.0, IQR = 3.0)), attended two postprandial test days separated by ≥ 7 -day washout period. Test breakfast meals were isocaloric (3.6 MJ), high fat (46% energy from fat, 46% energy from carbohydrates) or high carbohydrate (74% E carbohydrates, 17.5% E fat). Blood samples were collected at baseline (fasting), 180 min and 360 min after consumption of the breakfast meal. The lunch meal (3.7 MJ, 18% E fat, 76% E carbohydrates) was consumed 240 min after baseline. Samples were analysed for lipaemia and glycaemia. Additionally, chylomicron-rich, and VLDL-rich lipoprotein fractions were isolated by sequential ultracentrifugation and chylomicron particle number (apolipoprotein (apo) B48), triacylglycerol (TAG), and total cholesterol were assessed in these fractions. Data were analysed using a mixed between-within-subject analysis of variance. There were no differences in age, and baseline anthropometric measures between groups, apart from the Chinese group exhibiting significantly lower waist circumference and BMI compared to the Caucasian group. There were no differences between groups in blood measures, apart from a higher total- and LDL-cholesterol concentration in the Caucasian compared to the Chinese group ($P < 0.05$). Despite identical fasting TAG concentrations, the Chinese group, compared with the Caucasian group exhibited significantly elevated serum TAG and chylomicron-apo-B48 concentrations at 360 min following both test meals ($P < 0.01$). All other postprandial measures were not different between groups. These findings show that despite having identical or improved fasting glycaemia and lipid profile, the Chinese group exhibited impaired postprandial lipid metabolism which may contribute to their increased risk of metabolic diseases.

References

1. Fan W, Lee DH, Billimek J, et al. (2017) *BMJ Open Diabetes Res Care* 5, e000327–e000327.

2. Ke C, Luk AO, Chan JCN, et al. (2021) *Diabetes res clin pract* 180, 109062.

3. Zhou Y, Yang G, Qu C, et al. (2022) *BMC Endocr Disord*, 22, 7.

Keywords: postprandial metabolism; ethnicity; cardiovascular disease

Ethics Declaration: Yes

Financial Support: Diabetes Australia Research Program: Grant Reference Y20G-HUGC

Abstract

A primary care-led weight management intervention for adults with diabetes and obesity: quantitative results from a randomised controlled trial of total meal replacement (DiRECT)

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Methods to reduce obesity and type 2 diabetes in Aotearoa New Zealand are desperately needed, with obesity one of the greatest predisposing factors for type 2 diabetes as well as heart disease, and certain cancers.¹ A recent New Zealand report² identified several interventions that might benefit people with established diabetes, the most promising being a period of rapid weight loss, followed by supported weight-loss maintenance. Such weight loss has shown to achieve what was previously thought impossible, diabetes remission,³ as well as appreciably reduce the risk of cardiovascular disease and prevent diabetes-related chronic kidney disease, retinopathy, nephropathy, and lower limb amputation.² While the findings from the studies of low energy total meal replacement diets have stimulated great interest, their use in Aotearoa New Zealand has not been considered. The purpose of this primary-care led intervention therefore was to consider the acceptability and efficacy of such a weight loss programme, DiRECT, in Aotearoa New Zealand. Te Kāiika DiRECT is a 12-month study conducted within a Māori primary healthcare provider in Ōtepoti Dunedin. The DiRECT protocol is three months of total meal replacement for rapid weight loss followed by food reintroduction and a longer period of supported weight loss maintenance. Participants were adults with prediabetes or T2 diabetes and obesity wanting to lose weight. Twenty participants (70% female, age 46 (SD 10), BMI 41 (9), HbA1c 51 (11)) were randomised to receive the DiRECT protocol, twenty more (70% female, age 50 (SD 8), BMI 40 (7), HbA1c 54 (14)) were randomised to receive best practice weight loss support (usual care). All participants had the same number of visits with the in-house Dietitian and free access to the onsite gym. Participants in the control group also received regular grocery vouchers to purchase the foods encouraged by healthy eating guidelines. Recruitment began in February, 2022. After the initial three month study period, DiRECT participants reported consuming 3.0MJ (95%CI 1.2 to 4.8MJ) less energy per day than those in usual care. Mean weight loss was 6kg (2.3-9.6kg) greater for DiRECT participants than usual care participants, while medication use and systolic blood pressure (12mmHg (0-24mmHg)) were lower. Continuous glucose monitoring identified that at baseline, participants on average only spent 10% of the day with a blood glucose reading under 8mmol/L (normoglycaemia). After three months, the usual care group spent on average 48% of the day within the normoglycaemic range, while DiRECT participants spent 78% of the day within the normoglycaemic range. Results at 12 months will enable comment on longer term markers of blood glucose control (HbA1c) and diabetes remission rates, as well as indicate if the body weight, medication, and blood pressure improvements observed at three months are sustained.

References

1. Forouzanfar MH et al. (2016). *The Lancet* 388(10053): 1659-724.

2. PwC DNZ, Edgar Diabetes and Obesity Research Centre (University of Otago), *Healthier Lives (National Science Challenge)*, Tony and Heather Falkenstein. *The Social and Economic Cost of Type 2 Diabetes*. Aotearoa New Zealand, 2021.

3. Churuangasuk et al. (2021). *Diabetologia*

Keywords: diabetes; body weight; RCT; primary care

Ethics Declaration: Yes

Financial Support: This trial was funded by the Ministry of Social Development, Pūtahi Manawa (CoRE), and the Healthier Lives National Science Challenge.

Abstract

A primary care-led weight management intervention for adults with diabetes and obesity: qualitative results from a randomised controlled trial of total meal replacement (DiRECT)

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The UK Diabetes Remission Clinical Trial (DiRECT) demonstrated that a weight loss strategy consisting of: (1) 12 weeks total diet replacement ; (2) 4 to 6 weeks food reintroduction; and (3) a longer period of weight loss maintenance, is effective in reducing body weight, improving glycaemic control, and facilitating type 2 diabetes remission.⁽¹⁾ The DiRECT protocol is now funded for type 2 diabetes management in the UK.⁽²⁾ Type 2 diabetes is a growing problem in Aotearoa New Zealand,⁽³⁾ but the acceptability and feasibility of the DiRECT intervention in our diverse sociocultural context remains unclear. We conducted a randomised controlled trial of DiRECT within a Māori primary healthcare provider in Ōtepoti Dunedin. Forty participants with diabetes and obesity who wanted to lose weight were randomised to receive the DiRECT intervention or usual care. Both groups received the same level of individualised support from an in-house dietitian. We conducted individual, semi-structured interviews with 26 participants after 3 months. Questions explored perspectives and experiences, barriers and facilitators, and future expectations regarding dietary habits and weight loss. Interview transcripts were analysed using inductive thematic analysis.⁽⁴⁾ Participants struggled with weight management prior to the study. Advice from doctors, friends and whānau, and the internet was prolific, yet often impractical or unclear. The DiRECT intervention was mentally and physically challenging, but rapid weight loss and an improved sense of health and wellbeing enhanced motivation. Participants identified strategies which supported adaptation and adherence. Food reintroduction beyond 3 months was an exciting milestone, but the risk of reverting to previous habits was daunting. Participants feared weight regain and felt ongoing guidance was required for a successful transition to a real-food diet. Conversely, usual care participants described a gradual and ongoing process of health-focused dietary modification. While this approach did support behaviour change, a perceived slow rate of weight loss was often frustrating. Across both interventions, self-motivation and whānau support contributed to perceived success, whereas busy lifestyles, social and cultural norms, and financial concerns presented additional challenges. The role of individualised and non-judgemental dietetic support was a central theme across both groups. In addition to nutrition education and practical guidance, the in-house dietitian offered encouragement and promoted self-acceptance among participants. At 3 months, positive shifts in perspectives surrounding food, health, and sense of self were identified, which participants largely attributed to the level of nutrition support received: a new experience for many. The DiRECT protocol appears an acceptable weight loss approach among New Zealanders with diabetes and obesity, but tailored dietetic and behavioural support must be prioritised in its implementation. Future research should examine the broader health benefits associated with providing greater dietetic support and the cost-effectiveness of employing nutrition-trained health professionals within the primary care workforce.

References

1. Lean MEJ, Leslie WS, Barnes AC, et al. (2018) *Lancet* 391, 541-551.

2. Diabetes UK (2023) https://www.diabetes.org.uk/about_us/news/nhs-soup-and-shake-diet-to-help-people-with-type-2-into-remission

3. PwC (2021) <https://healthierlives.co.nz/wp-content/uploads/Economic-and-Social-Cost-of-Type-2-Diabetes-FINAL-REPORT.pdf>

4. Braun V & Clarke V (2006) *Qual Res Psychol* 3, 77-101.

Keywords: type 2 diabetes; weight loss; total diet replacement; qualitative analysis

Ethics Declaration: Yes

Financial Support: This trial was funded by the Ministry of Social Development, Pūtahi Manawa (CoRE), and the Healthier Lives National Science Challenge

Abstract

Short-term impact of a healthy and typical Australian dietary pattern on cardiometabolic outcomes: insights from a randomised, cross-over feeding study

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Immune Health Research Program, Hunter Medical Research Institute, New Lambton Heights, NSW, 2305 Australia. Cardiovascular disease (CVD) remains a major cause of global mortality. Poor diet quality, characterised by excessive consumption of energy-dense, nutrient-poor foods and insufficient intake of fruits, vegetables, and whole grains, is associated with an increased risk of CVD⁽¹⁾. This study compares the impact of two short-term dietary interventions, a Healthy Australian Diet adhering to national guidelines and a Typical Australian Diet representing current national consumption patterns, on several cardiometabolic outcomes. These outcomes include body weight, waist circumference (WC), body fat percentage (BFP), blood pressure (BP), fasting blood lipids and glucose concentrations. Data from an eight-week randomised, cross-over feeding study involving 34 adults (53% female, age 38.4 ± 18.1 years) were analysed, with participants randomly assigned to consume each diet for two weeks, separated by a two-week washout period. During each feeding phase, all food items were provided to ensure compliance. The Healthy Australian Diet adhered to the Australian Dietary Guidelines⁽²⁾, including a balanced intake of the five food groups and meeting Acceptable Macronutrient Distribution Range targets⁽³⁾, with saturated fat limited to ≤10% of energy. The Typical Australian Diet was formulated based on apparent consumption patterns in Australia⁽⁴⁾, setting total fat intake at 40% of energy and total saturated fat at 15% of energy. Comprehensive data collection occurred at four key visits: week 0 (end of run-in; baseline 1), week 2 (post-feeding phase 1), week 4 (end of washout, baseline 2), and week 8 (post-feeding phase 2). Trained personnel measured WC using a tensible tape, while body weight and BFP measurements were obtained using bioimpedance analysis (Inbody 270; Biospace Co, Seoul, Korea). Blood pressure was recorded using the Uscom BP+ supra-systolic oscillometric central blood pressure device. Blood glucose and lipid (triglycerides, total-, low-density lipoprotein- [LDL] and high-density lipoprotein- [HDL] cholesterol) concentrations were measured after a 12-hour fast by an accredited pathology service. Differential changes in cardiometabolic variables between intervention groups were evaluated using linear mixed-effect models, adjusting for diet sequence, feeding phase, and subject ID as a random variable to account for potential autocorrelation. Post-hoc pairwise comparisons were conducted to assess the impact effects of each diet. There were no significant differences between the Healthy Australian Diet and the Typical Australian Diet with respect to weight, BFP, WC, blood triglycerides, systolic and diastolic BP. However, the Healthy Australian Diet led to a significantly greater decrease in total-, LDL-, HDL- and non-HDL cholesterol, and fasting blood glucose relative to the Typical Australian Diet (p<0.001). The results underscore the importance of promoting dietary intakes that align with Australian Dietary Guidelines for optimising the risk of CVD and impaired glucose tolerance. Conversely, the Typical Australian Dietary pattern demonstrated detrimental cardiometabolic effects over a short period of just two weeks.

References

1. Aune D, Giovannucci E, Boffetta P, et al. (2017) *Int J Epidemiol* 46(3),1029-1056.

2. NHMRC (2013), <https://www.nhmrc.gov.au/adg> (last accessed 8 August 2023)

3. Lee E, Choi J, Ahn A, et al. (2015) *Clin Exp Hypertens* 37(6),463-7.

4. ABS (2022), <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/apparent-consumption-selected-foodstuffs-australia/latest-release> (last accessed 8 August 2023)

Keywords: cardiovascular disease; cardiometabolic outcomes; healthy Australian diet; randomised controlled trial.

Ethics Declaration: Yes

Financial Support: This work was supported by a National Health and Medical Research Council (NHMRC) Leadership Research Fellow Investigator Grant (APP2009340)

Abstract

Dietary fat consumption frequency and body mass index of middle-age adults in Mumbai city, India during COVID-19 pandemic

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Obesity and COVID-19 are global pandemics listed by World Health Organization, which need urgent attention. Obesity involves low grade chronic inflammation, which is characterised by sustained pro-inflammatory innate immune responses mediated through activation of the NLR family pyrin domain-containing 3 (NLRP3) inflammasome/IL-1 axis, and is a strong risk factor for Diabetes and Heart diseases.⁽¹⁾ Dietary fats provide energy, satiety, source of fat-soluble vitamins and essential fatty acids – Omega 3 (n-3) and Omega 6 (n-6) fatty acids, but must be consumed in right amounts and ratios. Essential fatty acids (EFA) deficiency and n-6/n-3 imbalance is linked with chronic illnesses such as, heart attacks, cancer, insulin resistance, stroke, obesity, and diabetes.⁽²⁾ Excess dietary fat intake and imbalance of fatty acids, contribute to obesity, inflammation, comorbidities and faster disease progression. A cross-sectional survey aimed to understand the fatty food frequency of overweight and obese middle age adults from Mumbai, India during the COVID-19 outbreak. Using purposive sampling, 100 adults (30-60 years), a questionnaire (demographics, anthropometrics and fat food frequency questionnaire) was administered. Data was analysed using SPSS 26.0. As per BMI standards, 60.2% participants were overweight, 12.6% were obese and 27.1% had normal BMI. For visible fat consumption, sunflower oil (47.6%), ghee (38.8%), rice bran oil (34%) groundnut oil (11.7%) and invisible fats – milk (100%). Other dairy products, nuts and oilseeds were consumed weekly. twice a week, majority (92.3%) consumed packaged high fat foods as compared to eating deep-fried items (58.9%). We concluded that excess dietary fat intake is high risk factor for obesity and related comorbidities diabetes, and hypertension. High BMI increases the risk for non-communicable diseases (NCDs) such as obesity, cardiovascular disease (CVD), insulin resistance and type 2 diabetes. People with co-morbidities are high risk groups for COVID-19 infection susceptibility. Hence, managing weight could be a cost-effective preventive strategy to help in delaying the onset and progression of NCDs, thereby lowering the susceptibility to COVID-19. Our findings have important implications in working towards adopting healthy fats and reducing mortality and reducing the global burden of pandemic. High dietary fat intake is a modifiable risk factor for overweight and obesity. Comorbidities increased risk for COVID-19 infection, disease severity and mortality. Hence, there is a need to understand the dietary fat consumption patterns in obesity and COVID-19. Dietary carbohydrate, sugar and fat quality in relation to obesity and pandemic such as, COVID-19 could be explored in future studies.

References

1. Gleeson LE, Roche HM & Sheedy FJ (2021) *Br J Nutr* 125, 628-632.

2. Johnson S, Saikia N, Mathur HB, et al. (2018) *Center for Science & Environment, New Delhi*. 2009. Available from: http://www.indiaenvironmentportal.org.in/files/fatty_acids_profile.pdf.

Keywords: dietary patterns; food frequency questionnaire; non-communicable diseases; obesity

Ethics Declaration: Yes

Financial Support: This research received no external funding

Public health

Public health

Abstract

Examining the nutrition and packaging of foods promoted as 'Back to School' products for children's school lunchboxes

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The local food environment plays an important role in food purchasing behaviours, and it is important to understand the how this context shapes the highly complex drivers of food choice for children and families. In Australia, children consume more than one-third of their total energy intake whilst at school ⁽¹⁾, thus making the content of school lunchboxes an important target for nutrition promotion efforts. Supermarkets invest heavily in promoting food for inclusion in school lunchboxes, particularly in the 'Back to School' period, but little is known about the nutrition content or the packaging of the foods included in these promotions. This study aimed to examine the types and packaging of foods that are promoted by supermarkets as school lunchbox foods. Catalogues for six supermarket chains in Adelaide, South Australia were collected during the four weeks of January 2023, the window often described as the 'Back to School' period. An audit of the contents was conducted and items promoted specifically as 'Back to School' items were coded according to the type of food (fruits, vegetables, dairy, grains/cereals, protein or drinks), whether the items was packaged or un-packaged and the processing classification according to the NOVA criteria ⁽²⁾. Descriptive statistics were calculated. In the 'Back to School' period, each of the six supermarket chains produced 4 catalogues and items relating specifically to foods promoted for inclusion in school lunchboxes appeared in 18 of the 24 catalogues. A total of 151 food or drink items appeared in the 'Back to School' promotions in these catalogues, and 100% of these items were packaged; 29% were packaged in single-use plastic packaging, 25% were packaged in recyclable packaging and 46% were packaged in a combination of single-use plastic and recyclable packaging. In terms of foods, snack foods, including sweet (n=32, 21%) and savoury (n=21, 14%) snacks were highly represented (35% overall). Dairy products (n=23, 15%), grains/cereal products (n=23, 15%) and drinks (n=20, 13%) were also featured, and spreads (e.g. vegemite, Nutella) appeared in 13% of catalogues (n=12). Fruits (n=8, 5%), vegetables (n=3, 2%) and proteins (n=5, 3%) did not appear in many catalogues. Seventeen (11%) foods were unprocessed, with 111 (74%) classified as ultra-processed foods. Supermarket catalogues promote 'Back to School' lunchbox foods that are overwhelmingly packaged and ultra-processed. Working with supermarkets to adapt the promotion of foods that are less packaged and less processed is an important step to improving the local food environment.

References

1. Bell & Swinburn (2004) *Eur J Clin Nutr* 58(2):258-63.

2. Monteiro, et al. (2019) *Ultra-processed foods, diet quality, and health using the NOVA classification system*. Rome, FAO.

Keywords: lunchbox; food packaging; school; supermarket

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Does continuous glucose monitoring influence adherence to time-restricted eating?

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Obesity is a significant health issue in Aotearoa; effective and pragmatic strategies to facilitate weight loss are urgently required. Growing recognition of the circadian rhythm's impact on metabolism has popularised diets like time-restricted eating (TRE).⁽¹⁾ The 16:8 TRE method involves limiting food intake to an 8-hour daily eating window and can lead to weight loss without other substantial changes to diet.⁽²⁾ Nonetheless, TRE requires accountability and tolerating hunger for short periods. Continuous glucose monitors (CGM) are small wearable biofeedback devices that measure interstitial glucose levels scanned via smartphones. By providing immediate feedback on the physiological effects of eating and fasting, CGM use may promote adherence to TRE.⁽³⁾ This pilot study aimed to 1) investigate how CGM affects adherence to TRE and 2) assess the feasibility of CGM use while undertaking TRE. This two-arm randomised controlled trial enrolled healthy adults from Dunedin, assigning them to TRE-only or TRE+CGM groups for 14 days. Successful adherence to TRE was defined *a priori* as maintaining an 8-hour eating window on 80% of days. CGM feasibility was defined *a priori* as scanning the glucose monitor thrice daily on 80% of days. Secondary outcomes included well-being, anthropometry, glucose levels, and overall TRE and CGM experiences via semi-structured interviews. Twenty-two participants were randomised into two groups: TRE-only (n=11) and TRE+CGM (n=11, with n=2 excluded from analysis post-randomisation for medical reasons). Participants had a diverse range of ethnicities, the mean age was 32 (+/-14.9) years, and 55% were female. The TRE+CGM group adhered to the 8-hour eating window for an average of 10.0 days (range 2-14) compared with 8.6 days (range 2-14) in the TRE-only group. Both groups had similar mean eating window durations of 8.1 hours. Five (56%) participants in the TRE+CGM group achieved the *a priori* criteria for TRE adherence, compared to 3 (27%) in the TRE-only group. Participants in the TRE+CGM group performed an average of 8.2 (+/-5.6) daily scans, with n=7 (78%) of participants meeting the *a priori* CGM feasibility criteria. Neither group reported consistent adverse psychological impacts in DASS-21 and WHO-5 scores. Interviews highlighted that CGM increased hunger tolerance during fasting as participants felt reassured by their normal glucose levels. CGM aided TRE accountability by acting as a biological tracker of food intake. Participants reported that TRE led to improved energy and self-efficacy, a more productive daily routine, and healthier food choices. Promisingly, 72% of participants would use CGM and undertake TRE in future. This study demonstrates that using CGM while undertaking TRE is feasible and can improve adherence by enhancing hunger tolerance and accountability. Overall, participants experienced increased awareness of eating habits and physiological mechanisms. Over the longer term, this simple and synergistic approach may be a helpful weight loss strategy.

References

1. Adaffer R, Messaadi W, Meddahi M, et al. (2020) *Nutrients* 12, 3770.
2. Lowe DA, Wu N, Rohdin-Bibby L, et al. (2020) *JAMA Intern Med* 180, 1491-1499.
3. Hegedus E, Salvy SJ, Wee CP, et al. (2021) *Obes Res Clin Pract* 15, 431-438.

Keywords: time-restricted eating; continuous glucose monitoring; adherence; weight loss

Ethics Declaration: Yes

Financial Support: This study was supported by funding from a 2022 accelerator grant from the Early and Mid-Career Researchers Group, Division of Health Sciences, University of Otago. The University of Otago Medical School supported Jessica's BMedSci(Hons) fees and stipend through which she was able to undertake this project.

Abstract

Strengthening national salt reduction strategies using mixed methods process evaluations – case studies from Malaysia and Mongolia

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Almost half of countries globally are implementing national strategies to lower population salt intake towards the World Health Organization's target of a 30% reduction by 2025 (1). However, most are yet to lower population salt intake (1). We conducted process evaluations of national salt reduction strategies in Malaysia and Mongolia to understand the extent to which they were implemented and achieving their intended outcomes, using the findings to generate insights on how to strengthen strategies and accelerate population salt reduction. Mixed methods process evaluations were conducted at the mid-point of implementation of the strategies in Malaysia (2018-19) and Mongolia (2020-21) (2). Guided by theoretical frameworks, information on the implementation, mechanism and contextual barriers and enablers of the strategies were collected through desk-based reviews of documents related to salt reduction, interviews with key stakeholders (n= 12 Malaysia, n= 10 Mongolia), and focus group discussions with health professionals in Malaysia (n=43) and health provider surveys in Mongolia (n=12). Both countries generated high-quality evidence about salt intake and salt levels in foods, and culturally-specific education resources in 3 and 5 years respectively. However, in Malaysia there was moderate dose delivered and low reach in terms of education and reformulation activities. Within 5 years, Mongolia implemented education among schools, health professionals and food producers on salt reduction with high reach but with moderate dose and reach among the general population. There were challenges in both countries with respect to implementing legislative interventions and both could improve the scaling up of their reformulation and education activities to have population-wide reach and impact. In the first half of Malaysia's and Mongolia's strategies, both countries generated necessary evidence and education materials, mobilised health professionals to deliver salt reduction education and achieved small-scale salt reformulation in foods. However, both faced challenges in implementing regulatory policies and the scaling up of their reformulation and education activities to have population-wide reach and impact could be strengthened. Similar process evaluations of existing salt reduction strategies are needed to strengthen intervention delivery and inform areas for adaptation, to aid achievement of the WHO's global target of a 30% reduction in population salt intake by 2025.

References

1. Santos JA, et al. (2021) *Advances in Nutrition* 12(5):1768-80.

2. Moore GF, et al. (2015) *BMJ* 350, h1258.

Keywords: salt reduction; process evaluation; Mongolia; Malaysia

Ethics Declaration: Yes

Financial Support: The individual case studies are based on work commissioned by the World Health Organization. Author funding declarations: KT was supported by an Early Career Fellowship (APP1161597) from the National Health and Medical Research Council of Australia (NHMRC) and a Postdoctoral Fellowship (Award ID 102140) from the National Heart Foundation of Australia. JW is supported in her research by a National Heart Foundation Future Leaders Fellowship Level II (#102039).

Abstract

Effective methods for engaging with YOPI (Young, Old, Pregnant, Immunocompromised) on food safety matters

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Young, older, pregnant, and immunocompromised (YOPI) people are most vulnerable to foodborne illnesses due to impaired or underdeveloped immune systems^[1]. There is a lack of information regarding how YOPI groups access, receive or use information about food safety, what influences their food safety behaviour, and their preferences for receiving food safety advice. The objective of this research was to develop a better understanding of how YOPI consumers in New Zealand access and use food safety information, the types and sources of food safety information used, how information and advice are obtained, and how these influence their decision-making about food safety practices and related behaviours. Research questions were guided by a rapid review of literature. Twenty qualitative focus groups (comprising of either young, old, pregnant, or immunocompromised individuals) based in one of three locations in New Zealand were conducted. This was complemented with data from health care providers from relevant sectors (nutritionists, dietitians, aged care providers, cancer nurses, Well Child Tamariki Ora providers, and midwives). Recruitment included a focus on ethnic groups (Māori and Pasifika) to ensure diversity of experiences and perspectives were represented in the research and to reflect NZFS's interest in developing fit-for-purpose messages and resources for these YOPI populations. Thematic and segmentation analysis was conducted to understand current food safety behaviours and how to best communicate food safety matters. Typologies of participants were developed by grouping participants based on common features: attitudes, beliefs, and experiences. The research revealed most participants are comfortable with their food safety practices and reported habitual behaviours. Many YOPI did not perceive themselves to be at a greater risk of foodborne illness, particularly older people. A key finding was that access to information does not necessarily lead to behaviour change. Groups undergoing periods of change (immunocompromised, pregnant and young) were more likely to seek additional information. Families and health professionals are trusted sources of information, with all groups reporting some use of the internet as an information source. An individual's risk perception was the main motivating factor for obtaining and following advice. Habit, cost of food, and lack of information were key barriers to obtaining or acting on information, along with pregnant people reporting social pressures as a reason to not obtain or act on relevant advice. In general, there are three key types of food-safety messaging all groups would like to receive: situation-specific advice; information received alongside other key information (e.g., starting solids); and general information for the whole population. Gaining insights into YOPI preferences on food safety matters can aid the development of appropriate communication and engagement methods of the risks and impacts of food safety matters to vulnerable people.

References

1. Pattis I, Horn B, Cressey P, et al. (2022, October). Annual report concerning foodborne diseases in New Zealand 2021. <https://www.mpi.govt.nz/dmsdocument/53872/direct>

Keywords: food safety, foodborne illness, Immunocompromised, old

Ethics Declaration: Yes

Financial Support: Ministry for Primary Industries, Operational Research Programme

Abstract

Children are exposed to much more alcohol advertising when a liquor store is sited near a school

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The physical location of liquor stores near schools can strongly influence the chances of youth accessing and consuming alcohol⁽¹⁾. As children transit to and from school, it is feasible that the presence of liquor stores near schools could also increase their exposure to alcohol advertising. Cumulative exposure to advertising influences alcohol attitudes, intentions and alcohol use⁽²⁾, so reducing children's exposure to alcohol advertising is important to delay the initiation of drinking and reduce future harms. As this has not yet been investigated in Australia, the aim of this study was to investigate whether the presence of a liquor store near a school was associated with an increased prevalence of outdoor alcohol advertising in Perth, Western Australia. We identified all outdoor alcohol advertising within a 500m radius (audit zone) of 64 randomly selected primary and secondary schools from low and high socio-economic areas across metropolitan Perth. We recorded the size, type, setting, and location of each advertisement during field data collection. Each zone was categorised by the presence or absence of at least one liquor store within the school audit zone, and results compared across these stratifications. Over half (56%) of the 64 school audit zones had at least one alcohol advertisement. On average, there were 5.9 alcohol advertisements per zone. School audit zones that contained a liquor store (59%) had over thirty times the average number of alcohol advertisements compared with audit zones that did not contain a liquor store (9.7 vs 0.3). The majority of all the alcohol advertisements identified (63%) were located outside a liquor outlet as opposed to other food businesses (2%), along the roadside (31%), on a bus shelter (3%) or on/outside another business (0.5%). Our findings that Perth schools with a liquor store nearby had more outdoor alcohol advertising within a 500m radius, compared with schools without a nearby liquor store, were independent of school type (primary or secondary) or the socio-economic status of the area. This poses significant concerns about the exposure of underage populations to outdoor alcohol advertising, and the resultant influence on alcohol use. These results underscore the necessity for policy interventions to mitigate children's exposure to alcohol marketing, especially during the daily school commute, by regulating the location of liquor stores and alcohol promotion near schools. It will be important to incorporate the voices of children when developing future policies to assert their right to be consulted, heard and appropriately influence their environments.

References

1. Trapp GSA, Knuiman M, Hooper P, and Foster S. (2018) *Am J Prev Med* 54(6), 825-830.
2. Sargent JD, and Babor TF. (2020) *J Stud Alcohol Drugs Sup* 19(2), 113-124.

Keywords: alcohol; schools; advertising; liquor store

Ethics Declaration: —

Financial Support: This research was funded by Heathway and the Cancer Council Western Australia as part of their Rapid Obesity Policy Translation programme. GT was supported by an ARC DECRA Fellowship (DE210101791).

Abstract

'I'm on board with the borg': encouraging risky alcohol use on TikTok

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A 'Blackout Rage Gallon' (borg) is a dangerous new alcohol consumption trend popular with young people. It involves creating a customised, individual alcoholic beverage by replacing half the water in a four litre (gallon) jug with alcohol (usually spirits), flavourings, electrolytes and caffeinated energy drinks or caffeine supplements. The most prevalent 'recipe' calls for the addition of 750ml of alcohol. The 'blackout' part of the name refers to the intent of one person to consume the borg in one session, thereby encouraging risky alcohol use. Indeed, there have been reports in popular media of multiple hospitalisations attributed to consumption of borgs at college events in the United States. Part of the attraction of the trend is to label the borg with a clever name, usually incorporating the term 'borg'. The trend has gained traction recently on TikTok, which has become an important, yet unregulated, source of information for the public including young people⁽¹⁾. We investigated TikTok videos associated with the hashtag #borg to better understand this dangerous new phenomenon. We identified and analysed highly viewed TikTok videos (n=105) for engagement, techniques, characteristics of featured individuals, and the portrayal of alcohol and risky drinking behaviours. Alcohol was visible in three quarters of the videos analysed (n=78), and consumed in one third (n=34). The average amount of alcohol present was well in excess of safe drinking guidelines (865ml) One quarter of videos (n=25) promoted alleged benefits such as control of volume of consumption, protection from drink spiking, and mitigation of side effects due to addition of electrolytes and water. Alarmingly, only 9 videos included a warning about potential harms of the borg or alcohol in general. Indeed, videos discussing potential harms and benefits tended to encourage the use of borg, for example 'I'm on board with the borg'. Our study found the borg TikTok trend encourages risky drinking in a fun and entertaining way, supporting previous studies where the majority of content was positively portraying a product or behaviour⁽²⁾. As there is an association between viewing alcohol-related content on social media and alcohol use³, there is an urgent need for social media content restrictions to limit the visibility of risky alcohol consumption, particularly to underage users.

References

1. McCashin D and Murphy CM (2022) *Clin. Child Psychol. Psychiatry* 28, 279-306.
2. Russell AM, Davis RE, Ortega JM, et al. (2021) *J Stud Alcohol Drugs* 82, 615-622.
3. Strowger M, Braitman AL, and Barnett NP (2022) *Alcohol Clin Exp Res* 46, 1592-1602.

Keywords: Alcohol; TikTok; social media; borg

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract

Increasing food insecurity severity is associated with lower diet quality in Australian adults

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Food insecurity, the inadequate or insecure access to food due to financial constraints, is a growing concern in high-income countries like Australia ⁽¹⁾. Food insecure adults may have reduced diet quality due to constraints on food purchasing and consumption ⁽²⁾ but further research is needed to understand how the severity of food insecurity impacts diet quality in an Australian setting. This study aimed to examine the relationship between diet quality and increasing severity of household food insecurity using validated measurement tools. A cross-sectional, online survey of Australian adults (aged 18 years+) used the USDA Household Food Security Six-item Short Form to classify respondents as food secure or marginally, moderately, or severely food insecure. The Australian Recommended Food Score (ARFS; score between 0–73) determined diet quality (ARFS total) and sub-scale scores for eight food groups, ⁽³⁾ with higher scores indicating higher diet quality. Diet quality score results are further categorised as “needs work” (<33), “getting there” (33–38), “excellent” (39–46) or “outstanding” (47+). Survey-weighted linear regression (adjusted for age, sex, income, education, location, household composition) analyses indicate that 45% of participants were living in households that experienced food insecurity, comprising 7% marginally, 18% moderately and 20% severely food insecure households. The ARFS total survey-weighted mean score for the whole sample (n=804) was 32.4 (SD=9.8). As the severity of household food insecurity increased, ARFS scores decreased. Marginally food insecure respondents reported a mean ARFS score three points lower than food-secure adults (B=-2.7; 95%CI [-5.11, -0.34]; p=0.03), and scores reduced by six points for moderately (B=-5.6; 95%CI [-7.26, -3.90]; p<0.001) and twelve points for severely food insecure respondents (B=-11.5; 95%CI [-13.21, -9.78]; p<0.001). Marginally food insecure respondents had significantly lower vegetable sub-scale scores, moderately food insecure respondents had significantly lower sub-scale scores for all food groups except dairy, severely food insecure respondents had significantly lower scores for all sub-scale scores. Poorer diet quality is evident in adults living with any food insecurity but gets progressively worse as the severity of food insecurity increases. Interventions to reduce food insecurity and increase diet quality are required to prevent adverse nutrition-related health outcomes in food-insecure populations in Australia and beyond.

References

1. Kent K, Murray S, Penrose B, et al. (2022) *Int J Behav Nutr and Physical Activity* 19, 115.
2. Lindberg R, McNaughton SA, Abbott G, et al. (2022) *Nutrients* 14, 4133.
3. Collins CE, Burrows TL, Rollo ME, et al. (2015) *Nutrients* 7, 785-798.

Keywords: food security; food insecurity; diet quality; dietary intake

Ethics Declaration: —

Financial Support: This research received no external funding

Abstract

Mapping workforce contributions to the Sustainable Development Goals: a tool to enhance staff capacity and inspire action

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The United Nations' Agenda 2030 provides a framework of 17 Sustainable Development Goals (SDGs) to achieve peace and prosperity for people and planet, now and into the future⁽¹⁾. The United Nations Decade of Action on Nutrition emphasises that food and nutrition are key levers for optimising both human and planetary health and that individuals working in food, nutrition and health play an essential role in contributing to the SDGs^(2,3). This project aimed to (i) map the work being done by staff and higher degree students at Monash University's Department of Nutrition, Dietetics and Food and its alignment with the SDGs, and (ii) assess the impact of this process on workforce capacity to embed the SDGs in future work activities. Three mapping workshops; one pilot, one in-person and one online, were conducted (n = 28), beginning with a short expert-led seminar about the SDGs before participants engaged in an interactive activity to record their work activities (research, education or engagement) relating to the SDGs. Mapping data were analysed to determine which SDGs were being prioritised and in what type of activities. To determine the impact on workforce capacity, participants completed pre- and post-workshop surveys that assessed their knowledge of and confidence regarding the SDGs. From the three workshops, 129 work activities were described, each linked to one or more of the SDGs. Of those, 41% were education, 36% were research, and 23% were engagement activities. Work activities spanned all 17 of the SDGs, with the most commonly aligned being Goal 3 Good Health and Wellbeing (53% of work activities), Goal 10 Reduced Inequalities (37% of work activities), Goal 4 Quality Education (36% of work activities), Goal 12 Responsible Consumption and Production (34% of work activities), and Goal 17 Partnerships for the Goals (27% of work activities). The pre- and post-workshop surveys indicated increased staff knowledge and confidence related to the SDGs. The percentage of participants that could correctly identify the number of SDGs increased from 43% to 96%, and the percentage of participants that recognised the correct aim of the SDGs increased from 43% to 86%. Regarding confidence in talking about the SDGs, the percentage of staff who indicated that they 'avoid talking about them' or are 'not confident' decreased from 39% to 4%, and the number of staff who were confident talking about the SDGs 'in general terms' increased from 39% to 75%. Nutrition professionals are well-placed to support progress towards each of the SDGs. Workshops such as these provide an opportunity to increase workforce capacity to discuss, share and relate their work to the SDGs and provide a periodic pulse-check to identify opportunities for greater contribution to this urgent, global Agenda.

References

1. United Nations. *Transforming our world: the 2030 agenda for sustainable development* (2015) <https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>
2. Willet W, et al. *Summary report of the EAT-Lancet Commission* (2019) https://eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf
3. United Nations. *United Nations Decade of Action on Nutrition (2016-2025)*. New York: UN General Assembly. <https://www.unscn.org/en/topics/un-decade-of-action-on-nutrition> (accessed August 2023)

Keywords: sustainable development goals; planetary health; workforce capacity; mapping exercise

Ethics Declaration: Yes

Financial Support: This research received no external funding

Nutrition and wellbeing

Nutrition and wellbeing

Abstract

Exploring school food provision programs and links to local foods in Pacific Island countries

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Providing access to food in schools can serve as a platform for food system transformation, while simultaneously improving educational outcomes and livelihoods. Locally grown and procured food is a nutritious, healthy, and efficient way to provide schoolchildren with a daily meal while, at the same time, improving opportunities for smallholder farmers.⁽¹⁾ While there is significant potential for school food provision activities to support healthy dietary behaviours in the Pacific Islands region, there is limited evidence of these types of activities, ⁽²⁾ including scope and links to local food production in the region. Therefore, the aim of this scoping study was to understand the current state of school food activities (school feeding, gardening and other food provision activities) and any current, and potential links to local agriculture in the Pacific Islands. A regional mapping activity was undertaken, initially covering 22 Pacific Island countries. The mapping included two steps: 1) a desk based scoping review including peer-reviewed and grey literature (2007-2022) and 2) One-hour semi-structured online Zoom interviews with key country stakeholders. Twelve sources were identified, predominately grey literature (n=9). Thirty interviews were completed with at least 1 key stakeholder from 15 countries. A variety of school food provision activities were identified, including school feeding programs (n=16, of varying scale), programs covering both school feeding and school gardens (n=2), school garden programs (n=12), and other school food provision activities (n=4, including taste/sensory education, food waste reduction, increasing canteen capacity for local foods, supply chain distribution between local agriculture and schools). Existing links to local agriculture varied for the different programs. Of the 16 school feeding programs, 8 had a requirement for the use of local produce (policy requirement n=6, traditional requirement from leaders n=2). Of the 12 school garden programs, 6 used local or traditional produce in the garden and 5 involved local farmers in varying capacities. Challenges to linking local agriculture into school food provision programs were reported for 17 activities and were context dependent. Common challenges included limited funding, inflation, Covid-19, inadequate produce supply for the scale of program, limited farmer capacity, limited institutional support for local produce, low produce storage life, climatic conditions and disasters, water security, delayed procurement process, and limited professional development and upskilling opportunities. Modernisation and colonisation of food systems resulting in a preference for hyperpalatable foods and challenges in incorporating local produce in a way that is accepted by students was also identified as a challenge. This evidence can be used to develop a pathway to piloting and implementing models of school food provision programs and promoting opportunities for shared learning and collaboration with key stakeholders across the Pacific Islands region.

References

1. WFP, FAO, IFAD, NEPAD, GCNF and PCD. 2018. *Home-Grown School Feeding Resource Framework. Technical Document. Rome.*
2. Burkhart S, Hayman A, Lam F, Jones B, Horsey B., Craven, D., Underhill, S. *School Food Programs in the Pacific Islands: Exploring opportunities and challenges for creating healthier school food environments. Public Health Nutrition*

Keywords: food provision; nutrition; school programs; local agriculture

Ethics Declaration: Yes

Financial Support: This project is funded by an Australian Centre for International Agricultural Research (ACIAR) Small Research and Development Activity (grant number: HORT2021159)

Abstract

Dietary fibre intake, adiposity, and metabolic disease risk in Pacific and New Zealand European women

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The aim of this study was to explore associations between habitual dietary fibre intake, adiposity, and biomarkers of metabolic health in Pacific and New Zealand European women who are known to have different metabolic disease risks. Pacific (n=126) and New Zealand European (NZ European; n=161) women (18-45years) were recruited to the PROMISE cross-sectional study^[1] based on normal (18-24.9kg/m²) and obese BMI (≥30kg/m²). Body fat percentage (BF%), measured using whole body DXA, was used to stratify participants into low (<35%) or high (≥35%) BF% groups. Habitual dietary intake was calculated using the National Cancer Institute method, involving a 5-day-food-record and a semi-quantitative FFQ. Fasting blood was analysed for glucose, insulin, and lipid profile. NZ European women in the low- and high-BF% groups were older, less socioeconomically deprived, and consumed more dietary fibre (median 23.7g/day [25-75-percentile, 20.1, 29.9]; 20.9 [19.4, 24.9]) than Pacific women (18.8 [15.6, 22.1]; 17.8 [15.0, 20.8]; both p<0.001), respectively. Pacific women consumed a higher proportion of their total fibre intake from discretionary fast foods, in contrast NZ European women consumed more dietary fibre from wholegrains. Regression analysis controlling for ethnicity, age, socioeconomic deprivation, energy intake, protein, total carbohydrate, and fat intake showed significant inverse associations between higher dietary fibre intake and BF% and visceral fat% ($\beta = -0.47$, 95% CI = -0.62, -0.31, p<0.001; $\beta = -0.61$, [-0.82, -0.40], p<0.001, respectively) among both Pacific and NZ European women. LDL-C ($\beta = -0.04$, [-0.06, -0.01]) was inversely associated with fibre intake following further adjustment for BF%-groups in NZ European women. Despite differences in intake, dietary fibre was inversely associated with adiposity and metabolic disease risk in both Pacific and NZ European women. However younger woman living in areas of higher socio-economic deprivation who consumed a higher proportion of total dietary fibre intake from discretionary fast foods were more likely to have low dietary fibre intakes than older, wealthier women. These women were also more likely to be Pacific women. Increasing habitual dietary fibre intake could help to reduce adiposity and metabolic disease risk; so implementing policies that make health-promoting high fibre foods more affordable, ensuring households have sufficient income to purchase nutritious food and limiting the amount of unhealthy food marketing that low income communities are exposed to should be public health priorities.

References

1. Kindleysides S, Kruger R, Douwes J, et al. (2019) *JMIR Res Protoc.* 8, 1–16.

Key words: dietary fiber; adiposity; obesity; metabolic diseases

Ethics Declaration: Yes

Financial Support: The PROMISE study was funded by the Health Research Council (HRC) of New Zealand [HRC 15/273]. NR was supported by a PhD scholarship provided by the Riddet CoRE Institute, Massey University, Palmerston North, New Zealand.

Posters



Abstract

Prevalence and factors associated with dietary diversity and food insecurity in a rural maritime community of a Small Island Developing State

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Small Island Developing States (SIDS) experience high burdens of non-communicable disease, which can in large part be attributed to poor diet. This is exacerbated by an increasing reliance on food imports, which are often of low nutritional quality and typically have high levels of food insecurity (FI).² Our study was based in the Yasawa Islands of Fiji, and aimed to estimate the prevalence of FI and an indicator of diet quality (dietary diversity score or DDS) in this remote rural setting. We also explored associations between two outcomes (FI and DDS) with food production diversity (FPD), food sources, and sociodemographic factors. We conducted a cross-sectional survey of adults aged 18 and over, between September 2021 and July 2022. The questionnaire included 24-hour diet recall, FI, FPD, sources of food consumed, and sociodemographic data. DDS (adequate diversity being a score of ≥ 5), Food production diversity, and FI were then obtained. Two hundred participants completed the survey: 52% were female and the mean (SD) age was 44.9 (15.2) years. The majority (64%) had attained at least a primary school education, and around half (48%) lived in a house with three or more occupants. Consuming foods produced by their own households and food obtained from borrowing/exchanging/bartering were the most common sources, with 94% and 93% consuming food from these sources more than weekly, respectively. Regular consumption (>weekly) of food from supermarkets and small shops was relatively rare (7% for both). The prevalence of inadequate dietary diversity was 72% (95%CI: 65, 78), and the mean (SD) DDS was 3.6 (1.7). The prevalence of moderate-to-severe FI was 5.5% (95% CI: 2.6, 8.5). For both DDS and FI, there were no differences by gender. In the multivariable analyses, increased FPD was associated with both a higher DDS [incidence rate ratio (95% CI): 1.08 (1.01, 1.17)] and lower FI [coefficient (95% CI): -3.77 (-6.56, -0.97)]. No other variables were associated with DDS. Older age and higher educational attainment were also associated with less FI, with coefficients (95% CI) of -0.34 (-0.62, -0.06) and -13.27 (-21.36, -5.19) respectively. Our findings confirm that food security can be attained through home production and community sharing of food, which is primarily used for home consumption. Despite the high prevalence of food security in the Yasawa Islands, dietary quality could be improved through increasing dietary diversity, which is desirable in order to reduce NCDs in this setting.

References

1. Connell J, et al. (2020) Food security and sovereignty in Small Island developing states: Contemporary crises and challenges. In *Food security in small island states* (pp. 1-23). Springer, Singapore.
2. Bhagtani D, et al. (2022) *Nutrients* 14(14):2891.

Keywords: dietary diversity score; food security; food insecurity; food production diversity

Ethics Declaration: Yes

Financial Support: UK Research and Innovation (Feb 2020-May 2023)

Abstract

Cultivating Wellbeing: Traditional Wisdom and Sustainability in Fiji's Green Schools

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This method abstract details the Green School Program, piloted across three schools in maritime Fijian islands, addresses critical issues faced by Fijian and Pacific Island communities. These encompass malnutrition, food security, health hazards, and the urgency of integrating traditional knowledge, governance, and social-ecological systems approaches into creating healthier school environments. Non communicable diseases have emerged as a pervasive concern within Pacific Island communities, creating a challenge for public health systems, driven greatly by dietary habits ⁽¹⁾. This complex health landscape underscores the need to safeguard traditional knowledge and agri-food practices and develop neo-traditional approaches to local food systems ⁽²⁾. Furthermore, the Green School Program recognizes the essential role of schools as community hubs, enabling enhancing healthy school environments by embracing traditional wisdom and sustainable farming practices and foods, ultimately empowering communities to address these multifaceted challenges ⁽³⁾. Developing the school environment as a sustainable setting for governance framework led by women and the school administration, rooted in traditional knowledge and practices. Additionally, it aims to design facilities that support efficient organic farming while integrating these into school activities. Economic sustainability through the sale of surplus farm products, as well as the enhancement of sustainable land-use management, health, wellbeing, and cultural identity. The program unfolds within a distinctive community-based framework with the establishment of robust governance, with a notable emphasis on the leadership of women and mothers who play a pivotal role in steering the green school initiative and ensuring community ownership. Collaborative governance spans multiple stakeholders, including school management, community-based school committees, youth groups, women groups, and traditional leaders. This inclusive engagement ensures both shared responsibility in program design and ownership during implementation phases. Sustainable facilities are strategically designed to include biodigesters, water storage and irrigation systems, composting, organic fertilizers, and seedling nurseries, enhancing the program's capacity to create healthier school food environments while embracing traditional practices and values. The program has witnessed the active engagement of women in governance roles, promoting community unity and ownership. Traditional knowledge integration has enhanced crop diversity and sustainability. Economic sustainability has been achieved through surplus farm product sales, reducing dependency on external funding sources. Health improvements are evident, with reduced exposure to indoor air pollution from open fires. Cultural identity preservation and increased student engagement are also notable outcomes. The Green School Program's holistic approach, rooted in traditional knowledge and sustainable practices, has yielded positive outcomes in governance, agriculture, nutritional food security, health, and cultural identity preservation. The program's success demonstrates the potential for community-based initiatives to address critical issues and empower remote island communities. These results provide valuable insights into sustainable development approaches that prioritize community wellbeing and cultural heritage preservation in similar contexts.

References

1. Harding, A., et al., (2023). Drivers of change: dietary change... University of the Sunshine Coast. <https://doi.org/10.25907/00780>
2. Shah, S., et al., (2018). *Environmental Development*, 28, pp.83-100. <https://doi.org/10.1016/j.envdev.2018.11.001>
3. Burkhart, S., et al., (2023). *Public Health Nutrition*, 26(2), 455-466. <https://doi.org/10.1017/S1368980022001951>.

Keywords: Healthy school environments; food security; traditional governance and wisdom; community wellbeing

Ethics Declaration: Yes

Financial Support: This work was supported by the Canadian Fund for Local Initiatives through the Canadian Ministry of Foreign Affairs, Trade and Development (grant number CFLI-2020-WLGTN-FJ-016); and the United Nations Development Program (grant number UNDP/FJI/INST/045/2020).

Abstract 1A.1

Development of a water-soluble Vitamin D drink for enhanced absorption and serum levels

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Vitamin D deficiency and insufficiency have been found in general population but especially in women of childbearing age. Although Vitamin D can be obtained from food source (few naturally) and produced from skin sunlight exposure, it can come from a reliable source via supplementation. Supplementing 15 µg daily could meet the recommended dietary allowance for 19 years and older and 20 µg for 70 years older. Daily supplementation greater than 100 µg is not recommended. Unlike water-soluble vitamins B and C, Vitamins A, D, E, and K are fat-soluble. This property of Vitamin D affects not only the delivery of it in drink but also absorption at the small intestine and bioavailability (i.e., serum level). This study focused on enhancing the solubility of vitamin D using a novel botanical solubilizer. Using rubusoside (RUB), isolated from stevia and other plants, Vitamin D₃ (cholecalciferol; VD₃) was experimented for solubility enhancement. VD₃ was processed with RUB to form the VD₃-RUB structure in powder form. Solubility of this powder in physiologic solutions of water, gastric or intestinal fluid, stability over time, and dilutability for achieving desired supplementation levels were examined. The VD₃-RUB complex structure in water solution was characterised for particle size and shape using dynamic light scattering techniques. VD₃ in water solution after filtration was quantified on HPLC. VD₃ was practically insoluble in water. However, in the presence of 10% w/v RUB as the botanical solubilizer, VD₃ became soluble in water to a concentration of 4,500 µg/mL. This water-soluble concentrate appeared clear and was freely dilutable to a drink containing amounts of VD₃ ranging from 15 µg to 100 µg. Particle size analysis indicated the presence of approximately 4 nm spherical particles. HPLC analysis of the water solution detected RUB and VD₃. These drinks were stable and remained clear and transparent for at least eight weeks. A packet of water-soluble Vitamin D₃ powder was also developed for addition to a glass of water in the amount of 15 µg VD₃. The packet, similar to the instant coffee powder, produced an instant Vitamin D drink containing the recommended dietary allowance of 15 µg. The water-soluble VD₃ powder was also dissolvable in simulated gastric fluid and intestinal fluid, and stable for at least two hours. This solubility enhancement could aid in absorption and improve oral bioavailability, seen in the work with oily ceramides (1) and insoluble curcumin (2). It is especially advantageous for making drinks as the solubilizer is generally regarded as safe by the US FDA.

References

1. Chen J, Khiste S, Fu X, et al. (2020) *Prostaglandins Other Lipid Mediat* 146, 106402.
2. Zhang F, Koh G, Jeansonne D, et al. (2011) *J Pharm Sci* 100, 2778–2789.

Keywords: solubility enhancement; delivery of nutritional ingredients; natural solubilizers; Vitamin D

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract 1A.2

Dietary fat intakes and food sources in early childhood: results from the Melbourne Infant Feeding, Activity and Nutrition Trial (InFANT) Program

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Dietary fat is a major energy source and an essential nutrient that supports healthy growth and development in young children⁽¹⁾. Despite the important role of dietary fat in early childhood, our understanding of fat intake trends during this period is limited, particularly among Australian children. Insufficient evidence has led to the establishment of an Adequate Intake (AI) for infants aged 0-12 months in Australia, while no recommendation is available for children ages 1-5 years. This study aimed to comprehensively describe fat intake and major food sources in young Australian children. The data of children at ages 9 months (n=393), 18 months (n=284), 3.5 years (n=244), and 5 years (n=240) from the Melbourne InFANT Program were used⁽²⁾. At each time point, child dietary intake data were collected via three 24-hour recalls. Food measurement booklets were utilised to estimate food portions. Food groups and nutrient intakes per day were calculated using the 2007 AUSNUT Food Composition Database. Daily energy (kJ/d) and fat (g/d) intake, the contribution of fat to total energy intake, and key food sources of fat intake were calculated. Descriptive statistics (mean and SD) were used to summarise all data. The mean daily energy intake increased from 3490 kJ/d at 9 months to 5889 kJ/d at 5 years. The mean (SD) fat intake (g/d) was 33.7 (8.0) (Australian AI is 30 g/d) at 9 months, 37.5 (9.5) at 18 months, 44.6 (13.4) at 3.5 years, and 49.0 (15.1) at 5 years. The WHO/FAO recommends that total fat intakes should constitute a minimum of 35% of energy (%E) for children aged 6-24 months, gradually reducing to a range of 25% to 35

%E for children aged 2 to 5 years⁽³⁾. Notably, 40% of children at 9 months, 76% at 18 months, 14% at 3.5 years, and 12% at 5 years had fat intakes below the WHO/FAO recommendations. In contrast, 24% of children at 3.5 years and 28% at 5 years exceeded the recommendation. At 9 months, the primary source of fat was formula/breastmilk, while at later ages, the major sources were milk/milk products, cakes/cookies, and breads/cereals. The proportion of fat from discretionary foods, such as cakes/cookies, processed meats, butter, oil or fat spreads, increased with age. The percentage of total fat from fish, nuts, and seeds was low, contributing <4 %E at all time points. The study highlights a significant proportion of children exceeding or falling below fat intake recommendations. Moreover, the results suggest low consumption of healthy fat sources such as fish, nuts, and seeds. The study findings will contribute to the refinement of fat recommendations in young Australian children and contribute to interventions that aims to improve fat intakes.

References

1. Monnard C, Fleith M (2021) *Nutrients* 13, 3547.
2. Campbell KJ, Hesketh K, Crawford D, et al. (2008) *BMC Public Health* 8, 1-9.
3. Joint, F. A. O, and WHO Expert Consultation on Fats and Fatty Acids in Human Nutrition (2010) *FAO Food and Nutrition Paper* 91, 1-166.

Keywords: fat intake; food source; infant; child

Ethics Declaration: Yes

Financial Support: The Melbourne INFANT Program was supported by the National Health and Medical Research Council (grant 425801), and the follow-ups were funded by a National Health and Medical Research Council Project Grant (APP1008879). TST is supported by Deakin University Postgraduate Research Scholarship (DUPR), MZ is supported by the Australian National Health Medical Research Council Early Career Research Fellowship.

Abstract 1A.3

Effect of dietary polyphenols on chronobiology in mammalian cells in vitro

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Circadian clocks play a key role in metabolic homeostasis, and disruption of circadian rhythms is inextricably intertwined with metabolic disorders [1]. Emerging evidence in the literature suggests that polyphenols possess the potential to modulate metabolic processes associated with circadian rhythms. This review aims to evaluate the effects of polyphenols on metabolic homeostasis via circadian rhythms and their potential mechanism(s) of action on circadian rhythmicity of clock components and linked metabolic processes, by critically assessing the literature on mammalian cells *in vitro*. To ensure that all relevant studies in this area were included, a systematic search protocol was developed by defining the inclusion and exclusion criteria based on the population, intervention, comparator and outcome framework, along with limiting the source of evidence to original research written in English. Three databases (Ovid Medline, Web of Science, and Scopus) were searched with no time constraints. The search identified 5842 studies and, after duplicate removal and initial screening, 48 studies were reviewed in full. Of those, 38 were eligible for inclusion. The included studies were published between 2008-2023, with a notable surge in publications after 2016, which is indicative of the growing attention towards polyphenols and circadian biology. 33 polyphenols were examined for their effects on circadian cellular processes (n=16 papers), expression of clock genes and/or proteins (n=26), or circadian rhythm features of clock genes (n=10). A handful of studies examined the role of polyphenols in regulating disrupted glucose and lipid metabolism through clock components. The findings suggested that the underlying mechanisms were BMAL1-dependent. It must be noted that the effects of the reported polyphenols were elucidated at concentrations exceeding the normal range found in human plasma and target tissues (> 10 µM). However, a single study revealed that (-)-epigallocatechin-3-gallate (EGCG) at a physiologically-relevant concentration (10 µM), improved hepatic glucose metabolism [2]. Further, the polyphenols reported in this review exhibited the potential to influence numerous clock components, mainly BMAL1, PER2 and RORα/γ, at mRNA and/or protein levels when administered at physiologically-relevant concentrations. These polyphenols include nobiletin, tangeretin, curcumin, bavachalcone, cinnamic acid, (-)-epigallocatechin-3-gallate, resveratrol and Urolithin A. Polyphenols have the potential to regulate circadian oscillators and associated metabolic processes in various types of cells. However, there is significant methodological heterogeneity among the studies, which makes it difficult to compare outcomes. Thus, this review will help future research in the field of circadian impacts of polyphenols to integrate standardised approaches, in aspects such as utilisation of a synchronisation method and physiologically-relevant concentrations of polyphenols (≤ 10 µM) in cultured cells. This is critical for understanding how polyphenols might modulate circadian-metabolic health in humans.

References

1. Poggiogalle E, Jamshed H, and Peterson CM (2018) *Metabolism* 84, 11-27.
2. Mi Y, et al. (2017) *Mol Nutr Food Res* 61(12), 1700440.

Keywords: flavonoid; circadian rhythms; metabolism; clock genes

Ethics Declaration: Yes

Abstract 1A.4

The effects of parental perception of children's weight on children's weight change: a systematic review and meta-analysis of longitudinal studies

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Childhood obesity has been a public health concern worldwide⁽¹⁾. Parents are a crucial part of the weight monitoring of children⁽²⁾. But effects of parental perception of children's weight on children's weight change remain inconclusive. This systematic review and meta-analysis aimed to evaluate the effects. A systematic search of six databases was conducted from inception to March 2023 based on Cochrane guidelines. Longitudinal studies were included. Data were synthesised using a semi-quantitative approach and meta-analysis. Finally, nine studies with a total of 25,475 respondents were included in the systematic review and meta-analysis. The pooled results showed that compared to children perceived as normal weight, children who were perceived as overweight or obese by their parents had a statistically significantly greater weight gain (pooled coefficient $\beta=0.43$, 95% confidence interval (CI): 0.1, 0.76, $p<0.05$) during follow-up. Conversely, children perceived as underweight presented less weight gain ($\beta=-0.16$, 95%CI: -0.3,-0.02, $p<0.05$) during follow-up compared to children perceived as normal weight. However, parental misperception of their children's weight was not statistically significantly associated with children's weight change (underestimation: $\beta=0.04$, 95% CI:-0.37, 0.44, $p>0.05$; overestimation: $\beta=-0.09$, 95% CI:-0.06, 0.23, $p>0.05$). We found that parental perception of children's weight, not parental misperception, might influence children's subsequent weight change. Longitudinal and intervention studies using validated measurements and including potential confounders and mediators are needed to confirm the causalities.

References

1. Jebile H, Kelly AS, O'Malley G, et al. (2022) *Lancet Diabetes Endocrinol* 10(5): 351-365.
2. García-Blanco L, Berasaluce A, Romanos-Nanclares A, et al. (2022) *World J Pediatr* 18(7): 482-489.

Keywords: children; parents; weight perception; weight change

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 1A.5

The effect of motivation type on intake and nutritional status of vitamin B12, omega-3 fatty acids, iron and nutrition knowledge in individuals following a vegan diet

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The fundamental principle of veganism is to avoid all possible animal exploitation and therefore, animal ethics has always been a primary motivator. Nowadays, the environment and health are also common motivators. Omission of all animal products leads to dietary exclusion of vitamin B12, limited intake of omega-3 fatty acids, specifically EPA and DHA, and intake of low bioavailable iron sources¹. Obtaining the knowledge to appropriately plan and replace nutrients through food or supplementation is key to avoiding deficiencies and subsequent consequences. This study aimed to determine the effect of motivation for being vegan on intake of key nutrients and nutritional knowledge. This cross-sectional, observational study recruited participants, who had followed a vegan diet for minimum 2 years. Demographics and nutrition knowledge were obtained from questionnaires. Motivation type was determined using the validated vegetarian eating motives inventory (VEMI) – participants scored the importance of animal ethic, environment and health. Intakes of vitamin B12 and iron, were collected using a 4-day food diary and assessed against Estimated Average Requirement (EAR). Blood samples were taken to determine status of vitamin B12, haemoglobin, serum ferritin, and omega-3 index. Omega-3 index score ≤ 4 indicates increased risk of coronary heart disease. Animal ethics was the greatest motivator to become vegan, with 83.5% of participants scoring it as very important, compared to 71.7% of people stating the environment, and 53.3% stating health. No association was found between all motivation types and intake of vitamin B12 and iron, nor omega-3 index. Mean vitamin B12 intake (supplements excluded) of 2.11ug/day \pm 3.43 exceeded the EAR of 2.0ug/day for both men and women, however intakes ranged between 0.00 and 37.63ug/day. Mean intake of iron (18.77mg/day) exceeded the EAR for both men and women. Overall mean omega-3 index was 3.16%. Both men (162.24g/L) and women (151.44g/L) had adequate mean Hb serum concentrations. Mean serum ferritin was within normal range for both men (64.86ug/L \pm 43.48) and women (32.55ug/L \pm 26.04). Overall mean serum vitamin B12 was within normal range (316.54pmol/L \pm 146.18), however a large range was observed from 72.00pmol/L

to 1,015pmol/L. Males and females had similar knowledge, with only one question regarding fibre content in cornflakes found to be significantly different ($P=0.012$). Knowledge was varied e.g., 100% of participants could identify that pasta was a carbohydrate source, yet could not identify which fats are most important to reduce. Mean vitamin B12 intake exceeding EAR and normal status despite limited vegan sources, indicates high consumption of high bioavailable fortified foods, and supplementation. Iron status shows large consumption of iron rich foods to overcome bioavailability issues, reflected by adequate iron intake, after increasing EAR by 80% to meet recommendations. The mean omega-3 index shows a low cardioprotective omega-3 fatty acid intake.

References

1. Key TJ, Appleby PN, & Rosell MS (2006) *Proceedings of the Nutrition Society*, 65(1), 35-41.

Keywords: vegan; motivation; nutrients; knowledge

Ethics Declaration: Yes

Financial Support: This work was supported by the Lottery Health Grant (LHR-2022-185693)

Abstract 2A.1

Evaluation of a pilot food education program delivered for children in grade four attending a school located in a disadvantaged area in greater Melbourne

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Primary school aged children (aged 4-12 years) in Australia consume approximately 40% of daily energy from energy-dense, nutrient poor foods and fewer than 5% meet the recommended guidelines for vegetables and fruit (ABS 2018). Poor eating habits in children can track into adulthood increasing the risk of non-communicable diseases later in life (Nicklaus 2013). Children spend a large amount of time at school where they are provided with social contexts which influence behaviour development (FAO, 2022) and thus are ideal settings for teaching children about food and nutrition (FAO, 2022; WHO 2017). This pilot study was designed in response to a call to action from a local primary school in southeast Melbourne facing disadvantage. Anecdotally, the school reported poor food literacy with many students bringing unhealthy lunches. The school asked us to design, pilot, and evaluate a student education program enabling healthier lunches among these children. The aim of the study was to explore the effectiveness of a 4-week food and nutrition education program delivered to grade 4 students within a disadvantaged area targeting, children's food-related knowledge, behaviours and self-efficacy (confidence) to pack a healthy lunch. The program delivered weekly 1-hour interactive sessions over four weeks (October-November 2022). Topics included healthy eating, designing healthy lunches and food safety and were delivered using interactive games, activities, quizzes and food tasting. Students completed an online survey measuring their knowledge, self-efficacy and behaviour (e.g. foods packed in their lunchbox) pre- and post- program. A comparative analysis of the pre- and post-survey responses was performed using McNemar Tests in SPSS version 29.0. Sixty students completed both the pre- and post-surveys. A significant increase ($p<0.001$) in knowledge of recommended daily serves of fruit (pre 43%, post 80%) and vegetables (pre 17%, post 54%) was observed. There was also a significant ($p<0.001$) increase in student's ability to identify 'sometimes food'. No changes were observed in identification of 'everyday food', sources of protein and sources of dairy food or safety knowledge. Children's confidence to make healthy food swaps significantly increased from pre- to post- program (27%45%, $p=0.035$). We observed significant increases in children's food and nutrition related knowledge for some topics and confidence to make healthy food swaps following completion of the program. A program of longer duration may be beneficial to observe additional improvements in knowledge as well as behaviour change, including foods packed in school lunches.

References

1. ABS. (2018) *National Health Survey First results*. Canberra: ABS.

2. FAO. (2022) *School Food and Nutrition*.

3. Nicklaus S and Remy E (2013) *Curr Obes Rep* 2: 179-184.

4. WHO. (2017) *Health promoting schools: experiences from the Western Pacific region*.

Keywords: primary school; food and nutrition education; children; pilot program

Financial Support: This research received no external funding

Abstract 2A.2

Bitter taste sensitivity and frequency of bitter food intake in healthy Australian adults: a cross-sectional, mixed-methods study

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Bitter taste perception plays a dual role in human nutrition and evolutionary biology; being identifiable in nutrient-dense foods such as cruciferous vegetables and historically signalled toxic compounds. The *TAS2R38* gene, part of the taste 2 receptor family, is central to individual differences in bitter taste perception.⁽¹⁾ While genetic variations are influential, dietary habits and food preparation also impact taste perception. However, research investigating the interplay between these factors and genetic variations in influencing bitter taste sensitivity and food intake is limited. This study aimed to elucidate the relationship between bitter taste sensitivity and *TAS2R38* haplotype variations in the context of bitter food consumption among Australian adults. A cross-sectional, mixed-methods study was conducted. Healthy adults who had maintained a stable diet for at least three months were eligible. Data collection was via an online survey (REDCap), capturing self-reported demographics, dietary patterns specific to bitter foods including metrics of bitter food avoidance, frequency, liking and perceived healthfulness, alongside a Dietary Quality Index (DQI) derived from a food frequency questionnaire.⁽²⁾ Bitter taste sensitivity was assessed using self-reported intensity perceptions of 6-n-propylthiouracil (PROP) taste strips.⁽³⁾ Genotyping was conducted via TaqMan qPCR assays on DNA extracted from buccal swabs to ascertain *TAS2R38* haplotypes. Data analysis utilised Analysis of Covariance (ANCOVA) and regression models, with all tests adjusted for confounding variables such as gender, age, and smoking status. A total of 222 participants (47.5 ± 17.7 years; 86% female; BMI 27.3 ± 7.1 kg/m²) completed the study. PROP sensitivity was strongly correlated with *TAS2R38* haplotype, with supertasters predominantly having PAV/PAV, medium tasters with PAV/AVI, and non-tasters with AVI/AVI (p=0.002). However, no relationship was observed between PROP sensitivity and either the frequency, liking, or avoidance of bitter foods (p>0.05). DQI was significantly related to bitter food consumption; individuals in the lowest DQI quintile consumed bitter foods more frequently than those in the third (p=0.007) and top quintiles (p=0.001). The perceived healthfulness of bitter foods was significantly higher in those with AVI/AVI haplotypes (non-tasters) compared to those with PAV/AVI (medium tasters) (p=0.001). Counterintuitively, participants who reported greater enjoyment of bitter tastes consumed bitter foods less frequently (p<0.001). Our study confirms that *TAS2R38* variants are predictive of PROP taste sensitivity, consistent with literature that identifies PAV/PAV individuals as supertasters. However, neither PROP sensitivity nor *TAS2R38* haplotype influenced bitter food frequency or preference consumption patterns. Interestingly, those with lower Dietary Quality Index scores and less enjoyment of bitter taste consumed bitter foods more often. These observations highlight the need to investigate other factors influencing bitter food intake, such as additional sensory characteristics or psychological and behavioural aspects.

References

1. Beckett EL, Martin C, Yates Z, et al. (2014) *Food & Function* 5, 3040-3054.
2. Milte CM, Thorpe MG, Crawford D, et al. (2015) *Exp Gerontol* 64, 8–16.
3. Tepper BJ (2008) *Annu Rev Nutr* 28, 367–88.

Keywords: bitter sensitivity; bitter food intake; diet quality

Ethics Declaration: Yes

Financial Support: This work was supported by a La Trobe University School of Allied Health Project Grant; and, La Trobe-RMIT Joint ECR Funding (LN, JD, JB).

Abstract 2A.3

Factors associated with dietary iron intakes among pregnant women in Ifako-Ijaiye, Lagos, Nigeria

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Iron deficiency anaemia (IDA) in pregnancy is a significant public health problem worldwide, but little is known about factors associated with dietary iron intake among pregnant women especially from low- and middle-income countries.⁽³⁾ This study assessed factors associated with dietary iron intake among pregnant women attending primary health centres in Ifako-Ijaiye Lagos, Nigeria. Sociodemographic information and dietary intakes were elicited from 432 apparently healthy singleton pregnant women using a pre-tested questionnaire and 24 hour- dietary recall, respectively. Dietary

iron intakes was estimated from foods and drinks reported using the West African Food Composition Table and adjusted for energy intakes using the residual method.⁽¹⁾ Chi-square test and one-way ANOVA was used to compare categorical and continuous variables respectively by tertiles of energy-adjusted dietary iron intakes at a two-sided $P < 0.05$.⁽²⁾ Mean age and dietary iron intake was 28.5 ± 4.6 years and 20.3 ± 3.3 mg/day, respectively for all respondents. Energy-adjusted iron intakes by tertiles of energy-adjusted dietary intakes were; 16.6 ± 1.4 mg/day for the first tertile, 19.7 ± 1.0 mg/day for the second tertile and 23.7 ± 2.0 mg/day for the third tertile. Age, gestational age, parity, education, marital status, and income differed insignificantly by tertiles of energy-adjusted dietary iron intakes. Current evidence suggests a statistically insignificant association between sociodemographic factors and dietary iron intakes in this sample, but further studies are vital for designing culturally relevant interventions to promote the consumption of iron-rich foods among women in this population.

References

1. FAO of the United Nations; 2012. 171 p.
2. WHO. Geneva, Switzerland: WHO; 2017. 96 p.
3. WHO. 1993-2005: WHO. Geneva; 2008. <https://apps.who.int/iris/handle/10665/43894>

Keywords: diet; iron intakes; maternal health; Nigeria

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract 2A.4

Characteristics of popular diet-related TikTok videos

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TikTok is a global social media platform popular with young people, encouraging viewers to engage with user-generated video content (through likes, shares and comments) and mimic displayed behaviours (by creating similar videos or content). It is therefore a powerful and engaging tool that has potential for the widespread dissemination of information (or misinformation) and to influence behaviours. Social media is saturated with the promotion of 'diet culture' and has a strong influence on the eating behaviours of young people^(1,2). This is concerning as childhood and adolescence are critical periods of growth requiring optimal nutrition⁽³⁾. This study aimed to investigate how dieting is portrayed on TikTok and consider the potential implications for public health. A cross-sectional descriptive content analysis was undertaken of 50 videos from each of the five most popular diet-related hashtags (#diet, #whatieatinaday, #wieiad, #dietitian, #diettips). A codebook was developed to analyse the body-related content referenced (weight measurement, calories, body image, body checking, body comparisons over time) and collect the engagement for each video (likes, comments and shares). Overall, the 250 videos contributed to a total of 197.2 million likes ($M = 789,051.0$, $SD = 923,335.0$), 126,7251 comments ($M = 5,069.0$, $SD = 9,315.3$), and 3.8 million shares ($M = 15,423.2$, $SD = 41,271.3$). Most videos featured adults ($n=205$, 82%), and only a small number of videos featured identifiable children or adolescents ($n=16$, 6.4%). The information and advice regarding diets and eating behaviours came from two types of sources: 'experts' and regular creators sharing their personal experience. Almost half of the videos were educational or instructional ($n=116$, 46.4%), of which 74 (63.8%) were posted by users who claimed expert status. The most common titles by those claiming to be experts were "dietitian" ($n=43$, 58.1%), "health and wellness coach" ($n=7$, 9.5%), "doctor" (MD; $n=6$, 8.1%), "fitness trainer" ($n=6$, 8.1%), and "nutritionist" ($n=3$, 4.1%). Of the videos that specifically mentioned a certain diet, the most common diets were low calorie ($n=32$, 12.8%), vegan ($n=14$, 5.6%), self-reported healthy eating ($n=12$, 4.8%), and fasting ($n=10$, 4.0%). The use of humour was the only feature significantly associated with engagement. Health professionals are presented with a unique opportunity to widely and positively influence the public by utilising the popularity of TikTok amongst young people to disseminate evidence-based information and promote healthy eating behaviours. Our findings suggest that experts using authentic, humorous, and engaging personas would be more likely to be popular on this platform.

References

1. Minadeo M, and Pope L (2022) *PLoS One* 17, 1–12.
2. Kühn J, and Riesmeyer C (2021) *MedienPädagogik* 43, 67–96.
3. Whyte HEA, Findlay SM, Canadian Paediatric Society, Adolescent Health Committee (2004). *Paediatr Child Health* 9, 487–91.

Keywords: TikTok; diet; public health; dietitian

Ethics Declaration: Yes

Financial Support: This work was supported by a Telethon Kids Institute RFA Collaboration Award.

Abstract 3A.1

Factors related to breastfeeding length among Filipino migrant women in South Korea

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Breastfeeding is vital to infants' health and development during their first year. The quality and quantity of breastmilk are closely linked to the mother's nutrition [1]. However, for migrant women who become new mothers, various social, economic, and family factors can pose challenges that negatively affect their dietary and breastfeeding practices. Due to the limited research evidence, this study aimed to investigate the factors associated with breastfeeding duration in migrant women. The study sample was drawn from the Filipino Women's Diet and Health Study (FiLWHEL). These women migrated to South Korea through marriage. At baseline (2014-2016), 504 women provided survey data, including demographic characteristics such as age, marital status, education, employment, income, and language proficiency. Anthropometric measures such as body mass index (BMI) and lifestyle factors were also recorded. Dietary intake of each food group was assessed using 24-hour recalls. We derived the Minimum Dietary Diversity for Women (MDD-W) from the ten food groups [2]. Breastfeeding (any) duration was defined as the average length in months per child. Multivariable logistic regression was used to evaluate the associations between participants' characteristics and breastfeeding duration, with a cut-off of 12 months (<12 months; ≥12 months). Linear regression analysis was used to assess the relationship between each of these factors and breastfeeding duration in months. Out of the initial 504 women, 271 met the eligibility criteria, with the median age of 35 [interquartile range (IQR): 30,40] years, median breastfeeding duration of 4 [IQR: 1, 10] months, mean BMI of 23.8kg/m², median (IQR) of fruits, vegetables, and legumes of 162.2 [76.9, 265.9] grams/day, and median of MDD-W score of 5 [IQR:4, 6]. Over 50% of the sample held a university degree or higher, but only 47.8% were employed. Most women were married (90%) and earned less than 20 million won (~AU\$23,114.58) per year (65%). Over half had a good understanding of the Korean language. The cross-sectional regression analysis found no associations for breastfeeding length, except for the total fruit, vegetable, and legume intake. Women in the highest tertile of this consumption had a two-fold likelihood of breastfeeding for 12 months or longer [adj.OR (95% CI): 2.15 (0.99-4.68)]. While the MDD-W score had a positive association with breastfeeding for at least 12 months, it did not reach statistical significance [adj.OR: 1.11 (0.92-1.34)]. In the linear regression analysis, only vegetable consumption (per gram increase) was positively related to the length of breastfeeding (beta-coefficient: 0.016; SE: 0.006; p = 0.01). This study among Filipino migrant women in Korea suggests that higher consumption of fruit, vegetables, and legumes positively linked to breastfeeding for at least 12 months. Given the study's small sample size, interpreting these results should be cautious and warrants further validation in other studies.

References

1. Ares Segura, et al. (2016) *An Pediatr (Barc)* 84(6): p. 347.e1-7.
2. Kim HS, et al. (2021) *Frontiers in Public Health* 9.

Keywords: diet quality; socioeconomic factors; breastfeeding; migrant women

Ethics Declaration: -

Financial Support: This research received no external funding.

Abstract 3A.2

Alterations to sour taste intensity in depression

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Sour foods, such as citrus fruits, some berries and fermented foods provide a range of nutrients and benefits important to mental health [1]. When sourness is perceived as unpleasant, intake of these foods may be reduced affecting mental health. Early research has shown changes to sour taste perception in depression and stress however, changes in anxiety have not been studied [4-8]. To address this gap and build on the knowledge base, a survey was conducted in which participants ($n = 424$) rated recalled intensity and liking of sour index foods and completed the Depression, Anxiety, and Stress Scale (DASS-21) to measure these states. Variations in sour taste and mood have been demonstrated between females and males, hence the data were explored for sex-differences. Standard least squares regression (*post hoc* Tukey's HSD) compared means between groups, and nominal logistic regression assessed differences in distributions between categories. Recalled sour intensity was 16-19.2% higher in those with scores indicative of mild depression than in those with normal scores in the total sample (p range 0.03-0.04), and 17.9-21.3% higher in females (p values were 0.03). There were no differences in sour taste intensity between the intergroup means for anxiety or stress and no associations between sour liking and any of the mood states. The results suggest that the sourness of index foods increases in depression. Further research to elucidate the biological processes and possible taste-related genetic influences that may be occurring would be beneficial. With this knowledge it may be possible to

screen for mood conditions by measuring changes to sour taste that appear alongside other signs and symptoms, create more tailored dietary interventions and develop additional therapeutics.

References

1. Ortega MA, et al. *Nutrients* 2022, 14, 3099.
2. Noel C & Dando R *Appetite* 2015, 95, 89-95.
3. Platte P, et al. *PloS One* 2013, 8, e65006.

Keywords: sour; foods; taste; depression

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 3A.3

Supporting Food and Nutrition Education in The Pacific Islands: Scoping Resources and Professional Development Opportunities for Teachers

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Schools provide a unique opportunity to educate and motivate Pacific Island students and the wider Pacific Island community about food systems, food production activities (e.g., gardening and cooking) and to focus on the knowledge and skills needed to make healthy and sustainable food choices. Recent work⁽¹⁾ has identified limited access to appropriate and credible learning and teaching resources and varying integration of food and nutrition in the curriculum across the Pacific Islands (P.I) region. Teachers reported an ardent desire to incorporate nutrition into the curriculum, but were not sure how to do this, or where to source assistance, including credible learning materials. Stakeholders also reported requiring assistance to develop contextualised learning materials, and that there were limited options for upskilling in food, nutrition and agriculture. Recommendations from this work included the development of a tool to assist teachers to bridge the gap between understanding the benchmark or learning outcomes provided in curriculum and designing engaging and authentic activities and assessment to meet these. Therefore, this project aimed to identify food and nutrition curriculum materials available for Pacific Island educators, to inform the development of a web-based resource. In 2022, a systematic desk-based scoping activity was undertaken to identify any resources available to teach food and nutrition in Pacific Island schools (primary and secondary level) and professional development opportunities relevant for educators. The mapping identified over 70 resources, with resources from almost all countries identified. Some are available for specific countries, but few that are designed for use regionally. Some of these resources are directly aligned to food-based dietary guidelines, while others appear to be developed for specific activities by non-governmental organisations. Very few professional development activities were identified. Once a resource was identified, the project team used the CRAAP test⁽²⁾ to evaluate the credibility of this. If deemed credible, the resource was tagged with key words (e.g., Tonga, gardening) and added for inclusion. The key resource categories (for tagging) were cooking, ocean and waterway foods, food in schools, food safety, healthy eating, sustainability, pacific research, teaching practice, gardening and WASH. A web designer developed the web-based resource through collaboration with the project team. Users can search for resources by country and/or topic. Based on the mapping of professional development activities, a professional development activity based on assessing the credibility of information was developed and added to the L&T toolkit. Users of the hub can share resources (their own) or identify other resources that could be added to the hub. There are limited resources and opportunities for Pacific Island food and nutrition teachers to upskill in food and nutrition education. School educators may benefit from more food and nutrition resources and professional development activities to complement those that are currently available.

References

1. FAO. 2019. *School Nutrition Education Programmes Scoping Study and Capacity Needs Assessment*. Apia. 130 pp. Licence: CCBY-NC-SA3.0/IGO.
2. *Evaluating Information – Applying the CRAAP Test* Meriam Library California State University, Chico. This work is licensed under a Creative Commons Attribution 4.0 International License. Available from: <https://library.csuchico.edu/sites/default/files/craap-test.pdf> (cited October 2022).

Keywords: school food; nutrition education; children; Oceania

Ethics Declaration: Yes

Financial Support: This work was funded by the Food and Agriculture Organization of the United Nations Sub-Regional Office for the Pacific Islands.

Abstract 3A.4

Intake of energy and macronutrients in the diets of 11–13-year-old schoolchildren living in Delhi India

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National surveys in India, through measures of anthropometry and biomarkers, have identified a triple burden of malnutrition (undernutrition, micronutrient deficiencies and overnutrition) in adolescents ⁽¹⁾. However, there is a dearth of high-quality data on individual dietary behaviour of this population ⁽²⁾ and the importance of sub-national dietary surveys in filling this gap has been identified ⁽³⁾. The objective of this study was to assess the intake of energy (E) and macronutrients and the contribution of macronutrients to E in a random sample of 11–13-year-old schoolchildren in Delhi, India. Method: The study was approved by The University of Adelaide Human Research Ethics Committee and the Independent Ethics Committee of the Centre for Chronic Disease Control, New Delhi. The target sample size of 360 was based on a $\pm 5\%$ margin of error in estimated sugars intakes. Using the list of private schools in Delhi (n=1374), a statistician external to the research team generated a random sample of 150 schools stratified by districts (n=11). Using this list, schools were invited to participate, and recruitment continued until 10 schools consented. Teachers shared study information with parents; interested parents filled in the online consent form. Assent was obtained from schoolchildren. Participants recorded all food and drink consumed over three consecutive days, including one weekend day, in a food diary. Information recorded was entered into an online dietary assessment tool, Intake24 Southeast Asia version, during an interview with each participant. The Intake24 database of over 2400 food photographs of more than 100 foods was used to ascertain portion size. The Intake24 database converts food and drink reported into the intake of nutrients through integrated food compositional tables. Of 514 pupils providing consent, 393 participants (76.4%) (169 girls, 224 boys) completed the study. The median daily E intake was 10.8 (IQR 9.0 -12.5) MJ for girls, and 12.3 (IQR 10.3- 15.2) MJ for boys. For the 97 girls and 144 boys providing body weight data, Physical Activity Level ratios were 2.0 and 2.1 respectively. The median daily intakes for girls were: protein 64.6 (IQR 54.8-79.3) g; carbohydrate 336.5 (IQR 285.3- 393.6) g; and saturated fat 45.6 (IQR 34.8-58.3) g. The respective values in boys were: protein 74.4 (IQR 61.4; 89.4) g; carbohydrate 379.6 (IQR 317.8; 461.8) g; and saturated fat 54.6 (IQR 41.9-69.5) g. There were no significant between-gender differences in percent E from protein (10.2 (IQR 9.2; 11.4)), or carbohydrate (52.4 (IQR 48.7; 56.7)). Girls obtained less E from saturated fat (16.1 (IQR 11.0-18.2) compared with boys 16.3 (IQR 14.2 - 19.1) (P<0.05). In conclusion, in this sample of adolescents from private schools in Delhi, E intake was above FAO recommended levels and median total fat intake exceeded the recommended threshold of 35% ⁽⁴⁾.

References

1. Meenakshi J V. *Agric Econ* (2016) 47: 115-134.
2. Kupka R, Siekmans K, Beal T. *Glob Food Sec*. 2020; 27:100442. [10.1016/j.gfs.2020.100442](https://doi.org/10.1016/j.gfs.2020.100442).
3. Locks LM, Shah M, Bhaise S, et al. *Front Pediatr*. 2022 May 17;10:725812. [doi: 10.3389/fped.2022.725812](https://doi.org/10.3389/fped.2022.725812).
4. FAO. *Energy Requirements of Children and Adolescents* <https://www.fao.org/3/y5686e/y5686e06.htm>

Keywords: energy intake; nutrients; adolescents; India

Ethics Declaration: Yes

Financial Support: Funding through the University of Adelaide Colgate Betty Fanning Scholarship

Abstract 3A.5

Habitual consumption of anthocyanin is associated with improvements in mood and cognitive performance in older people with memory complaints

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The role of flavonoids on cognitive performance in older adults has been intensively studied, with the subclass of anthocyanins showing promising outcomes ⁽¹⁾. However, there is conflicting evidence in the case of individuals at high risk of developing dementia, namely those with mild cognitive impairment (MCI). A recent study has suggested that cognitive scores in people with MCI were higher in those who had higher anthocyanin intake (>10 mg) ⁽²⁾. Baseline data from 65 participants of an ongoing clinical trial that had an MIS (Memory Index Score) score ≤ 13 with self-reported subjective memory complaints, (mean age 69.1y \pm 6.2) were used to investigate the relationship between dietary anthocyanin intake and indices of mood and cognitive performance. Repeated 24-hour dietary intake was recorded through Intake24 (a computer-based program) for three days (2Xweekday and 1Xweekend day) and anthocyanin intake was quantified using the PhenolExplorer food composition database. The primary outcome of interest was the Buschke and Grober Free and Cued Selective Reminding Test-Immediate Recall (FCSRT+IR) (assesses auditory anterograde memory functioning), while other cognitive functions assessed included: Spot the Word-2 (assessing premorbid estimate); Oral Symbol Digit Test (speed of processing); List Sorting (working memory); Trail Making Test A & B (speed of processing/executive function); and Verbal Fluency (language/semantic memory). Subjective memory complaints were assessed using the Memory Assessment Clinic-Q (MAC-Q) and mood was assessed using the Geriatric

Depression Scale (GDS). Independent t-tests were used to compare differences in cognitive tasks and mood scores between high (>10 mg/d) and low consumers of anthocyanins (<10 mg/d). There was a trend for high anthocyanin consumers (n = 35, median = 44.87 (10.01, 177.83)) to score better on FCSRT-Delayed Free Recall scores (16.57 ± 3.74) compared to lower consumers (n = 30, median = 0.01 (0, 9.51)), (15.97 ± 0.18) with a mean difference (SE) of -1.06 (0.58) (p = 0.06) suggesting recall of 1.06 more words after a 20-30 minute delay. Higher consumers had a lower GDS score (1.77 ± 3.73) compared to lower consumers (3.73 ± 1.77), p = 0.01. Spot the word test scores (assesses pre-morbid verbal abilities using a robust lexical decision task) were higher for high anthocyanin consumers (53.06 ± 4.38) compared to lower consumers (50.40 ± 4.38), mean difference (SE) = -2.66 (1.10), p = 0.01, meaning participants with higher intake of dietary anthocyanin were able to point at 2.7 more real words than low consumers. Dietary consumption of anthocyanin in older adults with MIS is associated with beneficial effects on depressive scores and the ability to retrieve words. Further research is warranted to identify optimal dosage for recommended intake. This cross-sectional study used baseline data from a randomised controlled trial registered with the Australian New Zealand Clinical Trials Registry (ANZCTR):12622000065796.

References

1. Feng RC, Dong YH, Hong XL, Su Y, Wu XV. (2023) *Nutrition Reviews* 1;81(3):287-303.
2. Kent K, Yousefi M, do Rosario VA, et al. (2022) *Nutrition Research* 104:36-43.

Keywords: anthocyanin; cognitive performance; mood; dietary consumption

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 4A.1

Estimated intake of vitamin D is low in Aboriginal and Torres Strait Islander people

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Despite high UVB radiation from the sun in Australia (the primary source of vitamin D), vitamin D deficiency (serum 25-hydroxyvitamin D concentration [25(OH)D] <50 nmol/L) is prevalent among Aboriginal and Torres Strait Islander people (27% of adults nationally; 39% of adults living in remote areas).⁽¹⁾ Vitamin D deficiency affects musculoskeletal health and may be associated with non-communicable diseases, such as type 2 diabetes and cardiovascular diseases, prevalent in Aboriginal and Torres Strait Islander people.^(2, 3) Alternative to UVB radiation, vitamin D can also be obtained from foods (e.g., fish, eggs, and meat) and supplements. However, vitamin D intake in Aboriginal and Torres Strait Islander people is currently unknown. Hence, we aimed to provide the first estimate of absolute vitamin D intake in Aboriginal and Torres Strait Islander people. We used food consumption data from the 2012-2013 National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey and vitamin D food composition data for vitamin D₃, 25(OH)D₃, vitamin D₂, and 25(OH)D₂. Absolute vitamin D intake was estimated by sex, age group, and remote and non-remote areas using bioactivity factors (BF) of 1 and 5 for 25(OH)D, which may be up to five times more bioactive than vitamin D. Absolute vitamin D intake from food and beverages was low for Aboriginal and Torres Strait Islander people compared with the estimated average requirement of 10 µg/day recommended by the Institute of Medicine.⁽⁴⁾ The mean estimated absolute vitamin D intake of Aboriginal and Torres Strait Islander people was 2.9 µg/day and 5.3 µg/day for BF 1 and 5, respectively. Males had a higher mean intake (3.2 µg/day, BF 1 and 5.9 µg/day, BF 5) than females (2.6 µg/day, BF 1 and 4.7 µg/day, BF 5). Vitamin D intake was 2.9 µg/day (BF 1) and 5.2 µg/day (BF 5) in non-remote and 2.8 µg/day (BF 1) and 5.4 µg/day (BF 5) in remote communities. The high prevalence of vitamin D deficiency and low vitamin D intake highlights a need to promote vitamin D sufficiency through public health policies. The results from this study can be used to model food fortification strategies to provide evidence for the development of nutrition policies to improve the vitamin D status of the Aboriginal and Torres Strait Islander population.

References

1. Black LJ, Dunlop E, Lucas RM, et al. (2021) *Br J Nutr* 126(1):101-109.
2. Liu D, Meng X, Tian Q, et al. (2022) *Adv Nutr* 13(4):1044-1062.
3. ABS. (2019) <https://www.abs.gov.au/statistics/people/aboriginal-and-torres-strait-islander-peoples/national-aboriginal-and-torres-strait-islander-health-survey/latest-release>. (last accessed August 2023).
4. IOM. (2011) <https://www.nap.edu/resource/13050/Vitamin-D-and-Calcium-2010-Report-Brief.pdf>. (last accessed May 2022).

Keywords: Vitamin D intake; Aboriginal and Torres Strait Islander people; Australia

Ethics Declaration: Yes

Financial Support: This study was supported by the National Health and Medical Research Council (GNT1184788). BN is supported by a Curtin Strategic Scholarship for GNT1184788.

Abstract 4A.2

Differences in dietary intake in early postmenopausal women with different levels of areal and volumetric bone mineral density: a cross-sectional analysis of baseline data from an intervention study

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Osteoporosis is a degenerative disease of the bone. The rate of bone loss is accelerated during the first postmenopausal years in women which results in their disproportionate prevalence of osteoporosis⁽²⁾. Some of the factors contributing to the development and maintenance of bone mineral density (BMD) relate to diet, particularly the intake of protein, calcium and other micronutrients that play a crucial role in bone composition⁽³⁾. The most common method of measuring BMD is dual-energy X-ray absorptiometry (DXA) which generates a two-dimensional image of the scan site (typically spine, hip and/or forearm) to determine areal BMD (aBMD). However, new methods have recently emerged, including High Resolution peripheral Quantitative Computed Tomography (HRpQCT), that offer more accurate three-dimensional measurements of volumetric BMD (vBMD) and microstructure of distal tibia and radius⁽⁴⁾. The aim of this study was to examine the differences in the dietary intake of nutrients that represent organic or inorganic components of the bone, in early postmenopausal women with different spine aBMD and tibia and radius vBMD levels. One hundred and fourteen healthy early postmenopausal women with a lumbar spine or total hip BMD T score > -2.5 (measured by DXA) were recruited as part of a larger interventional study. Dietary intake was recorded using a 297-point self-reported validated food frequency questionnaire⁽⁵⁾ for assessing the intake of energy, macro and micronutrients. Physical activity was self-reported using the validated Active Australia Questionnaire. Years since menopause were self-reported. DXA and HRpQCT scans measured L1-L4 spine, proximal femur aBMD, and distal tibia and radius vBMD respectively. Non-parametric statistical tests examined differences in dietary intake and physical activity levels between women at different levels of aBMD and vBMD. Data reported as median and interquartile ranges. There were no significant differences observed in the total sample between tertiles of aBMD and vBMD, regarding nutrient intake. However, for women with less than 3 years since menopause (i.e., the time-period of accelerated bone loss), lower dietary intakes of energy [8,658(3,324) vs 10,068(3,688) kJ/day; $p=0.047$], protein [94(29) vs 103(32) g/day; ($p=0.044$)], sodium [1,927(992) vs 2,625(2,185) mg/d; ($p=0.044$)], potassium [4,064(1,373) vs 5,121(2,377) mg/d; ($p=0.041$)], calcium [969(325) vs 1,214(652) mg/d; ($p=0.028$)] and zinc [10(3) vs 12(4) mg/d; ($p=0.005$)] were observed for women with osteopenia (-1 < L1-L4 aBMD T-score < 2.5) compared to those with normal L1-L4 aBMD (i.e., T-score > -1). No significant differences were observed for women with more than 3 years since menopause, with the only exception of alcohol intake ($p=0.033$), which was found to be lower in women with osteopenia compared to those with normal aBMD. These findings highlight the importance of targeting osteopenic women within the first 3 years following menopause as candidates for tailored dietary intervention programs for preventing osteoporosis.

References

1. Mohd-Tahir N & Li S (2017) *Osteoporos Int* 28, 2035-2044.
2. Hernlund E, et al. (2013) *Arch Osteoporos* 8, 36.
3. Rizzoli R (2014) *Best Pract Res Clin Endocrinol Metab* 28, 795-808.
4. Nilsson A, et al. (2018) *J Intern Med* 284, 301-317.
5. Barrett, J et al. (2010) *J Am Diet Assoc* 110, 1469-1176

Keywords: bone mineral density; dietary intake

Ethics Declaration: Yes

Financial Support: Supported by Probi AB. The funder had no role in the study design, data collection, analysis, nor interpretation of results.

Abstract 4A.3

Effect of acute supplementation with New Zealand berry anthocyanin-enriched drink on repeated sprint performance in recreationally active males

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Consumption of 300mg of a New Zealand berry extract containing 105 mg anthocyanins for 7 days has been shown to increase running distance during repeated sprints to exhaustion(1). The supplemented group also displayed higher blood lactate concentration over the first thirty minutes of recovery time(1). However, there is limited research available on the acute effects of berry-derived anthocyanins on sports performance. We aimed to evaluate the effect of a single dose of 12 g of a New Zealand berry anthocyanin-enriched powder (NZBP) supplement containing 120 mg of anthocyanins on sprint performance in a randomised controlled crossover trial using the modified Loughborough Intermittent Shuttle Test (m-LIST). The m-LIST protocol consisted of 6 x 15-min blocks divided into four blocks of "prescribed-pace" activity (blocks 1 - 4) (participants exercise based on audible signals) followed by two blocks of "self-paced" (blocks 5, 6) running (no audible signals) with a 3-min rest period between each block. Each block consisted of repeated sequences of 3x20 m walks at 5.4 km/h, 1x15 m sprint, 3x20 m run and 3x20 m jog. Fourteen recreationally active males (mean \pm SD age: 29.53 \pm 9.35 years, height: 170.84 \pm 24.13 cm, weight: 76.24 \pm 8.26 kg, V O₂max: 46.64 \pm 4.40 mL·kg⁻¹·min⁻¹) participated in three indoor sessions. The first session focused on a multistage fitness test (beep test) to determine V O₂max and the run and jog prescribed speeds for blocks 1 to 4. For the main trial visits (minimum 7-day wash-out period in between), participants consumed a body weight adjusted standardised dinner (lasagna, garlic bread, banana, and salad greens) and arrived at the laboratory fasted the next morning (between 6-7:30 am). They then consumed the study supplement (NZBP supplement or placebo mixed with 100 ml water) along with the standardised breakfast (100 g yogurt, 50 g granola, and 30 ml milk). One hour after breakfast the participants undertook a 10-min standardised warm-up, followed by the m-LIST protocol. No significant differences (two-way repeated measures ANOVA; $p = 0.286$) were found in average sprint speed from blocks 1 to 6 within or between NZBP and placebo groups. No effect of supplementation and no interaction effect was observed for sprint distance, sprint time, heart rate, reaction time, movement, or blood lactate concentration. The observed changes induced by repeated sprints on ratings of feeling scale, felt arousal scale, and perceived exertion ($p = <0.001$, all) were also not affected by supplementation ($p = 0.679$, $p = 0.288$, $p = 0.327$ respectively). Thus, an acute dose of NZBP containing 120 mg anthocyanins under the conditions reported here did not improve repeated sprint performance in recreationally active males.

References

1. Perkins IC, Vine SA, Blacker SD, Willems ME (2015) *Int J Sport Nutr Exerc Metab* 25, 487-93.

Keywords: football; exercise; Loughborough Intermittent Shuttle Test; sports performance

Ethics Declaration: Yes
Financial Support

Abstract 4A.4

Micronutrient intake from complementary foods of Asian New Zealand infants

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The complementary feeding period (6-23 months of age) is when solid foods are introduced alongside breastmilk or infant formula and is the most significant dietary change a person will experience. The introduction of complementary foods is important to meet changing nutritional requirements⁽¹⁾. Despite the rising Asian population in New Zealand, and the importance of nutrition during the complementary feeding period, there is currently no research on Asian New Zealand (NZ) infants' micronutrient intakes from complementary foods. Complementary foods are a more easily modifiable component of the diet than breastmilk or other infant milk intake. This study aimed to compare the dietary intake of micronutrients from complementary foods of Asian infants and non-Asian infants in NZ. This study reported a secondary analysis of the *First Foods New Zealand* cross-sectional study of infants (aged 7.0-9.9 months) in Dunedin and Auckland. 24-hour recall data were analysed using FoodFiles 10 software with the NZ food composition database FOODfiles 2018, and additional data for commercial complementary foods⁽²⁾. The multiple source method was used to estimate usual dietary intake. Ethnicity was collected from the main questionnaire of the study, answered by the respondents (the infant's parent/caregiver). Within the Asian NZ group, three Asian subgroups were identified – South East Asian, East Asian, and South Asian. The non-Asian group included all remaining participants of non-Asian ethnicities. Most nutrient reference values (NRV's)⁽³⁾ available for the 7-12 month age group are for total intake from complementary foods and infant milks, so the adequacy for the micronutrient intakes from complementary foods alone could not be determined. Vitamin A was the only micronutrient investigated in this analysis that had an NRV available from complementary foods only, allowing conclusions around adequacy to be made. The Asian NZ group (n=99) had lower mean group intakes than the non-Asian group (n=526) for vitamin A (274 μ g vs. 329 μ g), and vitamin B12 (0.49 μ g

vs. 0.65µg), and similar intakes for vitamin C (27.8mg vs. 28.5mg), and zinc (1.7mg vs. 1.9mg). Mean group iron intakes were the same for both groups (3.0mg). The AI for vitamin A from complementary foods (244µg) was exceeded by the mean intakes for both groups, suggesting that Vitamin A intakes were adequate. The complementary feeding period is a critical time for obtaining nutrients essential for development and growth. The results from this study indicate that Asian NZ infants have lower intakes of two of the micronutrients of interest than the non-Asian infants in NZ. However, future research is needed with the inclusion of infant milk intake in these groups to understand the total intake of the micronutrients. Vitamin A intakes do appear to be adequate in NZ infants.

References

1. Boswell N (2021) *Int J Environ Res Public Health* 18, 7165.
2. Katiforis I, Fleming EA, Haszard JJ, et al. (2021) *Nutrients* 13, 657.
3. National Health and Medical Research Council, Australian Government Department of Health and Ageing, New Zealand Ministry of Health. (2006)

Keywords: complementary foods; infant; micronutrients; New Zealand Asian

Ethics Declaration: Yes

Financial Support: This study is supported by the Health Research Council (HRC) of New Zealand (19/172). The HRC had no role in the study design, writing of the protocol manuscript and the decision to submit the manuscript for publication

Abstract 4A.5

Parent-reported offering of allergen foods to infants during complementary feeding: an observational study

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The prevalence of food allergies in New Zealand infants is unknown; however, it is thought to be similar to Australia, where the prevalence is over 10% of 1-year-olds⁽¹⁾. Current New Zealand recommendations for reducing the risk of food allergies are to: offer all infants major food allergens (age appropriate texture) at the start of complementary feeding (around 6 months); ensure major allergens are given to all infants before 1 year; once a major allergen is tolerated, maintain tolerance by regularly (approximately twice a week) offering the allergen food; and continue breastfeeding while introducing complementary foods⁽²⁾. To our knowledge, there is no research investigating whether parents follow these recommendations. Therefore, this study aimed to explore parental offering of major food allergens to infants during complementary feeding and parental-reported food allergies. The cross-sectional study included 625 parent-infant dyads from the multi-centred (Auckland and Dunedin) First Foods New Zealand study. Infants were 7-10 months of age and participants were recruited in 2020-2022. This secondary analysis included the use of a study questionnaire and 24-hour diet recall data. The questionnaire included determining whether the infant was currently breastfed, whether major food allergens were offered to the infant, whether parents intended to avoid any foods during the first year of life, whether the infant had any known food allergies, and if so, how they were diagnosed. For assessing consumers of major food allergens, 24-hour diet recall data was used (2 days per infant). The questionnaire was used to determine that all major food allergens were offered to 17% of infants aged 9-10 months. On the diet recall days, dairy (94.4%) and wheat (91.2%) were the most common major food allergens consumed. Breastfed infants (n=414) were more likely to consume sesame than non-breastfed infants (n=211) (48.8% vs 33.7%, $p \leq 0.001$). Overall, 12.6% of infants had a parental-reported food allergy, with egg allergy being the most common (45.6% of the parents who reported a food allergy). A symptomatic response after exposure was the most common diagnostic tool. In conclusion, only 17% of infants were offered all major food allergens by 9-10 months of age. More guidance may be required to ensure current recommendations are followed and that all major food allergens are introduced by 1 year of age. These results provide critical insight into parents' current practices, which is essential in determining whether more targeted advice regarding allergy prevention and diagnosis is required.

References

1. Osborne NJ, Koplin JJ, Martin PE, et al. (2011) *J. Allergy Clin. Immunol* 127, 668-76.
2. Ministry of Health (2021) *Healthy Eating Guidelines for New Zealand Babies and Toddlers (0–2 years old)*. Wellington: Ministry of Health. Available from: <https://www.health.govt.nz/system/files/documents/publications/healthy-eating-guidelines-for-new-zealand-babies-and-toddlers-nov21-v3.pdf>

Keywords: food; allergy; New Zealand; infant

Ethics Declaration: Yes

Financial Support: This study is supported by the Health Research Council (HRC) of New Zealand (19/172).

Abstract 5A.1

Diet and well-being of 1st year Medical Interns during hospital placement

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Hospital placement is essential training for medical interns, involving shift work and high-pressure environments. This can increase physiological and psychological stress, which may be mediated by metabolites of microbial digestion⁽¹⁾. Nutrients of interest include those accessible to microbial digestion and associated with altered signalling within the microbiota-gut-brain axis (MGBA)⁽¹⁾. Fibre is fermented by gut microbes to produce short-chain fatty acids⁽²⁾ and is associated with improved psychological outcomes⁽³⁾. Tryptophan, a precursor to gut-derived serotonin⁽²⁾, has been negatively associated with anxiety⁽⁴⁾. Processed foods contain food additives, excess sugars, and saturated fats that may disrupt gut homeostasis⁽¹⁾ and impact psychological well-being⁽⁴⁾. Lastly, total energy intake may determine the level of substrate available for microbial fermentation⁽²⁾. Therefore, this research explores how microbiota-accessible food components interact with physical and psychological well-being in a cohort of medical interns undertaking their first-year of hospital placement. Participants were healthy medical interns, during first-year hospital placement (n=21) from the Hunter New England Local Health District, NSW, Australia. Participants completed diet and wellbeing surveys at baseline and every 2 months over a 10-month period. 24-hour diet diaries were self-recorded from participants using a mobile application (Easy Diet Diary) and analysed using AusNut and the NOVA classification system of ultra-processed foods (ULP). Wellbeing surveys include depression, anxiety, stress scale (DASS), and PROMIS survey for mental (M), physical (P), and sleep well-being. Current data represents an 'in-progress' of the longitudinal data collection. This study utilised Spearman correlation and Tukey's post hoc test for mixed methods analysis. From baseline to timepoint 3 (T3, 4 months) daily energy intake was consistent with cohort estimated energy requirements (EER). However, consumption ranged from 37% to 167% of EER, indicating a large variation of intakes. Energy consumed from ULP ranged from 30% to 34% (p=0.6875). Baseline tryptophan intake (\bar{x} =1139mg) was within the suggested target, whilst fibre intake (\bar{x} =23g) was below the recommended intake. Neither saw significant changes from baseline to T3. Fibre intake was positively correlated with mental and physical well-being at baseline (\bar{x} =23.1g, M: r=0.474, p=0.04, P: r=0.608, p=0.007), and timepoint 2 (\bar{x} =31.5g, M: r=0.647, p=0.026, P: r=0.780, p=0.004) but not at T3. In addition, baseline consumption of sugar (\bar{x} =18g) and poly-unsaturated fats (\bar{x} =15g) were both negatively correlated with mental and physical well-being. Overall, no significant dietary changes were evident from baseline to mid-year collection in a first-year medical intern cohort during hospital placements. Fibre was significantly associated with mental and physical well-being, building on current understanding of fibre's role in the MGBA. Planned metabolite analysis will explore the mechanisms of proposed microbiome-accessible nutrients alongside diet, well-being, and microbiota data. Findings from this study will identify how diet-microbiome interactions change under stress, with wider positive implications on intense workplace environments with the aim to preserve individual wellbeing.

References

1. Foster JA, Rinaman L & Cryan JF (2017) *Neurobiol Stress* 7, 124-136.
2. Debnatha N, Kumarb R, et al. (2021) *Biotechnol Genet Eng Rev* 37(2), 105-153.
3. Saghafian S, Hajishafiee M, et al. (2023) *Nutr Neurosci* 26(2), 108-126.

Keywords: gut microbiota; mental well-being; microbiome; fibre

Ethics Declaration: Yes

Financial Support: This work was supported by the Defence Science and Technology (DST) Group: Next Generation Technology Funding (NGTF) (grant number: G2100173)

Abstract 5A.2

Intake of free sugars by 11–13-year-old schoolchildren living in Delhi, India

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Intake of free sugars is associated with a risk of non-communicable diseases including dental caries, and authoritative organisations recommend limiting intake to <5% energy intake (E) or lower ^(1, 2). National surveys of schoolchildren in India indicate the prevalence of obesity is rising >10%/year ⁽³⁾ and that 52.5% of young adolescents are affected with dental caries ⁽⁴⁾, yet, there is a dearth of data on dietary intake of sugars by this population. The objective of this research was to assess the intake of total and free sugars, and the contribution of food sources to free sugars intake, in a random sample of 11–13-year-old schoolchildren in Delhi, India. The study was approved by The University of Adelaide Human Research Ethics Committee and the Independent Ethics Committee of the Centre for Chronic Disease Control, New Delhi. The target sample size of 360 was based on a $\pm 5\%$ margin of error in estimated sugars intake. A statistician external to the research team generated a random sample of 150 schools stratified by district (n=11). Schools were recruited in turn from the list until 10 schools had consented. Teachers shared study information with parents who were invited to complete an online consent form. Child assent was obtained before data collection. Participants recorded all food and drink consumed over three consecutive days, including one weekend day, in a food diary. The information recorded was entered into an online dietary assessment tool, Intake24 (Southeast Asia version), during an interview with each participant during which portion size was ascertained with reference to the database of over 2400 food photographs of more than 100 foods. The Intake24 database converted food and drink reported into the intake of total and free sugars through integrated food compositional tables. Of 514 pupils providing consent, 393 participants (76.5%) (169 girls, 224 boys) completed the study. In girls, the median (IQR) daily intakes of total and free sugars were 95.0 (70.1-120.2) g/day and 43.0 (28.1-68.5) g/day respectively. The corresponding values in boys were significantly higher at 104.0 (80.2-138.7) g/day and 53.1 (34.1-76.5) g/day (p=0.004). No between-gender difference was observed in the median percent contribution of sugars to E: total and free sugars contributed 14.9% (IQR 11.4-18.1%) and 7.1% (IQR 4.8-10.1%) respectively. The percent contribution of the main sources of sugars to free sugars intake were: (i) Sugars Preserves and Syrups (31.2% (IQR. 9.6-51.7%)); (ii) Cakes and Biscuits (13.7% (IQR 0-26.4%)); (iii) Desserts (5.4% (0-17.5%)) and (iv) Sugar-Sweetened Beverages and Juices (2.1% (IQR 0-15.7%)). In conclusion, in this sample of 11-13-year-old schoolchildren from Delhi, free sugars intake was above the WHO <5% E threshold. Forms of sugars that are added to foods by the consumer made the largest contribution to intake.

References

1. *Guideline on Sugars Intake for Adults and Children. WHO 2015*
2. Turck D et al.(2022) *Scientific opinion on the Tolerable Upper Intake Level for dietary sugars. EFSA Journal.*
3. Ranjani H et al. (2016) *Indian J Med Res 143, 160-174.*
4. *Dental Council of India (2004). <http://dciindia.gov.in/Download/Books/NOHSBOOK.pdf>*

Keywords: dietary sugars; diet record; India; schools

Ethics Declaration: Yes

Financial Support: Funding through the University of Adelaide Colgate Betty Fanning Scholarship.

Abstract 5A.3

Several genetic SNPs identified in acute appendicitis patients including the HLA-C known to be related to coeliac disease in a Genome-Wide Association Study

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Acute Appendicitis (AA) is an inflammatory condition of the vermiform appendix in the caecum of the colon. Genetic polymorphisms have been suggested as risk factors predisposing to AA susceptibility but have remained relatively unknown, due to insufficient sample size in previous analyses. Therefore, the primary research aim was to identify genetic variants associated with AA. It was hypothesised that gene polymorphisms associated with AA will provide a connection to other diet-related inflammatory diseases. Genetic variants associated with AA were studied via a Genome-Wide Association Scan (GWAS) using the Global Biobank Meta-Analysis Initiative (GBMI). The GBMI is a collaborative consortium of 23 biobanks with a publicly released repository of de-identified genetic data linked with digital health records spanning 4 continents with a study population size of over 2.2 million consented individuals of multiple ancestral backgrounds¹. A linear regression model was used to estimate the association between single nucleotide polymorphisms (SNPs), across the human genome, and AA by each contributing biobank. The results were then meta-analysed with a total of 32,706 cases and 1,075,763 controls. In the present study, the free open-source Complex Traits Genetic Virtual Lab (CTG-VL) platform was used to access, analyse, and visualise the GWAS summary statistics of AA². Genome-wide significantly associated SNPs (p-value < 5×10^{-8}) were further searched for their associations with health-related traits in publicly available GWAS summary statistics. Upon analysis, significantly associated SNPs for AA were identified within or nearby nine genes. *HLX*, *NKX2-3*, *LTBR*, and *DLEU1* are genes involved in immune responses; *IRF8* associated with maturation of myeloid cells; *OSR-1* responsible for transmembrane ion transporter activity; *NCALD*

a regulator of G protein-coupled signal transduction. In addition, based on the hypothesis, the SNP of key clinical importance was the *HLA-C* rs2524046 (p-value = 2.38×10^{-8}), with the AA risk-increasing allele C being also strongly associated with a higher risk of coeliac disease (CD). The CD is an autoimmune condition where gluten, a protein present in grains such as barley, rye, and wheat, elicits an inflammatory response that results in damage to the small intestine lining. Considering how both AA and CD share the same SNP, it is possible to speculate whether gluten initiates a similar pathophysiological mechanism that exacerbates inflammation in the vermiform appendix in AA. In conclusion, the top AA associated SNPs suggests its development could be due to immunological responses influenced by dietary nutrient intake. The *HLA-C* SNP is common to AA and CD, suggesting that the gluten protein found in certain cereal grains possibly contributes to the pathophysiology of AA like CD. This warrants further investigations into whether dietary gluten could play a key role in AA development.

References

1. Zhou W, Kanai M, Wu KH, et al. (2022) *Cell Genom* 2, 1-20.
2. Cuéllar-Partida G, Lundberg M, Kho PF, et al. (2019) *BioRxiv* 518027, 1-16.

Keywords: acute appendicitis; coeliac disease; genome wide association study; single nucleotide polymorphism

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 5A.4

What can TikTok tell us about the food practices of the residents of tiny apartments?

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With continuing population growth and increased urbanisation, the prevalence of apartment living will also increase. The food practices and diet of apartment residents may differ to those in lower density, detached or semi-detached housing. Food practices may be impacted by physical constraints of apartment kitchens (size, storage, cooking facilities) and the influence of the surrounding community food environment, particularly in smaller apartments. High-rise apartment residents spend a larger proportion of their weekly household budget on eating foods prepared out of the home ¹. This is concerning given meals prepared outside the home tend to be of lower diet quality ² and are associated with higher body weight ³. This study investigated how kitchens, residents' food practices and hypothesised barriers to healthy eating were portrayed on popular TikTok videos associated with hashtags denoting small apartments. Using the keyword 'microapartment', the top four most viewed hashtags relevant to the topic were identified: #studioapartment (190.5 million views), #smallapartment (152.5 million views), #tinyapartment (62 million views), and #microapartment/#microapartments (4.9 million views combined). The most liked videos (n=50) from each of these four hashtags and #apartment (as a comparator) were selected for investigation. Using a REDCap survey, two researchers independently coded a random sample of 15 videos, with comparison and discussion to tighten codebook definitions and reduce ambiguity. Subsequently over half of all videos were coded by at least two researchers, achieving acceptable inter-rater reliability (Cohen's kappa >0.8). Each video was coded for engagement characteristics, user profile, and characteristics of individuals appearing. Further coding included apartment size, kitchen features displayed or mentioned, and food practices (grocery shopping, cooking at home, and eating foods prepared out of the home). Videos were categorised as having positive sentiment if they depicted the apartment in an explicitly positive way, including promoting or encouraging an aspect of apartment living or indicating support for a behaviour. Conversely, videos were coded as being of negative sentiment where they depicted a clear negative position on an aspect of apartment living. Else, the video was coded as neutral sentiment. The majority of videos (87%) portrayed apartment living with a positive or neutral sentiment; with only 2% of videos portraying kitchen size or function negatively. The expected physical constraints of small apartment kitchens were not evident in the videos, nor were interactions with the food environment surrounding the apartment. Indeed, in the small number of videos portraying the food practices of cooking, shopping and eating, the videos highlighted the ability to undertake these practices despite limitations of size and facilities. As the food practices of residents of small apartments are not well researched, it is not known whether their portrayal on TikTok may indeed reflect reality, or may be a glamorisation.

References

1. Oostenbach LH, Lamb KE, Dangerfield F, et al. (2021) *Public Health Nutr.* 24, 2132-2143.
2. Kant AK, Whitley MI, and Graubard BI (2015) *Int J Obes (Lond)* 39, 820-827.
3. Moyeda-Carabaza AF, Githinji P, Nguyen B, and Murimi M (2021) *J Am Coll Health* 1-8.

Keywords: apartment; TikTok; kitchen; food practices

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract 5A.5

Cognitively testing Aotearoa's food security questionnaire in the modern context

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The eight well-known food security indicators were developed in 1997 using a stepwise process that involved five focus group interviews (one Māori, one Pakeha, two Pacific, and one mixed ethnicity) of 8-16 people, all of whom were either on a low income or were government beneficiaries⁽¹⁾. As part of the development of the tools and methods for a future New Zealand National Nutrition Survey, these eight indicators were considered for inclusion. The Māori and Technical Advisory Groups convened for the development of the National Nutrition Survey foresaw issues with the interpretation of some of the questions given the changes in the food environment and sources of food assistance in the last 25 years and recommended that cognitive testing should be conducted to see if changes were required. Participants were recruited through two community organisations, a local marae, and community Facebook pages. Participants were given the option of participating in a one-on-one interview or as part of a focus group. During each session, participants were asked five (three original and two new) questions relating to food security (running out of basics, use of food assistance, household food preparation and storage resources). After each question, the participants were asked a series of additional probing questions to ascertain whether they had interpreted the question as intended. All interviews were audio recorded and transcribed, and a qualitative analysis was performed on the transcripts to determine areas of concern with each question. A total of 46 participants completed the cognitive testing of the food security questions, including 26 aged 18-64 years, and 20 aged 65+ years. Participants also spanned a range of ethnicities including 8 Māori, 15 Pasifika, 15 Asian, and 8 New Zealand European or Other. Just over half of the participants ($n=24$) reported themselves to be financially secure, 16 participants reported that their financial security was borderline, 1 participant reported that they were not at all financially secure, and 5 participants declined to answer. Variable interpretations of terms by participants were found in all questions that were tested. Therefore, answers to the food security questions may have not reflected the actual experience of participants. This study also identified other dimensions of food security not assessed by the current eight indicators (e.g., lack of time, poor accessibility). These findings indicate that the food security questions need to be improved to ensure they are interpreted as intended and that new questions are needed that considers all dimensions of food insecurity (i.e., access, availability, utilisation, and stability). These new and amended questions should be cognitively tested in groups that are more likely to be experiencing food insecurity.

References

1. Reid J (1997) Master of Public Health Thesis, University of Otago

Keywords: food security; cognitive testing; nutrition survey

Ethics Declaration: Yes

Financial Support: This work was supported by Manatū Hauora/New Zealand Ministry of Health

Abstract 6A.1

Price, social life and proximity influence food choices: Engaging young people as co-researcher collaborators to better understand their surrounding school food environments

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Food environments around secondary schools are a strong influence on adolescents' food purchasing habits¹. We conducted a repeat cross-sectional study using Google Street View to examine school food environments in regional and metropolitan NSW, Australia over 17-years. Findings showed that unhealthy food outlets such as fast-food franchises, consistently dominated school food environments over 2007-2023. Increasing levels of poor nutrition among youth has been raised as a concern² by the Health Advisory Panel for Youth at the University of Sydney [HAPYUS] - an established group of 16 adolescents aged 13-18 years residing in NSW³. To gain further insight into the study findings

and how it may impact adolescents' health, it is critical to include voices of adolescents in this research. The aim of this sub-study was to engage with members of our youth advisory group and conduct a consultation exercise on these study findings, drawing upon their lived experiences of school food environments. In Aug-2023, we engaged four youth advisors from HAPYUS. Study authors provided an overview of the study and its findings to the youth advisors via a Zoom call. Youth advisors formulated a 500-word statement on their perspectives and lived experiences of food environments surrounding their high schools over the subsequent 4 weeks. Adolescents agreed that physical proximity to unhealthy food outlets around schools was a key contributor to unhealthy eating habits however also recognised social and economic factors which play a significant role in shaping poor diets. The following quotes from their combined statement reflect social and economic concerns: i) "[We] observed on a daily basis young people were opting to travel to the closest food court for fast food, or **in some extreme cases**, even order fast food via a meal delivery app, to be delivered to the school - as opposed to choosing the closest outlet" ii) "Overpriced foods in schools with some drinks costing 2x more than a heavily discounted KFC meal, no meaningful difference between foods sold at canteens and those sold at fast food outlets - heavily processed, packaged snacks, pre-made reheated foods" iii) "Most unhealthy food outlets choose a location that is not only close to schools but also close to major shopping centres and food courts... ideal for an after-school social catchup as it appears to accommodate the needs of a large group of people." Consultation findings revealed the importance of social and economic factors that must be analysed in addition to adolescents' physical proximity to food outlets around their schools. Youth advisors call for governments to take immediate action to implement policies that ensure schools have cheap and healthy foods at canteens to mitigate against the purchase of foods from nearby unhealthy food outlets.

References

1. Neufeld LM, Andrade EB, Ballonoff Suleiman A, et al. (2022) *Lancet* 399, 185-197.
2. Valanju R, Barani M, Mautner D, et al. (2022) *Lancet Child & Adolescent Health* 6(7), 456-458.
3. Raeside R, Spielman K, Maguire S, et al. (2022) *BMC Public Health* 22(1), 1805.

Keywords: food environment; adolescents; secondary schools; youth engagement

Ethics Declaration: No

Financial Support: This research received no external funding

Abstract 6A.2

A qualitative exploration of food choice motives of Pacific Islanders: Implications for the use of the Food Choice Questionnaire in understudied populations

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Nutrition transitions are key contributors to the obesity epidemic plaguing South Pacific Island countries (SPIC). Prior to European contact and colonisation, traditional Pacifica diets consisted mainly of root crops, indigenous fruits and vegetables, freshwater proteins and seafood⁽¹⁾. This diet has been replaced by diets high in processed foods which are high in salt, sugar and unhealthy fats⁽²⁾. Various political, economic, environmental and socio-cultural factors have been associated with the proliferation of unhealthy foods in Pacifica diets. However, very few studies have examined how these changes have impacted individual food choices. This study aims to address the gap in the knowledge of food choice motives of Pacific Islanders. An online qualitative survey was used (1) to explore how the nine food choice motives in the widely used Food Choice Questionnaire (FCQ)⁽³⁾ impact food choice and (2) to identify additional food choice motives, not captured in the FCQ. The first section of the survey included open-ended questions which explored the top three food choice motives of the participants. This section was followed by a series of open-ended questions exploring participant's views on the nine food choice motives from the FCQ. The last part of the survey asked participants to identify any other food choice motives which were not already identified in the survey. An exploratory qualitative approach, employing inductive and deductive thematic analyses, was used to analyse results⁽⁴⁾. The sample ($N = 105$) was predominantly female (73%), living with family (72%) and the average age was 22.06 years (S.D = 5.0). It consisted of 28% indigenous Fijians, 26% Fijians of Indian descent, 15% Solomon Islanders, 13% I-Kiribati and smaller percentages of students from Niue (3%), Samoa (5%), Tonga (5%) and Vanuatu (5%). Of the nine FCQ motives, the most commonly identified top three food choice motives included *price* ($n = 54$), *health* ($n = 45$), and *sensory appeal*, especially taste ($n = 40$). Participants also identified three new food choice motives which many ranked in their top three motives: *satiety concerns* ($n = 22$), *food quality and hygiene* when eating out ($n = 26$) and *religious or cultural food restrictions* ($n = 11$). Additionally, issues with face validity of the *health*, *convenience*, *price*, *weight control* and *familiarity* food choice motives from the FCQ were identified. These findings highlight the importance of validity studies prior to using FCQ, and more broadly other similar instruments, with understudied populations like that of SPIC. The findings also provided important insights into the food choice motives of Pacific Islanders and can inform public health interventions for encouraging healthy eating. Further research using an adapted FCQ with larger and diverse samples will increase its effectiveness of measuring food choice motives in the region.

References

1. Lako JV (2001) *Asia Pac. J. Clin. Nutr.* 10, 183–187.
2. Thow AM, Snowdon W (2010). *Trade, food, diet and health: Perspectives and policy options* 147-168.
3. Steptoe A, Pollard TM & Wardle J (1995) *Appetite* 25, 267-284.
4. Fereday J, Muir-Cochrane E (2006) *Int. J. Qual. Methods* 5, 80-92.

Keywords: food choice; nutrition transition; obesity; Pacific Island Countries

Ethics Declaration: No

Financial Support: This research received no external funding

Abstract 6A.3

A comparison of nutritional contents and price differential between dairy and plant-based milk in Fijian supermarkets

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Plant-based milk import has been increasing in the Fijian supermarkets. While this milk may cater for vegans ^[1] and people with allergies from dairy milk, the question always remains that if the plant-based milk are equally nutritious and available at reasonable price in comparison to the dairy milk. Dairy milk is commonly consumed by the Fijian population while the plant-based milk is positioning itself into the market as alternatives. Therefore, this paper is aimed at comparing the nutrient content and price of milk from dairy cows and plant milk sources available in the supermarkets in Fiji. This study examines different brands of dairy and plant-based milk in 6 major supermarket chains in the central part of Fiji. There was 22 dairy milk, 6 soya milk, 5 almond milk and 4 oat milk sampled from these supermarkets. The median value of milk nutrient composition and price for dairy milks and different plant-based milks were calculated as the data was not normally distributed. The Kruskal- Wallis test was conducted to further analyse the difference between the nutrient composition and price of dairy milks and plant-based milk. The energy composition in the dairy milk was significantly higher ($p < 0.01$) when compared with plant-based milks soya almond milk and oat. There was a significant difference ($p < 0.01$) in dairy milk protein, fat and saturated fat when compared to plant-based milks. The result indicated that the protein, fat, and saturated fat are both significantly higher in cow's milk. Milk carbohydrate analysis indicate higher composition in dairy milk therefore a significant difference ($p < 0.01$) was noted when compared to almond milk(except soya and oat milk). There is a significant difference ($p < 0.01$) in sugar indicating cow's milk having higher sugar when compared to plant-based milk (except soya milk). The sodium composition in the dairy milk and all the plant- based milk showed no significance difference ($p > 0.05$) in the composition. There was also significant difference ($p < 0.05$) in comparison of calcium composition of dairy milk and plant-based milk indicating almond milk with lower calcium. The phosphorus composition in dairy milk and plant-based milk indicates that there is a strong significant difference ($p < 0.01$) (except soya and oat milk). The riboflavin composition was significantly higher ($p < 0.01$) in dairy milk compared to soya and oat milk. Lastly, there was significant difference ($p < 0.01$) between price of dairy milk when compared to plant-based milk. The study concludes that there is more nutrient in dairy milk and the price is significantly lower than plant-based milk at which these nutrients are available in dairy milk.

References

1. Park YW, (2021) *Food science of animal resources* 41(1), 8.
2. Walther B, et al. (2022) *Frontiers in nutrition* 9, 2645.

Keywords: dairy milk; nutrient; nutrition; plant-based milk

Ethics Declaration: No

Financial Support: Yes

Abstract 6A.4

The GUTFIT Cohort: Understanding of different gastrointestinal symptoms score variation between Chinese and non-Chinese individuals with functional constipation

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The diagnosis of functional constipation (FC) relies on patient-reported outcomes evaluated as criteria based on the clustering of symptoms. Although the ROME IV criteria for FC diagnosis is relevant for a multicultural population⁽¹⁾, how an individual's lifestyle, environment and culture may influence the pathophysiology of FC remains a gap in our knowledge. Building on insights into mechanisms underpinning disorders of gut-brain interactions (formerly functional gastrointestinal disorders) in the COMFORT Cohort⁽²⁾, this study aimed to investigate the differences in gastrointestinal (GI) symptom scores among participants with FC in comparison to healthy controls between Chinese and non-Chinese New Zealanders. The Gastrointestinal Understanding of Functional Constipation In an Urban Chinese and Urban non-Chinese New Zealander Cohort (GUTFIT) study was a longitudinal cohort study, which aimed to determine a comprehensive profile of characteristics and biological markers of FC between Chinese and non-Chinese New Zealanders. Chinese (classified according to maternal and paternal ethnicity) or non-Chinese (mixed ethnicities) adults living in Auckland classified as with or without FC based on ROME IV were enrolled. Monthly assessment (for 3 months) of GI symptoms, anthropometry, quality of life, diet, and biological samples were assessed monthly over March to June 2023. Demographics were obtained through a self-reported questionnaires and GI symptoms were assessed using the Gastrointestinal Symptom Rating Scale (GSRS) and Structured Assessment of Gastrointestinal Symptoms Scale (SAGIS). This analysis is a cross-sectional assessment of patient-reported outcomes of GI symptoms. Of 78 enrolled participants, 66 completed the study (male, n=10; female, n=56) and were distributed across: Chinese with FC (Ch-FC; n=11), Chinese control (Ch-CON; n=19), non-Chinese with FC (NCh-FC; n=16), non-Chinese control (NCh-CON; n=20). Mean (SD) age, body mass index, and waist circumference were 40 ± 9 years, 22.7 ± 2.5 kg/m², and 78.0 ± 7.6 cm, respectively. Ethnicity did not impact SAGIS domain scores for GI symptoms (Ethnicity x FC severity interaction p>0.05). Yet, the constipation symptoms domain of the GSRS was scored differently depending on ethnicity and FC status (Ethnicity x FC interaction p<0.05). In post hoc comparison, NCh-FC tended to have higher GSRS constipation severity scores than Ch-FC (3.4 ± 1.0 versus 3.8 ± 0.8 /8, p<0.1) Although constipation symptom severity tended to be higher in NCh-FC, on the whole, ethnicity did not explain variation in this cohort. FC status was a more important predictor of GI symptoms scores. Future research will assess differences in symptom burden to explore ethnicity-specific characteristics of FC.

References

1. Schmulson MJ & Drossman DA (2017) *J Neurogastroenterol Motil* 30;23(2). 151-163.
2. Heenan P, et al. (2020) *Inflamm Intest Dis* 5(3). 132-143.

Keywords: disorders of gut-brain interactions; functional gastrointestinal disorders; ethnicities; gastrointestinal symptoms scores

Ethics Declaration: No

Financial Support: This research was funded by the Ministry of Business Innovation and Employment (MBIE) through the Strategic Science Investment Fund (AgResearch Contract A25773)

Abstract 6A.5

Dietary fibre from seeds of Australia native *Plantago* species as modulators of quality and glycaemic response in starch gels

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Dietary fibre (DF) is a non-digestible nutrient which has important roles in the digestive system including maintaining regularity, and reducing the risk of certain cancers and non-communicable diseases, such as metabolic syndrome. Even though the positive health effects of DF have long been established, it has been shown that DF intake for children and adults in Australia is below the recommended range – less than 20% of adults met the suggested intake for reducing risk of chronic diseases⁽¹⁾. *Plantago ovata*, also known as psyllium, is widely used as DF supplement with evidence showing positive effects on weight control, hyperglycaemic response, cholesterol levels, and irritable bowel syndrome⁽²⁾. *P. ovata* seed husk produces a highly viscous gel called mucilage when seeds are exposed to moisture. This mucilage is nearly pure DF and has an intricately layered structure which can be further fractionated and studied as a proxy for different gelling systems. Interestingly, Australia is home to many mucilage-producing *Plantago* species, most of which are underexplored and underutilised, but show remarkable gelling properties and hypoglycaemic potential⁽³⁾. In this work, we compare structural and functional properties of fractionated DF from *P. ovata*, and two promising Australian native relatives, *P. turrifera* and *P. drummondii*, and their effect on enzymatic hydrolysis in potato starch gels. Using a 3-step fractionation method, we have separated distinct fractions and explored their individual properties⁽⁴⁾. *P. turrifera* and *P. drummondii* have higher water absorbing capacity, DF yield, and viscosity compared to *P. ovata*. Monosaccharide composition of all three species is similar – they are highly substituted heteroxylans with minor pectic component. Notably, arabinose to xylose ratio in all species increases with further extraction steps, which is different from cereal arabinoxylans. In an attempt to explore impact of DF in starch-rich systems, we have fabricated DF-potato starch gels and measured enzymatic hydrolysis (with porcine pancreatic α-amylase), freeze-thaw stability, and colour change.

Addition of DF reduced syneresis (water separation) during 15 day freeze-thaw cycle measurement, which can lead to prolonged storage stability and has positive implications for shelf life. Colour change was most noticeable when *P. drumondii* DF were added, while colour of *P. ovata* and *P. turifera* DF gels was similar to control potato starch gel. Effects on α -amylase starch hydrolysis were significant as well, and depended on species and fractions. Certain DFs had impacts on constant k (speed of hydrolysis), while effects on the extent of hydrolysis are still being explored. In conclusion, utility of Australia native *P. turifera* and *P. drumondii* DFs are evident when applied to starch gels, and should be further explored in food products such as bread to increase DF intake and possibly lower glycaemic index.

References

1. Fayet-Moore F, Cassettari T, Tuck K, et al. (2018) *Nutrients* 10, 599.
2. McRorie J, Gibb R, Sloan K, et al. (2021) *Nutr Today* 56, 169-182.
3. Cowley JM, O'Donovan LA, Burton RA (2021) *Sci Rep* 11, 12692.
4. Cowley JM, Herliana L, Neumann KA, et al. (2020) *Plant Methods* 16, 20.

Keywords: dietary fibre; Plantago; starch; α -amylase

Ethics Declaration: Yes

Financial Support: Australian Research Council Linkage Grant LP180100971 and School of Agriculture, Food and Wine, University of Adelaide

Abstract 7A.1

Effect of heat-inactivated *Lactobacillus* sp. on sleep, stress, and gastrointestinal health in adults with insomnia and elevated stress levels: a study protocol for a randomised, controlled, double-blind study

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Insomnia is characterised by impaired sleep quality, including inability to initiate or maintain sleep. Chronic insomnia significantly affects daily activities, and it increases the risk of depression, anxiety, and immune dysfunction. Stress is a main contributor of poor sleep quality. Pharmacotherapy can be effective in treating insomnia; however, it comes with adverse side effects. Finding a safe treatment is warranted. Evidence shows the gut microbiota can regulate sleep and mental state. Postbiotics (inactivated probiotic cells or cell fractions) can regulate the microbiota–gut–brain axis, bringing health benefits to patients with mental illness, and potentially for insomniacs. Previous studies show treatment with postbiotic improved stress-associated symptoms and quality of sleep in healthy young adults. This study aims to evaluate the effect of a postbiotic on sleep, stress, and gastrointestinal health in adults with insomnia and elevated stress level. This 12-week study includes a two-week lead-in phase, eight-week intervention, and two-weeks follow-up. Ninety adults (18-45 years) with mild-severe insomnia and moderately elevated stress are being randomly allocated to tablets containing a postbiotic or placebo with a stratified randomisation by gender and stress levels. Self-reported sleep quality (primary objective) is being assessed with the Pittsburgh Sleep Quality Index (PSQI) global score. Secondary objectives include changes in: self-reported stress (Perceived Stress Questionnaire-Recent Stress); quantitative electroencephalogram (EEG) measures of sleep stages, sleep quantity and quality (Dreem3 EEG headband); habitual sleep patterns (actigraphy, worn on the wrist for seven days); and changes in daily bowel movements. Exploratory outcomes include changes in: self-reported anxiety and depression (Anxiety and Depression Scale anxiety and depression subscales); PSQI individual domains; salivary cortisol; physical activity (actigraphy); sleep disturbance and daily impairment (Patient Reported Outcomes Measurement Information System); and stool microbiota (shotgun metagenomics). Assessing these outcomes may provide greater insight into the effect of consuming postbiotics on sleep and overall gut health.

References

NA

Keywords: heat-inactivated lactobacillus; insomnia; stress; mental health

Ethics Declaration: No

Financial Support: This study was funded by Asahi Quality and Innovations Ltd., Japan.

Abstract 7A.3

Increasing consumption of milk, yoghurt, and cheese in older adults in aged care reduces falls and fractures without adverse effects on serum lipids: a cluster randomised controlled trial

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Correction of dietary calcium and protein undernutrition using milk, yoghurt, and cheese in older adults in aged care homes is associated with reduced fractures and falls. As these foods contain potentially atherogenic fats, we aimed to determine whether these dietary changes adversely affect serum lipid profiles. Sixty aged care homes in Australia were randomised to intervention (n=30 milk, yoghurt, and cheese enriched menu) or control (n=30 regular menu) for 2 years. A sample of 159 intervention and 86 control residents (median age 87.8 years) had dietary intakes recorded using plate waste analysis and fasting serum lipids measured at baseline and 12 months. Diagnosis of cardiovascular disease and use of relevant medications were determined from medical records. Data were analysed using mixed effects linear regression model adjusting for clustering (aged care home) and other confounders. Intervention increased daily dairy servings from 1.9 ± 1.0 to 3.5 ± 1.4 ($p < 0.001$) while controls continued daily intakes of 1.7 ± 1.0 to 2.0 ± 1.0 ($p < 0.05$). No group differences were observed for serum total cholesterol/high-density lipoprotein-C (TC/HDL-C) ratio, Apoprotein B/Apoprotein A (ApoB/ApoA) ratio, low-density lipoprotein-C (LDL-C), non-HDL-C, or triglycerides (TGs) at baseline and 12 months. Among older adults in aged care homes, correcting insufficiency in the daily intake of calcium and protein using milk, yoghurt and cheese does not alter serum lipid levels, suggesting that this is a suitable intervention for reducing the risk of falls and fractures.

References

NA

Keywords: cardiovascular disease; cheese; clinical trials; milk

Ethics Declaration: Yes

Financial Support: This study was supported by grants from Dairy Australia (grant number TP 701722), California Dairy Research Foundation, National Dairy Council, Aarhus University Hospital and Danish Dairy Research Foundation, Fonterra Co-operative Group Ltd, Dutch Dairy Association, Dairy Council of California, Dairy Farmers of Canada, the Centre national interprofessionnel de l'économie laitière, University of Melbourne, Austin Hospital Medical Research Foundation and Sir Edward Dunlop Medical Research Foundation.

Abstract 7A.4

A nutritional modelling framework for inclusion in a Norwegian food system model

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The aim of this study was to apply a comprehensive mathematical model designed to assess the current and future availability of food, as well as the resulting nutrient availability and intake, in the context of the Norwegian population. The model explores various scenarios, including self-sufficiency levels for food supply and impacts on nutrition recommendations. A food mass balance charting production, import, export, feed, seed, and consumer allocation in the Norwegian food system provided insights into the nutrients available to the population. The analysis included a comparison with two versions of the Nordic Nutrient Recommendations (NNR)¹, with the latest version recommending substantial changes in food consumption compared to current dietary patterns in Norway. The nutrient analysis compared the food mass to Matvaretabellen² and was supplemented with data from the United Nations World Population Prospects³ and the Food and Agriculture Organisation/World Health Organisation/United Nations⁴ report to ensure comprehensive nutrient analysis. Micronutrient gaps were observed in Iodine (94% of the target intake) and Vitamin D (46% of the target intake), while saturated-fatty acids slightly exceeded the recommended requirements (107% of the upper limit) based on the current baseline scenario. The updated NNR⁴ recommends changes to specific food categories, namely fruits, vegetables, nuts, and seeds. A secondary scenario testing compared against the updated NNR found that increasing the availability of the supply of these groups does not result in any new nutrient gaps, demonstrating the feasibility of addressing the issue on a national supply basis. These approach offers a mathematical-modelling based tool that can be used to provide information for a national food system. Leveraging the model's capacity to simulate various scenarios, informed decisions to optimise self-sufficiency levels and align food supply with recommended nutritional guidelines can be made. To improve the model, higher data resolution and clearer categorisation of food groups are required which can then be linked into a more complete national food system. The

mathematical model presented in this study provides a framework for understanding of food and nutrient availability in Norway. By identifying critical nutrient gaps and potential solutions, this research contributes knowledge for a healthier and sustainable food future for the nation.

References

1. Nordic Council of Ministers (2012). <https://www.norden.org/en/publication/nordic-nutrition-recommendations-2012> (last accessed August 2023)
2. Norwegian Food Composition Database (2022). <https://www.matvaretabellen.no/> (last accessed August 2023)
3. World Population Prospects (2022). <https://population.un.org/wpp/>
4. FAO, WHO, & UNU. (2007). <https://apps.who.int/iris/handle/10665/43411> (last accessed August 2023)
5. Nordic Council of Ministers (2023). <https://www.norden.org/en/publication/nordic-nutrition-recommendations-2023> (last accessed August 2023)

Keywords: population nutrition; food supply; mathematical modelling; nutrient supply

Ethics Declaration: Yes

Financial Support: This work was supported by Animilia AS (Project number 1005-206963)

Abstract 7A.5

An internship program that empowers international students to grow professionally and find their voice in the nutrition field

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During the COVID-19 pandemic, our international students were confined to their rooms in a foreign land and were unable to return to their home countries during their semester break due to border closures. A summer internship program, underpinned by Asian philosophies including Confucianism⁽¹⁾ and collectivism⁽²⁾, was designed to bring them together physically in a COVID-safe environment and collectively develop employability skills. Twenty-five international students across six year-levels and from 11 countries participated in the five-week internship program. Our in-house dietitian presented participants with an authentic nutrition problem, i.e. observable unhealthy eating habits being prevalent amongst the international student client group. Participants were empowered to draw on their cultural knowledge, international student experience, cooking skills and evidence-based nutrition knowledge, in the development of an educational nutrition resource to be used in the dietitian clinic. Employability skills self-assessment was completed pre- and post-program for comparison. In addition, a collective reflection was facilitated at the end of the program to gather in-depth understanding of the unique learnings from the students' and program facilitators' perspectives. Thematic analysis was adopted to analyse the narrative data. It was found that the student-participants developed a website with healthy eating information, including tailored to international students' habits of late-night snacking and suggestions for quick meals during exams. They developed 50 healthy, simple, multicultural recipes with cooking videos. The internship served as an opportunity for the students to work together with a shared purpose. They reported a strong sense of community which was longed for and extended the established friends outside of the internship program. Students were observed sharing acculturative experience and knowledge with one another when socialising together. Upon reflection, students reported feeling challenged by the lack of structure and assessment guide for the internship tasks. However, they were able to develop confidence in their judgement and decision-making skills through this process and work together exploring the uncertainties. Many reported feeling empowered from this internship as their cultural differences and unique international-student-experience were valued and utilised in the resource development. This low-cost education strategy contributed to the development of professional skills and formation of professional identity, and for the students to find their voice in the nutrition field.

References

1. Huang DD, Charter RA (1996) *Cult Divers Ment Health* 2: 35.
2. Triandis HC (2001) *Journal of personality* 69(6):907-24.

Keywords: international students; internship; professional identity; cultural tailoring

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 1B.1

An e-Delphi study to evaluate content validity of the Teacher Food and Nutrition-Questionnaire

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Teacher food and nutrition (FN) related factors include diet quality, health perceptions and FN attitudes. These factors are associated with both personal health and wellbeing, and teacher classroom FN practices. With Australian schoolteachers currently experiencing high levels of stress, anxiety and burnout, measuring and understanding the status of teacher FN-related health and wellbeing is needed. However, first there needs to be a comprehensive and validated tool to collect these data. This study aims to evaluate content validity of a new tool, the Teacher Food and Nutrition Questionnaire (TFNQ), to measure FN-related health and wellbeing of Australian schoolteachers. The TFNQ was developed following an extensive literature review of FN data collection methods previously used in schoolteacher populations internationally. It initially included 16 FN-related constructs alongside six constructs of wellbeing and mental health, and seven lifestyle covariates identified from the literature review. A two-round e-Delphi methodology was implemented using a mix of structured, rank-order and qualitative questions administered to an international, multidisciplinary group of experts via an online survey¹. Descriptive statistics were used to derive a consensus vote (set at 75%) of constructs and covariates to be prioritised for inclusion. Qualitative feedback was analysed to identify areas of potential change. Twenty-three experts participated in round-one from Australia (n=15), Switzerland (n=3), The United Kingdom (n=2), Canada (n=1), The United States of America (n=1) and New Zealand (n=1). Of the 29 constructs and covariates evaluated in round-one of the e-Delphi, all achieved above 75% consensus, yet qualitative feedback indicated potential to reduce and streamline the number of constructs. Rank order questions and qualitative feedback resulted in the removal of four FN and two wellbeing constructs along with four lifestyle covariates. Round-two included 19 (83%) experts from round-one, with 83% (n=15) in agreement regarding question order. Final feedback indicated only minor adjustments to question item phrasing. The e-Delphi process modified the TNFQ and established content validity. Further construct validity and reliability testing is required to produce a robust tool for measuring FN-related health and wellbeing of contemporary Australian schoolteachers.

References

1. Asher RC, Jakstas T, Lavelle F, et al. (2022) *Nutrients* 14(9), 1778.

Keywords: e-Delphi; nutrition; schoolteachers; wellbeing

Ethics Declaration: Yes

Financial Support: This project is currently funded by the Teachers' Health Foundation. TJ is supported by a Higher Degree by Research (HDR) Scholarship Research Training Program (RTP) Stipend and RTP Allowance at The University of Newcastle and a King and Amy O'Malley Trust Postgraduate Scholarship with a PhD top-up scholarship from Teachers' Health Foundation. CEC is supported by an NHMRC Research Leadership Fellowship (L3)

Abstract 1B.2

He Rourou Whai Painga, an Aotearoa New Zealand Dietary Pattern for Metabolic Health and Whānau Wellbeing: Protocol for a randomised controlled trial

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Cardiometabolic diseases are highly prevalent in Aotearoa New Zealand⁽¹⁾. Dietary intake is a modifiable risk factor for such diseases and certain dietary patterns, specifically the Mediterranean diet (MedDiet), are associated with improved metabolic health⁽²⁾. This study aims to test whether an intervention of a Mediterranean dietary pattern incorporating high quality New Zealand foods (NZMedDiet pattern) using behaviour change science can improve the metabolic health of participants and their household/whānau. This is a multi-centre, three-stage trial, with two randomised controlled trials (RCTs), both parallel groups, superiority trials, and a longitudinal cohort study. The first RCT (RCT1) is a comparison of the NZMedDiet pattern implemented using behaviour science compared to usual diet for 12 weeks, and the second (RCT2) is a behaviour-change intervention compared to no intervention for 12 weeks, administered after participants have been exposed to the intervention in RCT1. The third stage is a longitudinal cohort study where all participants are followed for up to a year. The primary outcome measure for each stage is the metabolic syndrome severity score (MetSSS). Two hundred index participants and their household/whānau have been recruited and randomised into the trial. Participants are from four centres, two of which are University research units (University of Auckland (n=57) and

University of Otago, Christchurch (n=60)), one a community-based traditional meeting place (Tū Kotahi Māori Asthma and Research Trust at Kōkiri Marae in Lower Hutt, Wellington (n=19)), and the other based at a hospital-based research unit (the Centre for Endocrine Diabetes and Obesity Research (CEDOR) in Wellington (n=64). The trial will test whether the NZMedDiet pattern and behaviour change support improves the cardiometabolic health of people in New Zealand.

References

1. <https://www.tewhatauora.govt.nz/our-health-system/data-and-statistics/virtual-diabetes-tool/> Accessed 11 August 2023
2. Martínez-González MA, Gea A, Ruiz-Canela M (2019). *Circ Res*, 124(5):779-798.

Keywords: metabolic syndrome; dietary pattern; Mediterranean diet; behaviour change support

Ethics Declaration: Yes

Financial Support: High Value Nutrition National Science Challenge

Abstract 1B.3

Perspectives of staff and clients regarding the delivery of nutrition information in Green Prescription: a qualitative inquiry

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In New Zealand, the community-based service, Green Prescription (GRx), has a preventative health focus, supporting clients to make lifestyle changes including improving nutrition literacy, which is known to improve health and reduce chronic disease risk and outcomes^(1,2). Fourteen GRx services operate in New Zealand, each with staff who have backgrounds in health and/or exercise. Some staff are degree-qualified nutritionists and/or dietitians. Responsibilities of staff may include providing clients with information about nutrition. We aimed to identify the extent of nutrition information delivery in GRx including successes, challenges, and perspectives of staff and clients. An invitation was extended to all 14 GRx services inviting participation from both staff and clients. Semi-structured interviews were conducted with a convenience sample of 15 GRx staff and 18 clients, representing nine and five GRx services respectively. Interviews were completed in-person, over video call, and by phone. Responses from clients and staff revealed both positive and challenging aspects of nutrition information delivery from GRx services. Thematic analysis identified factors that enhance or diminish the delivery of nutrition information including capacity of staff and appropriateness of information. One theme highlighted was expectations from both clients and staff about what is needed, beneficial and feasible. An expectation identified was for GRx staff to provide meal plans and tailored nutrition advice. Provision of this is dependent on the capacity of nutrition-qualified staff as well as confidence of non-nutrition-qualified staff delivering information beyond basic nutrition guidelines. Client respondents reported they benefit from nutrition information but are challenged when their dietary needs require more specific input, which may be beyond the capacity of GRx. From a staff perspective, there is an expectation that clients possess a certain level of basic nutrition literacy and the effect of nutrition on health. However, staff responses identified there is a vast range of nutrition knowledge among clients; limited foundational knowledge, while simultaneously having in-depth understanding of certain nutrition topics. Provision of information is further complicated by misconceptions about nutrition and limited knowledge about specific health conditions where nutrition plays a significant role. Factors that impact the practical implementation of eating more healthfully were identified by both clients and staff, demonstrating there needs to be both sensitivity and adaptability about what is feasible for clients and achievable in GRx service delivery. Greater focus on determining the nutrition literacy a person has and communicating what is practical in both service delivery and clients' circumstances would aid in aligning the expectations of supporting clients well with nutrition education and enhance available resources within Green Prescription services.

References

1. Taylor MK, et al. (2019) *Public Health Nutrition* 22 (12), 2157-2169.
2. Michou M, et al. (2019) *Health and nutrition literacy levels in Greek adults with chronic disease. Public Health Panorama* 5(2-3, 123-329: 271:279.

Keywords: preventative health; nutrition education; community health support; nutrition literacy

Ethics Declaration: Yes

Financial Support: This work was supported by the Health Research Council of New Zealand (grant number 21/1030)

Abstract 1B.4

More dietary advice may be needed to support healthy body composition for children with cerebral palsy in Aotearoa New Zealand

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The available literature on the nutritional status of children with cerebral palsy (CP) worldwide has identified high rates of malnutrition, specifically undernutrition⁽¹⁾. However, there is a current lack of clear CP-specific dietary guidelines for children with CP across all functional levels. Standard reference tools such as estimated energy requirement (EER) and recommended dietary intake (RDI) may overestimate requirements in children with CP, especially those with reduced mobility and activity levels. Furthermore, for children with severe CP, body composition data indicates higher risks of obesity and obesity-related conditions⁽²⁾. There can be a wide range of functional abilities, classifiable with tools such as the Gross Motor Function Classification System (GMFCS) and the Eating and Drinking Ability Classification System (EDACS). The majority of nutrition-related CP literature focuses on children requiring assistance for feeding (EDACS IV-V) with little information available for children with higher levels of functional independence. The aim of this study was to determine whether children with CP had received any prior dietary guidance for healthy body composition and to summarise the type of advice received. Children aged 5-12 years and their whānau were invited to participate in a study where a purpose-developed questionnaire captured their history of receiving tailored dietary recommendations for CP. Body composition was assessed via whole-body dual-energy X-ray absorptiometry scan. Nine participants (6 males, median age: 10y, n=2 Māori), across GMFCS levels I-IV and EDACS levels I-III took part in the study. Out of 9 children, 5 (55%) indicated that their child had never received dietary advice, 3 of whom were classified as obese or overweight based on growth chart percentiles using their measures of body fat percentage, 1 was classified as underweight and 1 was within the healthy ranges. Of the 4 who had previously received advice, its nature was reported as in support of weight gain (n=3), and weight loss (n=1). All 4 received dietary advice from a dietitian and 1 reported some additional advice from a pediatrician and/or orthopedic doctor. Two of the children who had received dietary advice fell within a healthy body fat percentage based on the growth chart percentiles at the time of the study, while the other two were classified as overweight or obese. The results indicate the importance of developing clear dietary guidance for children with CP which may differ from that for typically developing children, particularly depending upon CP subtype diagnosis and functional level, in order to support healthy body composition.

References

1. Da Silva DCG, da Cunha MSB, de Oliveira SA, et al. (2022) *Public Health* 205, 192-201.

2. Whitney DG, Miller F, Pohlrig RT (2019) *Int J Obes* 43, 82-90.

Keywords: children; body fat percentage; nutrition

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 1B.5

Nutrition status and incidence of malnutrition in home enteral nutrition patients: A cross sectional study

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Home enteral nutrition (HEN) is a long-term, life-sustaining nutrition therapy for patients unable to consume sufficient food orally. Patients rely on a prescribed, manufactured product to provide their full nutrient requirements, although some patients may have supplementary oral intake. Prescribed enteral nutrition is used as a treatment for malnutrition, but may, in the long-term, cause poor nutrition status. This study aimed to investigate the nutrition status (energy, protein, vitamin D, and selenium) and malnutrition incidence in long-term HEN patients in the Counties Manukau region. In this cross-sectional study, 42 adults on HEN for 4+ weeks under the care of Te Whatu Ora Health New Zealand were analysed. Participants' enteral and oral feeding regimes were tracked using patient records and five non-consecutive 24-hour recalls. Biochemical markers, body mass index (BMI), body composition (BIA), and nutrition focussed physical findings were evaluated using reference standards and the Global Leadership Initiative on Malnutrition (GLIM) malnutrition criteria⁽¹⁾. Independent t-tests and Mann-Whitney tests compared participants based on their enteral and supplementary oral intakes and adherence to their enteral prescription. Dependent t-tests and Wilcoxon tests evaluated nutrients contributions from various feeding methods and sources. Over half (54.7%, n=23) relied exclusively on enteral

nutrition, but 60% did not achieve their full energy prescription. Compared to requirements based on the Oxford equation and 1g/kg of body weight, energy and protein intake was low in 20% of all participants, mean intake of these participants was $1,242 \pm 183$ kcal and 57.5 ± 13.5 g respectively. Participants with full enteral intake had a significantly higher vitamin D intake ($14.9 \mu\text{g}$, $P < 0.05$) than those with supplementary oral intake ($11.2 \mu\text{g}$, $P < 0.05$). However, those with oral intake had significantly higher intake of selenium, energy, and all the macronutrients than those with sole enteral intake. Vitamin D and selenium intakes were significantly greater in participants obtaining their full prescription than those that did not. No participants had low vitamin D or selenium blood concentrations, however 40% and 38.1% respectively were high. There was a significant relationship between meeting their energy prescription and high plasma selenium. Low BMI, mid arm muscle circumference, and fat free mass index were observed in 47.5%, 40.5%, and 44.8% of participants respectively. This was not statistically significant between groups. Fat mass and waist circumference were significantly higher in participants on full enteral nutrition. According to the GLIM malnutrition criteria, 62.5% ($n=25$) of all participants were malnourished. In conclusion, while HEN patients maintain good vitamin D and selenium status, energy and protein malnutrition are evident. The types of food consumed by those with oral intake may be responsible for the differences in nutritional status. Further attention to prescription adherence and nutritional balance from HEN and oral intake is necessary for this vulnerable group.

References

1. Cederholm T, Jensen GL, Correia MITD, et al. (2019) *Clin Nutr ESPEN* 43, 32-40.

Keywords: home enteral nutrition; malnutrition; vitamin D; selenium

Ethics Declaration: Yes

Financial Support: Funding was provided by the Counties Manukau Tupu fund (Mātātupu grant) and the Massey University Research Fund.

Abstract 2B.1

Role of Extracellular Vesicles (EVs) in Mediating Antioxidant Response to a Glucoraphanin Rich Meal

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Aging is associated with increasing oxidative stress and declining antioxidant defences, making the body susceptible to various chronic conditions. Cruciferous vegetables contain glucoraphanin, which is metabolised into sulforaphane (SFN) in the gut (1). SFN activates a mechanism enhancing antioxidant defences that may contribute to a reduction in risk of age-related chronic diseases. Our hypothesis proposes that consuming cruciferous vegetables releases hepatic extracellular vesicles (EVs), which carry with a cargo of antioxidant proteins, into the systemic circulation (2) that are transported to 'at risk' tissues. We seek to characterise the antioxidant protein content of EVs from blood samples of healthy human volunteers from a prospective dietary intervention study trial called (GLOBE). The GLOBE study employs a randomised, single-blind, two-arm crossover design and involves 12 healthy male or female adults aged >55 years, at the time of enrolment, have a BMI in the range of 18.5-30 kg/m², and have self-reported healthy (are not suffering from current illness like cancer, and gastrointestinal diseases including coeliac, Crohn's, colitis, and irritable bowel syndrome) and not using any medications like antacids, laxatives and antibiotics which can interfere with normal digestive or metabolic processes. The dietary intervention consists of two commercially available treatments, one of which is a glucoraphanin-rich vegetable soup, while the other vegetable soup lacks glucoraphanin. Our initial focus lies in optimizing and standardizing a method for routinely characterizing EVs derived from healthy volunteers participating in dietary intervention studies. We specifically aim to extract EVs from a minimal plasma volume (2ml) using size exclusion chromatography (SEC). Subsequently, we intend to employ this method to analyse EVs obtained from 161 plasma samples collected from 12 participants during the GLOBE study for different time points like 0, 120, 240, 360, 480 min, 24 and 48 hr. Our goal is to gain insight into the role of EVs as part of the mechanisms by which consuming a moderate quantity of cruciferous vegetables may confer health benefits. Our research carries the potential to establish a standardised approach to the characterisation of EVs from healthy individuals which has several applications in nutrition research.

References

1. Santín-Márquez R, Alarcón-Aguilar A, López-Diazguerrero NE, et al. (2019) *GeroScience*. 41(5):655–70.

2. Urabe F, Kosaka N, Ito K, et al. (2020) *Am J Physiol - Cell Physiol*. 318(1):C29–39.

Keywords: aging; chronic diseases; extracellular vesicle; glucoraphanin

Ethics Declaration: Yes

Financial Support: This research is funded by Liggins Institute, University of Auckland

Abstract 2B.2

Cardiovascular disease risk in Australians following plant-based dietary patterns compared to regular meat eaters

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The adoption of dietary patterns emphasising higher intakes of plant foods and lower intakes of animal foods (plant-based diets, PBDs), continue to rise worldwide. PBDs have been associated with a lower risk of cardiovascular morbidity and mortality as well as major risk factors such as overweight/obesity and type 2 diabetes. Evidence regarding the dietary profile and disease risk associated with various PBDs in comparison to traditional meat-eating diets are scarce within the Australian population. The aim of this study is to investigate the 5-year and 10-year risk of developing cardiovascular disease (CVD) among Australians habitually following various PBDs compared to a regular meat diet (RMD). The Plant-based Diet (PBD) Study is a cross-sectional study consisting of healthy adults between aged 30-75 years from the Hunter Region (NSW) between 2021-2023. A validated FFQ was used to assess eligibility and categorise individuals who were habitually consuming one of five dietary patterns for at least 6 months into the following groups: vegan (nil animal products), lacto-vegetarian (LOV, including eggs and dairy), pesco-vegetarian (PV, including seafood with/without dairy and eggs), semi-vegetarian (SV, minimal consumption of animal products) or RMDs (including animal meat daily or multiple times/day).⁽¹⁾ 5-year and 10-year CVD risk was quantified using the Framingham Risk Equation⁽²⁾ and the Australian Absolute CVD risk calculator, respectively. CVD risk and other quantitative measures was compared using One-way ANOVA or Kruskal Wallis, and Chi-square or Fisher's Exact for qualitative data. Directed acyclic graphs displayed confounding variables and mediators and a regression model was used to adjust for these. A total of 240 participants (median age 55(16), 77.5% female) with 48 participants in each group showed a significant difference in predicted 5-year risk of CVD ($P<0.05$), however 10-year risk did not significantly differ across groups. 5-year CVD risk was significantly lower in the vegan group (1%) compared to the RMD, SV, PV, and LOV diet groups (all 2%). In comparison to a vegan diet, crude association showed those consuming a RMD had a 2.4% (95% CI 0.7, 4.1) higher 5-year risk of developing CVD, followed by 1.7% in LOV (95% CI 0.6, 2.9), 1.8% in PV (95% CI 0.5, 3), and 1.1% in SV (95% CI 0.2, 2.1). Significance was lost after adjusting for confounders such as age, gender, smoking status, alcohol intake, physical activity levels and BMI. This is the first study to purposefully sample Australians habitually following PBD, presenting novel population-based evidence for CVD risk. These findings suggest more restrictive PBDs such as vegan diets when compared to RMD may lead to lower CVD risk, however population-based longitudinal studies primary investigating the development of CVDs in the context of PBDs are warranted.

References

1. Kim H, Caulfield LE, Garcia-Larsen V, et al. *J Am Heart Assoc* 97, 1-7.

2. D'Agostino RB, Sr., Vasan RS, Pencina MJ, et al. (2008) *Circulation* 6, 743-53.

3. Australian Chronic Disease Prevention Alliance, Australian absolute cardiovascular disease risk calculator

Keywords: plant-based diets; vegetarian; vegan; dietary patterns

Ethics Declaration: Yes

Financial Support: This work was partially supported by the following grants: pilot grant from the College of Health, Medicine & Well-being at the University of Newcastle (grant no. 10-32804), Bridging Scholarship and an Early Career small grant for statistical support from the Hunter Medical Research Institute (grant no. 2101041), and Hunter Medical Research Institute Philanthropy funds (grant no. 2200517).

Abstract 2B.3

A 12-month randomised controlled trial using intensive dietary interventions for adolescents with obesity associated complications

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Adolescent obesity requires effective and accessible intervention options and there is potential for intensive dietary interventions to be used as adjunctive therapy to behavioural weight management for some individuals⁽¹⁾. The aim of this study was to determine the effect of two novel diet therapies, delivered in the as part of an intensive behavioural weight management intervention, in adolescents with metabolic complications associated with obesity. The Fast Track to Health study (HREC/17/SCHN/164; ACTRN12617001630303) was a multi-site 52-week RCT, conducted 2018 – 2023, comparing a very-low-energy diet (800kcal/day) followed by i) an intermittent energy restricted (IER) diet; and ii) a continuous energy restricted diet (CER), for adolescents (13-17years) with ≥ 1 obesity associated complication. Interventions were delivered as part of an intensive behavioural weight management intervention by a multidisciplinary team². Anthropometry, body composition and cardiometabolic health were assessed at baseline and week-52. The primary outcome was change in BMI z-score at week-52. Dyslipidaemia was defined as HDL < 1.03 mmol/L and/or triglycerides ≥ 1.7 mmol/l, and elevated liver function tests (LFTs) as ALT and/or GGT ≥ 1.5 upper limit of 30U/L³. The difference in BMI z-score between groups at week-52 (± 4) was assessed using a t-test. Mixed models was used to investigate changes over time. Descriptive statistics were used to describe participants above and below clinical cut-points at baseline and week-52. In total, 141 adolescents (70 female) were enrolled and 97 (48 female) completed the intervention. At week-52, BMI z-score reduced by -0.23 [95%CI -0.37 to -0.22], BMI expressed as a percentage of 95th percentile reduced by -8.86 [95%CI -12.46 to -7.47] and Fat Mass Index reduced by -1.49 [95%CI -2.36 to -1.08]. There was no significant difference for weight or cardiometabolic outcomes between diet groups. The occurrence of dyslipidaemia was unchanged between baseline and week-52 (n=60 [43%] and n=37 [43%] respectively) and a small improvement in the occurrence of impaired LFTs (n=37 [27%] to n=15 [17.2%] respectively). There were no differences in change of occurrence of dyslipidaemia or impaired LFTs between intervention groups. These findings suggest that both IER and CER, delivered as part of an intensive behavioural weight management program, are equally effective for improving weight and cardiometabolic outcomes for adolescents with obesity.

References

1. Lister, et al. (2023). *Nat. Rev. Dis. Primers* 9(1):24.
2. Lister, et al. (2020) *Obes. Res. Clin. Pract* 14(1):80-90.
3. Fraser, et al. (2007) *Gastroenterology* 33(6):1814-20.

Keywords: adolescent; diet; very low energy diet; intermittent energy restriction

Ethics Declaration: Yes

Financial Support: This work is supported by the Australian National Health and Medical Research Council (grant number 1128317, N.B.L. grant number 1145748, M.L.G. grant number 1158876, H.J. grant number 2009035)

Abstract 2B.4

Dietary metabolites and blood pressure regulation in dietary feeding interventions: a systematic review

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Hypertension, characterised by elevated blood pressure (BP), continues to be a major global public health problem. It is defined as systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic BP (DBP) ≥ 90 mmH⁽¹⁾ and is the leading risk factor for cardiovascular diseases⁽²⁾. Nutritional metabolomics (Nutrimetabolomics) presents an objective approach to explore the interplay between diet and health outcomes⁽³⁾. Through analysis of intermediate molecules and metabolic byproducts, metabolomic profiles can objectively reflect an individual's dietary intake and assess variations in metabolism⁽³⁾. To date, no review has been conducted that investigates the relationship between diet, metabolites and BP regulation. This systematic review aimed to identify and synthesise findings of human dietary feeding intervention studies that have examined the role of metabolites in BP regulation. A comprehensive search was conducted in November 2022 across EMBASE, Medline, CINAHL, PsychINFO, Scopus and Cochrane databases. Search terms were defined using a combination of keywords, including "metabolome", "diet", and "blood pressure". All included intervention studies explored the dietary metabolome from food provision, meals or supplements to a comparator or control intervention and, examined the relationship between dietary-related metabolites and BP in humans and published in English. The initial search identified 1,109 studies, with a final six studies meeting all eligibility criteria and included in the final review. Metabolites were identified in urine (n=4), plasma (n=2), or faeces (n=1). Various analytical techniques were employed, including H-NMR, LC-MS, and GC-MS, while majority of studies used untargeted metabolomics (n=4). Among included studies, five reported a significant association between individual metabolites and BP or change in BP. These investigations emphasised dietary patterns as the primary focus of analysis. In contrast, one study revealed no relationship between the investigated metabolites and BP. However, this particular study evaluated the impact of a single food product rather than dietary patterns. In total, 39 metabolites were linked to BP, with 36 associated with SBP and 25 with DBP. Several super-pathways involved in blood pressure regulation were identified, across metabolism of amino acids, carbohydrates, cofactors, vitamins, lipids, nucleotides, peptides, and xenobiotics. Within these, 17 distinct sub-pathways were delineated. The only metabolite found to have a significant relationship with BP measures across multiple studies was N-Acetylneuraminic acid. In one study, it showed a relationship with DBP, while another study linked

it to a decrease in both 24-hour DBP and SBP. No other metabolites were consistently replicated between studies. Nutrimentomics appears to be a promising field in evaluation of diet and BP reduction. However, further research is required to understand which metabolites influence BP regulation.

References

1. Zhou B, Carrillo-Larco RM, Danaei G, et al. (2021) *The Lancet* 398, 957-80.
2. Murray CJL, Aravkin AY, Zheng P, et al. (2020) *The Lancet* 396, 1223-49.
3. Guasch-Ferre M, Bhupathiraju SN and Hu FB (2018) *Clin Chem* 64, 82-98.

Keywords: metabolome; diet; blood pressure; hypertension

Ethics Declaration: Yes

Financial Support: CEC is supported by an NHMRC Leadership Research Fellowship (Investigator Grant APP2009340). JJAF also holds separate employment at the Sanitarium Health Food Company who had no input into the study and are not financially supporting or sponsoring any part of this study

Abstract 2B.5

Ultra-processed food consumption and risk of chronic respiratory diseases mortality

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Chronic respiratory diseases (CRDs) are diseases of the respiratory tract and are among the most prominent causes of disability and mortality globally ⁽¹⁾. Chronic obstructive pulmonary disease (COPD) and lung cancer are among the leading cause of death among all CRDs ⁽²⁾. Evidence showed that diet, particularly ultra-processed foods (UPFs) are strongly associated with cardiovascular disease, diabetes, cancer, and depression ⁽³⁾. However, the link between UPFs intake and CRDs has rarely been investigated. We aimed to examine the association between UPF consumption and risk of mortality due to CRDs overall, COPD and lung cancer among adults in the USA. A total of 96,607 participants aged 55 years and over were obtained from Prostate, Lung, Colorectal and Ovarian (PLCO) cancer study, a randomised trial designed to investigate the effects of screening on cancer-related mortality. However, data collected also afforded the opportunity to examine the relationships between UPF intake and mortality caused by respiratory diseases. Dietary history of participants was collected at baseline using a validated food frequency questionnaire as was the presence of respiratory diseases. Food items were grouped into one of the four NOVA food classification system ⁽⁴⁾. Cox regression was fitted to estimate the risk of all-cause mortality and cause-specific mortality due to increased consumption of UPFs over time. Competing risk regression was used to account for the competing risks events and effect of participant loss. During the follow-up period of 1,379,655.5 person-years (median 16.8 years), 28700 all-cause, 4,901 all respiratory, 2,015 lung cancer and 1,536 COPD mortalities occurred. A dose-response association was found between higher UPF intake and mortality from all respiratory diseases and COPD, but not lung cancer. After considering competing events, higher intake of UPF increased the risk of mortality from all respiratory diseases by 10% (HR: 1.10; 95% CI: 1.01, 1.21) and COPD by 20% (HR: 1.20; 95% CI: 1.02, 1.42). After imputation for missing data, the risk of lung cancer increased by 25% among participants in the highest quintile of UPF intake. The PLCO trial data highlighted that consumption of UPF increased respiratory mortality, among those with COPD, however further mechanistic studies are recommended to further clarify the link between UPF and lung cancer. This study also indicated that a high intake of UPF generally increases the risk of mortality of those with respiratory diseases and contributes to a large body of evidence indicating that higher UPF consumption increases the overall risk of mortality.

References

1. GBD (2021). *The disease burden of NCDs in the Region of the Americas, 2000-2019.*
2. Viegli G, et al. (2020) CRDs. *Journal of AMAPDD* 33(4).
3. Suksatan W, et al. (2021) UPFs Consumption and Adult Mortality Risk: Meta-Analysis. *Nutrients* 14(1).
4. Monteiro CA, et al. (2019) UPFs, diet quality and human health.

Keywords: ultra-processed food; chronic respiratory disease; COPD; lung cancer

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract 3B.1

Drivers of change: dietary change, food and nutrition security and agricultural practices in peripheral communities in Pacific Island countries and territories: A scoping review protocol

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Pacific Island Countries and Territories (PICTs) are experiencing a Diet-Related Non-Communicable Disease (DR-NCD) health crisis ⁽¹⁾. Increasing rates of DR-NCDs such as Type 2 diabetes and cardiovascular disease have been linked to dietary transitions and increasing food insecurity in the region ⁽²⁾. Anthropogenic climate change has also been identified as a significant threat to food security in PICTs ⁽³⁾. Additionally, the impacts of the COVID-19 Pandemic have been identified as both a contributor to food insecurity in the region and as an opportunity to transform PICT food systems and reduce rates of DR-NCDs ⁽⁴⁾. Yet, the drivers of dietary change, food security and agricultural practices in peripheral PICT communities are not well documented or understood. To determine how these drivers may change in the future and the impacts this may have on Pacific peoples, a deeper understanding of the historical and contemporary drivers of change is necessary. The aim of this scoping review was to collate existing information to improve this understanding, by mapping key factors evident in the literature that underpin the links between DR-NCDs and food security with a focus on women in PICT peripheral communities, to better clarify the challenges, working definitions and conceptual boundaries in the research area. The review maps where research has been conducted geographically and how the links between DR-NCDs and food security in PICTs have been investigated over time and identifies projections and suggestions for the future. The scoping review was conducted in accordance with a pre-defined protocol available online ⁽⁵⁾. A total of 476 peer-reviewed sources and 126 grey literature sources were identified by the initial search criteria. Two independent researchers completed title/abstract and full text screening using Covidence, and data extraction using a data extraction tool. The resulting data was quantified in table format, with common themes and ideas presented qualitatively. Sources spanned all sectors of PICT food systems with a heavy focus on production from fisheries and agriculture. Most PICTs were represented in the findings. Many drivers of change within food systems were identified, some of which included the impacts of anthropogenic climate change, the COVID-19 pandemic, and urbanisation. The drivers impacted all four pillars of food security, and many were directly or indirectly related to dietary and lifestyle changes associated with DR-NCD risk factors. This data is accompanied by an interpretation of results and a narrative summary. These results provide a useful platform to further explore the drivers of dietary change, food security, agricultural practices and DR-NCD's in this region.

References

1. World Health Organisation (2017) *epiH*. 36:e2014007.
2. Sievert K, et al. (2019) *Nutrients*. 11(6).
3. Medina Hidalgo D, et al. (2020) *Reg. Environ. Change*. 20(3).
4. Ferguson CE, et al. (2022) *Mar. Pol.* 137:104954.
5. Harding A, et al. (2023). *UniSC Research Bank*.

Keywords: diet-related non-communicable disease; drivers of change; food and nutrition security; Pacific Island countries and territories

Ethics Declaration: Yes

Financial Support: The author is supported by a research training scholarship from the Australian government and a 'top up' scholarship courtesy of the Australian Centre for Pacific Islands Research.

Abstract 3B.2

Use of nutraceuticals and micronutrient supplementation for the management of Polycystic Ovary Syndrome: a scoping review

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Polycystic Ovary Syndrome (PCOS) is a common hormonal condition affecting women of reproductive age ⁽¹⁾. Women with PCOS experience a broad range of clinical symptoms, collectively grouped into reproductive, metabolic, psychological and anthropometric features ⁽²⁾. Complementary therapies, such as nutrient supplementation, have been

identified as potential adjunct therapeutic approaches to support currently recommended lifestyle and pharmacological interventions⁽³⁾. However, evidence for their overall efficacy and safety is inconsistent and unclear. This review aimed to systematically map the available literature on the use of nutrient supplementation for the management of PCOS features, including metabolic, reproductive, psychological and anthropometric. This review followed a systematic approach with literature searches using CINHAL, Cochrane reviews, Medline, PsycINFO, Scopus and LILACS conducted up to April 2022. All types of study designs were included if they reported on the efficacy or association between micronutrient supplementation and/or nutraceuticals on features of PCOS in women (≥ 18 years) with a confirmed diagnosis of PCOS. A total of 317 articles were included involving $n = 23,926$ women. Forty-three different supplements examined various clinical features of PCOS grouped into metabolic, reproductive, psychological and anthropometric. The most studied supplements included Inositols ($n=83$), Vitamin D ($n=51$), N-acetylcysteine ($n=25$), Omega-3 fatty acids ($n=18$) and Biotics ($n=14$). Most studies ($n = 262$; 83%) reported on reproductive features followed by metabolic ($n = 212$; 66%), anthropometric ($n = 181$; 57%) and psychological ($n = 5$; 2%). Less than half ($n = 148$; 47%) of the included studies reported on the potential for adverse events. Our results highlight that the potential therapeutic benefit of micronutrient and nutraceutical supplementation on psychological features of PCOS warrants future exploration. Additional primary studies that are adequately powered are needed to investigate therapeutic doses needed for clinical benefits. Lastly, a more rigorous approach to monitoring and recording adverse event data is recommended.

References

1. Bozdogan G, Mumusoglu S, et al. (2016) *Human Repro* 31, 2841-2855.
2. Teede H, Deeks A, et al. (2010) *BMC Med* 8, 1-10.
3. Bergamin A, Mantzioris E (2019) *Pharm Med* 33, 291-309.

Keywords: Polycystic Ovary Syndrome; nutraceuticals; supplementation; micronutrients

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 3B.3

Exploring the anti-inflammatory activity of the plant-derived phytochemical sulforaphane from cruciferous vegetables

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Dysregulation of immune responses results in the development of chronic inflammatory conditions. The current frontline therapy, glucocorticoids, are effective immunosuppressive drugs but come with a trade-off of cumulative, debilitating side effects with sustained use. Clearly, alternative drug options with improved safety profiles are urgently needed. Macrophage Migration Inhibitory Factor (MIF) is a pleiotropic pro-inflammatory cytokine and integral component of immune and inflammatory responses. MIF counter-regulates the immunosuppressive effects of glucocorticoids and promotes NLRP3 inflammasome activation.^{1, 2} Elevated MIF is a feature of multiple diseases, including multiple sclerosis, rheumatoid arthritis, and systemic lupus erythematosus. Given the association of increased MIF in serum with multiple disease models, it is considered MIF may be a plausible, specific druggable target in treatment of chronic inflammatory and autoimmune diseases, particularly as a target for glucocorticoid-sparing therapy to reduce the dose or duration of glucocorticoid treatment. The organosulfur isothiocyanate phytochemical sulforaphane (SFN) is extracted from cruciferous vegetables, including broccoli and Brussel sprouts following hydrolysis of its inactive precursor, glucoraphanin. SFN has antioxidant and cancer chemoprotective properties, and promotes NRF2 antioxidant signalling to upregulate the expression of numerous antioxidant enzymes. SFN has been shown to covalently modify MIF with high reactivity and is a potent inhibitor of MIF tautomerase activity. However, to date, no such study has evaluated the role of SFN as a novel inhibitor of MIF-mediated inflammatory pathway activation. Using cell-based assays, we have sought to investigate the role of SFN as an inhibitor of multiple inflammatory pathways which have previously implicated MIF as a possible regulator. Our initial work has examined SFN as an inhibitor of NF- κ B activity, inflammasome activation, and evaluated if MIF is required for this effect. RAW264.7 murine macrophage cells stably expressing NF- κ B-luciferase reporter construct were pre-treated with SFN (2.5 μ M) before the induction of inflammation, via LPS (100ng/mL). For NLRP3 inflammasome activation, cells were subsequently treated with the NLRP3-specific inflammasome activator, nigericin (10 μ M). TNF, IFN- β and IL-1 β cytokine expression was measured by ELISA and NF- κ B activity by luciferase reporter assay. We found SFN is a potent inhibitor of NF- κ B activity and inhibits release of the pro-inflammatory cytokine IL-1 β through inhibition of NLRP3 inflammasome activation. Finally, co-incubation of SFN with the glucocorticoid dexamethasone significantly suppressed TNF and IFN- β expression, demonstrating steroid sparing activity of SFN *in vitro*. Thus, SFN may be a suitable treatment for disruption of inflammatory pathways and suggest some of these effects may be mediated through direct interactions with MIF.

References

1. Lang T, et al. (2018) *Nat Commun*, 9, 2223.
2. Allam V, et al. (2023) *Thorax*, 78, 661-673.

Keywords: Glucocorticoids; isothiocyanate; inflammation; macrophage migration inhibitory factor (MIF)

Ethics Declaration: —

Financial Support: This work was supported by GW's Monash University Establishment Fund

Abstract 3B.4

Fiber intake is inversely associated with the prevalence of circadian syndrome among adults attending NHANES 2005-2016

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It is well-known that many modern lifestyles, including the use of artificial light, shift work, irregular or short sleep, sedentary activity, and unhealthy diet can disrupt the circadian rhythm. This disruption can result in the so-called Circadian Syndrome (CircS) which has been identified as a risk factor for a variety of chronic diseases. The concept of Circadian Syndrome (CircS) was first proposed by Zimmet et al in 2019. CircS has been shown to be a better predictor for cardiovascular diseases (CVD) than the metabolic syndrome (MetS) in adults in China and USA ^{1,2}. Dietary patterns are found to be associated with CircS ³, whereby western dietary pattern was positively related, while prudent pattern was inversely associated, with CircS in the US adults. However, no prior study has investigated the association between fiber intake and CircS. We, thus, aimed to fill this research gap. We analysed data from 10,486 adults aged 20 years and above years who attended the 2005-2016 National Health and Nutrition Examination Survey (NHANES). Fiber and other nutrients intake were assessed using two days 24 hours recall. CircS was derived from all five components of MetS (i.e. central obesity, elevated fasting glucose, elevated triglyceride, reduced HDL-Cholesterol and elevated blood pressure), in addition to short sleep (sleep duration <6 hours/day) and depressive symptoms (PHQ-9 score ≥5). A cut-off for CircS was set as ≥ 4 components. Multivariable logistic regression was used to assess the association between fiber intake and CircS. Mean age of participants was 50.3(SD 17.6) years, and 41.3% had CircS. The mean (SD) fiber intake was 7.8 (2.1), 12.9 (1.3), 17.9 (1.7), and 28.9 (8.2) g/day across the quartiles of fiber intake. The prevalence of CircS decreased across quartiles of fiber intake (44.5% in Q4 and 37.1% in Q1). In the multivariable logistic model adjusting for age, gender, ethnicity, energy intake, education and lifestyle factors, across the quartiles of fiber intake, the odds ratios (ORs) (95%CI) for CircS were: 1.00, 0.91 (0.76-1.08), 0.82 (0.70-0.96), 0.79 (0.63-0.98) (p trend 0.012), respectively. No significant interactions were found between fiber intake and race, gender, smoking, alcohol drinking, and physical activity, in relation to CircS. In conclusion, a high fiber intake was associated with a lower prevalence of CircS among US adults. The findings highlight the importance of fiber intake for the prevention of metabolic and circadian syndrome, suggesting a potentially accessible and cost-effective lifestyle approach to improve public health. Our results underscore the concern that most of the US adults had fiber intake below the recommended level. Longitudinal studies are needed to validate the findings in different populations.

References

1. Shi Z, Tuomilehto J, Kronfeld-Schor N, et al. (2022) *Nutrients* 14(24).
2. Shi Z, Tuomilehto J, Kronfeld-Schor N, et al. (2020) *J Intern Med*.
3. Akbar Z, Shi Z. (2023) *Nutrients* 15(15).

Keywords: fiber intake; circadian syndrome; NHANES; adults

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 3B.5

The metabolic health of New Zealand vegans

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The popularity of a vegan diet is growing worldwide. Data analysed from the 2018 NZ Attitudes and Values study showed that 1.1% of New Zealanders followed a vegan diet ⁽¹⁾. Though there are potential nutrient deficiencies in a vegan diet, it is generally accepted that a vegan diet, with its emphasis on a variety of vegetables, fruit, grains, legumes, and pulses,

has greater metabolic benefits than a Western-style diet high in red meat and processed foods and lower in plants ⁽²⁾. This observational cross-sectional study aimed to explore the dietary intake (4-day food diary) and metabolic health status (including anthropometry, blood pressure, lipids, body fat percentage, omega-3 index and glycaemic control) of adults who had been consuming a vegan diet for 2+ years. Participants (N=212) were predominantly female (N=155) with a mean (SD) age of 39.5 (12.4) years. Mean cardiometabolic markers of systolic and diastolic blood pressure, BMI, waist circumference, HbA1c, total cholesterol, LDL-cholesterol, HDL-cholesterol, Chol:HDL ratio and triglycerides were all below the thresholds for disease risk. Omega-3 index results <4% placed most participants (86.3%) in the high-risk category for heart disease. Many female participants (71%) had >30% body fat, compared to 5.3% of males. With reference to the AMDR (total fat 20-35%, carbohydrate 45-65% and protein 15-25%), the intake of total fat was at the upper end (males 34.4%, females 35.9%), carbohydrate was at the lower end (males 46.2%, females 44.7%), and protein was below the lower end (males 14.9%, females 14.2%). Saturated fat intakes ranged from 4.0-65.9 g/d, with a mean (SD) of 24.9 (10.5) g/d for males and 20.2 (9.9) g/d for females. The mean (SD) dietary fibre intake was much higher than the AI set by the Ministry of Health of 25g/d for females and 30g/d for males, at 55.0 (17.8) g/d for males and 43.4 (12.8) g/d for females, ranging from 10.9-133.9g/d. This is the first New Zealand study to examine the metabolic health and dietary intake of adult vegans. The results of cardiometabolic health markers indicate that the vegan diet confers cardioprotective benefits. However, the low Omega-3 index of most participants is concerning, which warrants longitudinal research to assess the level of risk conferred by a low Omega-3 index result in a population with no other cardiometabolic risk factors. The findings of the present study may help guide the growing New Zealand vegan community towards a nutritionally optimal vegan diet.

References

1. Milfont TL, Satherley D, Osborne MS, et al. (2021) *Appetite* 166.
2. Herpich C, Müller-Werdan U & Norman K (2022) *Maturitas* 165, 47-51.

Keywords : vegan; metabolic health

Ethics Declaration: Yes

Financial Support: The study was supported by the Lottery Health Project Grant LHR-2022-185693

Abstract 4B.1

Evaluation of the potential implications of following a vegan diet on bone health

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Cow's milk is the primary source of calcium in the NZ diet ⁽¹⁾. The absence of dietary planning in a vegan diet can result in the individual unknowingly obtaining low intakes of calcium. Prolonged low calcium intakes can result in negative implications on bone mineral density by increasing the risk of osteoporosis later in life. The measurement of bone health parameters in NZ vegan adults have not been investigated. Therefore, we measured bone mineral density, markers of calcium homeostasis and assessed intake of essential nutrients for optimal bone health in vegans. This cross-sectional study included adults (>18yrs), who followed a vegan diet for 2 years minimum. Demographic and lifestyle information was obtained from questionnaires including previous history of bone fractures and background of familial osteoporosis. A 4-day food record was completed for analysis of calcium, zinc, protein, magnesium, phosphorus and vitamin C intake and compared to the Estimated Average Requirement (EAR) ⁽²⁾. Weight, height and BMI were obtained, bone mineral density was measured at the hip and spine via dual x-ray absorptiometry (DXA) and reported as Z and T scores. Plasma calcium concentrations were corrected for albumin. All values are presented as mean and standard deviation. The study included 212 participants, aged 39 ± 12.38 years, 71% female. T scores at the lumbar spine and femoral neck were -0.63 ± 1.22 (Z score: -0.29 ± 1.12) and -0.66 ± 1.00 (Z score: -0.24 ± 0.89), respectively. Nine participants had a Z-score of <-2.0 at the lumbar spine, and three at the femoral neck. Corrected calcium concentrations were 2.21 ± 0.33 mmol/L. Calcium intake was 917 ± 347.23 (range 195 to 2,429 mg/day) in all participants, which exceeded the EAR of 840 mg/day for adults aged 19-50 years. Men had higher intakes of calcium than women, 1,051 ± 363.7 mg/day (range 382 to 2,267 mg/day) vs. 867 ± 328.04 mg/day (range 194 to 2,428 mg/day), P-value <0.001. The main source of calcium in the vegan diet was tofu. The intake of protein (77 ± 27.80) g/day, magnesium (569 ± 181.05) mg/day, and vitamin C (145 ± 96.94) mg/day met the EAR, excluding vitamin and mineral supplements. However, the intake of phosphorus (1,472 ± 459.98) mg/day and zinc (10.6 ± 4.01) mg/day were below the EAR. The findings of this study suggest that bone health of vegans are not negatively affected by the exclusion of dairy in the diet, provided that appropriate dietary planning is included to avoid nutrient deficiencies associated with poor bone health. Despite mean intake of calcium exceeding the EAR, very low intakes demonstrated significant variations between participants.

References

1. Parnell W, Wilson N, Thomson C, et al. (2011) *A focus on nutrition: key findings of the 2008/09 New Zealand Adult Nutrition Survey*. Ministry of Health: Wellington, New Zealand.
2. *Nutrient Reference Values for Australia and New Zealand*. Canberra: National Health and Medical Research Council; 2006.

Keywords: vegan diet; calcium; bone mineral density; adults

Ethics Declaration: Yes

Financial Support: Lottery Health Grant - LHR-2022-185693

Abstract 4B.2

The impact of egg consumption on cognitive function: a systematic literature review

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Eggs provide several nutrients that have been linked to neurological function. Phospholipids, which comprise 30% of lipids in egg yolk, modulate neurotransmitter receptors and have been shown to lower reaction time in healthy adults⁽¹⁾. Eggs are also high in choline (340mg per egg), a building block for acetylcholine, a neurotransmitter involved in memory, learning and attention⁽²⁾. Finally, eggs contain the omega-3 fatty acid docosahexaenoic acid (DHA) (25mg per egg), which has roles in neurological function including neurogenesis, synaptic plasticity and myelination⁽³⁾. The impact of whole egg consumption on cognition has not been widely explored. This systematic review aimed to consolidate studies that investigated frequency of egg consumption or egg-supplemented diets on cognitive function. This review followed PRISMA guidelines and involved a search of five databases (Ovid Medline, Embase, CINAHL Plus, SCOPUS, and PsychInfo) from inception until April 2023. Included studies examined the link between whole chicken egg consumption and brain function, including cognitive decline, memory, risk-taking, reaction-time, decision-making, and executive function, in healthy adults (aged >16 y). All studies underwent risk of bias assessment. Twelve studies were included in the review. Four were prospective cohort studies, 4 were retrospective, 3 cross-sectional and 1 was a randomised controlled trial (RCT). Participant numbers, with the exception of the RCT, ranged between 178-9028 and were aged between 42-97 years. Duration of prospective studies varied from 2-5 years. Egg intake was measured via food frequency questionnaires (n=8), 24-hr diet recalls (n=2), a 4-day food record (n=1) and a 7-day food record (n=1). The RCT provided 2 DHA-fortified eggs/day compared to 2 whole eggs/day for 8 weeks. The primary outcome across 9 studies was cognitive decline, followed by memory (n=7), reaction-time (n=2), attention (n=2), and executive function (n=1). For outcome measures, studies used 9 different validated task-oriented tools (including the Montreal Cognitive Assessment n=3, and California Verbal Learning Test n=2), or 4 self-completed questionnaires. Several studies found no significant associations between egg consumption and cognitive decline (n=4) or memory (n=2). Conversely, 5 studies reported significant inverse associations between egg consumption and rates of cognitive decline. The RCT found that reaction-times were faster on both whole eggs and DHA-eggs after 8 weeks (p>0.05 between groups). Although conflicting results were found, more studies showed a greater frequency of habitual egg consumption to be associated with reduced cognitive decline. However, the variety of outcome measures across studies make direct comparisons challenging, preventing definitive conclusions about the impact of eggs on cognitive health. This review highlights the need for future RCTs.

References

1. Hellhammer J, Waladkhani AR, Hero T, et al. (2010). *Br Food J* 112, 1124-1137.
2. Haam J & Yakel JL (2017). *J Neurochem* 142 Suppl 2, 111-121.
3. Weiser MJ, Butt CM & Mohajeri MH (2016). *Nutrients* 8, 99.

Keywords: eggs; cognition; DHA; phospholipid

Ethics Declaration: No

Financial Support: This research received no external funding

Abstract 4B.3

Rare earth elements in rice samples in Australian market from different origins

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Rare earth elements, also known as lanthanides, are comprised of seventeen elements including lanthanum (La) to lutetium (Lu) in the periodic table ⁽¹⁾. Despite their increased utilisation, little attention is given to them as emerging environmental contaminants and their associated health risks. The concentration of these elements in urban and agronomic soil is critical and may trigger bioaccumulation in plants and may enter the food chain. Also, the consumption of fertilizers in agricultural practices on a larger scale is a significant challenge. The REEs enriched fertilizers are a risk factor for contamination in soil and food ⁽²⁾. However, there is very limited data in the literature regarding the occurrence of these elements in a staple food such as rice. Thus, this study is aimed at quantification of REEs in 64 rice samples imported from different countries (Australia, India, Italy, Pakistan, Sri Lanka, Thailand, and Vietnam, including polished, brown, and parboiled) and sourced locally and consumed by the Australian population by using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The average concentration of REEs in Australian, Thailand and Vietnamese rice samples were quantified at 0.013- 2.974 µg/kg, 0.012-3.113 µg/kg, 0.009-0.919 µg/kg, respectively and were lower than other countries. The highest average concentrations of REEs were found in Pakistan (0.299-128.2 µg/kg), India (0.063-20.574 µg/kg), and Sri Lankan (0.022-11.522 µg/kg) rice samples imported to Australia. Scandium (Sc) and yttrium (Y) were found in the range of 107.463- 85.961 µg/kg. The pattern of light REEs (LREE) was more abundant than heavy REEs (HREE). This study did not include field experiments to find the translocation factors of REEs from soil to different parts of plant bodies, thus cannot establish the correlation between fertilizers and REEs concentration in rice grains. However, this study presented the general interpretation of REEs quantification in rice grains from different countries. The outcome of this study includes filling the subsequent knowledge gaps in analysing REEs in rice. This study also indicated the need to establish regulatory policies and monitoring programs for this type of staple cereals, aiming at promoting public health.

References

1. Ober JA (2016). *Mineral Commodity Summaries 2016*.
2. Pagano G, Aliberti F, Guida M, et al. (2015). *Environmental Research*, 142, 215-220.

Keywords: Lanthanides Exposure; Emerging contaminants; Australian rice; Public Health

Ethics Declaration: -

Financial Support: This research was funded by Australian Research council and Commonwealth Australia

Abstract 4B.4

The GUTFIT Cohort: Identifying dietary intake of Chinese New Zealanders with functional constipation

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Distinct pathophysiology has been identified with disorders of gut-brain interactions (DGBI), including functional constipation (FC)^(1,2), yet the causes remain unclear. Identifying how modifiable factors (i.e., diet) differ depending on gastrointestinal health status is important to understand relationships between dietary intake, pathophysiology, and disease burden of FC. Given that dietary choices are culturally influenced, understanding ethnicity-specific diets of individuals with FC is key to informing appropriate symptom management and prevention strategies. Despite distinct genetic and cultural features of Chinese populations with increasing FC incidence⁽³⁾, DGBI characteristics are primarily described in Caucasian populations⁽²⁾. We therefore aimed to identify how dietary intake of Chinese individuals with FC differs to non-Chinese individuals with FC, relative to healthy controls. The Gastrointestinal Understanding of Functional Constipation In an Urban Chinese and Urban non-Chinese New Zealander Cohort (GUTFIT) study was a longitudinal case-control study using systems biology to investigate the multi-factorial aetiology of FC. Here we conducted a cross-sectional dietary intake assessment, comparing Chinese individuals with FC (Ch-FC) against three control groups: a) non-Chinese with FC (NCh-FC) b) Chinese without FC (Ch-CON) and c) non-Chinese without FC (NCh-CON). Recruitment from Auckland, New Zealand (NZ) identified Chinese individuals based on self-identification alongside both parents self-identifying as Chinese, and FC using the ROME IV criteria. Dietary intake was captured using 3-day food diaries recorded on consecutive days, including one weekend day. Nutrient analysis was performed by Foodworks 10 and statistical analysis with SPSS using a generalised linear model (ethnicity and FC status as fixed factors). Of 78 enrolled participants, 66 completed the study and 64 (39.4 ± 9.2 years) completed a 3-day food diary at the baseline assessment. More participants were female (84%) than male (16%). FC and ethnicity status allocated participants into

1 of 4 groups: Ch-FC (n = 11), Ch-CON (n = 18), NCh-FC (n = 16), NCh-CON (n = 19). Within NCh, ethnicities included NZ European (30%), non-Chinese Asian (11%), Other European (11%), and Latin American (2%). Fibre intake did not differ between Ch-FC and NCh-FC (ethnicity × FC status interaction $p > 0.05$) but was independently lower overall for FC than CON individuals (21.8 ± 8.7 versus 27.0 ± 9.7 g, $p < 0.05$) and overall for Ch than NCh (22.1 ± 8.0 versus 27.0 ± 10.4 g, $p < 0.05$). Carbohydrate, protein, and fat intakes were not different across groups ($p > 0.05$ each, respectively). In the context of fibre and macronutrient intake, there is no difference between Ch-FC and NCh-FC. Therefore, fibre and macronutrients are unlikely to contribute to potential pathophysiological differences in FC between ethnic groups. A more detailed assessment of dietary intake concerning micronutrients, types of fibre, or food choices may be indicated to ascertain whether other dietary differences exist.

References

1. Heenan P Doctoral dissertation, University of Otago (2021).
2. Heenan P, Creemers RH, Sharma S, et al. (2020) *Inflamm Intest Dis* 5, 132-143.
3. Chen Z, Peng Y, Shi Q, et al. (2022) *Front Med (Lausanne)* 9, 815156.

Keywords: asian; dietary intake; functional constipation; functional gastrointestinal disorders

Ethics Declaration: Yes

Financial Support: This research was funded through the AgResearch Strategic Science Investment Fund (Contract A25773)

Abstract4B.5

Adherence to a Mediterranean diet is not associated with severity of menopausal symptoms: a cross-sectional analysis of Australian peri-menopausal and menopausal women

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During the menopausal transition, women often encounter a range of physical and psychological symptoms which negatively impact on health-related quality of life (HRQoL) ⁽¹⁾. Diet quality has previously been identified as a modifiable factor associated with mitigating the severity of these symptoms in peri-menopausal and menopausal women ⁽²⁾. We therefore explored the independent associations between adherence to a Mediterranean diet (MedDiet) and the severity of menopausal symptoms in peri-menopausal and menopausal women living in Australia. We also explored the association between MedDiet adherence and HRQoL in this same cohort of women. We conducted a cross-sectional study of Australian peri-menopausal or menopausal women aged between 40 to 60 years. An 86-item self-administered questionnaire was used to assess the relationship between adherence to a MedDiet and severity of symptoms. MedDiet adherence was assessed using the Mediterranean Diet Adherence Screener (MEDAS), the Menopause Rating Scale (MRS) was used to assess the severity of menopausal symptoms related to somatic, psychological and urinary-genital symptoms and the 36-item short form survey instrument (SF-36) was used to assess HRQoL. Multivariable linear regression analysis (and 95% CI) was used to investigate the independent association between adherence to a MedDiet, severity of menopausal symptoms and HRQoL subscales using one unadjusted and five adjusted predictor models. A total of n = 207 participants (50.7 ± 4.3 years; BMI: 28.0 ± 7.4 kg/m²) were included in the final analyses. Participants reported low-moderate adherence to a MedDiet (5.2 ± 1.8 ; range: 1-11). We showed that MedDiet adherence was not associated with severity of menopausal symptoms. However, when assessing individual dietary constituents of the MEDAS, we showed that low consumption of sugar-sweetened beverages (<250ml per day) was inversely associated with joint and muscle complaints, independent of all covariates ($\beta = -0.149$; CI: -0.118, -0.022; $P = 0.042$). Furthermore, adherence to a MedDiet was positively associated with the physical function subscale of HRQoL ($\beta = 0.173$, CI: 0.001, 0.029; $P = 0.031$) and a low intake of red and processed meats (≤ 1 serve per day) was positively associated with the general health subscale ($\beta = 0.296$, CI: 0.005, 0.014; $P = < 0.001$), independent of all covariates used in the fully adjusted model. Our results suggest that diet quality may be related to severity of menopausal symptoms and HRQoL in peri-menopausal and menopausal women. However, exploration of these findings using longitudinal analyses and robust clinical trials are needed to better elucidate these findings.

References

1. Hooper SC, Marshall VB, et al. (2022) *Menopause* 29, 707-713.
2. Herber-Gast GC, Mishra GD (2013) *Am J Clin Nutr*, 97, 1092-1099.

Keywords: Mediterranean diet; menopause; peri-menopause; symptoms

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 5B.1

Motivators and facilitators of fruit and vegetable intake in Tonga

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Food choice is complex and is heavily influenced by the environment one lives in.⁽¹⁾ Pacific Island food environments, including those in Tonga, have changed considerably in recent years, making healthier food choice more challenging.⁽²⁾ A widespread nutrition transition across the region has contributed to an increase in the availability of, and accessibility to, highly-processed foods, and high rates of diet-related non-communicable diseases.⁽³⁾ While system change is needed to support the availability, accessibility and affordability of healthy foods, nutrition education plays an important role in supporting individuals, communities, and populations to navigate their rapidly changing food environments, and to encourage healthy food choice and behaviour change. Approaches to nutrition education in the Pacific Islands region vary and do not always consider the socio-cultural aspects of the food environment, especially when focusing on fruit and vegetable consumption. This work was driven by an intent to develop contextually appropriate nutrition education plans using a structured process, Design Online.⁽⁴⁾ However, to develop a nutrition education plan a critical analysis of the current motivators and facilitators for the behaviour are required. When reviewing the scientific literature there is limited information on determinants of food choice within Tonga, and more broadly within the Pacific Islands context. Therefore, the aim of this cohort study was to qualitatively explore and document the motivating and facilitating determinants of fruit and vegetable consumption in Tonga. Data collection took place during August and September 2023 on the main island of Tongatapu. Semi-structured interviews (n= 5 men, 3 women) and a focus group (n= 4 women) based on the most appropriate method of engaging with participants, were conducted in Tongan. Guiding questions were derived from Design Online and proposed within the following categories: motivating determinants and facilitating determinants. Interview responses were qualitatively analysed using an inductive content analysis model. Key categories for motivating determinants included health and nutrition knowledge, normal consumption patterns, availability and access, production, financial considerations and preferences, perceptions and practices. Key categories for facilitating determinants included education, community engagement, environmental factors, food preference, finance, and accessibility. While this work has explored motivating and facilitating determinants for fruit and vegetable consumption in Tonga with a small sample, it makes an important contribution to the limited literature. The findings of this study can be used to underpin activities, such as the design of nutrition education plans. The findings also provide a foundation for further exploration of determinants of food choice. This study was undertaken on the main island of Tongatapu, but it is of interest to explore determinants with communities who live in the outer islands, and at different time points during the year to reflect seasonality.

References

1. Neufeld LM, Andrade EB, Suleiman AB, et al. (2022) *The Lancet*. 399;10320.

2. Bottcher C, Underhill SJR, Aliakbari J, et al. (2021) *J Hunger Environ Nutr* 16, 751-769.

3. WHO (2017) *Global School-Based Student Health Survey*.

4. Columbia University Design Online (2023) <https://designonline.ctl.columbia.edu/about/>

Keywords: nutrition education; fruit and vegetables; motivators; facilitators

Ethics Declaration: Yes

Financial Support: This work was supported by funding from the Australian Centre for International Agricultural Research (ACIAR) Project: HORT/2019/165.

Abstract 5B.2

Investigating nutritional status and body composition in children with cerebral palsy; the Eat, Sleep Play-CP study

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Cerebral palsy (CP), or to use the Te Reo term “Hōkai Nukurangi”, is an umbrella name for a group of permanent neurodevelopmental disorders, affecting movement and posture⁽¹⁾, and is the most common childhood onset physical disability globally. The available literature on the nutritional status of children with CP describes high rates of malnutrition, however data appears to be skewed towards children of higher levels of impairment impacting functional independence. Less is known about the nutritional status of children with lower levels of impairment. The aim of the “Eat, Sleep, Play-

CP” study was to evaluate total energy intake, total protein intake and the timing of protein intake in relation to physical activity for children with CP across all functional levels living in Aotearoa New Zealand. Children with CP aged 5-12 years were invited to participate in an observational assessment of dietary intake using parent reported 24-hour dietary recall (Intake 24) on three non-consecutive days, accompanied by a questionnaire capturing self-reported sleep and physical activity patterns. Body composition was assessed via whole body dual energy X-ray absorptiometry scan. Nine participants (6 males, median age: 10 years, n=2 Māori), across Gross Motor Function Classification System levels I-IV, and Eating and Drinking Classification System levels I-III took part in the study. The median total energy intake was 7267kJ/d (range 5355-10731.96kJ/d), and median protein intake was 67g/d (range 49-111g/d). According to the Nutrient Reference Values for Australia and New Zealand (NRV)⁽²⁾, 3 of the 9 participants (33%) were within the recommended range for energy intake according to their age and reported physical activity levels. Of the other 6, 4 were below and 2 were above the recommended ranges. All 9 met the recommended protein intake (NRV). Participants had a median percentage body fat of 40% (range 20-46%), and non-fat mass of 58% (range 52-76%). Five participants fell within the overweight or obese range for their age and sex, three of whom were within the recommended range of total energy daily intake according to NRVs. This outcome may indicate that for some children with CP, recommendations could be over-estimating the actual requirements. These early results may bring in to question current practice around guidance for energy intake requirements for children with CP and their whānau to support healthy body composition. Further investigations are needed to establish whether specific energy intake guidelines are required for children with CP.

References

1. Bax M, Goldstein M, Rosenbaum P, et al. (2005) *Dev Med Child Neurol* 47, 571-766.
2. National Health and Medical Research Council, New Zealand Ministry of Health. *Nutrient Reference Values for Australia and New Zealand*. 2006.

Keywords: children; cerebral palsy; nutrition; body composition

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 5B.3

Folic acid and iodine supplement use from preconception through to six weeks postpartum in New Zealand women

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Folic acid (FA) and iodine supplements are recommended by the Ministry of Health (MOH) for pregnant and/or lactating women in New Zealand (NZ)⁽¹⁾. Evidence suggests that many NZ women are not just taking FA and iodine in the form of a single-nutrient supplement (SNS) but are taking FA and iodine as part of a multivitamin supplement (MVS) which may or may not contain the recommended doses, and some are using a combination of both ⁽²⁾. No NZ study has examined the daily dose taken from both SNS and MVS for both FA and iodine across all time periods ^(2, 3). The aim of this study was to investigate what nutritional supplements containing FA and iodine were taken by postpartum NZ women, preconception, during the three trimesters of pregnancy and post-partum, and examine how well the women’s supplement use aligned with the NZ MOH recommendations. This cross-sectional observational study utilised data gathered on FA and iodine supplement use from an anonymous survey between February and August 2022. Descriptive statistics including frequency and percentages were reported. Folic acid and iodine weekly intakes from SNS and MVS were calculated by multiplying the amount of nutrient in each supplement, with the number of times per day taken, and the average number of days taken per week reported. A total of 584 women were included in the analysis. In addition to the SNS for FA (0.8mg and 5mg) and iodine (150 ug), women took 28 different MVS. Fifty-eight percent (preconception; 30% from SNS, 18% from MVS, and 10% from both) and 96% (1st trimester pregnancy; 61% from SNS, 17% from MVS, and 19% from both) of women took FA containing supplements. More than 75% of women reported taking iodine containing supplements during pregnancy (1st and 2nd trimesters: 93%, 3rd trimester: 89%) and postpartum (76%). Approximately 60% took SNS, 18% took only MVS and 14% took both. Based on the MOH recommendations, only 30% (preconception) and 62% (1st trimester) achieved sufficiency of FA supplementation at 0.8mg/day; 35% (preconception) and 69% (1st trimester) achieved sufficiency of FA at 5mg/day; around 50% women achieved sufficiency of iodine supplementation at 150 µg/day during pregnancy while only 37% during postpartum. The balance either took none, an insufficient dose or a dose that exceeded the recommended dose and many took them during non-recommended periods (FA after the 1st trimester; iodine preconception). Most women reported taking FA and/or iodine containing supplements at some point before, during and after their pregnancy. However, it is concerning that a large number of women do not seem to be adhering to the MOH recommendations for FA and iodine supplementation.

References

1. Ministry of Health. (2018). <https://www.health.govt.nz/your-health/pregnancy-and-kids/pregnancy/helpful-advice-during-pregnancy/folic-acid-iodine-and-vitamin-d>
2. Teixeira JA, Marchioni DM, Castro TG, et al. (2018) *Public Health Nutr* 21(12), 2183-2192.
3. Bulloch RE, McCowan LME, Thompson JMD, et al. (2019) *Br J Nutr* 122(8), 910-918.

Keywords: folic acid; iodine; multivitamin supplement

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 5B.4

A retrospective and explorative analysis of dietary and behavioural factors on weight loss and well-being following a 12-week lifestyle education program promoting anti-inflammatory dietary principles

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It is estimated that one-quarter of the world's population has Metabolic Syndrome (MS), ⁽¹⁾ a key driver of growth in healthcare expenditure. Traditional approaches to treating MS through the application of standard dietary recommendations and caloric restriction have had limited success. More recent evidence suggests that novel, anti-inflammatory approaches such as replacing refined carbohydrates and ultra-processed food with unprocessed or minimally processed, lower carbohydrate foods and adapting meal timing and frequency may be more effective. ⁽²⁾ The aim of the study was twofold: 1) To determine the effectiveness of anti-inflammatory dietary strategies for long-term weight loss and improvement in metabolic health and 2) To examine the relationships between eating behaviours and long-term weight loss. Twelve-month audit data from a UK based 12-week lifestyle program that focuses the principles of consuming an anti-inflammatory diet was analysed using repeated-measures ANOVA to examine the effects of the program on changes in weight and waist circumference. A quantitative, survey-based research design was used to retrospectively identify relationships between eating behaviours and both anti-inflammatory and pro-inflammatory dietary patterns. Multivariate regression using stepwise method was used to examine differences in weight change based on eating patterns and behaviours. Six hundred and forty-two ($N = 642$) participants (age = 50.4 ± 12.5 years, female 63.6%, weight = $96.1 \text{ kg} \pm 22.1$, BMI $35.2 \text{ kg/m}^2 \pm 7.5$) demonstrated a weight loss average of $4.49 \text{ kg} \pm 3.78$ post-lifestyle program (12 weeks). Survey respondents ($N = 64$) reported a maximum long term weight loss of $13.9 \text{ kg} \pm 11.9$. Weight loss and percentage weight loss after the program was significantly predicted by daily consumption of sweet drinks and grain-based foods. The model predicted one unit increase in daily serving consumption of these foods resulted in less weight lost [2.3 kg (4.5%)]. Seventy one percent of survey respondents had maintained most or all their weight loss for more than 6 months. The model predicted change in consumption of grain-based foods, TFEQ-emotional eating score, consumption of savoury ultra-processed foods, and following an alternative dietary approach after the program were statistically significant in predicting weight loss maintenance ($R^2 = 0.803$, $F(4, 20) = 20.376$, $p < 0.001$). The preliminary findings suggest that anti-inflammatory dietary approaches are effective and sustainable for weight loss. Eating behaviour may both support and hinder long term changes in eating patterns and whilst there are significant relationships between eating behaviour and eating patterns, the extent to which dietary patterns drive eating behaviour remains unclear.

References

1. Saklayan M (2018) *Curr Hypertens Rep* 20,12.
2. Tristan Asensi M, Napoletano A, Sofi F, et al. (2023) *Nutrients* 15, 1546.

Keywords: metabolic syndrome; weight loss; anti-inflammatory diet; eating behaviour

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 6B.1

Associations between food groups and biomarkers of inflammation: Are some food groups more protective than others?

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The consumption of healthy foods such as whole grains, vegetables, fruits, nuts, legumes, dairy, and fish is associated with decreased risk of cardiovascular disease (CVD). CVD is an inflammatory disease caused by atherosclerosis. Inflammation is measured clinically using hsCRP, however hsCRP is not specific to CVD. Novel pro-inflammatory markers, such as platelet-activating factor (PAF) and lipoprotein-associated phospholipase A2 (Lp-PLA₂), have garnered attention due to their specific roles in endothelial dysfunction and CVD risk. During the COVID 19 outbreak research highlighted a potential interaction between PAF and Lp-PLA₂ and the SARS COVID 19 virus⁽¹⁻³⁾ and related adenovirus-vector and mRNA vaccines.⁴ This cross-sectional study investigated the association between PAF, Lp-PLA₂, hsCRP, and intake of healthy food groups including fruit, cruciferous and other vegetables, grains, meat and poultry, fish and seafood, nuts and legumes, and dairy in 100 adults (49 ± 13 years, 31% male) with variable CVD risk. Data were collected across four groups during May and July 2021 (Groups 1 and 2 - CVD risk factors) and January and April 2022 (Groups 3 and 4 - no CVD risk factors). Fasting PAF, Lp-PLA₂ and hsCRP and usual dietary intake (food frequency questionnaire) were measured. Food intake was converted into serves and classified into food groups. Correlations and multiple regressions were performed. Contrary to expectations, mean PAF was lower for groups 1 and 2 (n=46, mean PAF 3.31 ± 1.66 ng/mL) compared to groups 3 and 4 (n=54, mean PAF 19.82 ± 12.95 ng/mL) p < 0.001 with a large effect size (eta squared 0.665). Cruciferous vegetables were associated with lower levels of PAF (β = -.27, CI [-0.41, -0.14], p < .001) with a one serve increase in cruciferous vegetables per day associated with a 24% reduction in PAF. Nuts and legumes were associated with lower levels of hsCRP (β = -.51, CI [-0.81, -0.22], p < .001) with an increase of one serve per day associated with a 40% reduction in hsCRP. There were small inverse associations between cheese and both PAF (β = -.15, CI [-0.27, -0.03], p = .017) and Lp-PLA₂ (β = -.26, CI [-0.47, -0.04], p = .024), however these were not significant at the Bonferroni-adjusted P < .005 level. In conclusion, cruciferous vegetables and nut and legume consumption were associated with lower levels of inflammation. The lack of associations between PAF and Lp-PLA₂ and other healthy foods may be due to confounding by COVID-19 infection and vaccination programs which prevents any firm conclusion on the relationship between PAF, Lp-PLA₂ and food groups. Future research should aim to examine the relationship with these novel markers and healthy food groups in a non-pandemic setting.

References

1. Antonopoulou S, Petsini F, Detopoulou M, et al. *Biofactors*. 2022;1–13.
2. Dua P, Mishra A, Reeta KH *Biomark Med*. 2022;16(10):821-32.
3. English CJ, Lohning AE, Mayr HL, et al. *Biofactors*. 2023;49(2):457-471.
4. Ostrowski SR, Søgaard OS, Tolstrup M, et al. (2021) *Front Immunol*. 12:779453.

Keywords: inflammation; cardiovascular diseases; diet, biomarker

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 6B.2

Dietary phytochemicals as regulators of gut inflammation in the context of type 2 diabetes

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Numerous disorders, including type 2 diabetes and even COVID-19, are linked to poor gut health and inflammation^(1,2). In addition to impacting food digestion and absorption, gut inflammation worsens diabetes outcomes by causing gut microbial dysbiosis, disrupting tight junctions (allowing microbial metabolites to freely enter into circulation), and altering glucose absorption⁽³⁾. ACE2 is a crucial regulator of gut health and has received much attention during the COVID-19 pandemic due to its role as a major viral entry protease. Studies have shown that the ACE2/Ang-(1-7)/Mas axis is important in managing inflammation and maintaining normal glucose metabolism⁽³⁾. Dietary phytochemicals are plant bioactive compounds, with promising anti-inflammatory and anti-diabetic properties, and may affect these processes. In this work, we aimed to look at the link between inflammation, ACE2 and the glucose transporters, SGLT1 and GLUT2, and how phytochemicals could be used to normalise the changes brought about by inflammation in Caco-2/TC7 human intestinal epithelium cells. We first examined how gut inflammation, ACE2 and glucose transporters are related and

proceeded to look at the effect of some chosen phytochemicals on regulating glucose transport via modulation of the ACE2/Ang(1-7)/Mas axis. This included genistein (an isoflavone from soybeans), sulforaphane (an isothiocyanate found in Brassica, especially broccoli), apigenin (a flavone found in vegetables and herbs), and artemisinin (a sesquiterpene lactone used as a drug). The impact of phytochemicals on the SARS-CoV-2 viral entry receptors, ACE2 and TMPRSS2, was also examined as a secondary outcome. To induce inflammation, the Caco2/TC7 cells were co-stimulated with IL-1 β (25 ng/mL) and TNF- α (50 ng/mL) for varying durations (24 h, 48 h, 72 h, 168 h) and changes in target gene expression (ACE2, SGLT1, GLUT2, TMPRSS2) were assessed by droplet digital PCR. IL-6 and IL-8 were assessed as markers of inflammation in the cell culture media by multiplex ELISA. Inflammation increased ACE2, TMPRSS2 and SGLT1 mRNA. ACE2 increased with cytokine exposure duration, coupled with an obvious decrease in IL-8, SGLT1 and TMPRSS2. Pearson correlation analysis revealed that the increase in ACE2 was strongly associated with decreases in SGLT1 ($r = -0.99$, $p < 0.01$) and IL-8 ($r = -0.959$, $p < 0.05$), implying ACE2 to play a crucial role in gut inflammation and postprandial glycaemia. After establishing the gut cell inflammation model, we compared the effect of the phytochemicals on our target genes in cells cultured in normal and pro-inflammatory environments. None of the tested phytochemicals were effective in reducing IL-8 secretion, while phytochemicals showed varying effects on the target genes. Genistein normalised the effects of inflammation on the target genes with less effect from the other tested phytochemicals. However, further research is required to assess the importance of genistein *in vivo* in the context of gut inflammation and type 2 diabetes.

References

1. Jess T, Jensen BW, Andersson M, et al. (2020). *Clin Gastroenterol Hepatol*, 18, 881-888.
2. Suárez-Fariñas M, Tokuyama M, Wei G, et al. (2021) *Gastroenterology*, 160, 287-301.
3. Prasad R, Floyd JL, Dupont M, et al. (2023) *Circ Res*, 132, e1-e21.

Keywords: ACE2; glucose transporters; COVID-19; Genistein.

Ethics Declaration: —

Financial Support: Monash University International PhD Scholarship

Abstract 6B.3

The interaction between sodium to potassium intake and genetics to inform dietary management in hypertension

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Blood pressure (BP) is influenced by both genetics and diet. Dietary management of hypertension includes increasing potassium-rich foods while reducing sodium intakes. Dietary sodium and potassium intakes can be measured objectively using urinary sodium and urinary potassium, with lower urinary sodium to potassium ratios associated with lower BP⁽¹⁾. Understanding the interplay between diet and genetics may be useful in treating hypertension and determining which individuals may receive an outsized benefit from lowering their sodium potassium ratio. This study aims to investigate whether identifying genetic risk for hypertension could be utilised to identify individuals who may benefit most from lowering sodium intake and increasing potassium intake. UK Biobank cohort participants ($n = 296,475$) with data on genotype, BP and spot urinary sodium and potassium data were used. Diet quality was assessed using Oxford WebQ. Biologically directed genetic scores for BP were constructed for pathways related to sodium/potassium biology (pharmagenic enrichment scores [PES]), as well as traditional polygenic risk scores (PRS). A gene-by-environment effect between urinary electrolytes, diet quality and PRS on BP were tested. Genetic risk, diet quality and urinary electrolytes independently correlated with BP. Urinary sodium had larger BP increasing effects amongst individuals who had high genetic risk in sodium/potassium pathways than those with comparatively lower genetic risk. Higher diet quality had a small effect on reducing BP in baseline PRS models, but this did not remain significant in the full model. Polygenic scores for BP personalised to individual sodium/potassium biology (PES) could be used to identify individuals who may receive an outsized benefit from a personalised sodium/potassium dietary intervention. These findings may inform future precision and personalised dietary advice for the management of hypertension.

References

1. Ndanuko RN, Ibrahim R, Hapsari RA, et al. (2021) *Adv Nutr* 12, 1751-1767.

Keywords: precision nutrition; blood pressure; sodium; potassium

Ethics Declaration: Yes

Financial Support: Processing the dietary data was funded by a pilot grant from the School of Health Sciences, The University of Newcastle (E.C.). C.E.C. was supported by an investigator grant from the National Health and Medical Research Council (NHMRC).

Abstract 6B.4

Processed vegan food packaging: influencing vegan diet and lifestyle consumption choices

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As the demand for plant-based meat analogues (PBMA) continues to surge globally, understanding the marketing strategies that drive consumer choice becomes imperative⁽¹⁾. This research project, part of a larger study at Massey University, explores the design and packaging of vegan food products, specifically focusing on processed PBMA and how this influences vegan diet consumption choices in New Zealand vegans. We examined the packaging of vegan processed food available in New Zealand supermarkets and those promoted online, with a focus on processed PBMA. This informed the development of an online survey including: demographics, motivations for following a vegan diet, and questions related to perceptions and preferences about vegan diets and processed PBMA packaging. The survey was offered to individuals who had previously participated in vegan research at Massey University and followed a strict vegan diet. There were 235 participants of whom 198 completed the survey. This consisted of primarily females (n=156, 74%) and individuals of New Zealand European descent (n=159, 71%), aged 18 to 76 years (37.8 ± 12.3). The participants had varying durations of following a vegan diet, with the largest group (n=87, 42%) adopting it for 5 to 10 years. The primary motivation for following a vegan diet was animal welfare (n=205), followed by environmental concerns (n=189) and health (n=175). Participants were able to select more than one option, suggesting there are often multiple reasons for choosing to follow a vegan diet. Factors influencing purchase decisions for PBMA included nutrient claims on packaging, with protein having the highest positive influence. Environmental concerns also played a significant role, with eco-friendly packaging and positive environmental claims being important. Packaging images, particularly of the final prepared product, had a significantly positive impact on purchasing decisions (4.12 ± 0.78) where 1 represented a negative influence and 5 represented a positive influence on a Likert Scale. The majority sometimes, or always checked the nutrition information panel (n=167, 85%) and examined the ingredients (n=191, 98%). Participants reported concern about the nutritional value of processed PBMA (n=94), and reported that they are aware that these foods are classified as 'ultra-processed' (n=91). This research provides valuable insights into the reasons people choose vegan diets and what influences their choices when it comes to purchasing PBMA. It highlights the significance of marketing strategies in the plant-based meat alternatives industry. However, to gain a more comprehensive understanding of this evolving market, further research is necessary. Future research should consider a wider range of demographics and regional distinctions to better understand how consumer preferences in plant-based diets are changing. This should also include looking at how the market is maturing, with buyers becoming more aware of things like nutrients and the processing of food, which can impact the sustainable food choices individuals make.

References

1. Brooker G, Henfrie GA, Anastasiou K, et al. (2022) *Front Nutr* 9 1087194.

Keywords: vegan; New Zealand; plant-based; packaging

Ethics Declaration: Yes

Financial Support: This research received no external funding

Abstract 6B.5

Intake of micronutrients implicated in depression amongst young adults consuming vegetarian diets: a secondary analysis of the 2011-12 National Nutrition and Physical Activity Survey

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Major depressive disorder ('depression') is significantly more prevalent amongst young adults in Australia relative to older ages. The inefficacy of current treatment options for many individuals⁽¹⁾ warrants investigation of additional approaches to alleviating the burden of this illness. Incidentally, diet often becomes unhealthier during the transition from adolescence to young adulthood.⁽²⁾ This can result in poorer micronutrient consumption, and there is a growing body of evidence indicating that an inverse relationship exists between intake of certain micronutrients and depressive symptoms.⁽³⁾ Given this, diet may be an important modifiable risk factor or adjunctive means of ameliorating depression for young adults. Young adult vegetarians in particular have an increased risk of some micronutrient deficiencies which have been implicated in depression.⁽⁴⁾ In combination, their age and dietary choice suggest they may be especially vulnerable to depression and therefore benefit from clear guidance to adequately meet their micronutrient requirements. The present study aimed to elucidate the need for such guidance by comparing the proportions of vegetarian and omnivorous young adult participants in the 2011-12 National Nutrition and Physical Activity Survey (NNPAS) who had

inadequate intakes of micronutrients implicated in depression. The NNPAS collected the most recent nationally-representative data pertaining to the dietary intake (via two 24-h recalls) of Australians and included 2,397 young adults (18-34 years). Participants who were pregnant, lactating, or who mis-reported intakes according to Goldberg equation-derived cut-off values were excluded ($n=791$). The dietary data were used to estimate usual intakes via the Multiple Source Method. Inadequate intakes were identified according to the Estimated Average Requirement (EAR) cut-point method for all micronutrients with an EAR except iron, for which the full-probability method was applied. Survey weights allocated for inference to the total Australian population were implemented throughout the analysis. The final sample was composed of 66 vegetarians (did not report any animal tissue consumption) and 1540 omnivores. The mean intake of long-chain omega-3 fatty acids (EPA, DPA, DHA) from both diet and supplementation was significantly lower in vegetarians compared to omnivores (96.3mg/day vs. 264.5mg/day, $p<0.001$). A significantly greater proportion of vegetarians compared to omnivores had inadequate total B12 (22.7% vs. 1.4%), iron (58.3% vs. 18.9%), selenium (30.8% vs. 3.5%) and zinc (58.8% vs. 33.3%) intakes (all $p<0.05$). These results suggest that young adult vegetarians are likely to have significantly lower consumption of long-chain omega-3 fatty acids and an increased risk of inadequately consuming vitamin B12, iron, selenium and zinc compared to their omnivorous counterparts. These findings support the notion that young adult vegetarians may have an increased risk of depression from a nutritional standpoint, and therefore stand to benefit from tailored dietary advice on a public and individual level designed to support their mental health.

References

1. Cohen SE, et al. (2021) *Transl Psychiatry* 11 (1):168.
2. Stok FM, et al. (2018) *Nutrients* 10 (6).
3. Kunugi H (2023) *Psychiatry Clin Neurosci*.
4. Craig WJ (2010) *Nutr Clin Pract* 25 (6):613-20.

Keywords: micronutrients; depression; vegetarianism

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Abstract 7B.1

Nourished@Deakin – can an online cooking program inspire university students to cook and eat healthier?

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University students are a unique population subgroup, who experience a life transition into adulthood, often marked by the establishment of unhealthy eating behaviours ⁽¹⁾ which are associated with chronic disease risk factors, poor mental health and lower academic achievement ⁽²⁾. Data regarding the food skills/behaviours of university students is limited, but low cooking self- efficacy and food skills are potential barriers to healthy meal preparation ⁽¹⁾. *Nourished@Deakin* is an online cooking program, co-designed by Deakin University students, that aims to inspire students to cook and eat healthier. It commenced in November 2021 and includes a series of blogs, recipes, and cooking videos, available to all Deakin students via a Deakin University blog site. To determine if accessing *Nourished@Deakin* improves food skill confidence, food intake, and nutrition knowledge, participants completed a short online survey before accessing *Nourished@Deakin* materials and then again four weeks after their first engagement. The survey included 31 questions regarding confidence related to a variety of food skills (eg. recipe following, reading food labels, meal planning); 2 questions regarding fruit/vegetable intake; 11 knowledge questions regarding the Australian Dietary Guidelines (ADGs); and 16 demographic questions. Pre/post surveys were compared using paired t tests (knowledge scores, fruit/veg serves) or McNemar exact test (proportions). A total of 108 students completed the pre-survey and 41 (mean (SD) age 27.0 (8.4) years; 63% female) also completed the post-survey. Of the 41 participants who completed both surveys, 42% were studying within the Faculty of Health and 16 (39%) were living in the family home with parents. Most (68%) were studying full time and 59% were employed part-time/casually. Three-quarters were domestic students, and 59% were undergraduate students. Following completion of *Nourished@Deakin*, there was a significant increase in the proportion of participants feeling confident in two of the 31 food skills (namely 'meal planning': 44% pre vs 63% post, $P<0.05$; and 'growing fruit and/or vegetables at home': 22% pre vs 44% post, $P<0.05$). Fruit intake increased from 1.6 serves/day pre-program to 1.9 serves/day post-program ($P<0.05$), but vegetable intake remained stable (2.5 serves/day pre and 2.6 serves/day post, $P=0.287$). Before participating in *Nourished@Deakin*, 56% of participants correctly reported the recommended daily serves of fruit and 66% correctly reported it for vegetables. The mean ADG knowledge score was 8.2/9 and 49% of participants got all nine questions correct. There were no significant changes in any of the knowledge markers post-program. Over a relatively short period, *Nourished@Deakin* produced modest improvements in the self-reported confidence in some food skills and self-reported fruit intake. A revised program (incorporating a greater variety of recipes, additional blogs, and new videos) may encourage greater engagement and result in increased confidence and knowledge in other targeted areas.

References

1. Wilson CK, Matthews JI, Seabrook JA, Dworatzek PDN (2017) *Appetite* 108, 270-276.

2. Whatnall MC, Patterson AJ, Chiu S, et al. (2020) *Nutr & Diet* 77, 331-343.

Keywords: university students; food skills; cooking program

Ethics Declaration: —

Financial Support: This work was supported, in part by the Deakin and BUPA Healthier University Fund

Abstract 7B.3

Validating an electronic snacking questionnaire among New Zealand adolescents and young adults with type 1 diabetes – feasibility study

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Type 1 diabetes (T1D) is a chronic autoimmune disease characterised by a deficiency in insulin production and consequent hyperglycaemia. A glycated haemoglobin (HbA1c) value < 53 mmol/mol (< 7%) is recommended to reduce the risk for diabetes-specific complications. ⁽¹⁾ However, most adolescents and young adults (AYAs) have an HbA1c above the target. ⁽²⁾ Dietary behaviours, including a routine meal plan with snacks, play a significant role in self-management. ⁽³⁾ Snacks without an insulin bolus, grazing or snacking to cope with stress contribute to out-of-target glucose levels. Although modifying AYAs' snacking behaviours could be a low-cost, equitable, and effective approach to improving glycaemic control, there is a dearth of evidence to inform effective snacking interventions. Importantly, no brief, validated tool exists to assess snacking behaviour among individuals with T1D. This research explored the acceptability and feasibility of validating a snacking questionnaire adapted for AYAs with T1D; a crucial step before a larger validation study. Twenty-five AYAs (aged 13-20 years) with T1D and receiving diabetes care through Te Whatu Ora Southern were invited to participate in a feasibility study. Purposive sampling was used for maximum variability in participants' demographic characteristics. All study procedures were completed remotely, with electronic questionnaires administered in the morning via a secure web platform. On days 1 and 8 of the 8-day study, participants completed a 30-item snacking questionnaire that assessed the timing and frequency of snacking and types of food or drinks consumed as a snack in the past seven days. The snacking questionnaire was adapted from questionnaires previously used in population-level surveys. An experienced diabetes dietitian ensured that items reflected foods commonly consumed by AYAs with T1D. Before recruitment, two diabetes dietitians and a young adult with T1D critically reviewed the adapted snacking questionnaire. On days 2-8, participants recalled their snacking behaviour (timing, frequency, food/drink consumed) over the previous day. The proportion of completed snacking questionnaires assessed feasibility, defined as a response rate $\geq 80\%$. The ease of completing the snacking questionnaires was self-reported on a Likert-type scale (1-completely agree, 5-completely disagree) to assess acceptability, defined as $\leq 20\%$ of participants reporting the questionnaires were not easy to complete. Participants ($n=10$) were aged 16.2 ± 1.69 years, 60% male, and 90% self-identified as New Zealand or Other European. All participants completed the proposed validation study. Most (95%) of the snacking questionnaires were completed. All (100%) daily snacking behaviour questionnaires were completed. All participants (100%) agreed that the questionnaires were easy to complete. The snacking behaviours questionnaire validation procedures are feasible and acceptable to New Zealand and Other European AYAs with T1D. Feasibility and acceptability must be explored among ethnically diverse AYAs before conducting a larger rigorous validation study.

References

1. de Bock M, Codner E, Craig ME, et al. (2022) *Pediatr Diabetes* 23, 1270-1276.

2. James S, Perry L, Low J, et al. (2022) *Pediatr Diabetes* 23, 736-741.

3. Annan SF, Higgins LA, Jelleryd E, et al. (2022) *Pediatr Diabetes* 23, 1297-1321.

Keywords: Adolescents; questionnaire validation; snacking; type 1 diabetes

Ethics Declaration: Yes

Financial Support: University of Otago Research Grant (2022)

Abstract 7B.4

Adherence to a Mediterranean Diet is inversely associated with anxiety and stress but not depression: a cross-sectional analysis of community-dwelling older Australians

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2. Clinical and Health Sciences & Alliance for Research in Exercise, Nutrition and Activity (ARENA), University of South Australia, SA, Australia

An increasing body of evidence has emerged suggesting that lifestyle behaviours, including diet quality, may be an important modifiable risk factor for mental health disorders. The Mediterranean diet (MedDiet), which is often heralded as an anti-inflammatory diet, has been widely investigated and promoted as one of the 'healthiest' dietary patterns for reducing chronic disease risk and promoting healthy ageing ⁽¹⁾. Greater adherence to a MedDiet and / or anti-inflammatory diet is inversely associated with the risk of depression or depressive symptoms in younger and middle-aged adults ⁽²⁾. However, these findings have been inconsistent, particularly in older adults. We therefore explored the independent associations between adherence to a MedDiet and severity of symptoms related to depression, anxiety and stress in community-dwelling older adults from Australia. We conducted a cross-sectional study of older Australians aged ≥ 60 years. Older adults who were permanent residents of Australia, free from dementia or cognitive decline and could independently complete an anonymous online survey in English were invited to participate. A 75-item self-administered questionnaire was used to assess the relationship between adherence to a MedDiet and severity of symptoms related to depression, anxiety, and stress. MedDiet adherence was assessed using the Mediterranean Diet Adherence Screener (MEDAS) ⁽³⁾ and the Depression, Anxiety and Stress Scale (DASS-21) ⁽⁴⁾ was used to assess the severity of negative emotional symptoms. Multivariable linear regression analysis (and 95% CI) was used to investigate the independent association between adherence to a MedDiet and severity of symptoms related depression, anxiety and stress using one unadjusted and six adjusted predictor models. A total of $n = 294$ participants were included in the final analyses (70.4 ± 6.2 years; Females, $n = 201$; Males, $n = 91$; $n = 2$ unspecified). Adherence to a MedDiet was inversely associated with severity of anxiety symptoms ($\beta = -0.118$; CI: $-0.761, -0.012$; $P = 0.043$) independent of age, gender, BMI, physical activity, sleep, cognitive risk and ability to perform activities of daily living. Furthermore, MedDiet adherence was inversely associated with symptoms of stress ($\beta = -0.151$; CI: $-0.680, -0.073$; $P = 0.015$) independent of age, gender, BMI, physical activity and sleep. However, no relationship between MedDiet adherence and depressive symptoms was observed. We showed that adherence to a MedDiet is inversely associated with severity of symptoms related to anxiety and stress but not for depression. Exploration of these findings using longitudinal analyses and robust clinical trials are needed to better elucidate these findings in older adults.

References

1. Dinu M, Pagliai G et al. (2018) *Eur J Clin Nutr* 72, 30-43.
2. Gianfredi V, Dinu M et al. (2023) *Nutr Rev* 81, 346-359.
3. Schröder H, Fito M et al. (2011) *J Nutr* 141, 1140-1145.
4. Parkitny L, McAuley J (2010) *J Physio* 56, 204.

Keywords: Mediterranean diet; ageing; mental health; depression

Ethics Declaration: Yes

Financial Support: This research received no external funding.

Workshops



Workshops

Workshop 1

Update on dietary carbohydrate digestibility - how to correctly assess their impact on metabolic health

Elizabeth Barber - *Department of Nutrition, Dietetics and Food, Monash University, Victoria, Australia*

Jessica Biesiekierski - *Monash University*

Michael J. Houghton - *Department of Nutrition, Dietetics and Food, Monash University, Victoria, Australia*

"Update on Dietary Carbohydrate Digestibility - how to correctly assess their impacts on metabolic health." Presented by Elizabeth Barber, Jessica Biesiekierski and Michael Houghton (Monash University). This panel of internationally recognised experts in carbohydrate digestion will lead a workshop which includes a demonstration of recently validated methods to assess and report human digestive enzyme activities accurately, and the processes of measuring glycaemic responses. Interactive activities will include assessments of different types of carbohydrates, their digestibility and case study discussions. Participants will undertake their own personal experiment by consuming different carbohydrate-rich foods and assessing satiety at the end of the session.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/90>

Workshop 2

Postprandial metabolism - Special Interest Group

Anthony James - *School of Population Health, Curtin University, Western Australia, Australia*

Kay Nguo - *Department of Nutrition, Dietetics and Food, Monash University, Victoria, Australia*

Aimee Dordevic - *Department of Nutrition, Dietetics and Food, Monash University, Victoria, Australia*

"Postprandial metabolism - Special Interest Group". Led by Dr Antony James (Curtin University) and Dr Kay Nguo (Monash University). This workshop will promote collaborative opportunities between nutrition scientists investigating post-prandial metabolism and will discuss the importance of assessing post prandial metabolism in research. Current SIG members will discuss the importance of post-prandial metabolism in their research areas and there will be opportunity for small group discussions. If you are interested in understanding more about how post-prandial metabolism assessment affects chronic disease risk, this is the SIG for you.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/91>

Workshop 3

Developing Work Integrated Learning for Nutrition Curriculum

Katya Clark - *Curtin University, WA*

Susan McLeod - *La Trobe University, Victoria*

Tanya Lawlis - *University of Canberra, ACT*

Nina Wilson - *University of South Australia, SA*

"Developing work integrated learning for nutrition curriculum". Presented by Dr Katya Clark (Curtin University), Dr Susan McLeod (La Trobe University), Dr Nina Wilson (University of South Australia) and Assoc Prof Tanya Lawlis (University of Canberra). This workshop will explore the importance of work integrated learning (WIL) and placements for students, to expose them to diverse areas of nutrition work and showcase the breadth of our profession. It will also highlight the importance of such programmes within Universities, positively impacting the curriculum. Suited for both educators and employers of nutrition graduates, you will come away with a better understanding of how WIL can be achieved.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/92>

References

Barber, Blair, McCaffery and Palermo. *Employability and employment outcomes of nutrition science graduates: A qualitative exploration. Nutrition & Dietetics*. 2022. p. 1-9. Doi:10.1111/1747-0080.12777.

Lawlis, Torres, Coates, Clark et al. *Development of nutrition science competencies for undergraduate degrees in Australia. Asia Pacific Journal of Clinical Nutrition*, 2019. 28(1): p. 166-176.

Workshop 4

Bridging Boundaries: Uniting Rural Nutrition Researchers through Sharing Co-designed, Place-based Research from across Oceania

Laura Alston - *Deakin Rural Health, School of Medicine, Faculty of Health, Deakin University, Geelong, Australia*

Katherine Kent - *School of Medical, Indigenous and Health Sciences, Faculty of Science, Medicine and Health. University of Wollongong. Wollongong, NSW 2522, Australia*

Lucy Kokanda - *Nutrition and Dietetics, Department of Rural Health, University of Newcastle*

Kylie Hopkins - *Majarlin Kimberley Centre for Remote Health, University of Notre Dame*

Joanne Urlich - *Whakapiri Ora Community Outreach Services, New Zealand*

Tracy Raymond - *Solomon Islands*

Victoria Flood - *Centre for Rural Health, University of Sydney, New South Wales, Sydney*

"Bridging Boundaries: Uniting Rural Nutrition Researchers through Sharing Co-designed, Place-based Research from across Oceania." Presented by Dr Laura Alston (Deakin University), Dr Katherine Kent (University of Wollongong), Dr Lucy Kocanda (University of Newcastle), Kylie Hopkins (University of Notre Dame), Joanne Urlich (Whakapiri Ora Community Outreach Services), Tracy Raymond (Nutritionist) and Prof Vicki Flood (University of Sydney). This workshop will address the issues of poor dietary habits and growing food insecurity that contribute to observed health gaps between rural and urban regions across Oceania. Rural nutrition experts will present case studies of effective co-designed, place based rural research tackling poor dietary habits and food insecurity from diverse locations across Oceania. Participants will critically assess case studies, and discuss the feasibility and applicability of varied approaches in rural nutrition contexts.

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Early Career and Postgraduate Session 1

Marketing Yourself as a Nutrition Professional: Postgraduate and Early Career Masterclass

Whether you are working as a nutritionist in private practice, completing your PhD or working as a nutritionist in the private or public sector - all pathways have one thing in common ... the ability to effectively market yourself as a nutrition professional.

This Masterclass will feature three incredible speakers who understand the importance of marketing yourself effectively as a nutrition professional. Each speaker will provide tips that you can use when marketing yourself in various ways such as trying to increase clientele, applying for research funding, or advocating for nutrition in public and private settings. These talks will cover a range of topics including working with mainstream and social media, the importance of networking and most importantly how to widen your impact in the nutrition space. Alongside three speakers working in a range of areas, the masterclass will include ample opportunities for networking and discussion. Speakers:

- Dr Sarah Burkhart | Senior Lecturer in Nutrition and Dietetics in the School of Health and the Australian Centre for Pacific Island Research, University of the Sunshine Coast, Australia.
- Danijela Armitage | New Zealand Registered Nutritionist | Founder of Nourish and Temp
- Olivia Deadman | New Zealand Registered Nutritionist | Partnership Manager, My Everyday Wellbeing

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Early Career and Postgraduate Session 2

Meet the Experts: Postgraduate and Early Career Lunch Session

Are you a postgraduate student or early career researcher / professional? This is your opportunity to obtain insight and knowledge from experienced individuals, as well as connect with fellow students and ECRs. Chat over lunch with your peers and colleagues at a table hosted by one of our fantastic experts.

Confirmed experts include: Dr Ty Beal, Dr Pragya Singh, Dr Evangeline Mantzioris, Professor Nicole Roy Danijela Armitage, Dr Jessica Danaher and Renee Sobolewski.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/89>

Workshop 5

Exploring global school food environments for Pacific action

Monica Smith - *School of Health and Australian Centre for Pacific Islands Research (ACPIR), University of the Sunshine Coast*

Sarah Burkhart - *The Australian Centre for Pacific Islands Research and School of Health, University of the Sunshine Coast, Australia.*

Bridget Horsey - *The Australian Centre for Pacific Islands Research and School of Health, University of the Sunshine Coast, Australia*

Belinda Christensen - *The Australian Centre for Pacific Islands Research and School of Health, University of the Sunshine Coast, Australia*

Deana Leahy - *School of Education, Culture & Society, Monash University, Australia.*

Pragya Singh - *Fiji National University*

Emily Mitchell - *The Australian Centre for Pacific Islands Research and School of Health, University of the Sunshine Coast, Queensland, Australia*

"Exploring Global School Food Environments for Pacific Action". Presented by Monica Smith, Dr Sarah Burkhart, Bridget Horsey, Belinda Christensen (University of the Sunshine Coast), Deana Leahu (Monash) and Pragya Singh (FNU). This workshop will disseminate findings of a study scoping the global school food and nutrition environment and discuss how settings have been defined, characterised and measured. Workshop participants will review and discuss enablers, barriers, opportunities, and pathways for future research and interventions across Oceania to create healthy school food environments. Networking with like minded practitioners will strengthen connections and engagement through the Pacific School Food Network.

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Workshop 6

Empowering the Nutrition Workforce to be leaders in Sustainable Food Systems research and policy practice

Jolieke van der Pols - *Queensland University of Technology, School of Exercise and Nutrition Sciences, Faculty of Health, Brisbane, Australia*

Priscila Machado - *Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Geelong, Victoria, Australia*

Mark Lawrence - *Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Geelong, Victoria, Australia*

"Empowering the Nutrition Workforce to be Leaders in Sustainable Food Systems Research and Policy Practice." Presented by A/Prof Jolieke van der Pols (Queensland University of Technology), Prof Mark Lawrence (Deakin University) and Dr Priscila Machado (Deakin University). This workshop will introduce concepts of sustainable food systems and the relevance of nutrition science and workforce in influencing shifts towards more sustainable diets and food systems. Participants will discuss and summarise the potential contributions of nutrition science across the domains of research, policy, and workforce training and capacity building. Discussions will also include perspectives from Dr Ty Beal (Global Alliance for Improved Nutrition) and Ms. Elisiva Na'ati (Pacific Community).

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Workshop 7

The role of TikTok in public health nutrition messaging

Joelie Mandzufas - *Telethon Kids Institute, Nedlands 6009, Australia*

"The Role of TikTok in Public Health Nutrition Messaging". Presented by Joelie Mandzufas (University of Western Australia). This interactive workshop will briefly introduce the current role of TikTok in public health, and highlight nutrition case studies. Participants will use a design-thinking format to develop potential solutions to the questions of what topics on TikTok require deeper understanding by nutrition professionals, and how can we use TikTok to disseminate positive public health messaging. Participants will work in small groups resulting in a short video being created by each group

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/96>

Workshop 8

A DiRECT approach to weight loss: low energy meal replacement followed by supported weight loss maintenance

Andrew Reynolds - *Department of Medicine, University of Otago, Dunedin, 9054, Aotearoa New Zealand*

Mike Lean - *University of Glasgow*

Kate Campbell - *Department of Nutrition, University of Otago, Dunedin, 9054, Aotearoa New Zealand*

Natalie Ashton - *Te Kāika Health, Caversham, 9012, Aotearoa New Zealand*

Meredith Peddie - *Department of Nutrition, University of Otago, Dunedin, 9054, Aotearoa New Zealand*

"A DiRECT approach to weight loss: low energy meal replacement followed by supported weight loss maintenance". Presented by Dr Andrew Reynolds, Kate Campbell, Dr Meredith Peddie (University of Otago), Prof Mike Lean (University of Glasgow) and Natalie Ashton (Te Kaika Health). This workshop will share experiences working with the DiRECT study and approaches for those with type 2 diabetes and obesity wanting to lose weight, both in the UK and in Dunedin. You will be able to hear about the programme's effectiveness and learn about New Zealand patient-led solutions and success strategies experienced by participants. You will also be able to try the meal replacement products and contribute to a discussion to get DiRECT funded in Aotearoa NZ.

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Workshop 9

Nutrition Society Mentoring Workshop

Aimee L Dordevic - *Department of Nutrition, Dietetics and Food, Monash University, Victoria, Australia*

Tammie Choi - *Department of Nutrition, Dietetics and Food, Monash University, Victoria, Australia*

Sally Mackay - *University of Auckland*

Sheena Hendon - *Sheena Hendon Health*

Cherise Pendergrast - *Massey University*

Professional organisation-led mentoring programs are an effective method to access mentors who are independent of workplaces. Both the Australian and New Zealand Nutrition Societies offer mentoring programs to support newly Registered Nutritionists (including Associate Registered Nutritionists).

In this workshop, we will discuss the philosophy of mentoring and its role to continuous professional development for the profession. Outcomes from the recent Australian evaluation of the program will be used to inform workshop focus on enhancing mentoring relationships. This session will include an interactive speed-mentoring activity, where participants will be guided to participate in short speedy mentoring session in given allotted time, both as mentors or as mentees. Whether you have never participated in mentoring, or you want to get more out of your mentoring experience, this workshop is for you!

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/98>

Workshop 10

Exploring the NutriVerse

Jessica Danaher - *RMIT University, Australia*

Julia Low - *RMIT University, Australia*

Step into the future of interactive learning as we delve into the exciting possibilities of gamification and exploration via Virtual Reality (VR) in nutrition education. We'll bridge the gap between reality and the metaverse, opening doors to new dimensions of knowledge acquisition.

At the heart of this workshop is an unveiling of a new VR tool "Reality Bites" developed at RMIT University, including its integration into nutrition courses. Drawing inspiration from the world of game and film design, we'll demonstrate the effectiveness of storyboarding in planning and communicating sequence, motion, interaction, and content within the VR experience.

Attendees will engage in a hands-on storyboarding exercise, working in collaborative teams to create a compelling still-image storyboard that vividly explains a nutrition concept from the first-person point of view (Teams of 4-5; 45 mins). The workshop ends with each table having the chance to present their unique storyboards to the room.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/99>

Workshop 11

Co-creating nutrition interventions with indigenous communities – a how-to

Lisa Te Morenga - *Research Centre of Hauora and Health, Massey University*

Kim Bell-Anderson - *University of Sydney*

Hannah Binge - *University of Sydney*

Evie Mete - *Ministry for Primary Industries*

In this workshop we will use an interactive World Café Method to explore how we can design more effective nutrition interventions or programmes targeting indigenous communities by working in partnership to co-create or co-design them. We will explore what co-creation of co-design methodologies involve and what they are not. We will discuss the importance of building relationships with indigenous communities and how to do this appropriately, and the practicalities of working with indigenous people. Discussions will be illustrated with brief presentations demonstrating how we have implemented these approaches in our own research.

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Workshop 12

Food for thought? Nutritional influences on mood, performance and neurocognitive function

Andrew Scholey - *Monash University*

Nicola Gillies - *Discipline of Nutrition, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, 1023, New Zealand*

Lillian Morton - *University of Auckland*

Dominic Lomiwes - *The New Zealand Institute for Plant and Food Research Limited, New Zealand*

The workshop will examine the ways in which diet and specific nutrients can influence mood, mental function and performance. Scholey will explain cognitive domains and the tests which evaluate them and how they are sensitive to nutrition. Other talks will present data from placebo-controlled clinical trials into various health effects of a commercial New Zealand blackcurrant drink intervention. These include a 28-day trial into cognitive, mood, behavioural and microbiome effects (Gillies), cognitive and sports performance effects (Morton), and bioavailability of neuroactive components (Lomiwes). You will be able to participate in cognitive testing methods, learn how everyday mental functions translate into cognitive domains, and design your own study to test the effects of foods on the brain.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/101>

Workshop 13

More than just "kai": Understanding community perspectives of food in West Auckland

Michele Eickstadt - *Sport Waitakere*

Giuliana Sewell - *Healthy Families Waitakere*

This workshop will explore ways of engaging effectively with the community around food, with an emphasis on working with Māori and Pasifika communities, through a systems change approach. You will hear about examples of effective engagement happening in West Auckland and have the opportunity to discuss and reflect how this approach could help you better engage with communities that you may not come from.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/102>

Workshop 14

Values-guided dietary behaviour

Sara Styles - *University of Otago*

Values are the things that are important to us and the qualities of whom we want to be in the world. Our actions, even dietary behaviour, can be guided by our values.

This workshop will explore how our individual values can affect our dietary behaviour. Participants' values will be assessed, using a virtual values tool, so bring your laptop to participate. You will investigate barriers to implementing personally meaningful values-guided dietary behaviour, write your own action plan and learn effective quick interventions when you feel stuck.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/103>

Workshop 15

Eating well for ageing well, what are the challenges, priority research areas, and methodology on sustainable diet in healthy ageing?

Zhaoli Dai-Keller - *School of Population Health, Faculty of Medicine and Health, University of New South Wales*

Luna Xu - *School of Population Health, UNSW Sydney*

Ageing well and the quality of ageing provide enormous opportunities to relieve social and economic burdens due to global ageing. A healthy and sustainable diet is critical in healthy ageing and reducing the risks of age-related diseases.

This workshop will address the challenges of increasing advocacy and consumption of sustainable diets in an ageing population. Participants in groups will create short presentations on nutrition and ageing and these will be discussed by a range of experts and other workshop participants. For those with an interest in methodologies relating to research and healthy ageing using sustainable foods, this workshop will also take into consideration other social and cultural perspectives that may influence outcomes.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/104>

Workshop 16

Design, assessment and interpretation of diet-microbiome interactions: using cutting-edge gut-brain studies as an exemplar

Jessica Bieskiekierski - *Monash University*

Caroline Tuck - *Swinburne University of Technology*

CK Yao - *Monash University*

Matthew Snelson - *Monash University*

Diet plays a crucial role in shaping the microbiota-gut-brain axis, influencing health and disease.

This expert panel will highlight novel assessment methods and their interpretation for conducting gut-related nutrition research. These will focus on reverse translational studies, measurements across the digestive tract and microbiome analysis. Participants will apply interactive research case studies using Slido polling, to develop a deep understanding of research design and interpretation. There will also be a demonstration of capsule technology and hands-on experience analysing microbiome data.

<https://nutritionociety.gecco.co.nz/event-manager/ViewEvent/105>



Acknowledgements

To make a conference of this size and scope a success requires a huge amount of work. We would like to offer our sincere thanks and acknowledge everybody who has given their time and energy to help plan and deliver this conference experience.

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