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  @HEALTHYHEARTDOC



# STRESS AND HEART DISEASE

C.BATISTE, MD, FACC, FSCAI





2



2



# AMERICA IN CRISIS

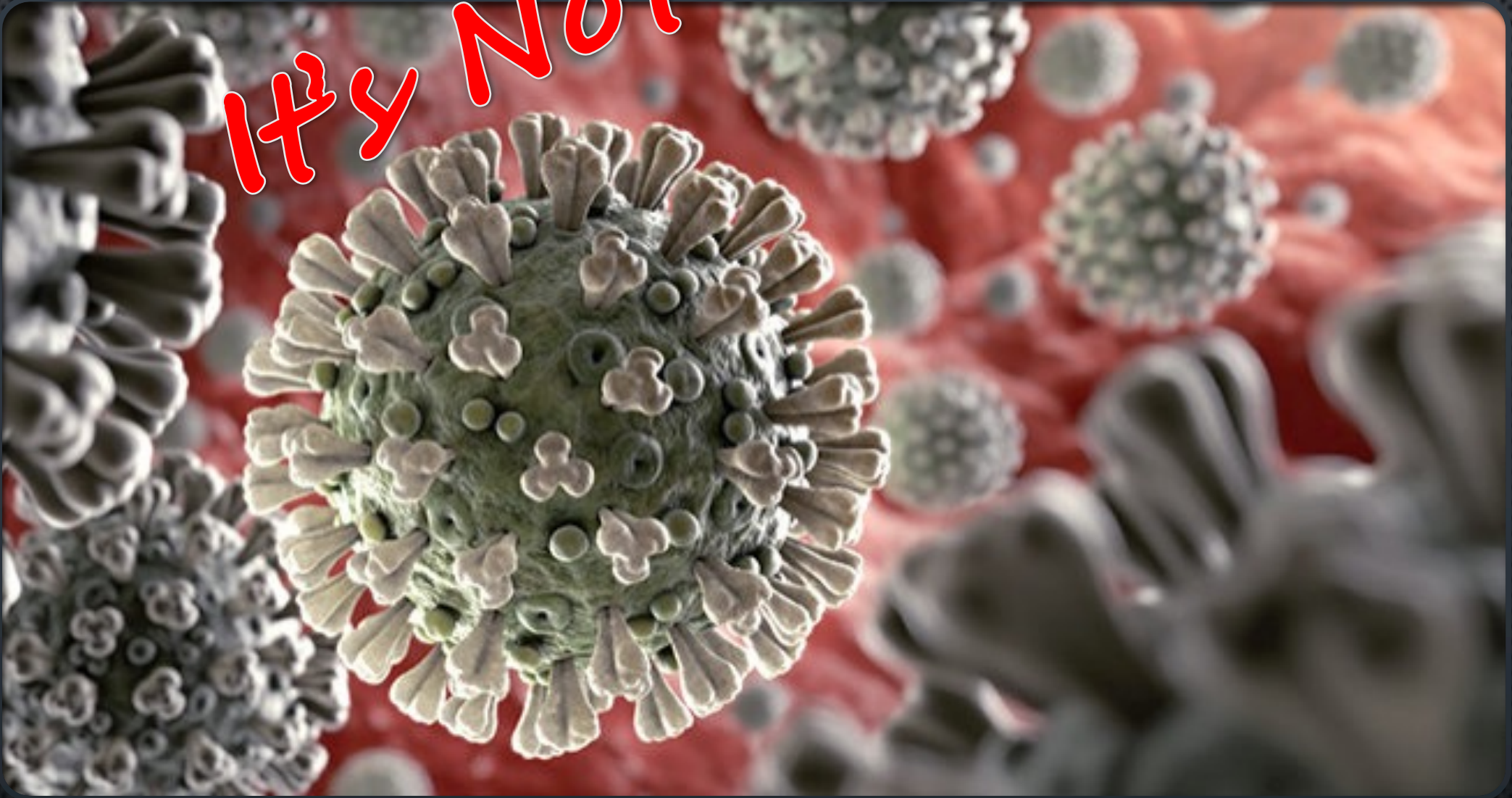




**it's**  
**NOT**  
**what you think**



It's Not





AMERICANS HAVE A HISTORY  
OF **LIVING SICKER** AND  
**DYING SOONER** THAN  
PEOPLE IN OTHER COUNTRIES

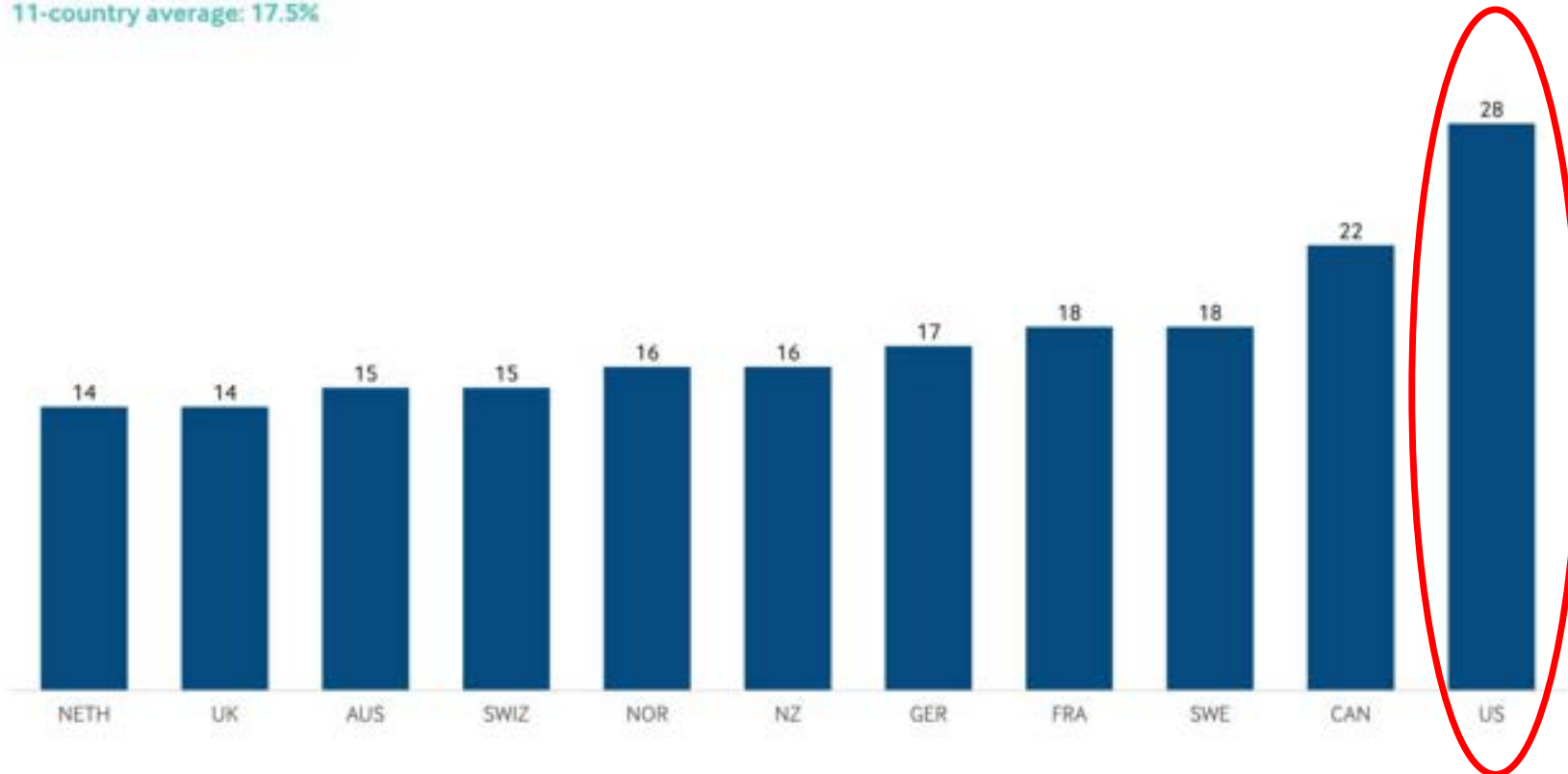


POPULATION HEALTH

# U.S. Adults Have the Highest Chronic Disease Burden

Percent (%)

11-country average: 17.5%



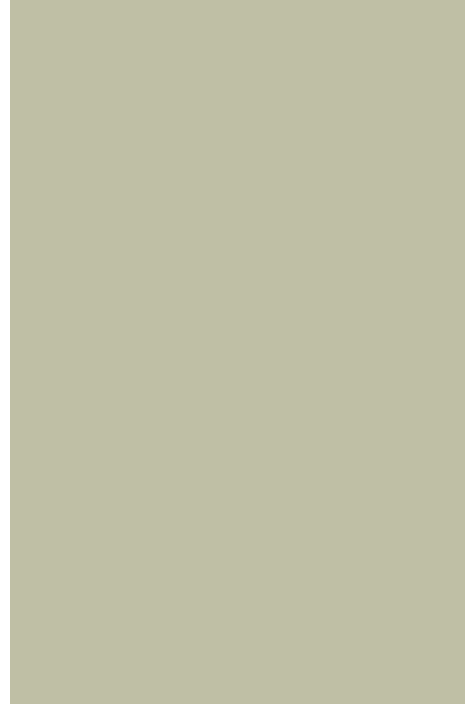


Why Not



# Politics





A KAISER PERMANENTE STUDY CONDUCTED IN SOUTHERN AND NORTHERN CALIFORNIA FOUND HOSPITALIZATIONS FOR HEART ATTACK, STROKE, AND HEART FAILURE WERE 17% HIGHER IN THE 5 DAYS AFTER THE 2020 ELECTION THAN IN THE SAME 5 DAYS 2 WEEKS BEFORE THE ELECTION.

**Original Investigation** | Cardiology



April 20, 2022

# Association of the 2020 US Presidential Election With Hospitalizations for Acute Cardiovascular Conditions

Matthew T. Mefford, PhD<sup>1</sup>; Jamal S. Rana, MD, PhD<sup>2,3</sup>; Kristi Reynolds, PhD, MPH<sup>1,4</sup>; [et al](#)

[» Author Affiliations](#) | [Article Information](#)

JAMA Network Open. 2022;5(4):e228031. doi:10.1001/jamanetworkopen.2022.8031







# PHYSICIAN BURNOUT

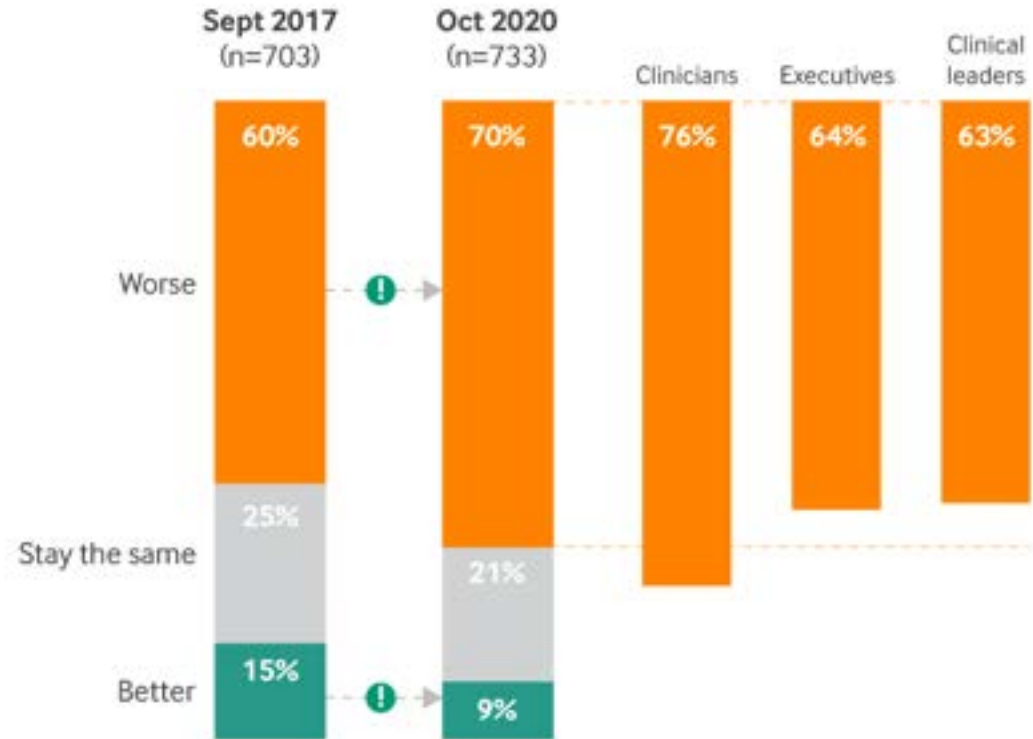
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@chrislandau



## Health Care Provider Burnout Is Predicted to Worsen

Do you anticipate that health care provider burnout will get better, stay the same, or get worse in the next 2–3 years at your organization?



! : Statistically significant

NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society



**NOT  
NEW**





**54%**  
of doctors  
say they are  
burned out.<sup>1</sup>



**88%**  
of doctors  
are moderately  
to severely stressed.<sup>2</sup>



**59%**  
of doctors  
wouldn't recommend  
a career in medicine  
to their children.<sup>3</sup>

1. Mayo Clinic 2014.

2. VITAL WorkLife & Cejka Search Physician Stress and Burnout Survey 2015.

3. Jackson Healthcare; 2013 Physician Outlook and Practice Trends.





ALMOST TWO-THIRDS (64%) OF  
THE U.S. PHYSICIANS SURVEYED  
SAID THE PANDEMIC HAD  
INTENSIFIED THEIR SENSE OF  
BURNOUT

Depressed Doctors

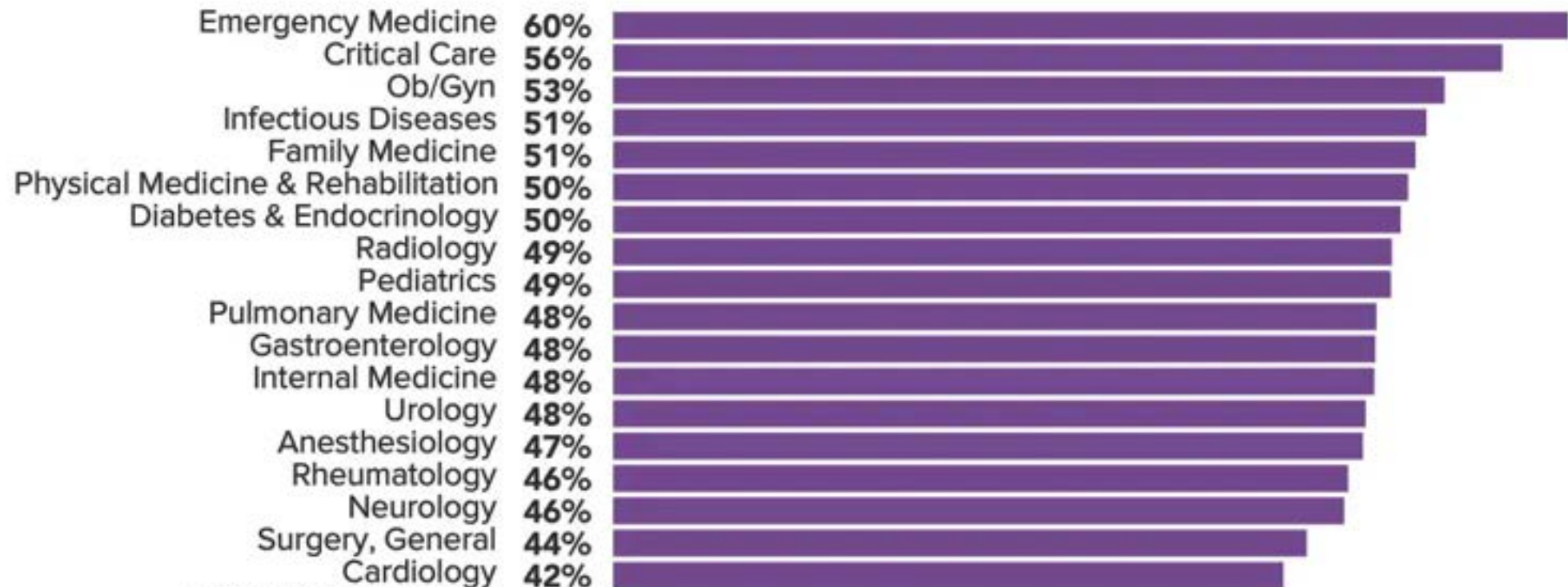
get depressed

get drunk





# Which Physicians Are Most Burned Out?





NEW SURVEY SHOWS THAT UP  
TO 47% OF US HEALTHCARE  
WORKERS PLAN TO LEAVE THEIR  
POSITIONS BY 2025





IN A 2014 ACADEMIC MEDICINE  
STUDY OF MEDICAL RESIDENTS, **60%**  
***MET THE CRITERIA FOR BURNOUT,***  
MORE THAN HALF SCREENED POSITIVE  
FOR DEPRESSION, AND ROUGHLY 8%  
EXPERIENCED SUICIDAL IDEATION.





# BURNOUT

BURNOUT IS A STATE OF EMOTIONAL, MENTAL, PHYSICAL  
EXHAUSTION CAUSED BY EXCESSIVE AND PROLONGED  
**STRESS**



*America is in crisis*

because...







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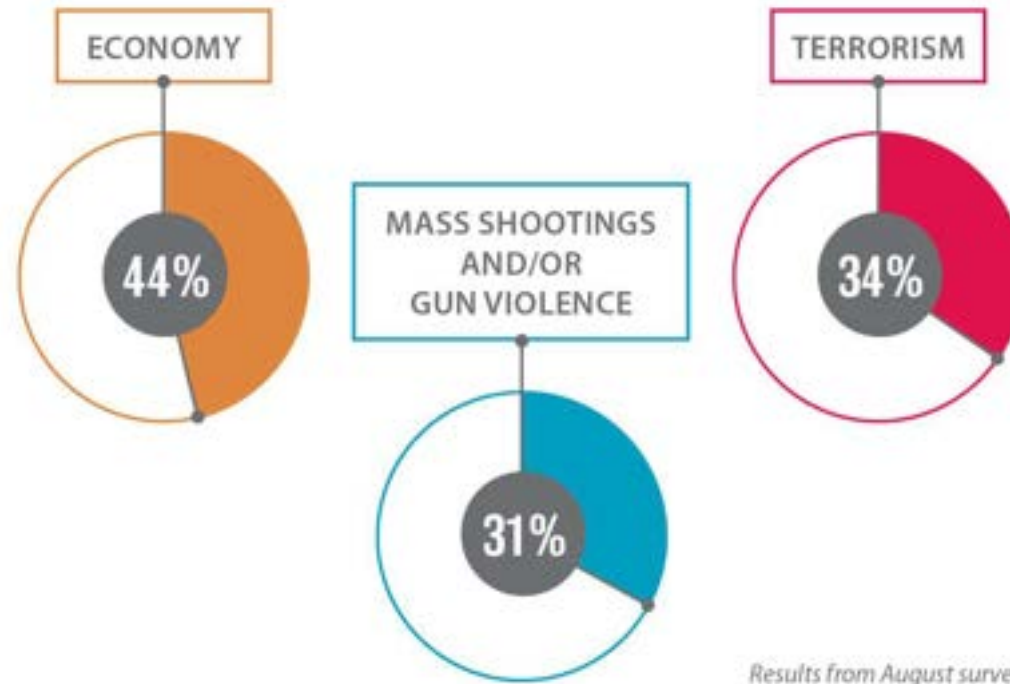
STRESS=DEMANDS-RESOURCES





== ONE NATION ==  
UNDER STRESS

## MOST COMMONLY REPORTED FACTORS ADDING TO STRESS IN THE PAST 10 YEARS



© 2017 American Psychological Association





### HIGH NUMBERS REPORT STRESS RELATED TO INFLATION, GLOBAL UNCERTAINTY AND INVASION OF UKRAINE

% SAY IS A SIGNIFICANT SOURCE OF STRESS



STRESS IN AMERICA™ 2022: COVID SECOND ANNIVERSARY

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# STRESS IN AMERICA

### STRESS ABOUT MONEY AND ECONOMY IS ON THE RISE

% SIGNIFICANT SOURCE OF STRESS

Stress about money is the highest recorded since 2015

#### MONEY

February 2022



June 2021



February 2021



#### ECONOMY

February 2022



August 2021



June 2021



STRESS IN AMERICA™ 2022: COVID SECOND ANNIVERSARY

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# STRESS AND ECONOMY



# Anxiety-Related Google Searches Reached A Record High During Early Stages Of The Pandemic



**Elana Lyn Gross** Forbes Staff

Business

*I cover breaking news.*

**f** **TOPLINE** A new [study](#) analyzed 16 years of Google Trends data and found that anxiety-related searches reached an all-time high in the United States during the first 58 days after President Trump declared the coronavirus pandemic a national emergency on March 13.

**t**

**in**



# WHAT IS STRESS?

STRESS IS A CONDITION OR FEELING EXPERIENCED WHEN A PERSON PERCEIVES THAT **DEMANDS EXCEED** THE PERSONAL AND SOCIAL **RESOURCES** THE INDIVIDUAL IS ABLE TO MOBILIZE.

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# AN EXAMPLE: FIGHT OR FLIGHT



IN ACUTE STRESSFUL SITUATIONS,  
ADRENALINE INCREASES, AND  
MANY CHANGES QUICKLY AND  
TEMPORARILY TAKE PLACE



# FIGHT OR FLIGHT

## NOTICEABLE EFFECTS

Pupils Dilate

Tunnel Vision

Constant Surveillance  
of Surroundings

Breathing Becomes  
Fast & Shallow

Heart Beat is Faster  
and Noticeable

Increase Sweating

Insomnia

ADD/ADHD type Symptoms

Mouth  
Gets Dry

Inhibition of  
Erections

Neck, Shoulder  
and Arm  
Muscles  
Become Tense  
and Stronger

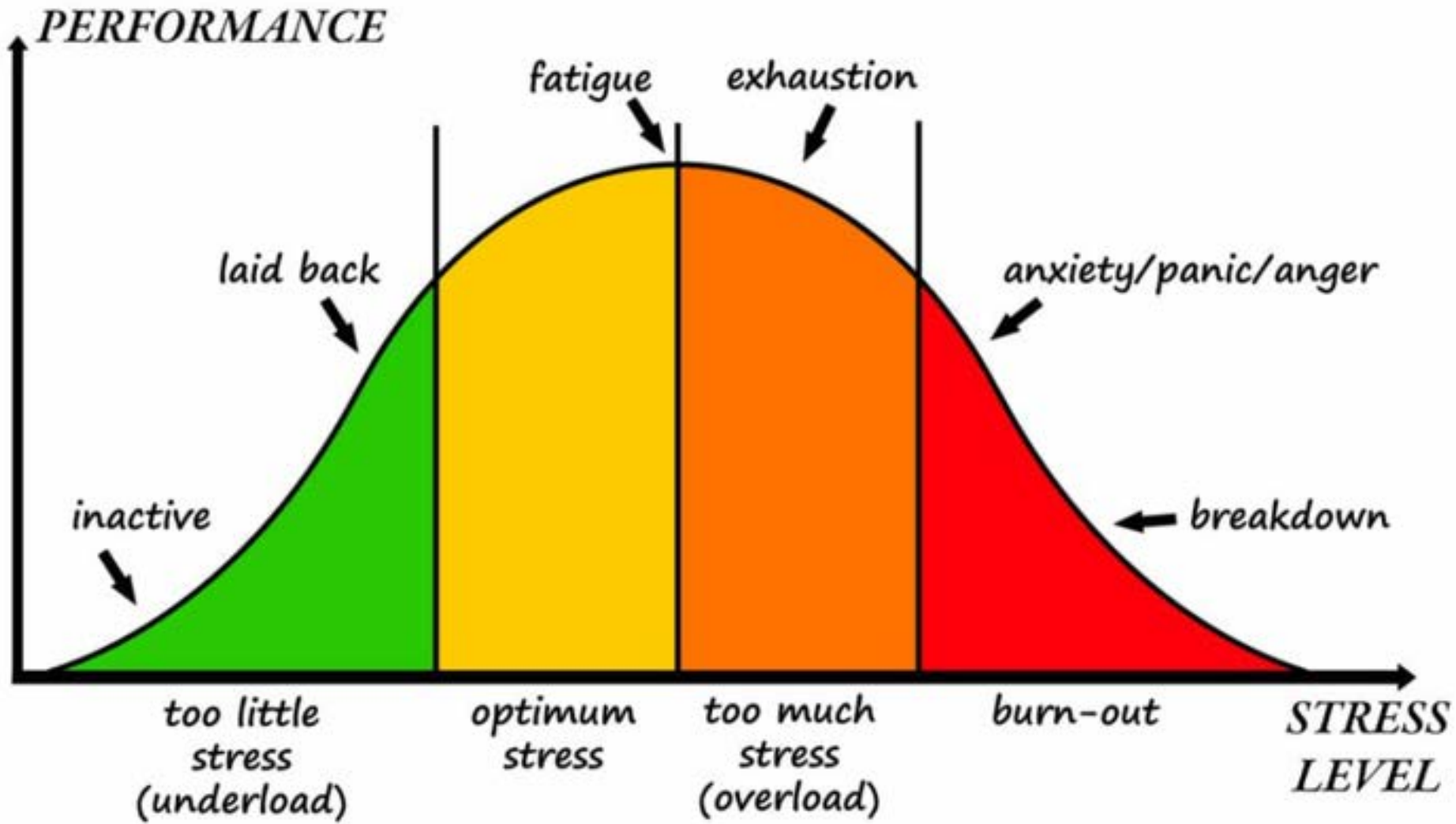
Leg Muscles Become  
Tense and Strengthened





*"Too much of a good  
thing can be a bad thing"*







HEALTH = RESILIENCY / STRESS



38 year old woman, housewife and mother of six children came to emergency department after a sudden onset of severe retro-sternal crushing chest pain at rest radiating up through the neck and left arm which lasted for one hour.

This was accompanied by dizziness, restlessness, distress, breathlessness and profuse sweating

# HER STORY





# HER STORY

The patient's history had no attributable cardiovascular risk factors (smoking, diabetes, or hypertension) and no family history of coronary artery disease or premature cardiac event

However, family history of depression was positive. She was always distressed worrying about her children's future.





Blood pressure was 85/50 mm Hg and pulse rate was 100 beats per minute. Jugular veins were not distended



First and second heart sounds were normal, while the third heart sound was audible and there were no audible lung rales

# HER STORY







EKG



# HER STORY

- MYOCARDIAL ENZYME ASSAYS REVEALED ELEVATED CARDIAC TROPONIN I (7.26 NG/ML) WITH NORMAL TOTAL CREATINE KINASE AND CKMB LEVELS.
- THE PATIENT WAS IMMEDIATELY TAKEN FOR CORONARY ANGIOGRAPHY, WHICH SHOWED NO EPICARDIAL CORONARY ARTERY DISEASE

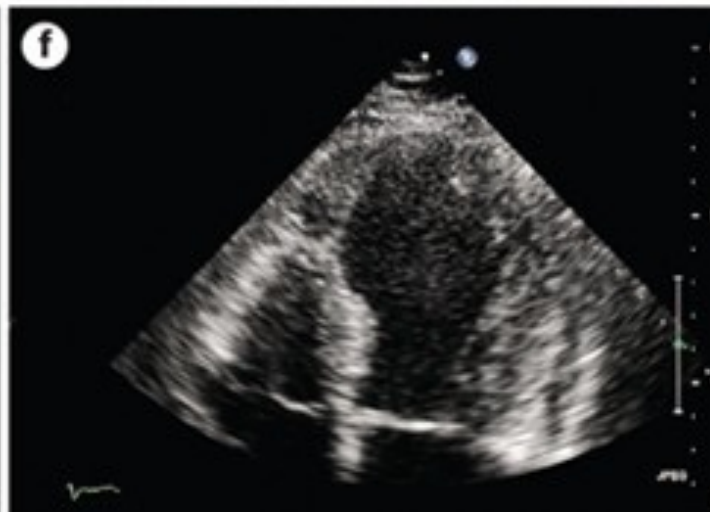
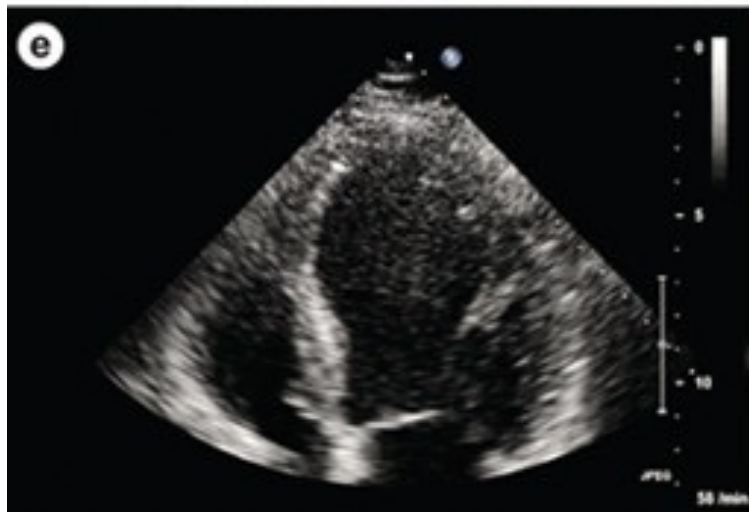
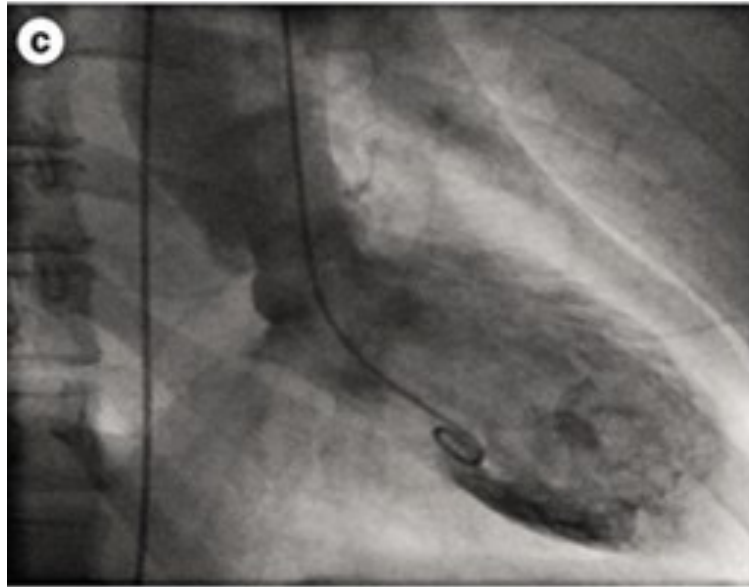




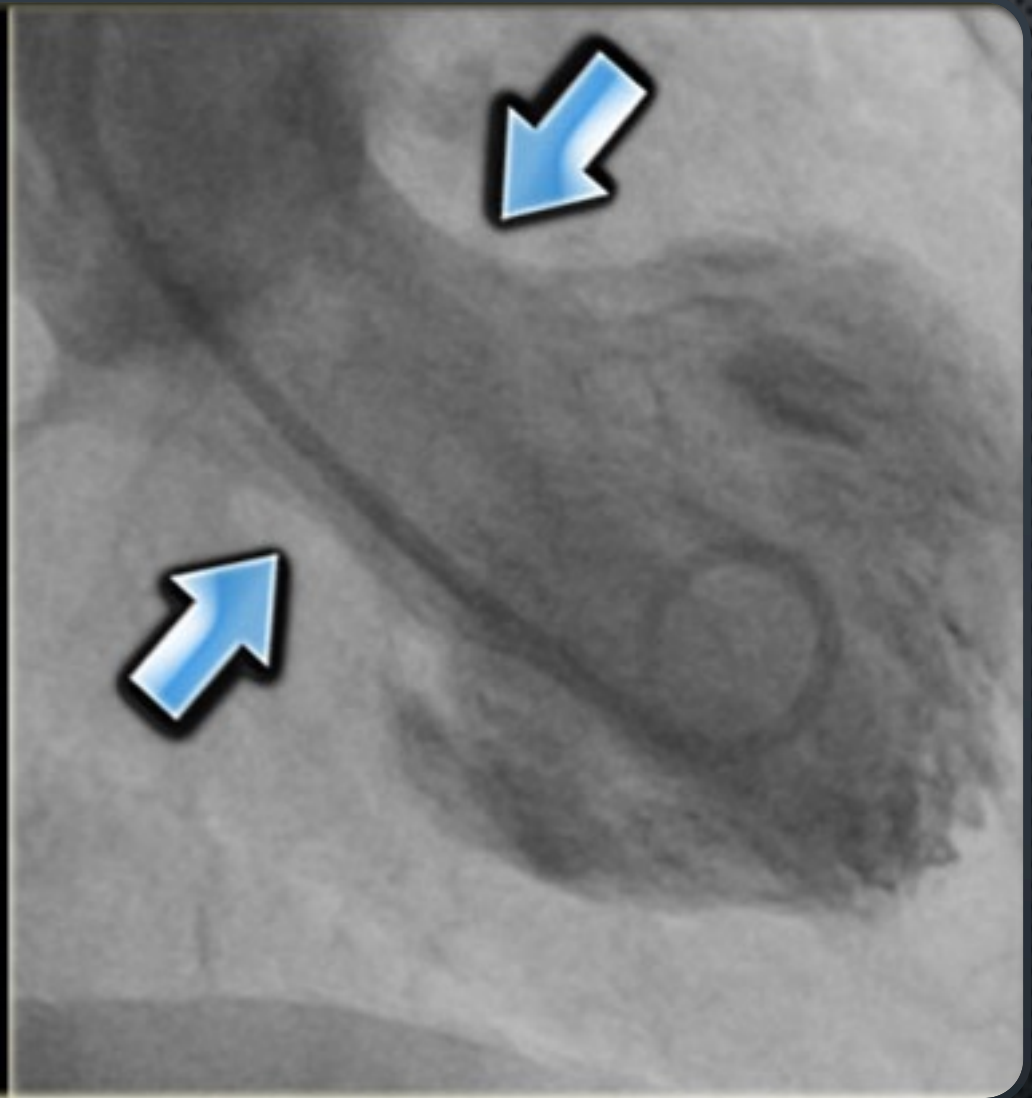


THE PATIENT WAS IMMEDIATELY TAKEN FOR CORONARY ANGIOGRAPHY, WHICH SHOWED NO EPICARDIAL CORONARY ARTERY DISEASE















Joey.mtz @Joeymtz4 · 1h

...

Lord god please on our family, my tias husband passed away this morning due to a heart attack at home he's with his wife now, these two will make anyone feel loved no matter what they have the purest hearts ever I love you sm tia and tio please be with me every step of the way





**'Broken Heart Syndrome' Has  
Increased During COVID-19  
Pandemic, New Study Says**





*HEART HEALTH = RESILIENCY / STRESS*





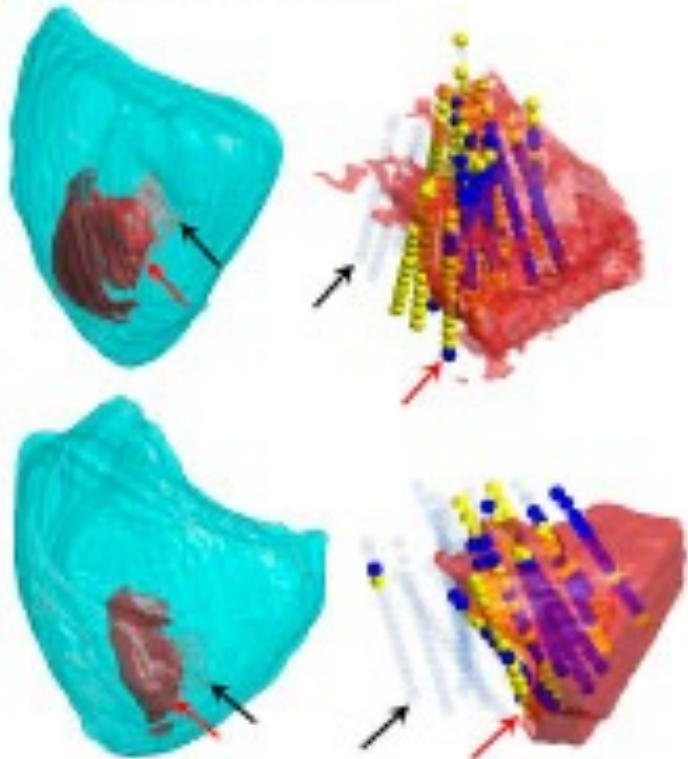
**CHRONIC EXPOSURE TO STRESS, POOR SOCIAL SUPPORTS AND LIMITED SOCIAL NETWORKS HAVE BEEN SHOWN TO *INCREASE DISEASE RISK* (INSTITUTE OF MEDICINE, 2001).**





# HEART AND CIRCULATORY PHYSIOLOGY.

1975-1976



RECENT STUDIES IMPLICATE  
CHRONIC STRESS AS AN  
IMPORTANT DRIVER OF THE  
METABOLIC SYNDROME,  
DIABETES, AND CVD  
DEVELOPMENT





# PERCEIVED STRESS & CHRONIC DISEASE

THE ASSOCIATIONS WITH PERCEIVED STRESS WERE SIGNIFICANTLY STRONGER AMONG THE POOREST INDIVIDUALS FOR ARTHRITIS, ASTHMA, DIABETES, EDENTULISM, AND  $\geq 4$  CHRONIC CONDITIONS. OUR DATA SUGGEST THAT **A RANGE OF CHRONIC CONDITIONS AND MULTIMORBIDITY ARE ASSOCIATED WITH GREATLY INCREASED PERCEIVED STRESS** AMONG PEOPLE IN LOW- AND MIDDLE-INCOME COUNTRIES, AND THAT THE POOREST PERSONS MAY BE A PARTICULARLY VULNERABLE GROUP.





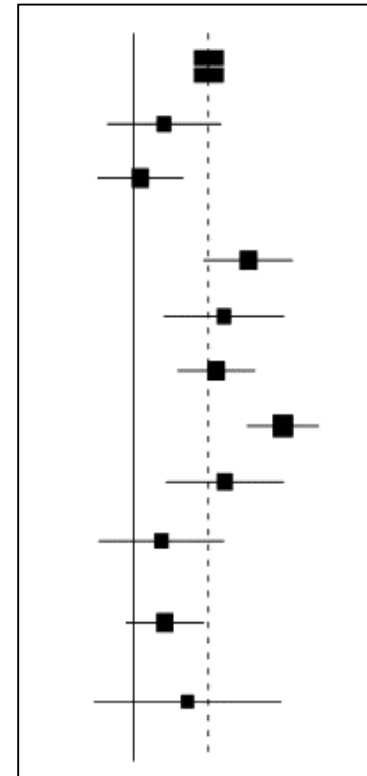
# PERCEIVED STRESS & HEART DISEASE

META-ANALYSIS SUGGESTS  
***THAT HIGH PERCEIVED  
STRESS IS ASSOCIATED WITH  
A MODERATELY INCREASED  
RISK OF INCIDENT CHD.***

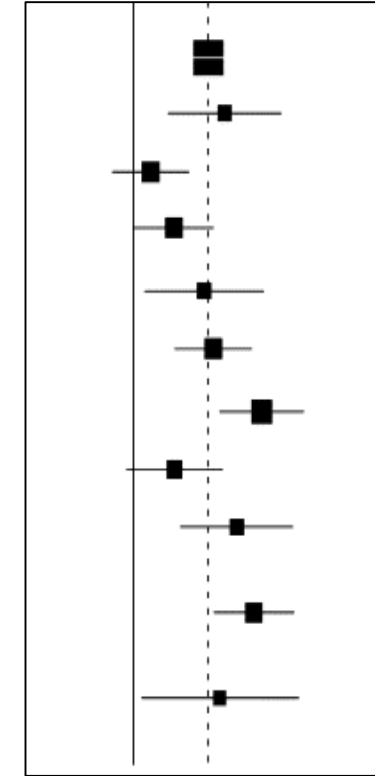


# INTERHEART STUDY STRESS & MACE

Region	Number
Overall	24767
Western Europe	1375
Central and eastern Europe	3473
Middle East	2892
Africa	1259
South Asia	3300
China and Hong Kong	5894
Asia	1921
Australia and New Zealand	1255
South America and Mexico	2783
North America	615



STRESS



DEPRESSION



**Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study**

Salim Yusuf <sup>1</sup>, Steven Hawken, Stephanie Ounpuu, Tony Dans, Alvaro Avezum, Fernando Lanas, Matthew McQueen, Andrzej Budaj, Prem Pais, John Varigos, Liu Lisheng, INTERHEART Study Investigators

THE INTERHEART STUDY SHOWED THAT PSYCHOLOGICAL STRESS IS AN INDEPENDENT RISK FACTOR FOR HEART ATTACKS, SIMILAR IN HEART-DAMAGING EFFECTS TO THE MORE COMMONLY MEASURED CARDIOVASCULAR RISKS



Possible **physiological pathways** include pain, fear, increased cardiac reactivity, reduced blood flow to the heart, and increased cortisol.

**anxiety**  
**depression**  
**chronic stress**  
**post traumatic stress disorder**



**stroke**  
**heart failure**  
**cardiovascular disease**  
**metabolic disease**  
**coronary artery calcification**  
**heart attack**

Possible **behavioral pathways** include medication non-adherence, smoking, and physical inactivity.



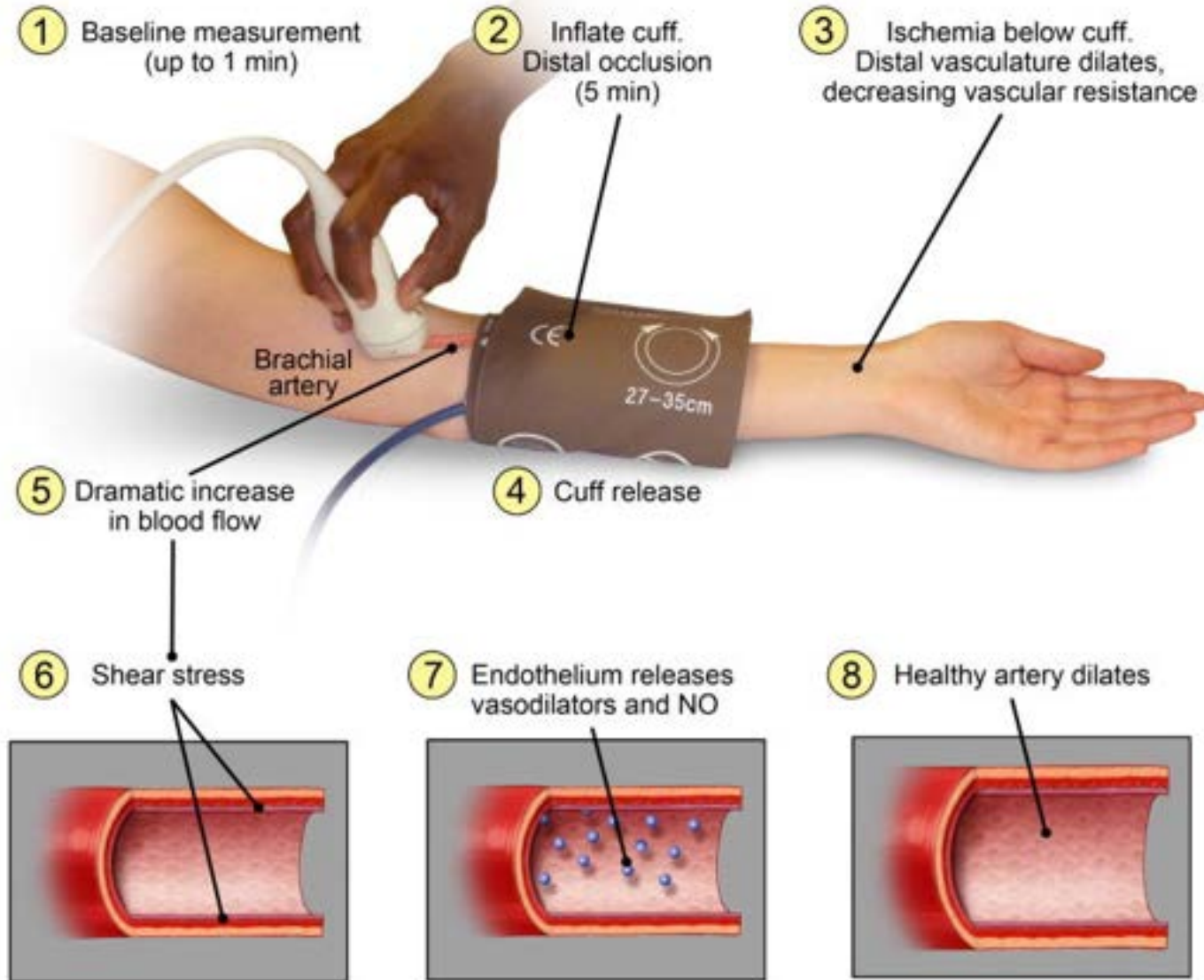








# FLOW MEDIATED DILATATION





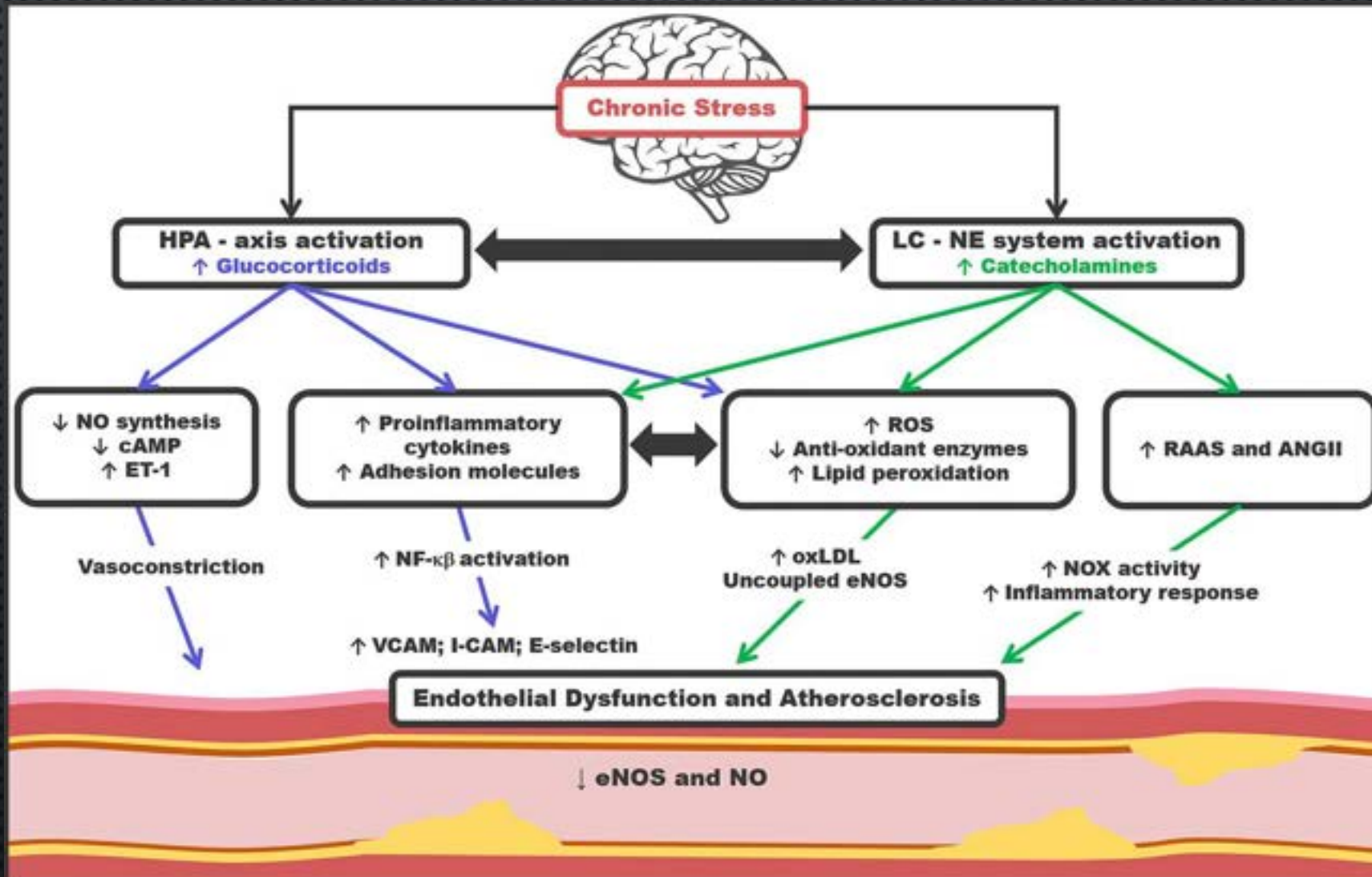


# Endothelial Dysfunction

Dilatation  
Growth inhibition  
Antithrombosis  
Anti-inflammation

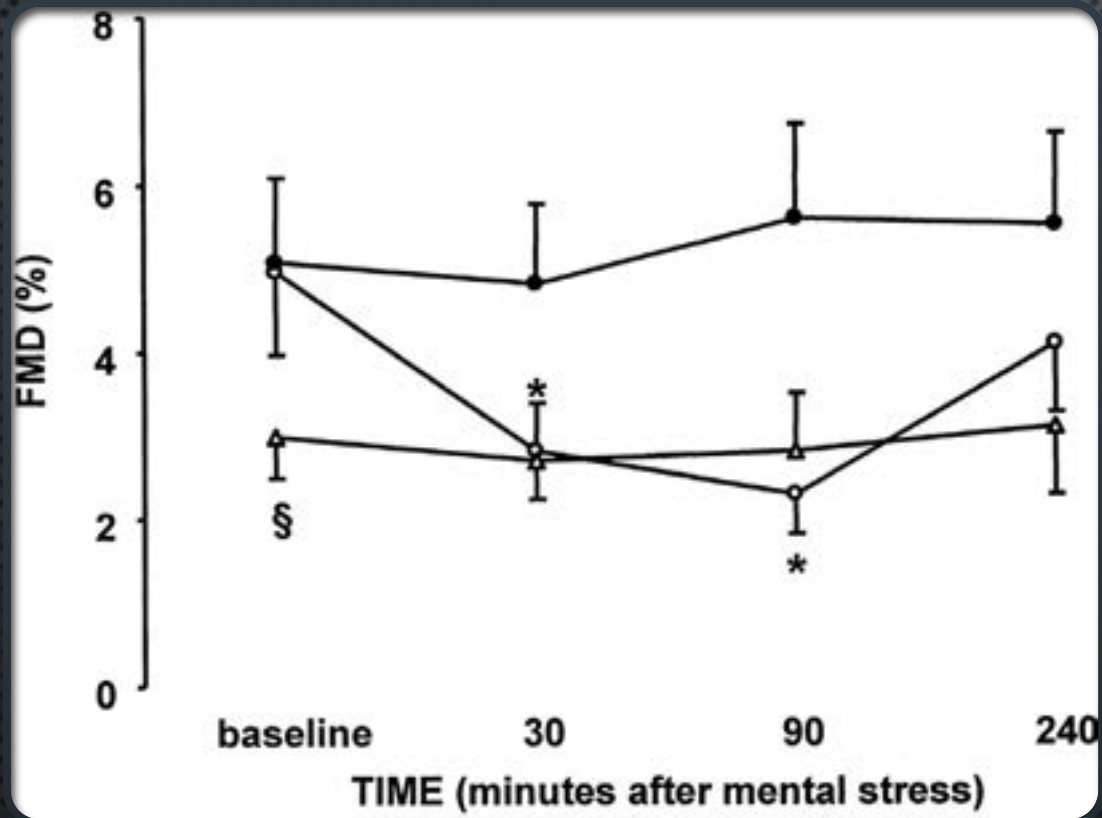
Constriction  
Growth promotion  
Prothrombosis  
Pro-inflammation

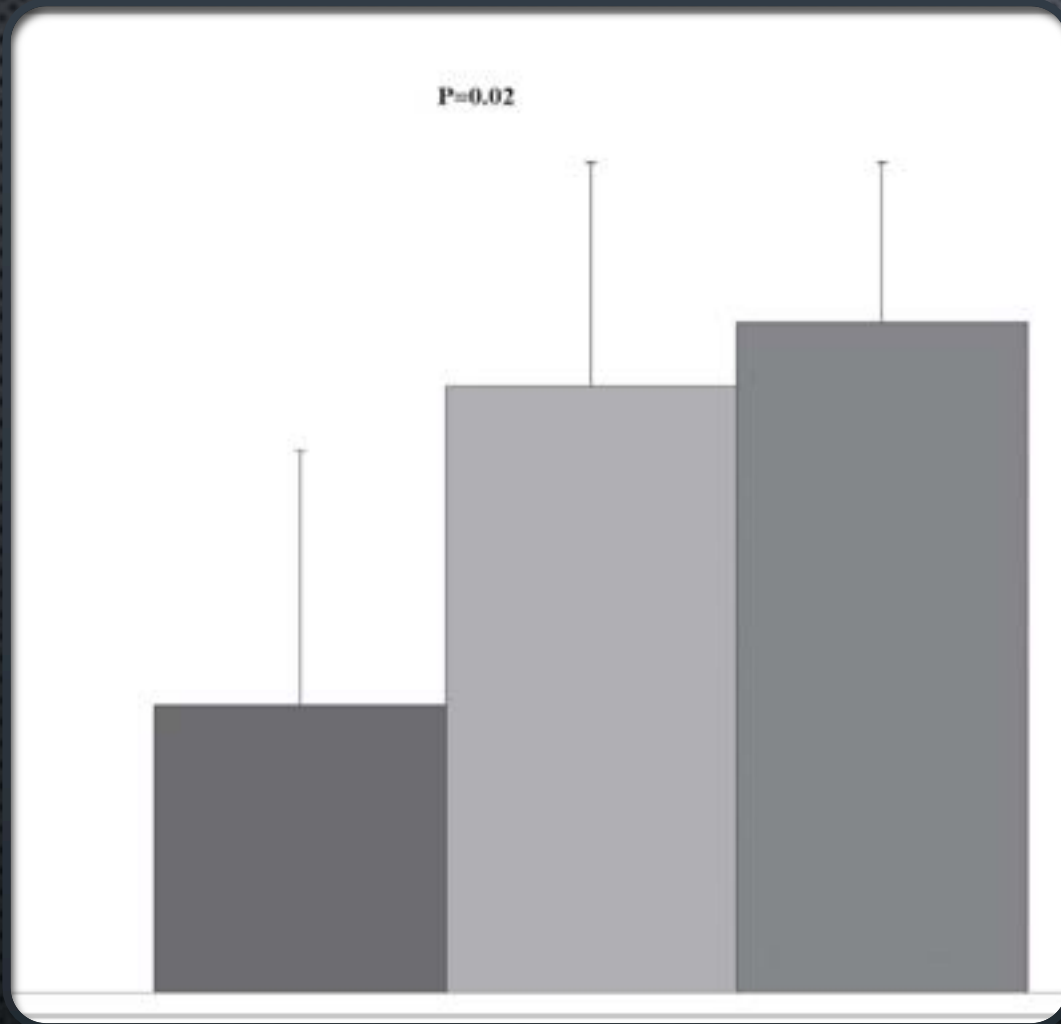






# MENTAL STRESS INDUCES TRANSIENT ENDOTHELIAL DYSFUNCTION IN HUMANS



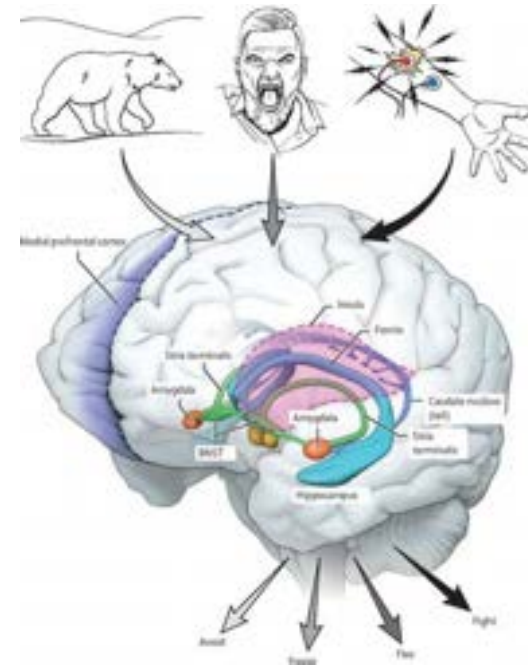


# CHRONIC STRESS AND ENDOTHELIAL DYSFUNCTION: MESA STUDY



A STUDY OF 293 PEOPLE INITIALLY FREE OF CARDIOVASCULAR DISEASE WHO UNDERWENT FULL-BODY SCANS THAT INCLUDED BRAIN ACTIVITY HAD A TELLING RESULT.

FIVE YEARS LATER, INDIVIDUALS FOUND TO HAVE **HIGH ACTIVITY IN THE AMYGDALA** WERE SHOWN TO HAVE **HIGHER LEVELS OF INFLAMMATION AND ATHEROSCLEROSIS.**



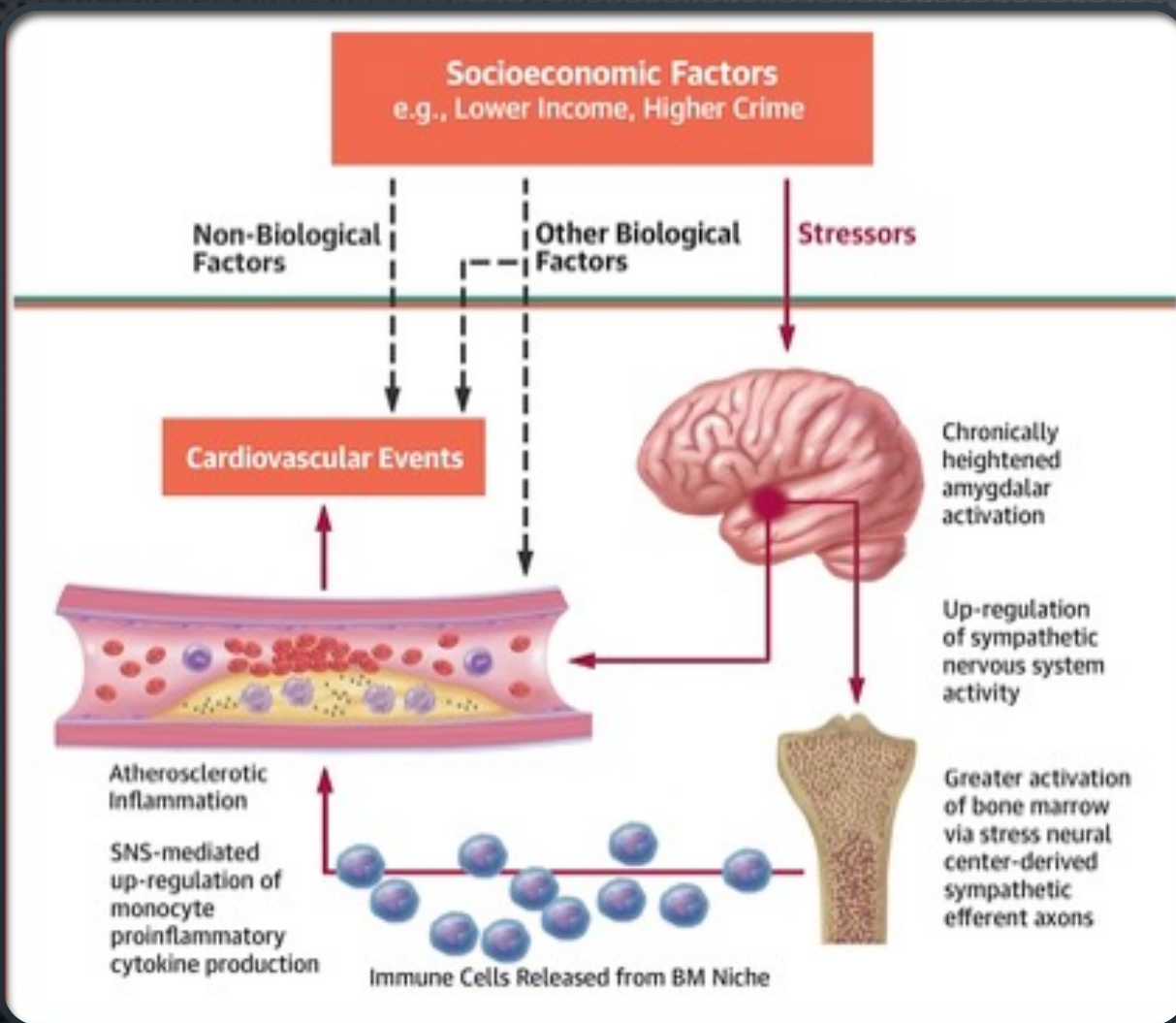
THE LANCET

The Global Burden of Disease Study 2017



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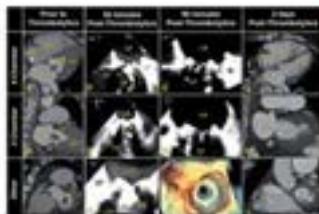
LOWER SES:  
 1) ASSOCIATES WITH HIGHER AMYGDALAR ACTIVITY; AND  
 2) INDEPENDENTLY PREDICTS MACE VIA A SERIAL PATHWAY THAT INCLUDES HIGHER AMYGDALAR ACTIVITY, BONE MARROW ACTIVITY, AND ARTERIAL INFLAMMATION. **THESE FINDINGS ILLUMINATE A STRESS-ASSOCIATED NEUROBIOLOGICAL MECHANISM BY WHICH SES DISPARITIES MAY POTENTIATE ADVERSE HEALTH OUTCOMES.**





# European Heart Journal

29,983



Editor-in-Chief:  
Filippo Crea

Executive Editors:  
Lina Badier  
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Raffaello De Caterina  
Pierre M. D'Adamo  
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Anna Tybirk Hansen

## Focus Issue on Thrombosis and Antithrombotic Treatment

Antithrombotic therapies in acute and peripheral arterial disease

Lipid-lowering vs statin-intolerant efficacy

Low-dose rivaroxaban in peripheral artery disease

Predictors of mortality in COVID-19 vaccination-induced thrombotic thrombocytopenia

Mechanisms of COVID-19 vaccination-induced thrombotic thrombocytopenia

Acute mental stress and plaque destabilization

Discussion Forum

Cardiovascular Psychiatry

OXFORD  
UNIVERSITY PRESS

ESC  
European Society  
of Cardiology

# ACUTE MENTAL STRESS DRIVES VASCULAR INFLAMMATION AND PROMOTES PLAQUE DESTABILIZATION IN MOUSE ATHEROSCLEROSIS

OUR DATA SHOW THAT ACUTE MENTAL STRESS RAPIDLY AMPLIFIES INFLAMMATORY LEUCOCYTE EXPANSION INSIDE MOUSE ATHEROSCLEROTIC LESIONS AND PROMOTES PLAQUE VULNERABILITY.



HEALTH = RESILIENCY / STRESS





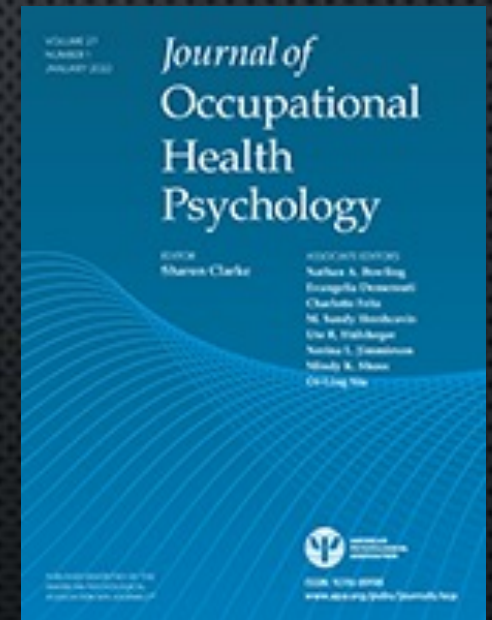
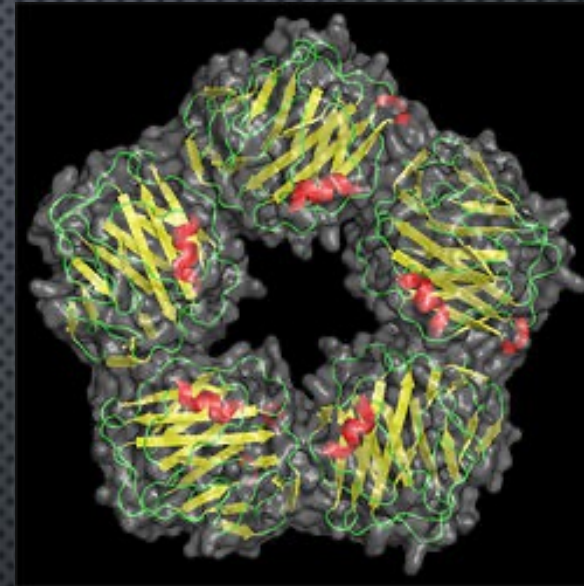


MARKERS OF  
ABNORMAL GLUCOSE  
METABOLISM ARE  
FOUND IN PHYSICIANS  
WITH SYMPTOMS OF  
BURNOUT





EVIDENCE SUPPORTS THAT BURNOUT, DEPRESSION, AND ANXIETY ARE ASSOCIATED WITH THE INFLAMMATORY MARKER C-REACTIVE PROTEIN (HS-CRP) AND FIBRINOGEN THAT IS GENDER DEPENDENT.





MORE THAN 90,000 EUROPEAN WORKERS WERE FOLLOWED PROSPECTIVELY. THOSE WHO REPORTED EITHER EFFORT REWARD IMBALANCE OR JOB STRAIN HAD A STATISTICALLY SIGNIFICANT **16% INCREASE IN RELATIVE RISK FOR SYMPTOMATIC CORONARY HEART DISEASE**, AND THOSE WHO REPORTED BOTH JOB STRAIN AND ERI HAD A **41% INCREASE IN RISK FOR CORONARY EVENTS** RELATIVE TO THOSE WORKERS WHO REPORTED NEITHER RISK FACTOR



**“Its not stress that kills us, it is  
our reaction to it.”  
~ Hans Selye**





WHEN YOU GET STRESSED  
WHAT DO YOU TURN TO?





# TURN TO FAKE RESOURCES





## UNDESIRED WEIGHT CHANGE AND INCREASE IN STRESS DRINKING\*

Have experienced undesired weight changes

58%



Gains of an average of **26 pounds**, with a median of 15 pounds



Losses of an average of **27 pounds**, with a median of 15 pounds

Have been drinking more alcohol during the pandemic to cope with stress

23%



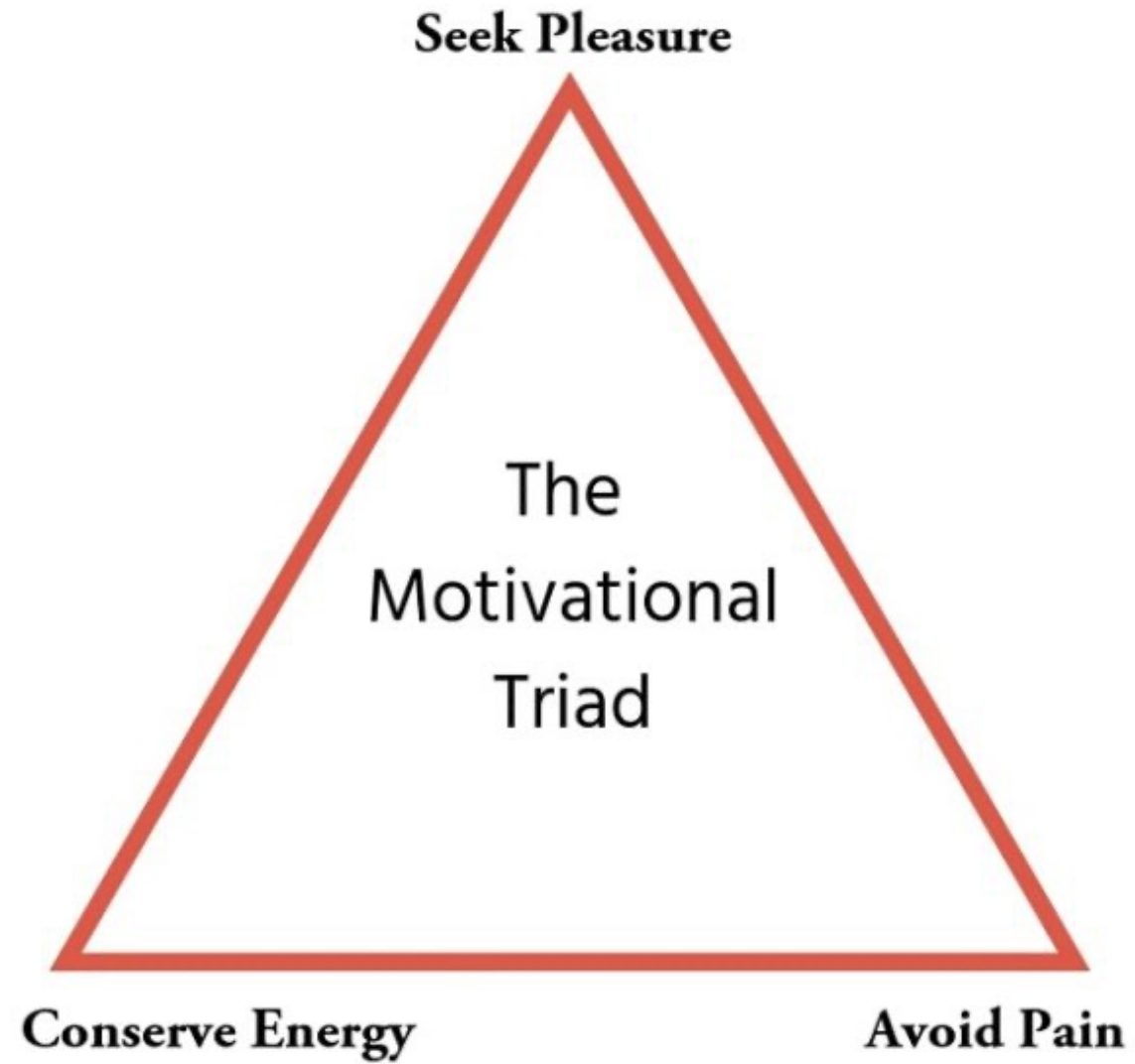
Average of **10 drinks** (median: 6 drinks) per week\*

Men averaged **12 drinks** (median: 7 drinks) per week\*

Women averaged **8 drinks** (median: 5 drinks) per week\*

*\*Average among adults who reported they have been drinking more alcohol to cope with stress during the pandemic*







HABIT PROBLEM  
DISEASE ENDING PROHIBITION  
BREAK ABUSE PERSON  
ADDICTED QUITTING TOBACCO  
ISSUES ADDICT QUIT HEALTH PRESSURE  
SMOKER MEDICINE  
UNHEALTHY  
HEALTHY  
HAND WARNING  
DRUG  
LIFESTYLE  
NICOTINE ILLNESS  
DANGER BAN  
BAD  
SMOKE  
FORBIDDEN HARMFUL  
HABITS  
ALCOHOL  
STRESS  
ADDICTION CIGARETTE RISK  
NARCOTIC  
STOP CANCER









---

---

STRESSED

SPELLED BACKWARDS IS

DESSERTS

---

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# NUTRITIONAL STRESS





EATING THE *DISEASE*  
*FORMING* FOODS



NOT EATING THE *HEALTH*  
*PROMOTING* FOODS





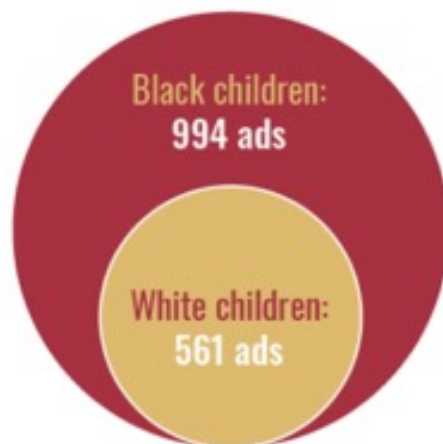
*The Choice is  
Yours*





## Fast-food TV ads disproportionately target Black and Hispanic youth

Black youth viewed **75% more** fast food ads than their White peers\*



\* Analysis of 2019 Nielsen data

\*\* Includes ad spending for top fast-food advertisers



### Spanish-language TV\*

- **33% increase** in ad spending since 2012
- **0 ads** for healthy menu items

**LEARN MORE AT:** [www.uconnruddcenter.org/research/food-marketing/facts](http://www.uconnruddcenter.org/research/food-marketing/facts)

Fast Food FACTS 2021 assesses advertising spending, TV advertising exposure, and targeted advertising for fast food in 2019.







The New York Times

## 'I Just Need the Comfort': Processed Foods Make a Pandemic Comeback

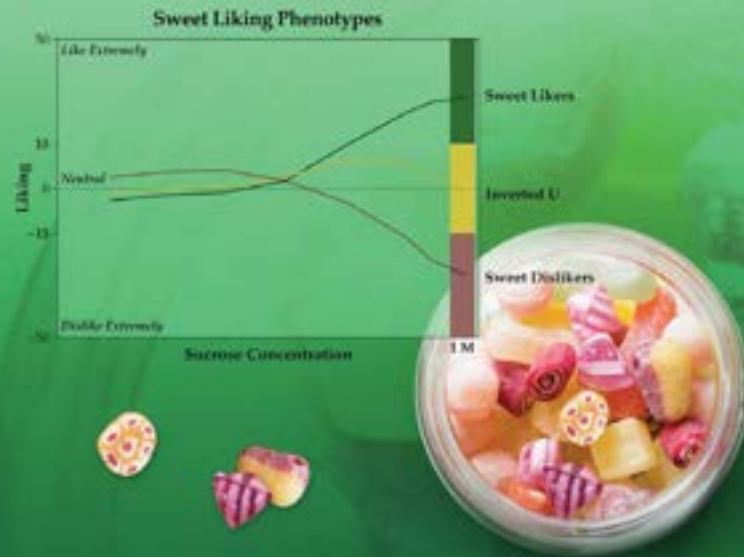
Shoppers, moved by nostalgia and hunting for longer shelf lives, are returning to old standbys like Chef Boyardee and Campbell's soup.





*nutrients*

IMPACT  
FACTOR  
4.196



Quantifying Sweet Taste Liker  
Phenotypes: Time for Some Consistency  
in the Classification Criteria

Volume 11 · Issue 1 | January 2019



mdpi.com/journal/nutrients  
ISSN 2072-6643

ACCORDING TO A RECENT STUDY  
PUBLISHED IN THE JOURNAL  
NUTRIENTS, IT WAS FOUND THAT THE  
**CONSUMPTION OF FAST  
FOOD AND LEVELS OF  
STRESS WERE DIRECTLY  
PROPORTIONAL** TO EACH  
OTHER. THIS MEANS THAT LOW  
LEVELS OF STRESS WERE ASSOCIATED  
WITH LOW CONSUMPTION OF FAST  
FOOD AND VICE VERSA.







International Journal of  
*Environmental Research  
and Public Health*

# Sustainable Work Ability and Aging

Edited by  
Clas-Håkan Nygård

Printed Edition of the Special Issue Published in  
*International Journal of Environmental Research and Public Health*

[www.mdpi.com/journal/ijerph](http://www.mdpi.com/journal/ijerph)



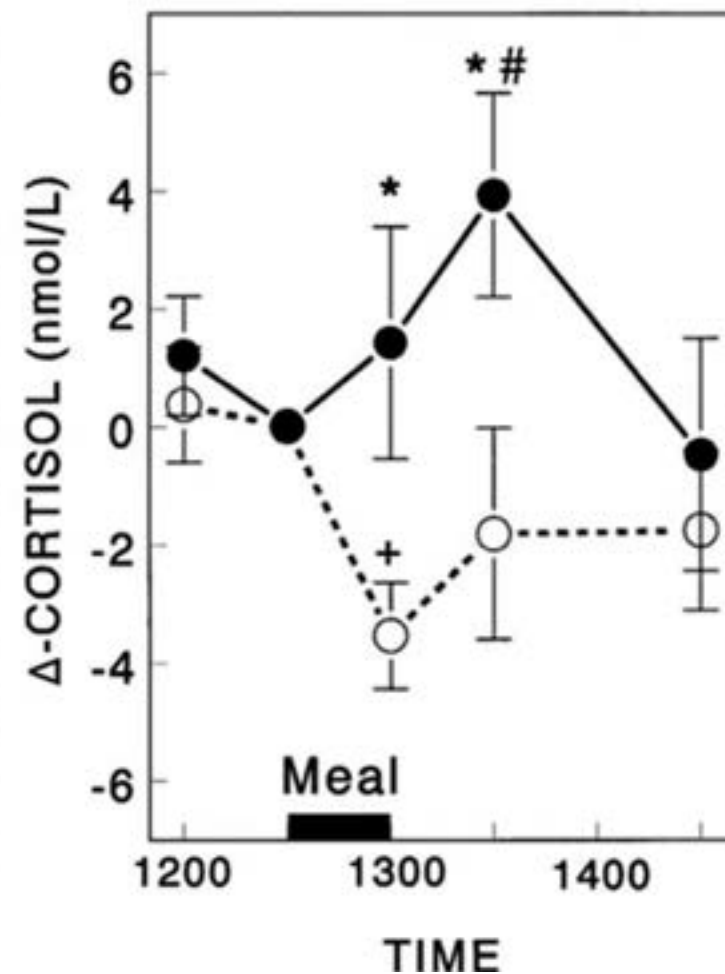
ANALYSIS SHOWED THAT HIGH  
STRESS LEVELS WERE  
ASSOCIATED WITH INCREASED  
ODDS OF HIGHER ULTRA-  
PROCESSED FOOD  
CONSUMPTION



## Increased Salivary Cortisol Reliably Induced by a Protein-Rich Meal

**Meal Composition.** The format of the menus for both meals was soup followed by stir-fried rice and vegetables. The high-protein meal had crab meat and sweet corn in the soup, and tuna and cottage cheese in the main course. The low-protein meal had pearl barley in the soup, and unsweetened apple juice as a drink (in addition to water being available). Both meals were equicaloric and provided an amount of energy quite typical for the midday meal (630 kcal).

On one day and a low-protein meal (5% energy as protein) on another day. Psychological well-being were also taken. **Results:** An acute meal-dependent increase in salivary cortisol was observed, which was reliable over 2 test days. This increase in cortisol depended on meal composition, increasing after the high-protein but not the low-protein meal. The increase in cortisol was significantly associated with poor psychological well-being in women. Some positive associations were also associated with the high- but not the low-protein meal. **Conclusions:** The effects of meal composition on mood, cognitive function, and levels of free cortisol in saliva provides a psychologically stress-free and reliable method of measuring cortisol. This method is similar to a standard protein-rich meal, i.e., a physiological challenge to the hypothalamic-pituitary-adrenal axis. **Key words:** cortisol, protein, nutrition, appetite, saliva.





THE HIGHER THE *NUTRITIONAL*  
*STRESS* THE POORER OUR  
HEALTH



FOOD WE EAT *CREATES*  
*STRESS* IN OUR BODIES







A STUDY HAS FOUND THAT POOR MENTAL HEALTH IS LINKED WITH POOR DIET QUALITY -- REGARDLESS OF PERSONAL CHARACTERISTICS SUCH AS GENDER AGE, EDUCATION, AGE, MARITAL STATUS AND INCOME LEVEL.

 BMC

**Nutrition  
Journal**

biomedcentral.com

Part of Springer Nature

**CONCLUSION: JUNK FOOD  
CONSUMPTION MAY  
INCREASE THE RISK FOR  
PSYCHIATRIC DISTRESS AND  
VIOLENT BEHAVIORS IN  
CHILDREN AND  
ADOLESCENTS.**





Journal of  
Pediatric & Adolescent  
Gynecology

Volume 35 • Number 2 • April 2022

Editor-in-Chief  
Paula J. Adams Hillard, MD



CONSUMPTION OF FAST  
FOODS INCLUDING RAMEN  
NOODLES, HAMBURGER,  
PIZZA, FRIED FOOD, AND  
OTHER PROCESSED FOODS  
WAS ASSOCIATED WITH  
INCREASED RISK OF  
DEPRESSION



## Plant-based diets



e.g., Mediterranean diet/ DASH diet

Fruits, vegetables, whole grains, legumes, nuts, fish, olive oil

### Lipid peroxidation

↓ F2-isoprostane; ↓ ox-LDL; ↓ MDA; ↓ TBARS

### Oxidative DNA damage

↓ 8-OH-dG

### Antioxidant defense

↑ SOD activity; ↑ SOD protein level;  
↑ catalase activity

### Inflammation

↓ hs-CRP; ↓ IL-6; ↓ TNF- $\alpha$

## Western diet



e.g., Fast-food diet

Red and processed meat, high-energy foods, refined carbohydrates, add

### Lipid peroxidation

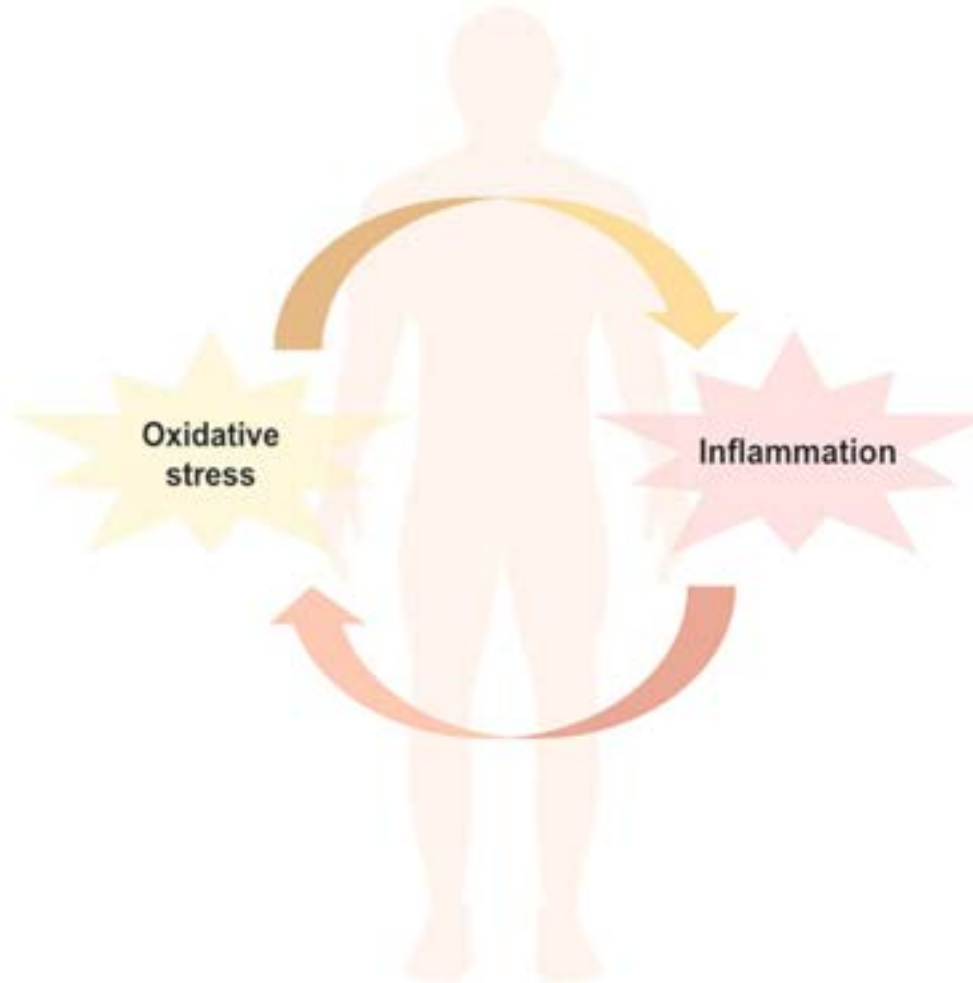
↑ MDA;  
↑ Lipoprotein-associated phospholi

### Antioxidant defense

↓ MPO protein level;  
↓ TAC; ↓ Ceruloplasmin

### Inflammation

↑ IL1RT1; ↑ IL2RA; ↑ TRAIL-





NUTRITIONAL STRESS  
DAMAGES OUR  
ENDOTHELIUM







#1 New York Times bestseller

**MICHAEL  
MOSS**

**SALT**



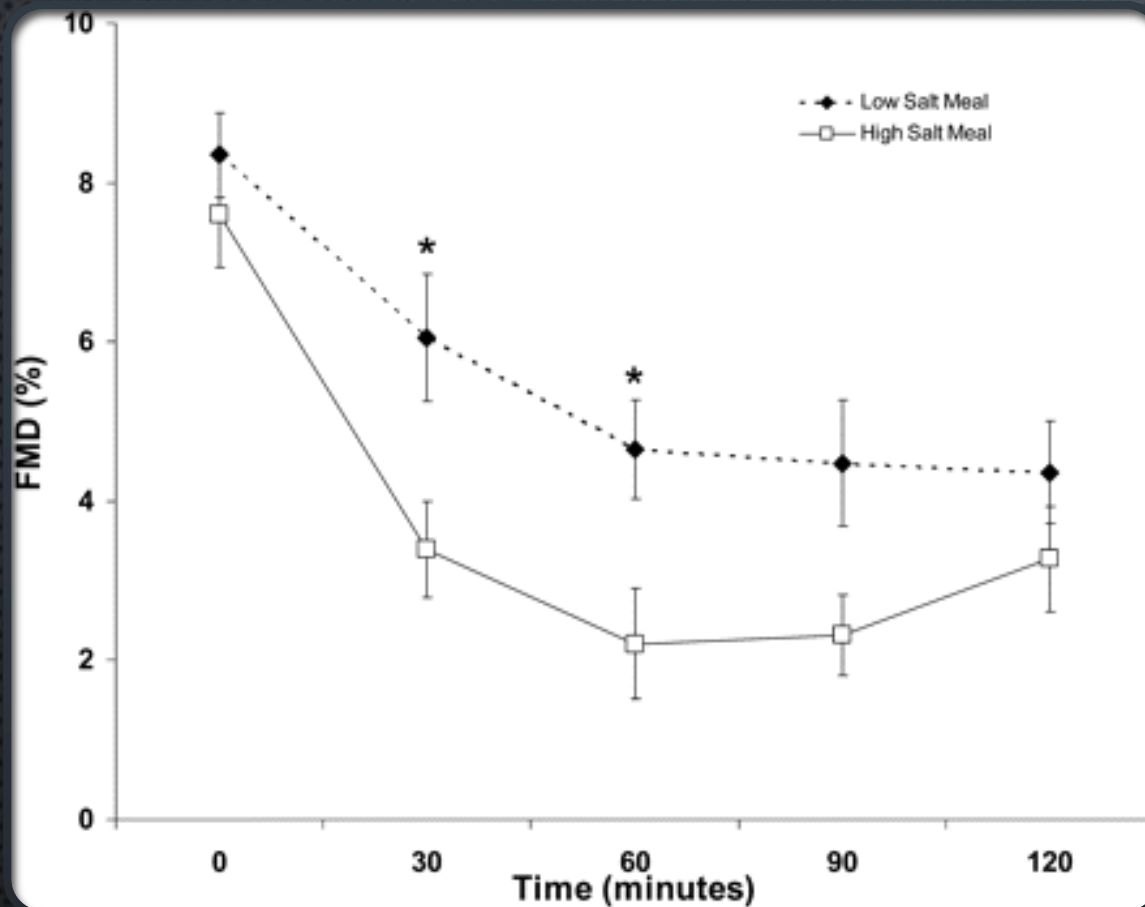
**SUGAR**

**FAT**

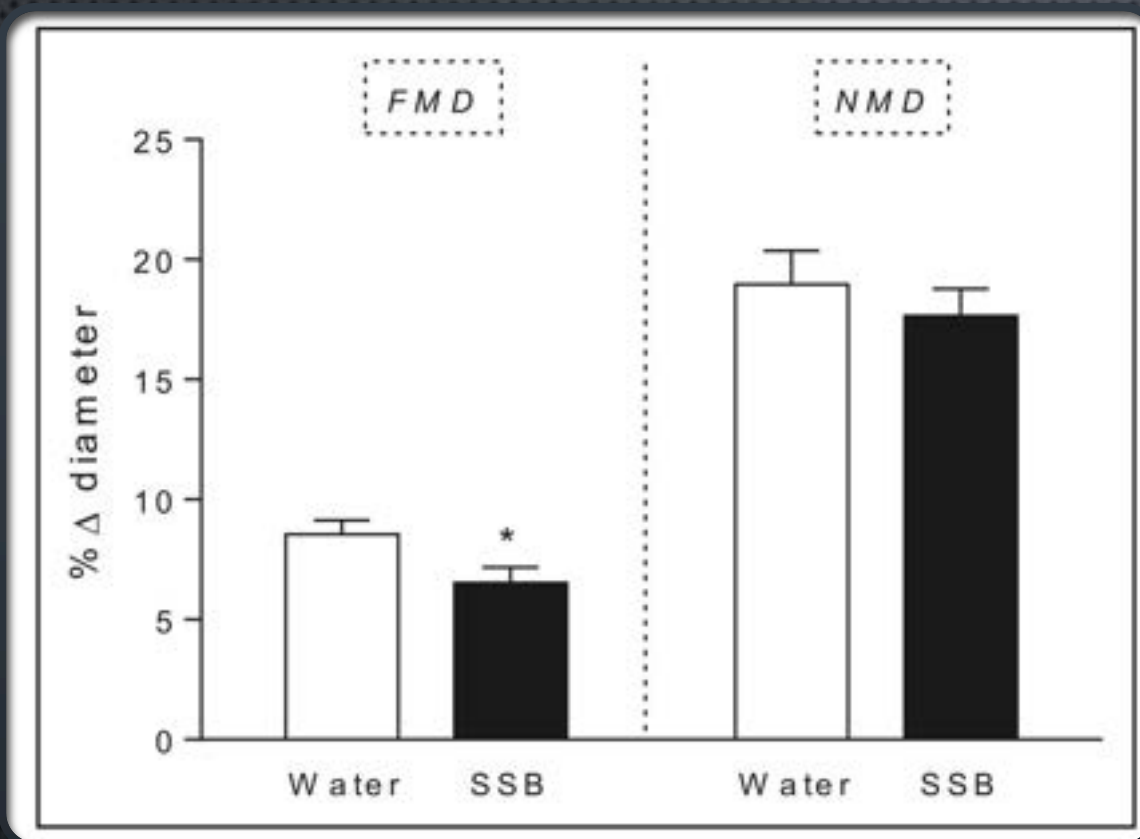




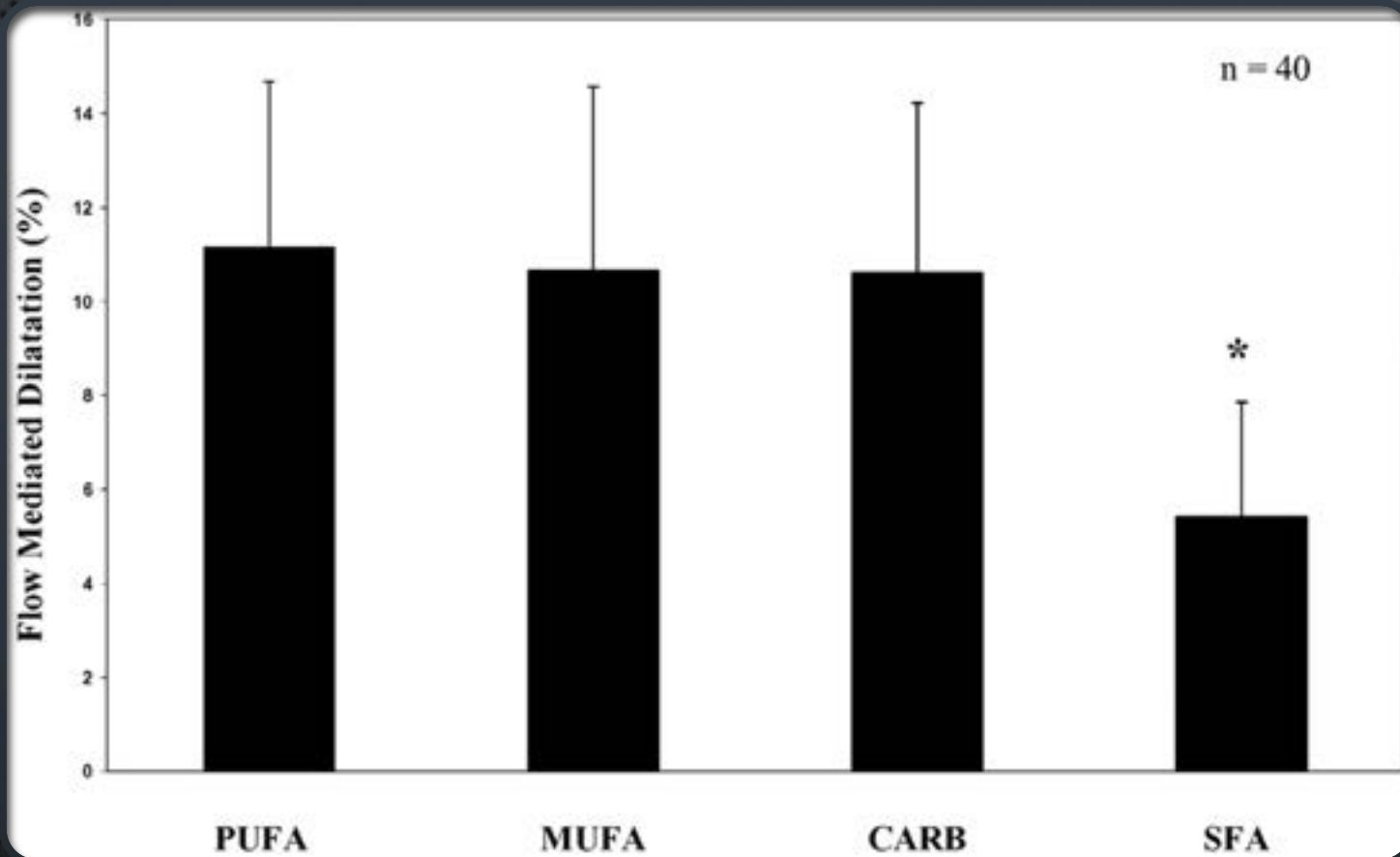
# ENDOTHELIAL FUNCTION IS IMPAIRED AFTER A HIGH-SALT MEAL IN HEALTHY SUBJECTS



# EFFECTS OF SUGAR-SWEETENED BEVERAGE CONSUMPTION ON MICROVASCULAR AND MACROVASCULAR FUNCTION IN A HEALTHY POPULATION

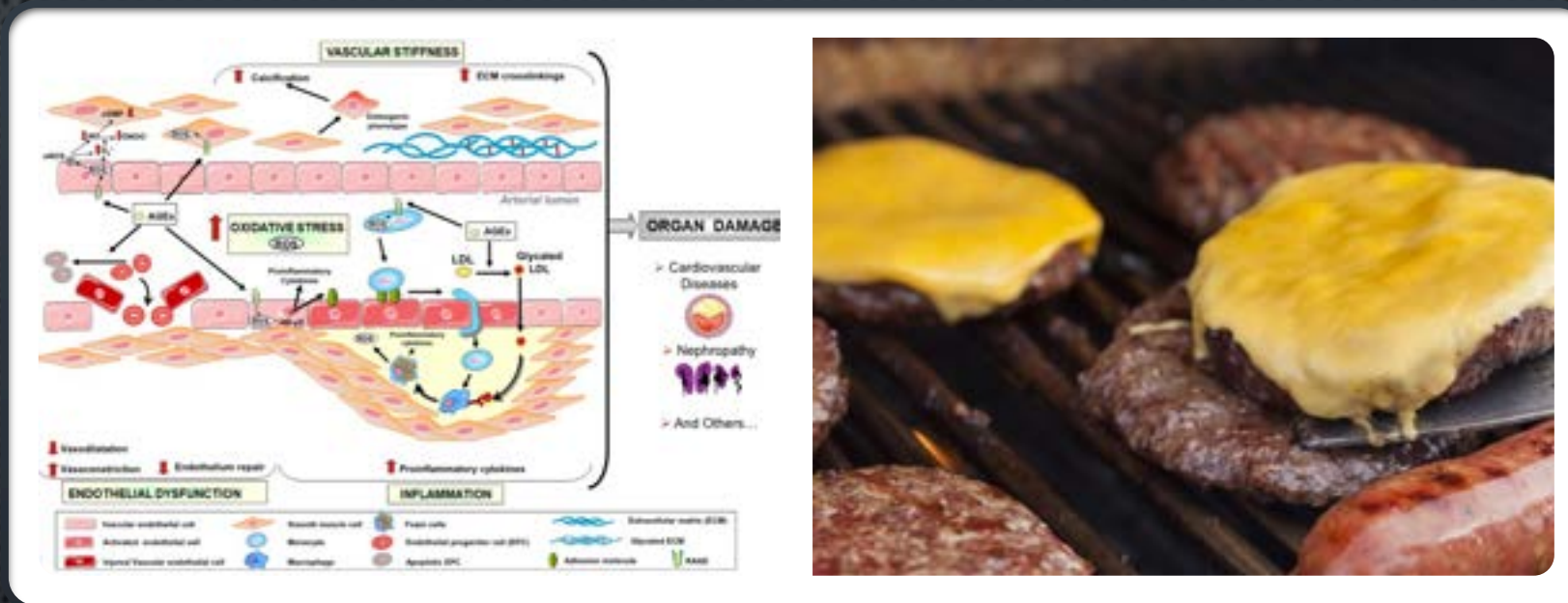






**FLOW-MEDIATED  
DILATATION IS  
IMPAIRED BY A  
HIGH-SATURATED  
FAT DIET BUT NOT  
BY A HIGH-  
CARBOHYDRATE  
DIET**



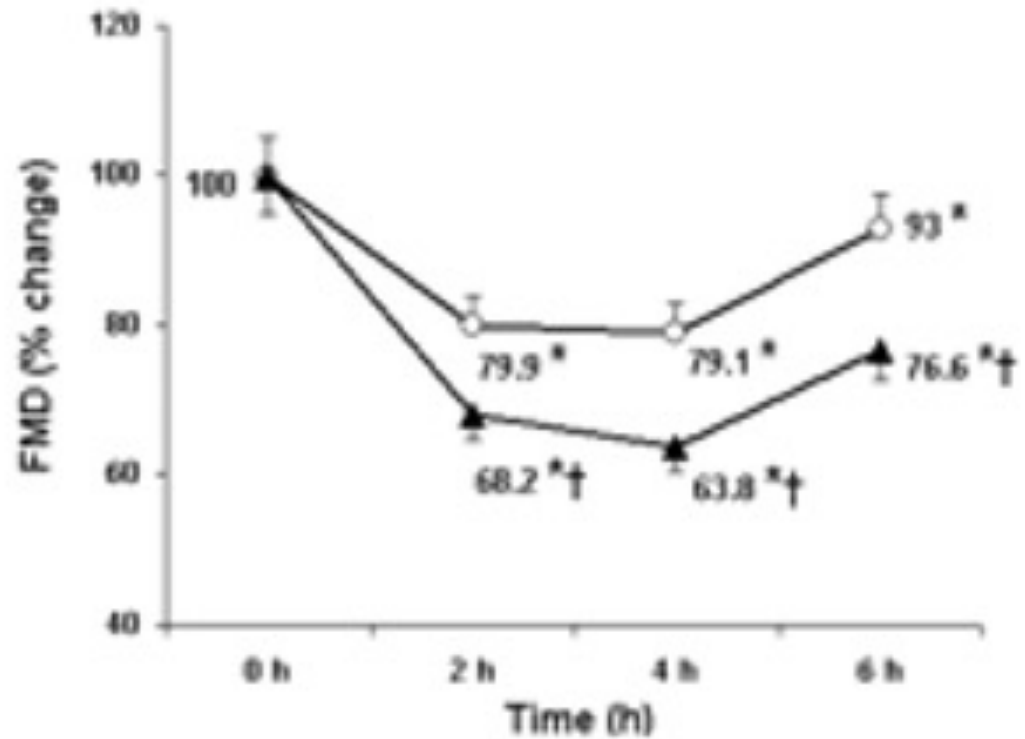


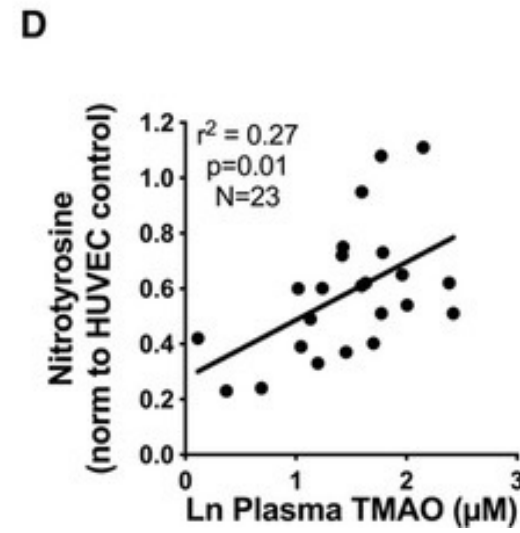
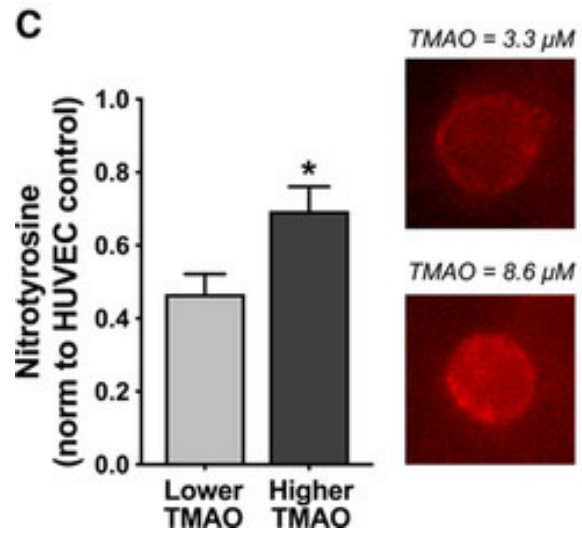
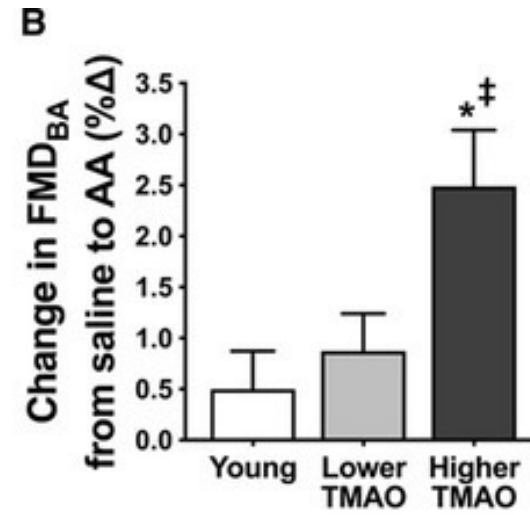
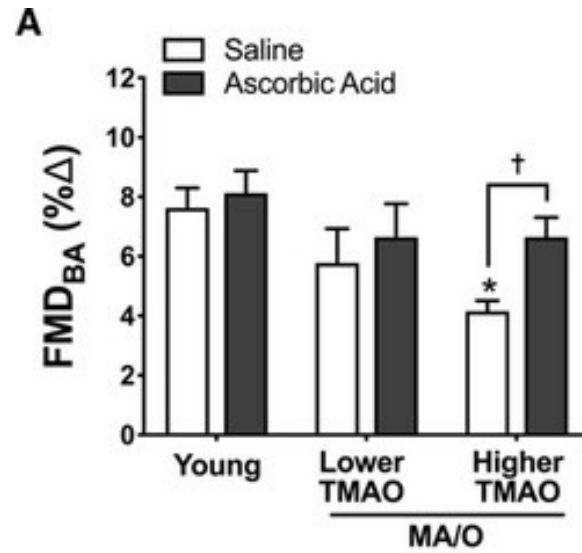
# ADVANCED GLYCATED END PRODUCTS





EFFECTS OF LOW- AND HIGH-  
AGE MEALS ON  
MACRO- AND  
MICROVASCULAR  
ENDOTHELIAL FUNCTION  
AND OXIDATIVE STRESS  
IN PATIENTS WITH TYPE 2  
DIABETES MELLITUS







WHAT ARE THE RESULTS  
FROM NUTRITION STRESS?





# Poor Nutrition is a Leading Causes Of Early Death Worldwide



**1 in 2** adults in the US has a preventable chronic condition for which nutrition can play a key role in **prevention and treatment**



**1 in 3** adults in the US has obesity



On any given day, **1/3** of Americans consume fast food



Eating out has **↑ 23%** since 1965, and time spent cooking has decreased significantly



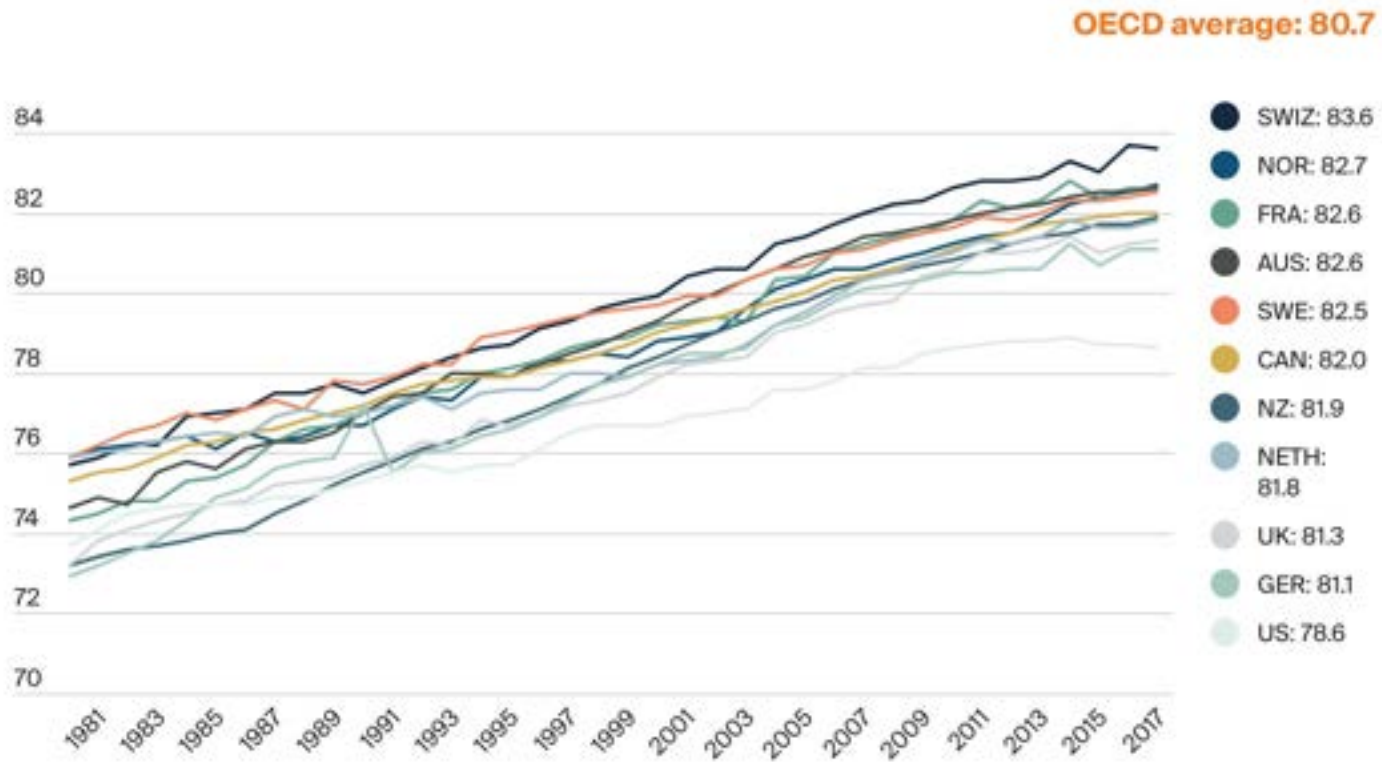


## HEALTH OUTCOMES

# The U.S. Has the Lowest Life Expectancy

Years

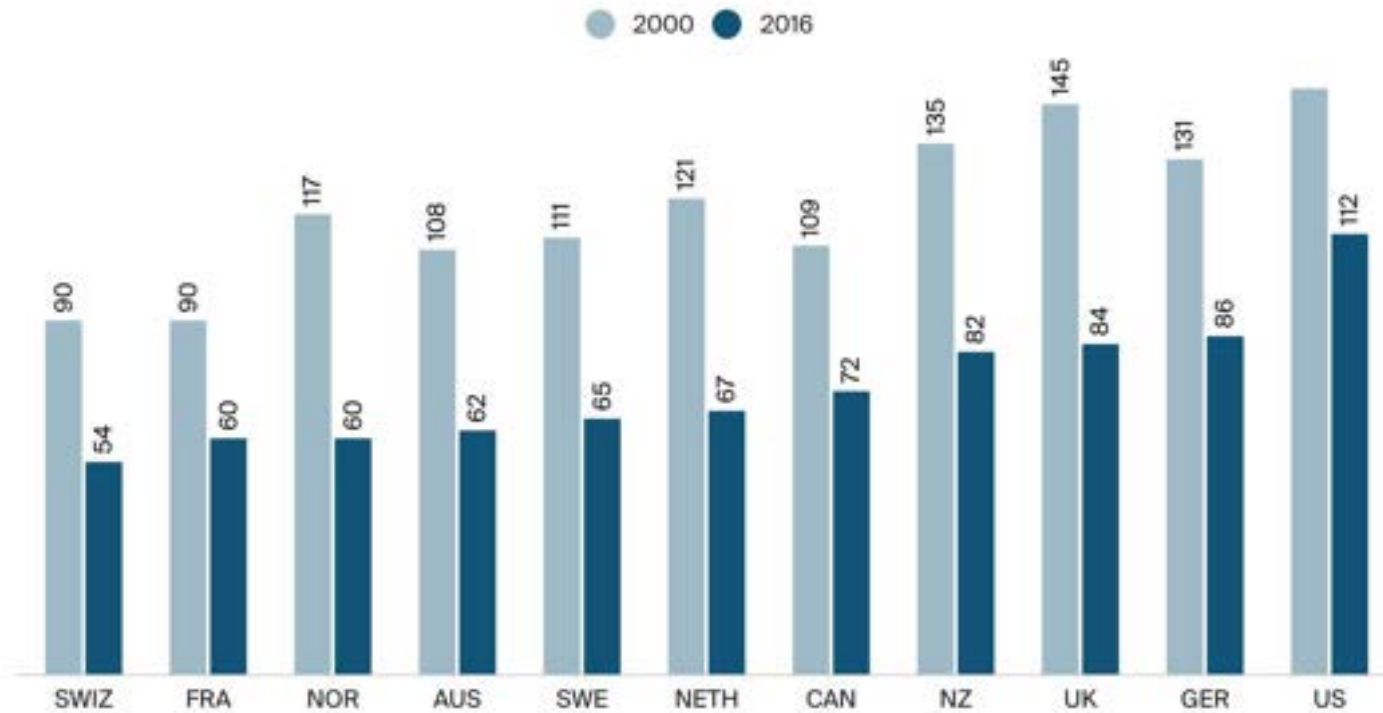
Legend shows 2017 data



## QUALITY AND CARE OUTCOMES

# The U.S. Has the Highest Rate of Avoidable Deaths

*Deaths per 100,000 population*

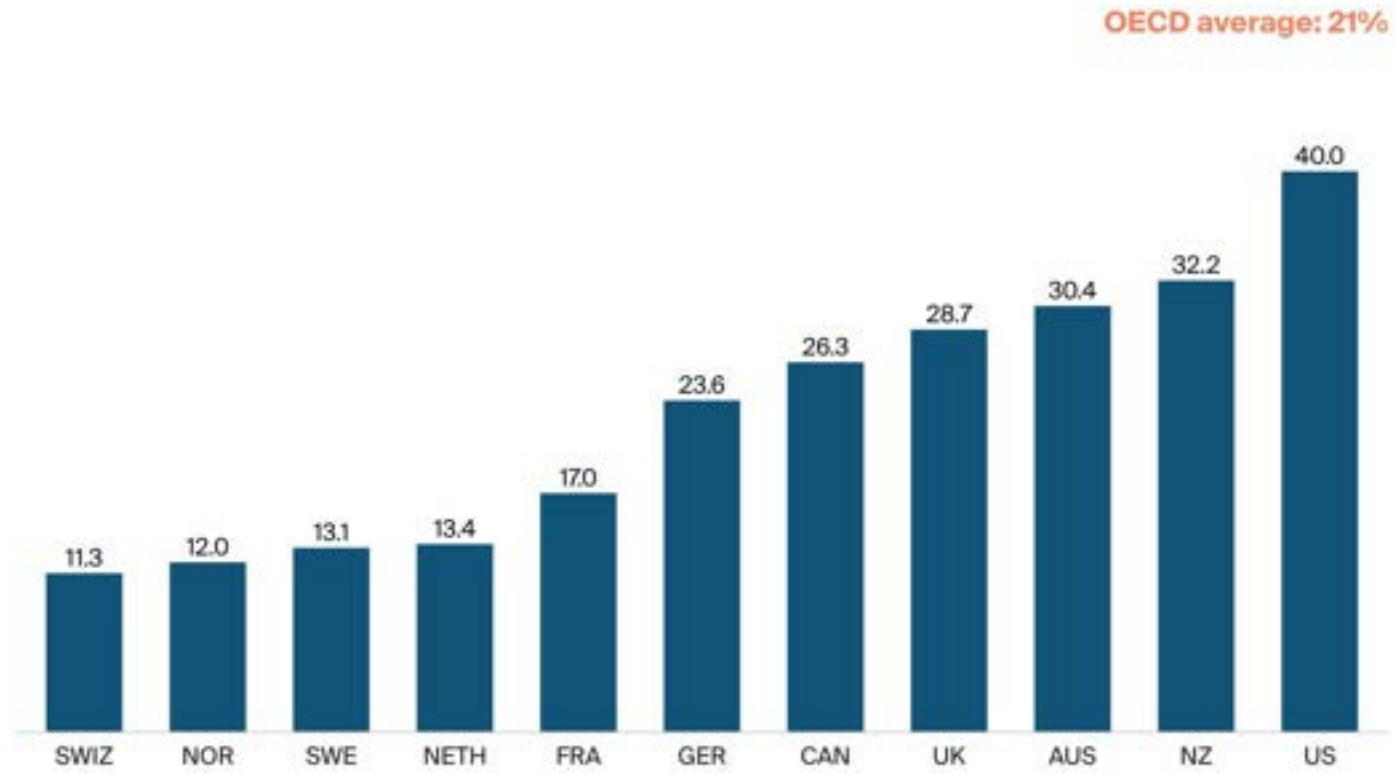




## POPULATION HEALTH

# The U.S. Has the Highest Rate of Obesity

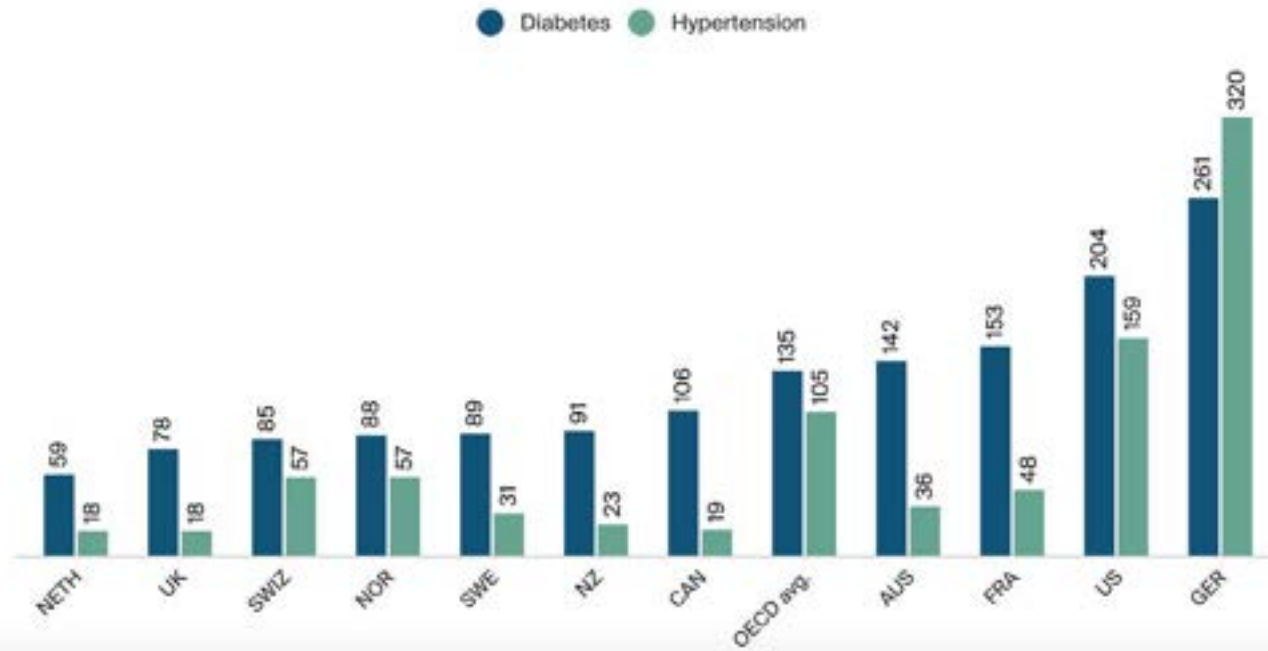
Percent (%)



## QUALITY AND CARE OUTCOMES

# The U.S. Has Among the Highest Rates of Hospitalizations from Preventable Causes Like Diabetes and Hypertension

*Discharges per 100,000 population*







Selfish



S  
E  
L  
F  
I  
S  
H

Spiritual

Exercise

Love

Food

Intimacy

Sleep

Humor





# S=SPIRITUALITY

“MEDITATION/PRAYER IS THE SINGLE MOST POWERFUL TOOL TO AID RECOVERY FROM DISEASE AND LEAD TO A LIFE OF MAXIMUM HEALTH”

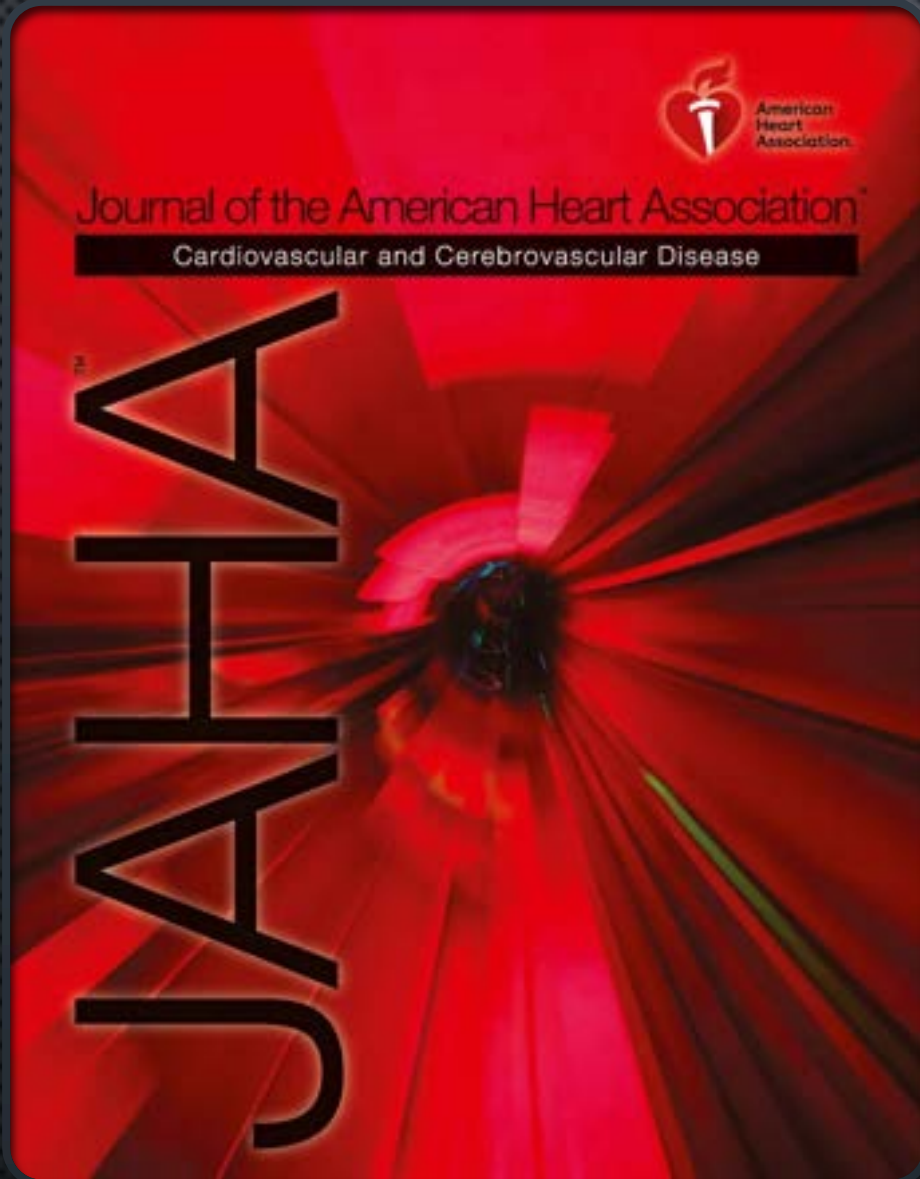
- IAN GAWLER





YOGA AND MEDITATION  
CAN SIGNIFICANTLY  
IMPROVE ENDOTHELIAL  
FUNCTION IN HEALTHY  
INDIVIDUALS AND PATIENTS  
WITH CARDIOVASCULAR  
DISEASE OR RISK FACTORS





# SPIRITUALITY

RELATIVE RISK FOR CVD MORTALITY WAS **SIGNIFICANTLY REDUCED BY 81%** IN THE TRANSCENDENTAL MEDITATION GROUP WHEN COMPARED WITH THE CONTROL GROUP.







# EFFECTS OF A RANDOMIZED CONTROLLED TRIAL OF TRANSCENDENTAL MEDITATION ON COMPONENTS OF THE METABOLIC SYNDROME IN SUBJECTS WITH CORONARY HEART DISEASE

IMPROVED PLASMA GLUCOSE AND INSULIN LEVELS WERE OBSERVED IN THE TRANSCENDENTAL MEDITATION GROUP VERSUS THE HEALTH EDUCATION GROUP AT THE CONCLUSION OF THE STUDY PERIOD ( $P = .01$ ).







**frontiers**  
in Psychology

OUR FINDINGS  
DEMONSTRATED THAT  
MEDITATION INCREASED  
CEREBRAL OXYGENATION  
AND ENHANCED  
PERFORMANCE, WHICH WAS  
ASSOCIATED WITH  
ACTIVATION OF THE PFC.





E=EXERCISE

“EXERCISE IS THE KEY NOT ONLY TO PHYSICAL HEALTH BUT TO PEACE OF MIND”

- NELSON MANDELA



THE SUBJECTS  
STRATIFIED AS  
SEDENTARY WERE **3**  
TIMES MORE LIKELY  
TO HAVE ELEVATED  
PERCEIVED STRESS.



 **Journal of Exercise Physiology Online**  
October 2014  
Volume 17 Number 5  
JEP Online

**Exercise Physiologists in the United States: A 2012 National Survey**  
Linda M. Wagdor

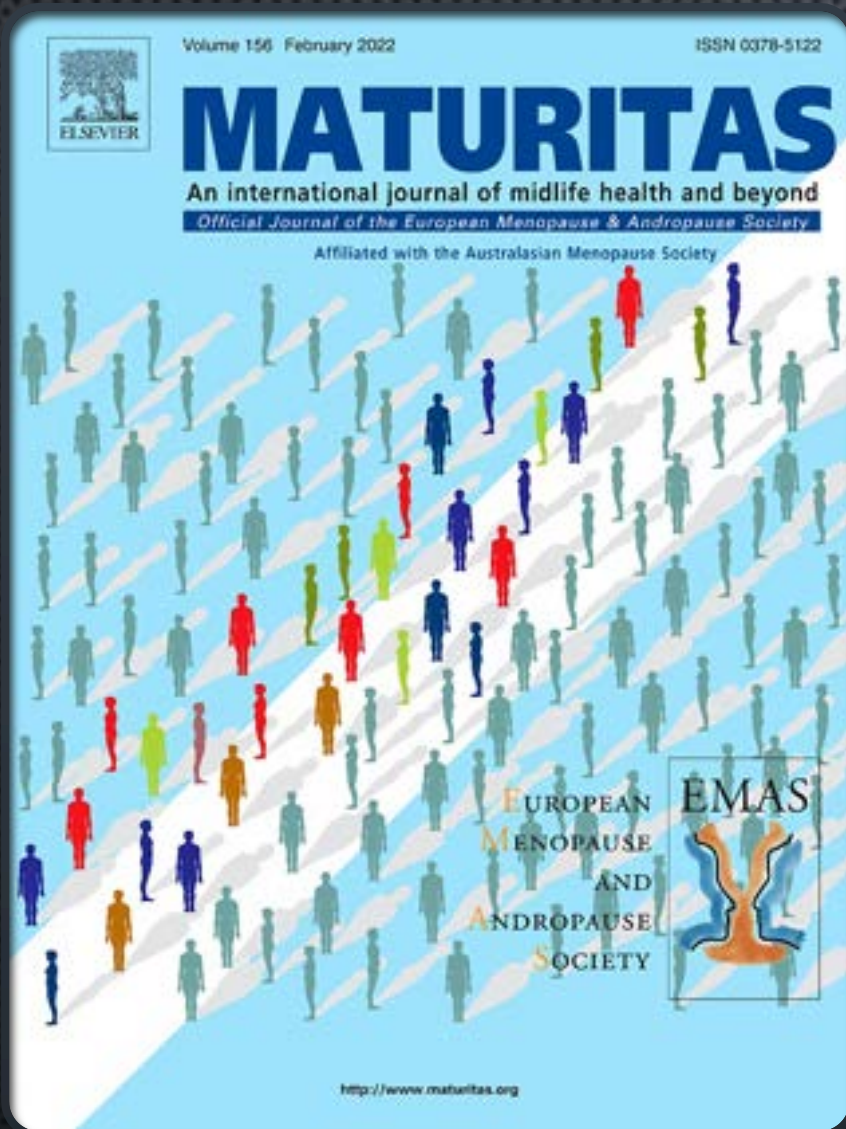
**ABSTRACT**

**Wagdor LM.** Exercise Physiologists in the United States: A 2012 National Survey. *JEP Online* 2014;17(5):1-18. Exercise physiology is an emerging discipline and exercise physiologists hold prominent positions in health-care and exercise settings, yet demographic data on this discipline are lacking. The purpose of this study was to use data from a national web-based survey to describe the educational and professional experience, work setting, and salary of exercise physiologists employed in the United States. An 11-item survey was made available on the Internet during the first 6 months of 2012. An open invitation to all exercise physiologists to take the survey was posted to the American Society of Exercise Physiologists (ASEP) website, and direct invitations were sent to exercise physiologists identified from the American College of Sports Medicine (ACSM) membership directory and faculty websites of universities that offer an exercise physiology course. Usable data came from 189 surveys. The sample included 54% male (83 of 150) and 46% female (65 of 142) (118 y), with 56% employed in universities (66%), 14% in health settings (24%), 14% in government (24%), 10% in academia (16%), and 16% in other settings (24%). Most (170) had a PhD, and 65% held at least one professional certification. The vast majority of exercise physiologists in academia took a PhD (84%), while most (84%) working in clinical settings have an MS degree. Although the median salary of the entire sample was \$60,000, there was considerable variability depending on the work setting, degree, years of experience, and geographical region of the country employed. Despite a recruitment bias toward ACSM members and those working in academia, this is the first national survey of exercise physiologists and, as such, it sets a precedent for future research.

**Key Words:** Exercise Physiology, Profession, Salary, Income







EXERCISE IMPROVES ANXIETY, STRESS,  
DEPRESSION.

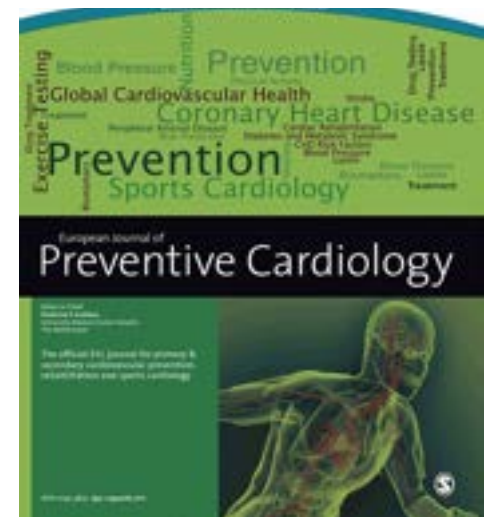
EXERCISE DECREASES INFLAMMATION.

EXERCISE IMPROVES PSYCHOLOGICAL,  
PHYSIOLOGICAL AND IMMUNOLOGICAL  
FUNCTIONS.

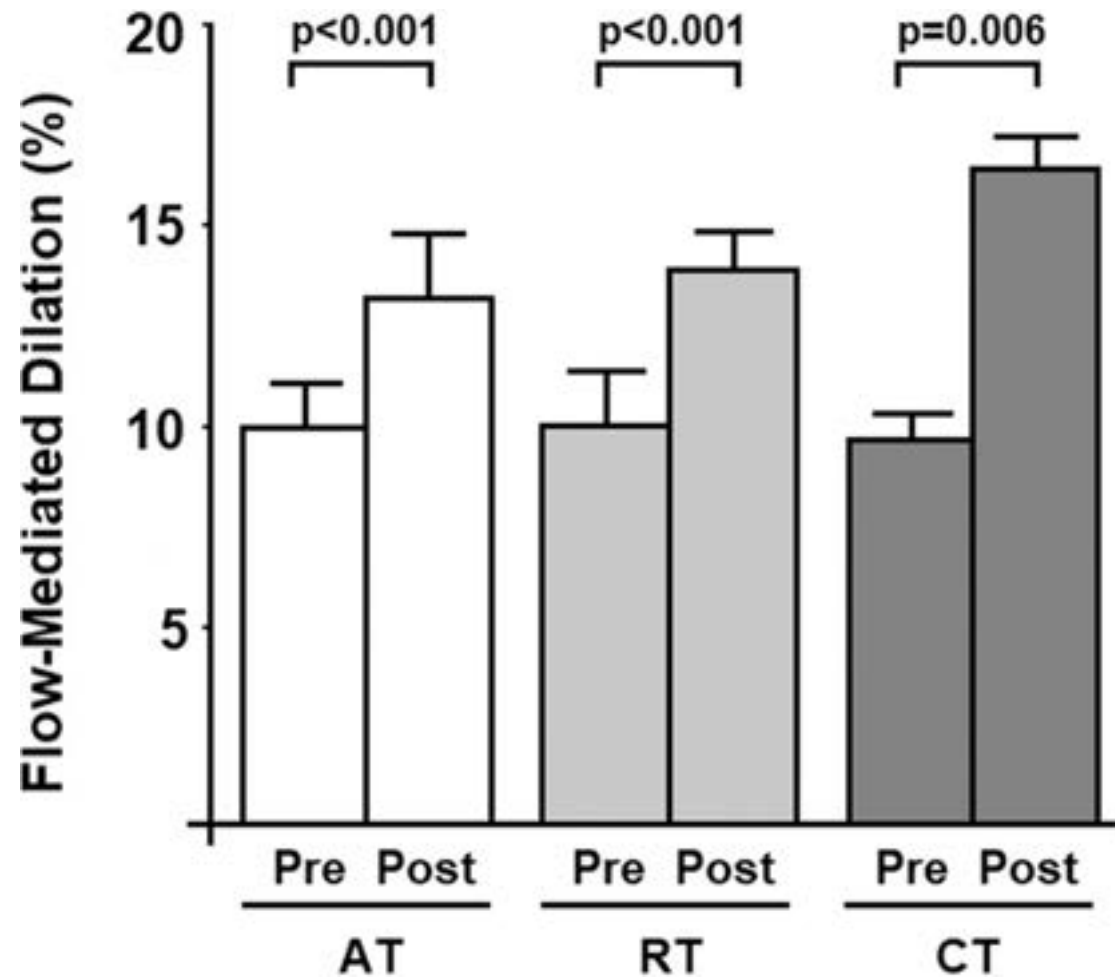




CONTINUOUS AND HIGH INTENSITY AEROBIC EXERCISE CAN **FAVORABLY AFFECT ENDOTHELIAL FUNCTION**, ...THESE TYPES OF AEROBIC EXERCISE HAVE A DIFFERENT IMPACT ON THE CENTRAL AND PERIPHERAL ARTERIAL STIFFNESS.

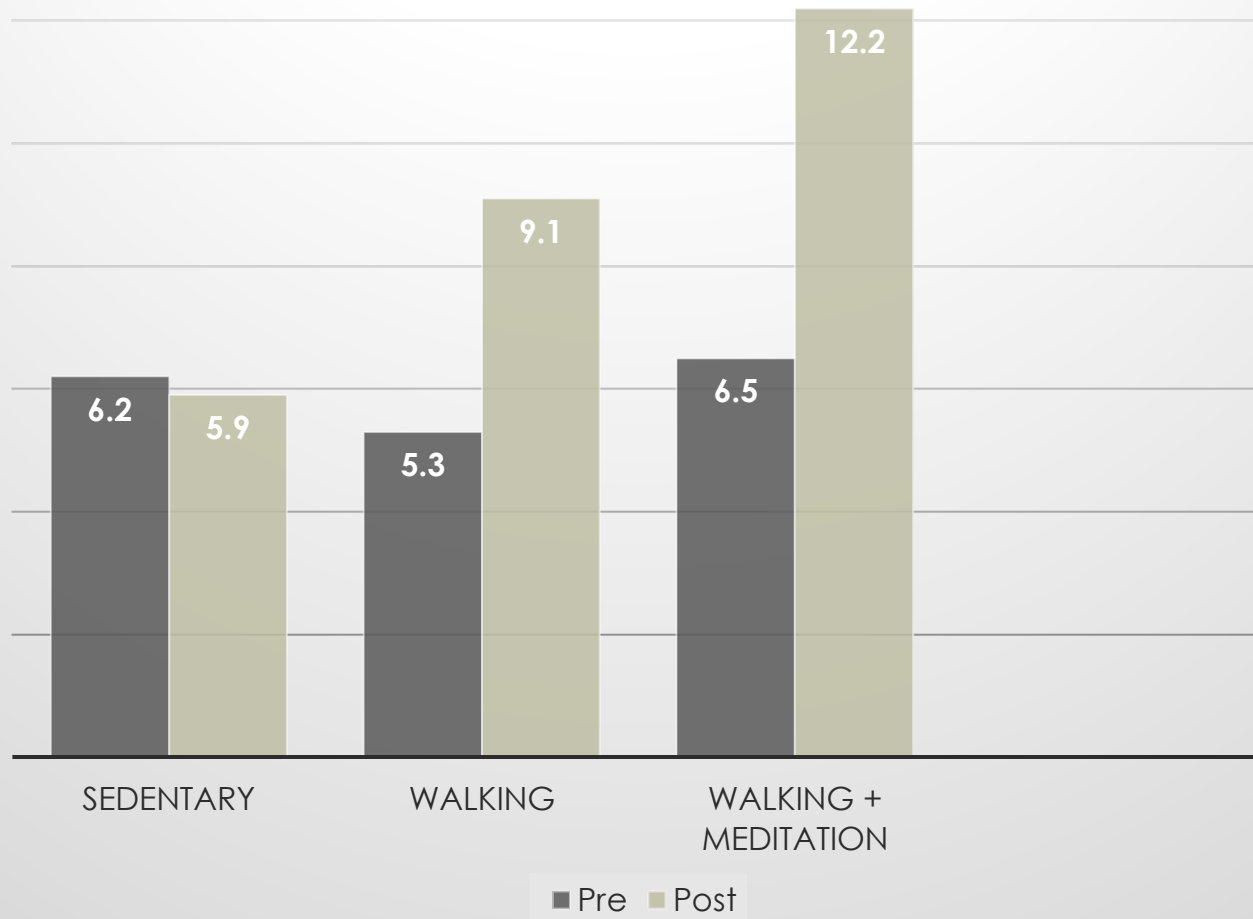






# EFFECTS OF EXERCISE ON FLOW MEDIATED DILATATION

## Flow Mediated Dilatation



EFFECT OF  
WALKING  
MEDIATION







Raphaely et al. IGI Global 20116

# EXERCISE

AS A RESULT OF A SERIES OF EPIDEMIOLOGICAL STUDIES, IT CAN BE CONCLUDED **THAT LEISURE-TIME PHYSICAL ACTIVITY IS EFFECTIVE IN THE PRIMARY PREVENTION OF CARDIOVASCULAR DISEASE**, WITH A DOSE-RESPONSE RELATIONSHIP THAT LEADS TO AN **≈20% REDUCTION IN CARDIOVASCULAR EVENTS AND AN INCREASE IN LIFE EXPECTANCY OF ≈5 YEARS.**



AN ACTIVE LIFESTYLE IS  
LINKED WITH A LOWER  
CHANCE OF DYING  
IMMEDIATELY FROM A HEART  
ATTACK, ACCORDING TO A  
STUDY PUBLISHED TODAY IN  
THE *EUROPEAN JOURNAL OF  
PREVENTIVE CARDIOLOGY*



EUROPEAN  
SOCIETY OF  
CARDIOLOGY





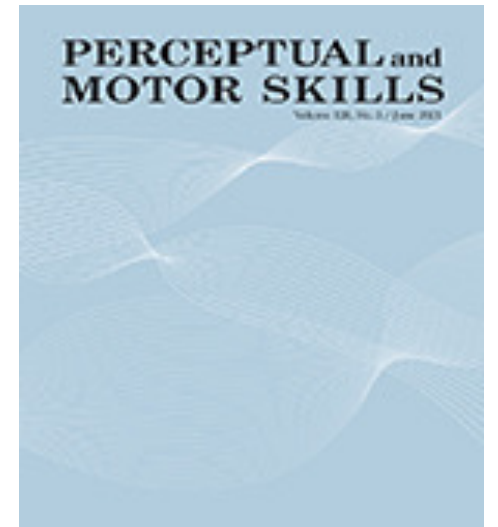


Healio 

ESTIMATED NUMBER OF DEATHS PREVENTED THROUGH  
INCREASED PHYSICAL ACTIVITY AMONG US ADULTS



WORKING ADULTS  
PARTICIPATING IN  
MODERATE AMOUNTS  
OF THESE ACTIVITIES  
HAVE ABOUT HALF THE  
RATE OF PERCEIVED  
STRESS AS  
NONPARTICIPANTS.





L=LOVE

“LOVE YOURSELF ENOUGH TO LIVE A HEALTHY LIFESTYLE”

- UNKNOWN







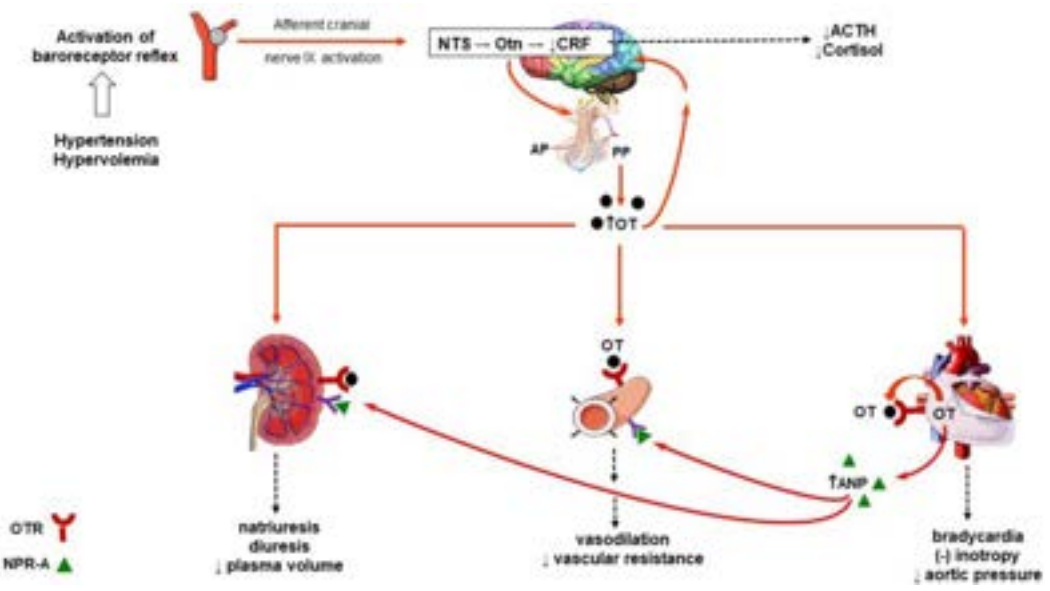


# LOVE

OXYTOCIN IS CARDIOPROTECTIVE BY REDUCING THE INFLAMMATORY RESPONSE AND IMPROVING CARDIOVASCULAR AND METABOLIC FUNCTION.

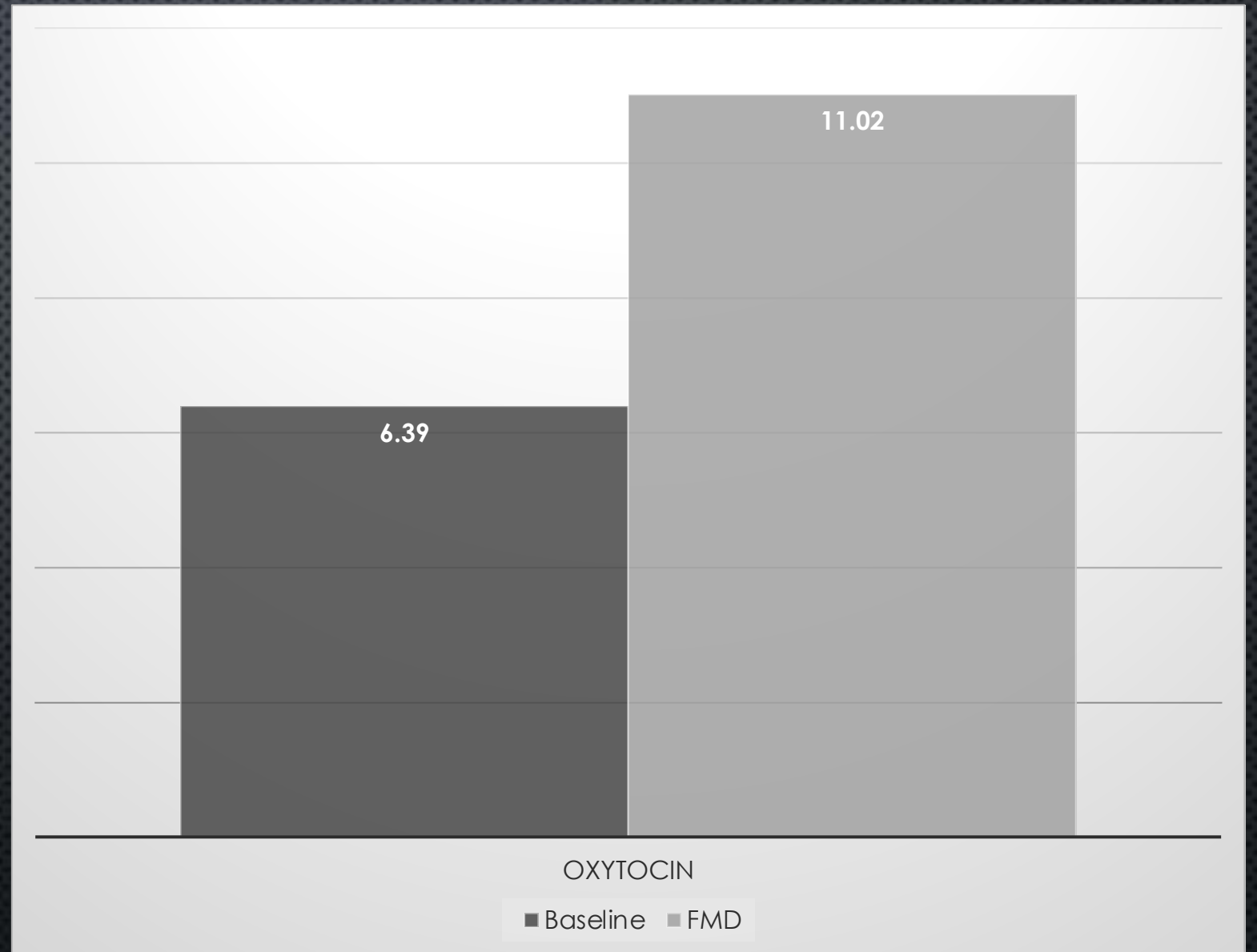


OXYTOCIN EXERTS ITS FUNCTIONS BY BINDING TO OTRS IN CARDIAC CELLS OR INDIRECTLY IN THE VASCULATURE TO REGULATE FUNCTION, SUCH AS DECREASING THE LEFT VENTRICULAR (LV) PRELOAD AND THE INOTROPIC STATE





# OXYTOCIN AND ENDOTHELIAL DYSFUNCTION



# LOVE IN ACTION: VOLUNTEERING

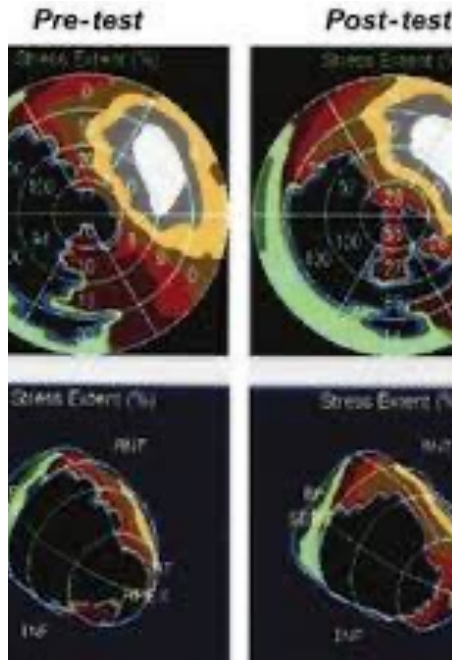
STUDIES HAVE CONSISTENTLY FOUND STRONG EVIDENCE SUPPORTING LINKS BETWEEN VOLUNTEERING AND A MULTITUDE OF PHYSICAL AND MENTAL HEALTH BENEFIT. THOSE WHO VOLUNTEER OFTEN EXPERIENCE INCREASED HAPPINESS, LESS CHRONIC PAIN, REDUCED RISK OF HEART DISEASE , BETTER PHYSICAL HEALTH AND INCREASED LIFE-EXPECTANCY. IN ADDITION, VOLUNTEERING CAN HELP COUNTERACT THE EFFECTS OF STRESS, ANGER, ANXIETY AND DEPRESSION





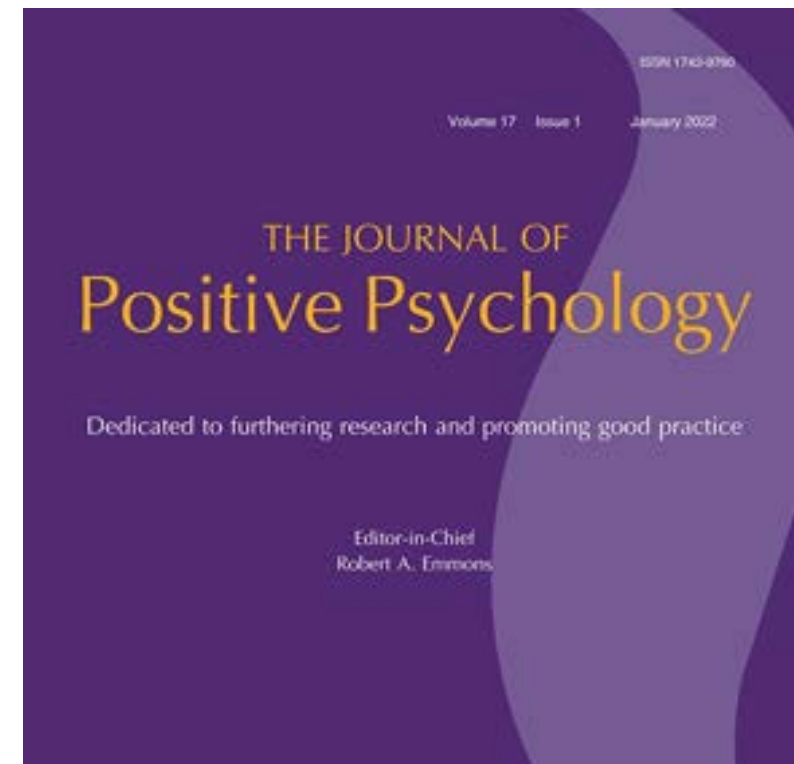
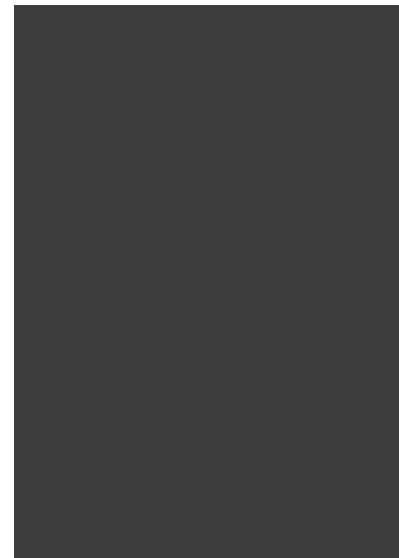
# LOVE IN ACTION: FORGIVENESS

PATIENTS ASSIGNED TO THE **FORGIVENESS GROUP** SHOWED SIGNIFICANTLY **FEWER ANGER-RECALL INDUCED MYOCARDIAL PERFUSION DEFECTS** FROM PRE-TEST TO THE 10-WEEK FOLLOW-UP



# LOVE IN ACTION: GRATITUDE

- RESULTS OF 13 STUDIES (FROM AN ORIGINAL POOL OF 234), BOTH EXPERIMENTAL (N = 11) AND NON-EXPERIMENTAL (N = 2) SHOW THAT **GRATITUDE POSITIVELY IMPACTS BIOMARKERS SUCH AS ENDOTHELIAL DYSFUNCTION, PROGNOSTIC INFLAMMATORY MARKERS, AND IMPROVES ADHERENCE TO HEALTH BEHAVIORS**





F = FOOD

“THE FOOD YOU EAT CAN BE EITHER THE SAFEST & MOST POWERFUL FORM OF  
MEDICINE OR THE SLOWEST FORM OF POISON”

- ANN WIGMORE



# FOODS THAT FIGHT STRESS







THE STUDY EXAMINED THE **LINK BETWEEN FRUIT AND VEGETABLE INTAKE AND STRESS LEVELS**

THE FINDINGS REVEALED **PEOPLE WHO ATE AT LEAST 470 GRAMS OF FRUIT AND VEGETABLES DAILY HAD 10 PER CENT LOWER STRESS LEVELS THAN THOSE WHO CONSUMED LESS THAN 230 GRAMS.**





75<sup>TH</sup> ANNIVERSARY

**BJN**

**BRITISH JOURNAL  
OF NUTRITION**

Volume: 127

Number: 4

28 February 2022

An International Journal  
of Nutritional Science

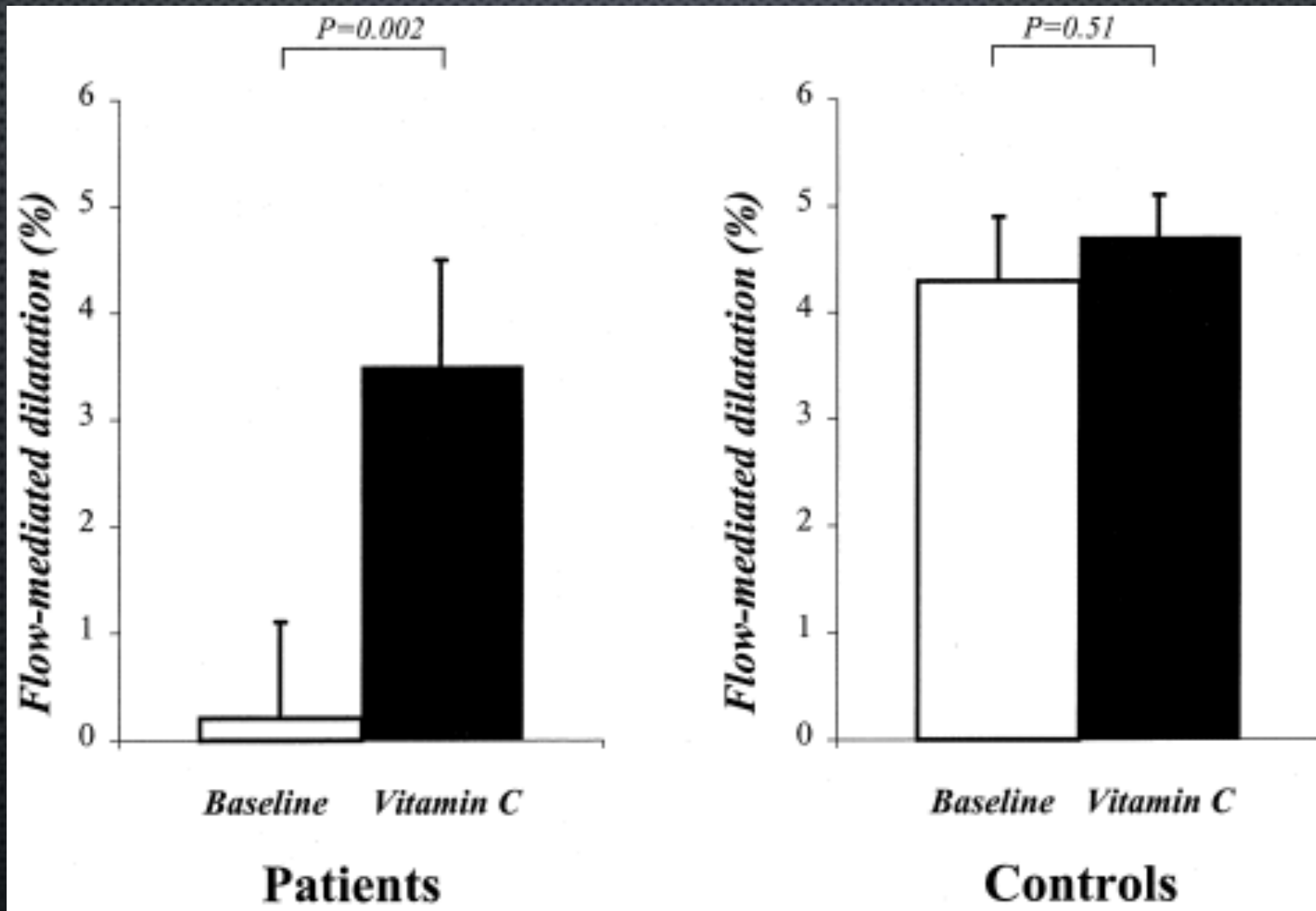
**NS** THE NUTRITION SOCIETY  
Advancing Nutritional Science

Published on behalf of The Nutrition Society by Cambridge University Press. ISSN 0007-1145

2018 META-ANALYSIS OF  
OBSERVATIONAL STUDIES  
PROVIDES FURTHER  
EVIDENCE THAT FRUIT AND  
VEGETABLE INTAKE WAS  
PROTECTIVELY ASSOCIATED  
WITH DEPRESSION









RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL IN 70 WOMEN WITH PMS, THE **DAILY SUPPLEMENTATION WITH 0.2 G OF CURCUMIN** FOR 10 DAYS DURING THREE CONSECUTIVE MENSTRUAL CYCLES SIGNIFICANTLY **REDUCED OVERALL PMS SEVERITY**, AS ASSESSED BY A COMPOSITE MEASURE OF ALL EMOTIONAL, BEHAVIORAL, AND PHYSICAL SYMPTOMS







CONSUMPTION OF 40 G  
OF DARK AND MILK  
CHOCOLATE DAILY  
DURING A PERIOD OF 2  
WEEKS APPEAR TO BE AN  
EFFECTIVE WAY TO  
***REDUCE PERCEIVED  
STRESS IN FEMALES.***





CURRENT EVIDENCE  
SUGGESTS THAT **PROBIOTICS**  
**CAN REDUCE SUBJECTIVE**  
**STRESS LEVEL IN HEALTHY**  
**VOLUNTEERS** AND MAY  
ALLEVIATE STRESS-RELATED  
SUBTHRESHOLD  
ANXIETY/DEPRESSION LEVEL.





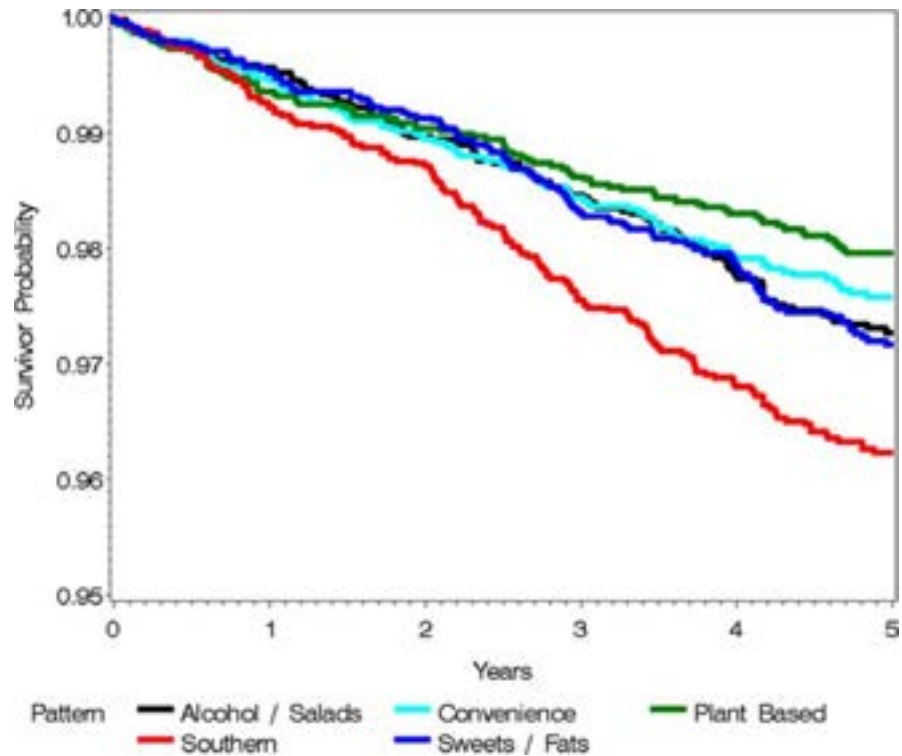
# GREEN LEAFY VEGETABLES

MODERATE VEGETABLE NITRATE INTAKE WAS ASSOCIATED WITH **12%, 15%, 17% AND 26% LOWER RISK OF ISCHEMIC HEART DISEASE, HEART FAILURE, ISCHEMIC STROKE AND PERIPHERAL ARTERY DISEASE HOSPITALIZATIONS** RESPECTIVELY.

CONSUMPTION OF AT LEAST ~ 60 MG/DAY OF VEGETABLE NITRATE (~ 1 CUP OF GREEN LEAFY VEGETABLES) MAY MITIGATE RISK OF CVD.







# SOUTHERN DIET PATTERN ASSOCIATED WITH ACUTE HEART DISEASE





**A SOUTHERN DIETARY PATTERN RICH IN PROCESSED AND FRIED FOODS WAS ASSOCIATED INDEPENDENTLY WITH MORTALITY IN PERSONS WITH CKD. IN CONTRAST, A DIET RICH IN FRUITS AND VEGETABLES APPEARED TO BE PROTECTIVE.**



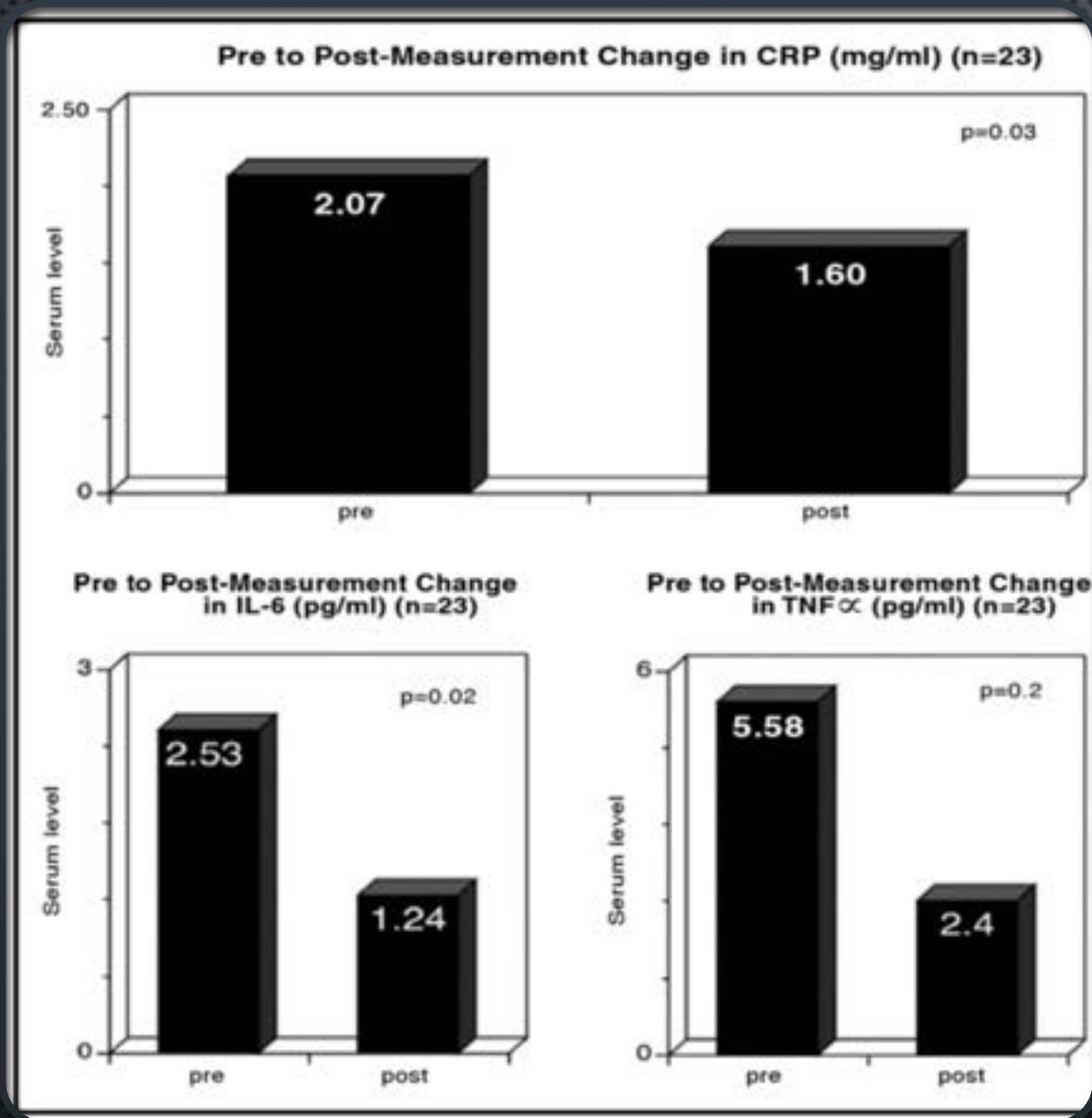


DATA SUGGEST THAT  
ADHERENCE TO A  
**SOUTHERN STYLE DIET**  
**MAY INCREASE THE RISK**  
**OF STROKE**, WHEREAS  
ADHERENCE TO A MORE  
PLANT-BASED DIET MAY  
REDUCE STROKE RISK.

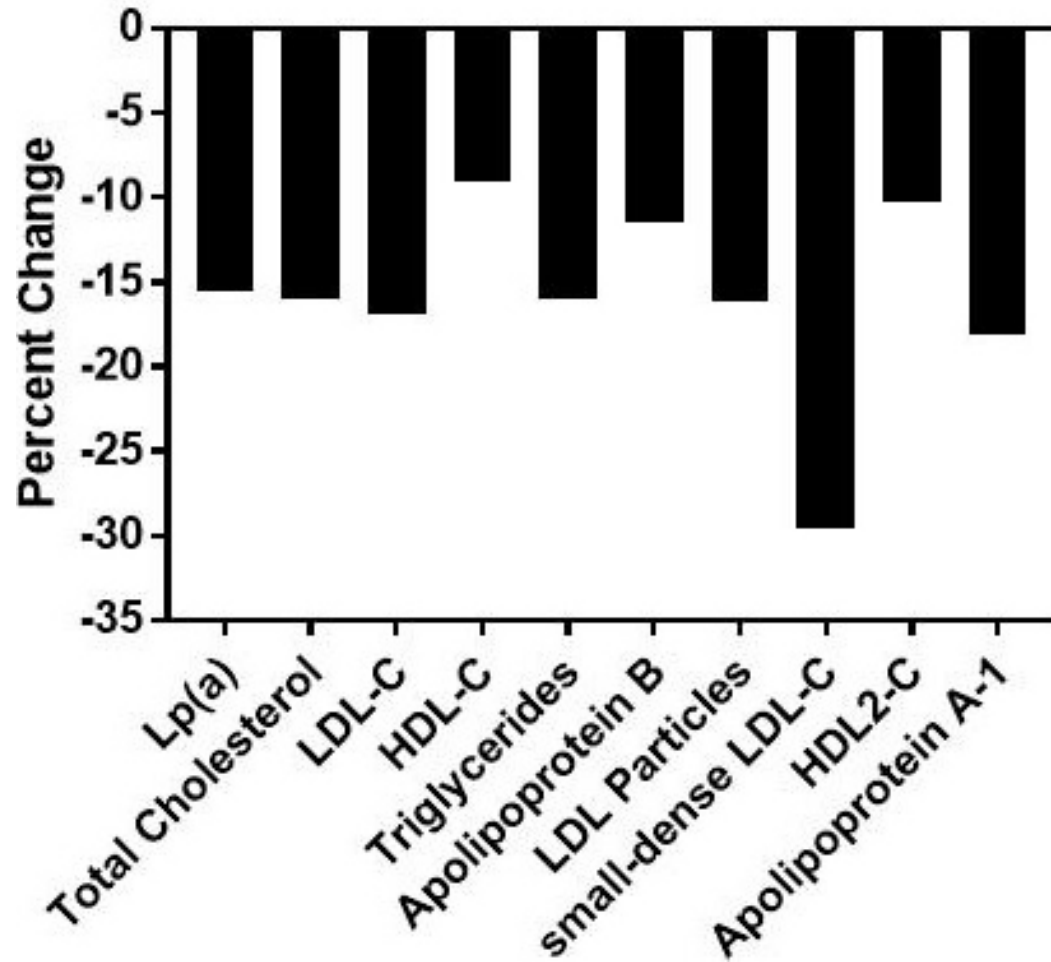




# EFFECT OF INTENSIVE LIFESTYLE CHANGES ON ENDOTHELIAL FUNCTION AND INFLAMMATORY MARKERS OF ATHEROSCLEROSIS



## Reductions in Biomarkers



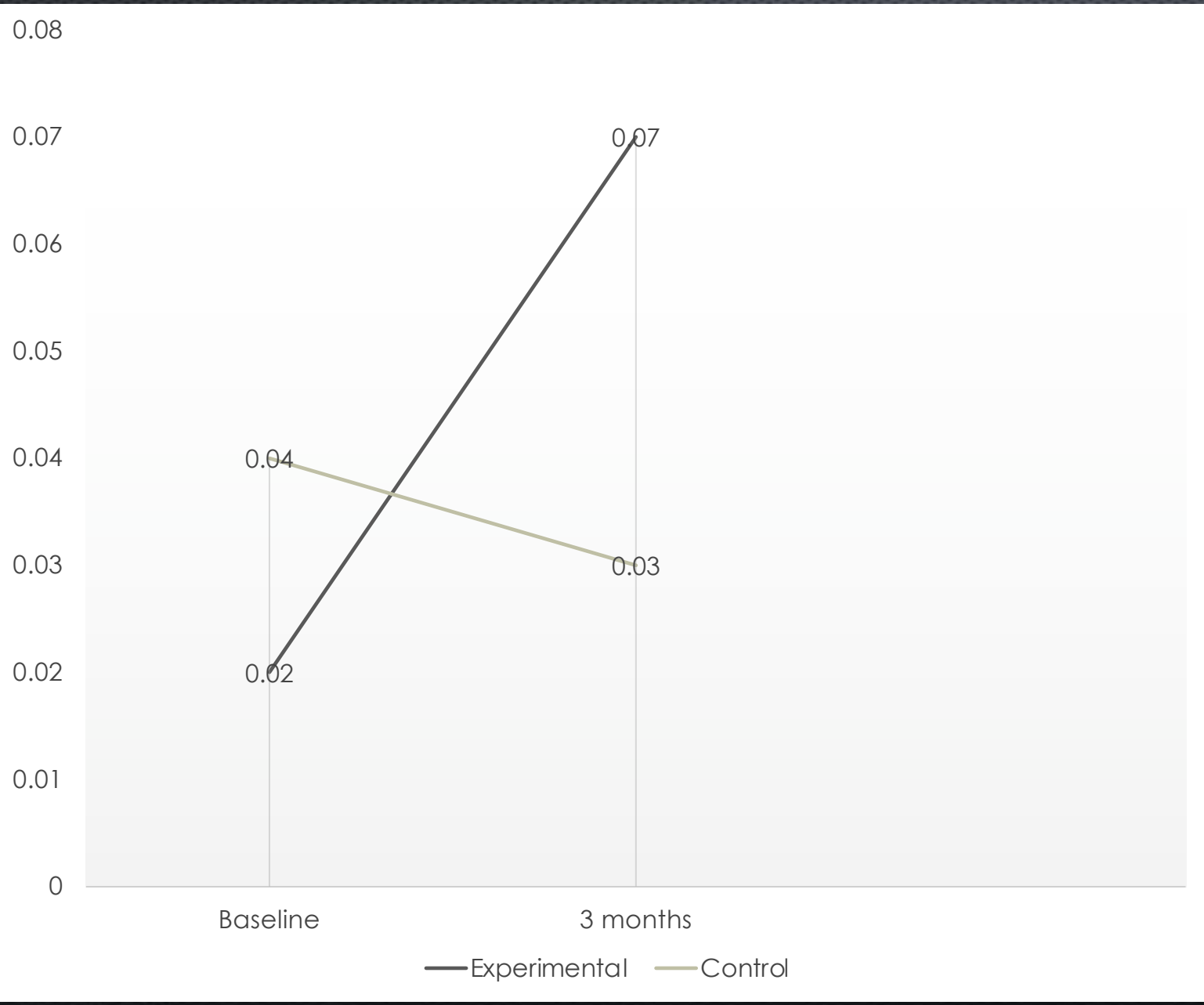
### CLINICAL INVESTIGATIONS

Consumption of a defined, plant-based diet reduces lipoprotein(a), inflammation, and other atherogenic lipoproteins and particles within 4 weeks

Rami S. Najjar<sup>1</sup> | Carolyn E. Moore<sup>2</sup> | Baxter D. Montgomery<sup>3,4</sup>







# EFFECT OF INTENSIVE LIFESTYLE CHANGES ON ENDOTHELIAL FUNCTION



# |=INTIMACY

“TRUE FRIENDSHIP IS LIKE SOUND HEALTH; THE VALUE OF IT IS SELDOM KNOWN  
UNTIL IT IS LOST”

- CHARLES CALEB COLTON





JULIANNE HOLT-LUNSTAD  
OF BRIGHAM YOUNG  
UNIVERSITY COMPARED  
THE RISK EFFECTS OF  
LONELINESS, ISOLATION  
AND WEAK SOCIAL  
NETWORKS TO SMOKING  
15 CIGARETTES A DAY.



THEORETICAL EXPLANATIONS FOR THE STRESS-BUFFERING ROLE OF SOCIAL SUPPORT OFTEN INCLUDE PSYCHOLOGICAL PATHWAYS—E.G., **RELATIONSHIPS CAN REDUCE PERCEIVED STRESS BY AFFECTING APPRAISAL PROCESSES, PROMOTING POSITIVE AFFECT, OR REDUCING DEPRESSIVE SYMPTOMS**







RESEARCHERS  
DOCUMENTED LOWER  
ANXIETY, DEPRESSION  
AND LONELINESS, AS  
WELL AS CHANGES IN  
KEY STRESS AND  
BONDING BIOMARKERS





S=SLEEP

“SLEEP IS THE GOLDEN CHAIN THAT TIES HEALTH AND OUR BODIES TOGETHER”

- THOMAS DEKKER





AFTER ADJUSTING FOR AGE,  
EMPLOYMENT STATUS AND PHYSICAL  
CO-MORBIDITY, **PERCEIVED  
STRESS WAS SIGNIFICANTLY  
ASSOCIATED WITH SLEEP  
DISTURBANCE** WHILE RESILIENCE  
AND SOCIAL SUPPORT WERE  
ASSOCIATED WITH A LOW  
LIKELIHOOD OF SLEEP DISTURBANCE.



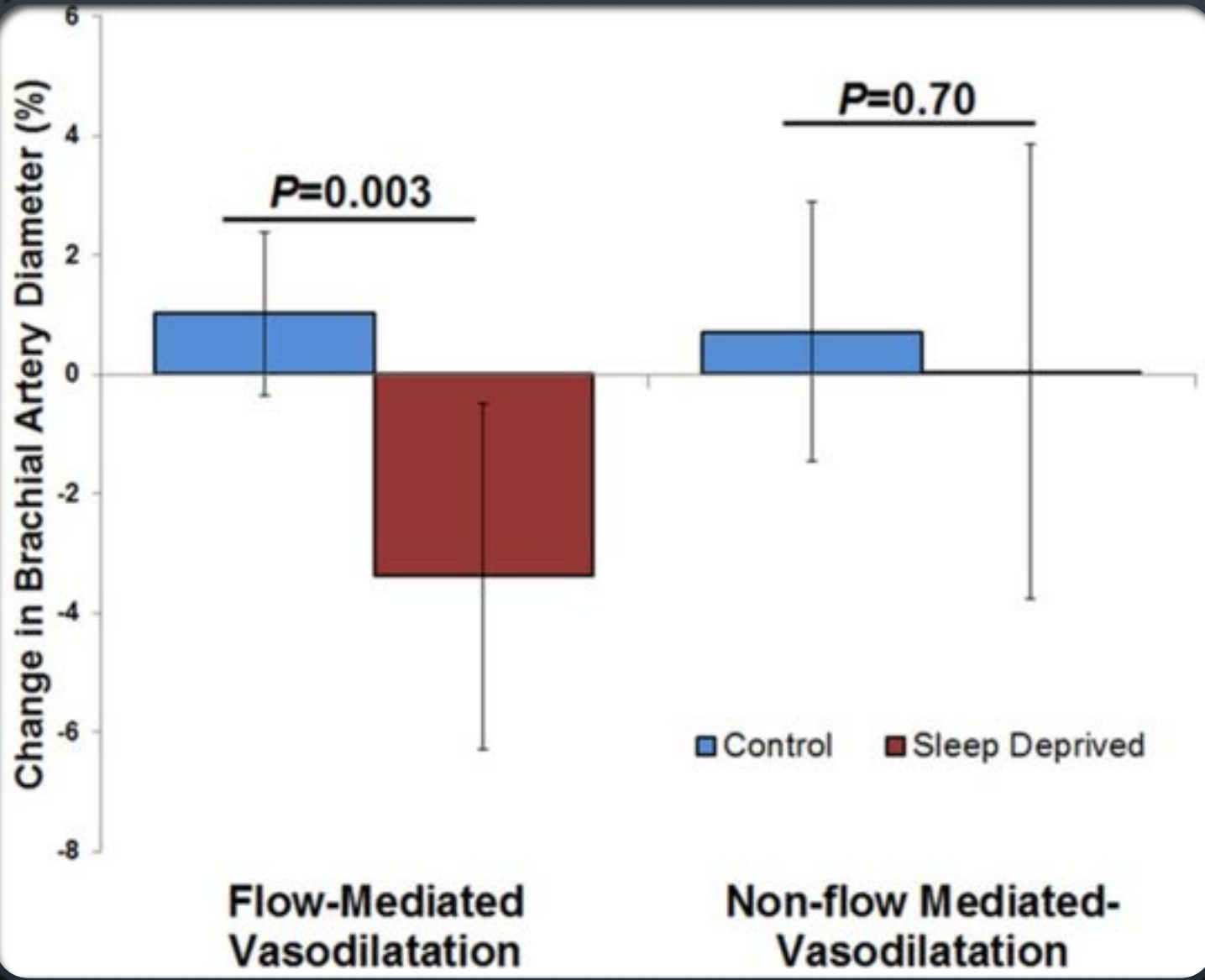
**ADULTS WHO SLEEP FEWER THAN EIGHT HOURS A NIGHT REPORT HIGHER STRESS LEVELS THAN THOSE WHO SLEEP AT LEAST EIGHT HOURS A NIGHT (5.5 VS. 4.4 ON A 10-POINT SCALE). ON AVERAGE, ADULTS WITH LOWER REPORTED STRESS LEVELS REPORT SLEEPING MORE HOURS A NIGHT THAN DO ADULTS WITH HIGHER REPORTED STRESS LEVELS (7.1 VS. 6.2 HOURS).**



AMERICAN  
PSYCHOLOGICAL  
ASSOCIATION







# SLEEP & ENDOTHELIAL FUNCTION



**Current** Cardiology  
Reviews



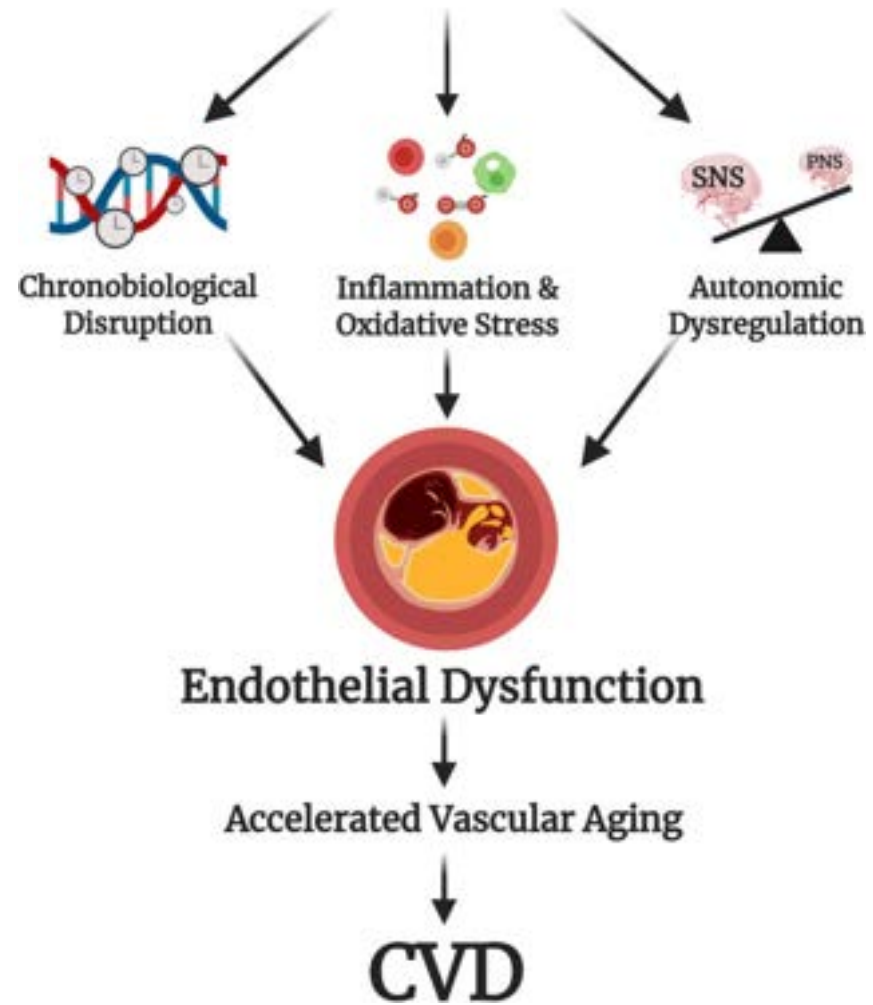
# SLEEP

THE ANALYSIS INDICATED THAT MORTALITY RATES FROM ISCHEMIC HEART DISEASE, CANCER, STROKE, AND ALL CAUSES COMBINED WERE LOWEST FOR INDIVIDUALS SLEEPING 7 OR 8 HR PER NIGHT. MEN SLEEPING 6 HR OR LESS, OR 9 HR OR MORE, HAD 1.7 TIMES THE TOTAL AGE-ADJUSTED DEATH RATE OF MEN SLEEPING 7 OR 8 HR PER NIGHT. THE COMPARABLE RELATIVE RISK FOR WOMEN WAS 1.6.





# Sleep Deprivation



H=HUMOR

"TROUBLE KNOCKED AT THE DOOR, BUT, HEARING LAUGHTER, HURRIED AWAY"

BENJAMIN FRANKLIN





WE FOUND THAT THE **FREQUENCY OF LAUGHTER ATTENUATED THE ASSOCIATION BETWEEN STRESSFUL EVENTS AND SUBSEQUENT STRESS SYMPTOMS.** THE LEVEL OF INTENSITY OF LAUGHTER, HOWEVER, WAS FOUND TO HAVE NO SIGNIFICANT EFFECT



COMPARED TO THE CONTROL GROUP, **PSYCHOLOGICAL STRESS LEVELS AND SALIVARY CORTISOL LEVELS WERE LOWER IN THE HUMOR GROUP**, YET NO DIFFERENCES WERE FOUND IN RESPONSE TIMES AND ACCURACY RATES FOR THE VISUAL SEARCH TASK.

OUR RESULTS DEMONSTRATE THAT A **SHORT HUMOROUS INTERVENTION SHIELDS AGAINST SUBSEQUENT PSYCHOLOGICAL STRESS** LEAVING COGNITIVE PERFORMANCE INTACT, THUS MAKING IT HIGHLY APPLICABLE TO IMPROVE MENTAL AND PHYSICAL HEALTH IN EVERYDAY LIFE SITUATIONS.



Scientific Reports





# HUMOR

EVEN AFTER ADJUSTMENT FOR HYPERLIPIDEMIA, HYPERTENSION, DEPRESSION, BODY MASS INDEX, AND OTHER RISK FACTORS, **THE PREVALENCE OF HEART DISEASES AMONG THOSE WHO NEVER OR ALMOST NEVER LAUGHED WAS 1.21 (95% CI, -1.03–1.41) TIMES HIGHER THAN THOSE WHO REPORTED LAUGHING EVERY DAY.** THE ADJUSTED PREVALENCE RATIO FOR STROKE WAS 1.60 (95% CI, 1.24–2.06).



go ahead, get

**Selfish**







[WWW.HEALTHYHEARTDOC.ORG](http://WWW.HEALTHYHEARTDOC.ORG)

