

Motivational strategies for physiotherapists

Niall McGrane¹, Tara Cusack², Grainne O'Donoghue³, Emma Stokes¹

¹Discipline of Physiotherapy, School of Medicine, Trinity College Dublin, Trinity Centre for Health Sciences, James' St., Dublin 8, Republic of Ireland, ²School of Public Health, Physiotherapy and Population Science, College of Life Sciences, University College Dublin, Belfield, Dublin 4, Republic of Ireland, ³Centre for Preventive Medicine, School of Health and Human Performance, Dublin City University, Dublin 9, Republic of Ireland

Physical inactivity and non-adherence to physiotherapy are common problems. Physiotherapists as promoters, preventers and rehabilitators are ideally placed to influence physical activity behaviours. Possessing the knowledge and skills to facilitate this behaviour change and to promote adherence to physiotherapy must be viewed as clinical competency. This paper reviews four psychological strategies; self-determination theory, social cognitive theory, cognitive behavioural therapy and motivational interviewing that have been shown to have a positive influence on exercise behaviour. The origins and theoretical model of all four are discussed and an example of an intervention based on each model from the literature is provided. A review of how physiotherapists can use each to inform their practice follows. To conclude the similarities between all four that can be implemented into practice are discussed.

Keywords: Exercise, motivation, patient adherence, physical activity, physiotherapy

Introduction

Physical inactivity and all the resulting consequences are well known to healthcare professionals (HCP). Recommended levels of physical activity (PA) have been devised by the American College of Sports Medicine (ACSM) to guide HCP and the public. Non-adherence to PA guidelines is common with evidence suggesting that 31% of the world's population are not meeting them.¹ While there is an abundance of research revealing the benefits of PA² there is also evidence of non-compliance with PA guidelines¹ and physiotherapy prescriptions and non-attendance to physiotherapy sessions.³

The World Confederation for Physical Therapy state that physiotherapists are 'experts in movement and exercise and with a thorough knowledge of risk factors and pathology and their effects on all systems, physical therapists are the ideal professionals to promote, guide, prescribe and manage exercise activities and efforts'.⁴ Incontestable epidemiological trends highlight the fact that for the foreseeable future, illness care will be dominated by an escalation in chronic lifestyle-related diseases.⁵ Furthermore, with the shift in focus from episodic individual care to promotion of health in the community and recognition of the importance of lifestyle, physiotherapists' role as promoters, preventers, and rehabilitators has them ideally placed to influence PA behaviours.⁶

Many people treated by physiotherapists may not grasp the importance of completing exercise programmes for a successful outcome or have little or no prior history of sustained exercise. A report published by the United Kingdom's National Health Service in 2011 states that the majority of adults are aware that PA recommendations exist, but few know what they are.⁷ Of a random sample of US adults only 33% correctly identified the ACSM guidelines for PA.⁸

Increasing PA, exercise prescriptions, and maintenance of rehabilitation regimes are essential interventions for physiotherapists. Adherence to these interventions is an important part of the rehabilitation process and adherence to prescriptions is necessary for a positive outcome. The success of many physiotherapy plans require not only attendance at treatment sessions but adherence to exercise prescriptions that are completed in the individual's own time, unsupervised.

Despite physiotherapists' unique position of influence, physiotherapy education fails to provide instruction on strategies to positively influence PA behaviour and tackle the problem of non-adherence.⁹ In a recent study, physiotherapy clinical educators identified psychological strategies for changing PA behaviour as one of the main areas absent from clinical education⁹ while experienced physiotherapists reported being unaware of strategies to change PA behaviour and improve adherence.¹⁰

Possessing the knowledge and skills to facilitate behaviour change must be viewed as a clinical competency for contemporary physiotherapy. Physiotherapists

Correspondence to: Emma Stokes, Discipline of Physiotherapy, School of Medicine, Trinity College Dublin, Trinity Centre for Health Sciences, James' St., Dublin 8, Republic of Ireland. Email: estokes@tcd.ie

must promote PA and adherence in a proven evidence-based manner. Therefore the purpose of this article is to present four psychological strategies, self-determination theory (SDT), social cognitive theory (SCT), cognitive behavioural therapy (CBT), and motivational interviewing (MI), that can be utilized to influence PA behaviour.

These four strategies have been shown to have a positive influence on exercise behaviour.¹¹ Based on the literature, this article will provide a brief description of the origins of each theory, an understanding of how each model works, an example of an intervention based on the model, and a review of how physiotherapists can use them to fulfil their role as PA promoters, preventers, and rehabilitators.

Self-determination Theory

Origins

Self-determination is defined by Webster's Dictionary as the act or power of making up one's own mind about what to think or do, without outside influence or compulsion. According to Ryan and Deci¹² self-determination theory is the concept of autonomous self regulation comprising both intrinsic and well-internalized extrinsic motivation. Intrinsic motivation exists when an individual participates in an activity for enjoyment and fulfilment; there is no external reward (extrinsic motivation). In terms of maintenance of health, SDT is focussed on the process by which an individual initiates a new, health-related behaviour and maintains it over time.¹³ It is widely accepted that human beings are intrinsically motivated, however it appears that intrinsic motivation is prevalent only under certain conditions and in particular circumstances. Self-determination theory focuses on the environmental and social supports that when present facilitate and enhance intrinsic motivation.

Theoretical model

Self-determination theory focuses primarily on an individual's psychological needs, namely autonomy, competence, and relatedness. Autonomous behaviour refers to acting with a sense of volition and willingness. When individuals are autonomously motivated they are interested and invested in what they are doing. Deci and Ryan¹⁴ maintain that autonomy in relation to health care means encouraging individuals to make choices about how to behave, providing them with the information they need, and respecting the choices they make. Competence is the degree to which people feel able, and have the confidence to achieve their desired outcomes.¹⁴ Creating a sense of autonomy and competence are essential for the internalization and integration of behavioural change. Individuals are more likely to adopt changes if they have a sense of being respected, understood, and cared for. Self-determination theory terms this relatedness. This will enable the

development of trust and connection which will allow internalization to occur.¹³

Self-determination theory suggests that maintenance of self-determined motivation depends, in part, on social and contextual factors which can facilitate or undermine intrinsic motivation. Specifically a subcomponent of SDT, cognitive evaluation theory, suggests that the level of intrinsic motivation experienced is dependent on whether the social environment supports the individual's needs for autonomy and competence.¹⁵ For example, in the presence of a physiotherapist adherence may be high. However, in the absence of a physiotherapist the non-self-determined individual's adherence will decrease. Specific factors within social environments that are referred to as autonomy supportive have been found to promote autonomous self-regulation both by helping people maintain intrinsic motivations and facilitating internalization of extrinsic motivation.¹⁴

Example from the literature

In the literature it would appear that SDT is not widely used in current physiotherapy practice. However it has been successfully employed in other areas including medication adherence,¹⁶ weight management,¹⁷ and substance abuse.¹⁸ Lonsdale *et al.*¹⁵ examined the relationship between self-determined motivation and students' objectively measured PA levels. This study demonstrated that students with self-determined motivation in physical education classes achieved more PA than non self-determined individuals. Thøgersen-Ntoumani and Ntoumanis¹⁹ conducted a study examining the role of self-determined motivation in the understanding of exercise-related behaviours. The results illustrated the importance of promoting self-determined motivation in exercisers to improve the quality of their experiences, as well as to foster exercise behaviour.

Use by physiotherapists

Self-determination theory suggests that autonomy support from others is important in motivating change of various health behaviours.²⁰ This is an important consideration for physiotherapists who are frequently concerned with modifying individuals' lifestyle choices. In SDT there is an emphasis on not attempting to control individuals, but respecting their frame of reference and facilitating them to engage in their own care.¹⁴ Self-determination theory means providing individuals with relevant information to make their own informed choices. Facilitating individuals to be more knowledgeable allows physiotherapists to enhance understanding and hence increase the possibility that the individual will persevere with lifestyle changes which they themselves have determined.

Increasing PA may not be an intrinsically enjoyable activity. However, if an individual understands and values the benefits of PA after discussing it with their physiotherapist, their intrinsic motivation to participate will increase. In time an individual will, with the extrinsic support of a physiotherapist, develop the confidence to change and embrace change on a voluntary basis. Autonomy support from HCP has been shown to facilitate the internalization of autonomy and competence.²⁰ The expertise, together with the respectful caring approach that physiotherapists bring to the practitioner–patient relationship, increases experiences of connection and trust thereby facilitating the internalization of change. Embracing SDT would offer physiotherapists the possibility of improving an individual’s adherence to an exercise programme and/or health behaviour changes. Self-determination theory, for example, is ideal for individuals progressing through the stages of cardiac rehabilitation. Enhancing understanding, creating an autonomy supportive programme, increasing competence and relatedness could be implemented successfully to progress individuals to become long-term exercisers.

Cognitive Behavioural Therapy

Origins

Cognitive behavioural therapy emerged from two theories of learning, classical and operant conditioning. Classical conditioning originated from the work of Pavlov and his dogs while operant conditioning was described by Thorndike’s Law of Effect and was further developed by Skinner in the 1950s. Pavlov conducted experiments on dogs, ringing a bell when he served them food. When the food was served the dogs would automatically salivate. This was termed the unconditioned response to an unconditioned stimuli. Over time, with continued repetition of the sequence of events the dogs would salivate to the sound of the bell. This is a conditioned response to a conditioned stimuli. The Law of Effect states that behaviour that is followed by satisfying consequences will tend to be repeated while behaviour that is followed by unpleasant consequences will occur less frequently, defined by Skinner as positive and negative reinforcements.

During the 1970s there was a growing realization that cognitive factors had a role in learning. It was not only stimulus and the resulting behaviours but also thoughts and perceptions that influenced learning. Bandura’s²¹ observation/social learning theory (SLT) described observational learning: if one observes another being successful, they will learn that it is wise to do the same. Another important feature of Bandura’s work was self-efficacy, if one perceives themselves capable of carrying out a behaviour, the behaviour will occur.

By the end of the 1970s new behavioural techniques had been developed and experimentally validated. These theories and techniques were added to the cognitive theories of Aaron Beck. Beck, working on depression, had a major influence on behavioural therapy.²² He introduced the idea that people can have two concurrent levels of thinking, a conscious level of thinking and an automatic level of thinking (where evaluative thoughts spontaneously arise in people’s minds).²³ Using behavioural and cognitive techniques individuals can be helped to identify and modify their negative thoughts. This led to cognitive and behavioural techniques merging during the 1980s and 1990s to form CBT.

Theoretical model

The major goal of CBT is to replace maladaptive coping skills, thoughts, emotions, and behaviours with more adaptive ones.²⁴ Cognitive behavioural therapy is used to help individuals recognize patterns of distorted thinking and dysfunctional behaviour. A systematic discussion and carefully structured behaviour assignments are used to help individuals identify and modify their thoughts and behaviours.²⁵ Much of the treatment is based on the present and the main goal is to assist individuals in bringing about desired changes in their lives. This is achieved by collaboration between the therapist and the individual in developing skills to overcome current and future problems through planning strategies and setting agreed upon goals. A major part of the success of CBT is that therapy occurs in everyday life and what has been discussed and agreed is put into practice.

Example from the literature

Physiotherapists delivered a CBT-led programme to people with chronic musculoskeletal pain in a study by Asenlöf *et al.*²⁶ The programme, delivered over 8–10 sessions, had seven general phases: behavioural goal identification; self-monitoring (using diaries); individual functional behavioural analysis; basic physical, cognitive, and behavioural skill acquisition to aid in goal attainment and to increase self-efficacy; putting into practice the basic skills and merging motor behaviours with cognitive and problem solving skills; generalization; and maintenance and relapse prevention. The experimental group did not receive any routine physiotherapy. The control group received 8–10 best practice physiotherapy sessions.

This study measured pain disability, pain, and self-efficacy and reported significant differences over time in all measures within both groups. There was a significant difference between groups in favour of the experimental group with regards to pain disability and pain. Fear of movement, physical performance, and global improvements were also measured. There

was a significant difference in favour of the experimental group for fear of movement, while both groups' physical performance improved significantly. Global improvement occurred in the experimental group but no differences were reported at 3-month follow up.

Use by physiotherapists

A major part of CBT treatment is based on the present and therefore may be more useful to physiotherapists when a person wants to or is actively trying to change, such as an overweight individual having changed their diet and seeking to safely increase their PA. Physiotherapists can help the individual to recognize individual barriers, be they physical, psychological, behavioural, or environmental, to exercise. Lack of time or feeling embarrassed exercising in public are examples of such barriers and physiotherapists can assist in developing individual plans to overcome them. In conjunction with the therapist, behavioural goals are identified and plans are put in place to attain them, recognizing dysfunctional thoughts, behaviours, and personal barriers and devising plans to overcome them. Self-efficacy plays a major role, both to complete the behaviour change and to complete new exercises.

Social Cognitive Theory

Origins

SCT stemmed from work in the area of SLT conducted by Miller and Dollard in the 1940s. Identifying four key factors in learning new behaviour (drives, cues, responses, and rewards), they proposed that if one was motivated to learn a particular behaviour, then that particular behaviour would be learned through clear observations. By imitating observed actions, the observer would solidify that learned action and would be positively reinforced.²⁷ The proposition of SLT was expanded upon by Albert Bandura from 1962 until the present, resulting in SCT.^{21,28,29}

According to the SCT, people learn by observing others, with cognition, the environment, and behaviour all recognized as chief factors influencing development. These three factors are not static or independent. They mutually influence each other and any can be stronger at any given time. Strategies for increasing well-being can therefore be aimed at improving emotional, cognitive, or motivational processes, increasing behavioural competencies, or altering social conditions.

Bandura's SCT stands in clear contrast to theories of human functioning that overemphasize the role of environmental factors and the influence of biological factors in the development of human behaviour, learning, and adaptation. Although it acknowledges the influence of both environmental and biological factors, SCT is rooted in a view that by looking into

their own conscious mind, people make sense of their own psychological processes. To predict how human behaviour is influenced by environmental and biological outcomes, it is critical to understand how the individual cognitively processes and interprets these.

Theoretical model

Social cognitive theory promotes effective self-management of health habits that keep people healthy through their lifespan.³⁰ More specifically, the SCT framework specifies five core determinants, the mechanism through which they work, and the optimal ways of translating this knowledge into effective health practices.

These five core determinants include knowledge of health risks and benefits, perceived self-efficacy that one can exercise control over one's health habits, outcome expectations about the expected costs and benefits, health goals people set for themselves and the plans and strategies for realizing them, and perceived facilitators and social and structural impediments to the changes they seek.³⁰

Knowledge of health risks and benefits creates the precondition for change. If people lack knowledge about how their lifestyle affects their health, they have little reason to change. Self-efficacy plays a central role in personal change. One must believe they can produce desired effects by their actions; otherwise they will have little incentive to change or persevere in the face of difficulties. Outcome expectations also affect health behaviour and can take several forms. What people expect their action to produce is important in determining behaviour change. For example physiotherapists can explain what to expect, how it will feel or how long it will take. Personal goals, both long and short-term, rooted in the individual's value system, will provide further self-incentives.³⁰

Individual barriers and facilitators are another determinant of health habits. These are personal and form an integral part of self-efficacy and of all the thoughts that affect human functioning. At the core of SCT are self-efficacy beliefs. Self-efficacy beliefs must be measured against gradations of challenges to successful performance.

Example from the literature

An example of how SCT has been utilized in practice is provided by Annesi *et al.*³¹ The effects of 'The Coach Approach', based on SCT, was investigated on exercise adherence in a population of obese females ($n=137$). Those in the experimental group met with a trained wellness specialist once a month for six months. These meetings instructed the participants on self-management and self-regulatory skills aimed at increasing mastery and competence of exercising and overcoming barriers. Instruction was given at each meeting on a different skill: cognitive restructur-

ing, stimulus control, disassociation for discomfort, self-reward, and preparing to overcome barriers to exercise. Exercise plans were adjusted to induce favourable post-exercise feelings while goal setting and behavioural contracts were also discussed and signed. Both groups were assigned three exercise sessions per week. The findings reported show that the experimental group had significantly better attendance and were significantly different from controls for all outcomes.

Use by physiotherapists

Social cognitive theory is extremely relevant to health communication. Healthcare professionals have traditionally relied on persuading individuals to change through 'informational power' (sharing facts about health and illness) and 'expert power' (using professional credentials at least implicitly to impress individuals with the potential effectiveness of the prescribed behaviour change).³² The concepts of SCT provide alternative ways for health education and communication. It is relevant for designing health behaviour and health education programmes. The theory can also be used for providing the basis for intervention strategies.^{32,33}

Physiotherapists can employ all five core determinants of SCT. Educating individuals on the risks and benefits will increase their knowledge. Thorough explanations and clear demonstrations of exercises and what one should feel or expect will tackle self-efficacy and outcome expectations. For example an individual who is learning a new rehabilitation exercise may lack experience of how this new exercise will feel; muscle soreness, tiredness, or cramps. Informing them of what to expect will provide realistic outcome expectations. In assessing personal efficacy to stick to an exercise routine, people judge their efficacy at regularly exercising in the face of different barriers: when they are under pressure from work, are tired, or face foul weather. If there are no impediments to surmount, the behaviour will be easy and everyone will be successful. Prescribing exercises and PA that will provide a challenge but are achievable will also boost self-efficacy. Identifying both the individual's personal and social barriers and devising plans to overcome them to achieve agreed upon health goals will assist in maintaining the change.

Motivational Interviewing

Origins

Motivational interviewing developed as a result of 'surprising' findings on the extent to which counsellor empathy explained the variance in successful behavioural change in a research study on problem drinking. Thereafter, with further reflection and discussion, William Miller described a conceptual model and

clinical guidelines for MI.³⁴ The definition of MI has evolved and Miller and Rollnick currently offer three levels of definition with the layperson's definition being that 'MI is a collaborative conversation style for strengthening a person's own motivation and commitment to change' while the most technical is 'MI is a collaborative, goal-orientated style of communication with particular attention to the language of change. It is designed to strengthen personal motivation for commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion'.³⁵

Theoretical model

Four key aspects are embodied in the spirit of MI; partnership, acceptance, compassion, and evocation.³⁵ Partnership refers to the collaboration that exists in MI as it is not done 'to' or 'on' someone but 'for' or 'with' someone. The individual is the expert on himself or herself. Acceptance refers to the worth of the individual, supporting their autonomy and seeking to understand the individual's perspective, accurate empathy, and affirmation of their strengths and efforts to change. Compassion refers to actively promoting the individual's welfare and best interests. Evocation refers to the drawing out of the individual's reasons for change and their own resources to achieve it.³⁵

There are four processes in MI: engaging, focussing, evoking, and planning. Engaging begins the process of forming a collaborative partnership. Focussing is the development of a specific direction in the conversation about change and the surfacing of goals. Evoking involves eliciting motivations for change, not installing reasons and finally, planning is put in place when the individual reaches the threshold of readiness to change.³⁵

Example from the literature

Since the 1980s, there has been a significant amount of research carried out on the efficacy of MI in various groups of people³⁶ and the number of publications on MI has been doubling every three years.³⁷ It has been investigated in many conditions, including alcohol, drug, and gambling addictions, reducing risky behaviour and increasing healthy ones.³⁶ In a study on the effect of motivational enhancement therapy (MET), an adaptation of MI techniques, physiotherapists delivered the interventions to individuals with **chronic low back pain**.³⁸ All subjects received 10 sessions of 30-minute physiotherapy in eight weeks. Those in the experimental group received MET training during these sessions while the control group received general communication. The intervention assessed proxy efficacy, which refers to the patient's confidence in their therapist, treatment expectancy, and working alliance between the individual and the therapist. There was a significant

difference between groups in favour of the intervention for proxy efficacy, working alliance, and treatment expectancy while there were within group significant differences for pain, lifting capacity, disability, and physical function. The groups differed significantly in favour of the intervention in general health and home exercise.

Use by physiotherapists

The three core communication skills, asking, listening, and informing are covered in the five key communication skills used throughout MI:³⁹ open-ended questions, affirming, reflecting, summarising, and providing advice and information with permission.³⁵

Using MI, with an individual who should become more active, requires a physiotherapist to establish a partnership and accept the individual as they are. Empathy and compassion about the challenges and barriers to exercise participation the individual describes will evoke more discussion. Engaging with the individual with empathy, and acknowledging that the choice to change is theirs, will increase the likelihood of honesty from the individual. Open-ended questions will engage the client and will evoke positives, 'change talk', and negatives, 'sustain talk', and allow for the exploration of ambivalence towards exercise. Reflective listening, summarizing what the client has said, and affirming their reasons for change will decrease ambivalence and reduce discrepancies. Focussing on and evoking the individual's change talk and rolling with resistance will help develop self-efficacy. Once the individual is committed to change the therapist can assist them, by evoking the individual's own plans and goals and providing advice and information with permission.

Conclusion

These four theories, SDT, SCT, CBT, and MI can be used to stimulate a change in exercise behaviour and most importantly sustain it. Incorporating a strategy to positively influence PA into all aspects of physiotherapy practice, empowering individuals to adhere, self-managing and completing courses of treatment is vital and plays a central part in physiotherapists' role as promoters, preventers, and rehabilitators. To become skilled in the use of any of these four strategies training is necessary, but these four theories have a number of similarities and can be implemented into practice.

Firstly the motivation to change must come from the individual; it must be his or her autonomous decision. Autonomy is present in all four theories. One cannot force another to change; only information on why change is necessary can be provided. Physiotherapists are experts and can educate on the health risks of behaviours. They can evoke reasons for change and challenge individual's ambivalence

but it is the individual who is the expert on himself or herself. He or she must weigh up his or her own pros and cons, recognize own individual barriers, and reach own decisions for any change to be sustainable. Any decision made must be supported to maintain autonomy.

Empathy, known as relatedness in SDT, also features. An accepting and trusting relationship where the client feels cared for should be created. This will allow for frank and open discussion where personal barriers to change and dysfunctional thoughts and behaviours may be identified. An attempt must be made to empathize with each individual and the challenges they face. This will also foster autonomy and increase the individual's self-efficacy for change. Open-ended questions, reflective listening, and summarizing are useful tools that can be used to create empathy, trust, and open discussion.

Bandura's self-efficacy is evident in all four theories, known as competence in SDT. One must have the belief that one has the power to produce the desired effect before one will attempt it. If the individual does not believe that they can change their behaviour, or even something as simple as executing an exercise, then little or no attempt will be made. Self-efficacy must be nurtured by building on success, therefore exercises that are challenging but most importantly achievable must be prescribed. Providing individuals with outcome expectations will inform them as to what to expect, increasing self-efficacy as the individuals know what is normal as a result of their change. An example of this would be informing an individual that delayed onset muscle soreness is perfectly normal and may be expected after PA.

Finally planning is an integral part of these theories. Once the decision is made to change, planning is vital to initiate and sustain change. Autonomy, empathy, and self-efficacy are all aspects to consider when planning. Plans can be devised together but it must be the individual's own, it must include his or her personal barriers and facilitators, personal strategies to overcome them, and personal goals. This will continue to support their autonomy. The therapist must be empathetic when assisting the client to devise plans and goals whilst also ensuring that the plan is challenging and achievable, supporting, and enhancing self-efficacy.

Time must be taken to learn, understand, and practice these strategies and training is essential to become skilled in their use. However changing the mindset of physiotherapy practice to incorporate an autonomous supportive service, empathetic communication/environment, nurturing self-efficacy, and informative assisting of individual's own planning is necessary to maintain their continued and successful use.

References

- 1 Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, et al. Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet*. 2012;**380**(9838):247–57.
- 2 Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc*. 2011;**43**(7):1334–59.
- 3 Bassett SF. The assessment of patient adherence to physiotherapy rehabilitation. *New Zeal J Physiother*. 2003;**31**(2):60–6.
- 4 WPCT. Policy Statement: Physical therapists as exercise experts across the life span. 2011. Available at <http://www.wcpt.org/policy/ps-exercise%20experts>.
- 5 Dean E. Physical therapy in the 21st century (Part I): toward practice informed by epidemiology and the crisis of lifestyle conditions. *Physiother Theory Pract*. 2009;**25**(5–6):330–53.
- 6 Verhagen E, Engbers L. The physical therapist's role in physical activity promotion. *Br J Sports Med*. 2009;**43**(2):99–101.
- 7 Roberts K, Marvin, K. Knowledge and attitudes towards healthy eating and physical activity: what the data tell us. Oxford: National Obesity Observatory; 2011.
- 8 Bennett GG, Wolin KY, Puleo EM, Masse LC, Atienza AA. Awareness of national physical activity recommendations for health promotion among US adults. *Med Sci Sports Exerc*. 2009;**41**(10):1849–55.
- 9 O'Donoghue G, Cusack T, Doody C. Contemporary undergraduate physiotherapy education in terms of physical activity and exercise prescription: practice tutors' knowledge, attitudes and beliefs. *Physiotherapy*. 2012;**98**(2):167–73.
- 10 Mohan N, Collins E, Cusack T, O'Donoghue G. Physical activity and exercise prescription: senior physiotherapists' knowledge, attitudes and beliefs. *Physiother Pract Res*. 2012;**33**(2):71–80.
- 11 McGrane N, Galvin R, Cusack T, Stokes E. The addition of Motivational Interventions to Exercise and Traditional Physical Therapy: A Review and Meta-analysis. Under Review at *Physiotherapy*. Under Review. 2013.
- 12 Ryan RM, Deci EL. Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp Educ Psychol*. 2000;**25**(1):54–67.
- 13 Ryan RM, Patrick H, Deci EL, Williams GC. Facilitating health behaviour change and its maintenance: interventions based on self-determination theory. *EHP*. 2008;**10**(1):2–5.
- 14 Deci EL, Ryan RM. Self-determination theory in health care and its relations to motivational interviewing: a few comments. *Int J Behav Nutr Phys Act*. 2012;**9**:24.
- 15 Lonsdale C, Sabiston CM, Raedeke TD, Ha AS, Sum RK. Self-determined motivation and students' physical activity during structured physical education lessons and free choice periods. *Prev Med*. 2009;**48**(1):69–73.
- 16 Williams GC, Rodin GC, Ryan RM, Grolnick WS, Deci EL. Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychol*. 1998;**17**(3):269–76.
- 17 Silva MN, Vieira PN, Coutinho SR, Minderico CS, Matos MG, Sardinha LB, et al. Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. *J Behav Med*. 2010;**33**(2):110–22.
- 18 Zeldman A, Ryan RM, Fiscella K. Motivation, Autonomy Support and Entity Beliefs: Their Role in Methadone Maintenance Treatment. *J Soc Clin Psychol*. 2004;**23**(5):675–96.
- 19 Thøgersen-Ntoumani C, Ntoumanis N. The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *J Sports Sci*. 2006;**24**(4):393–404.
- 20 Williams GC, Lynch MF, McGregor HA, Ryan RM, Sharp D, Deci EL. Validation of the 'Important Other' climate questionnaire: assessing autonomy support for health-related change. *Families, Systems & Health*. 2006;**24**(2):179–94.
- 21 Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977;**84**(2):191–215.
- 22 Dowd ET. Cognition and the cognitive revolution in psychotherapy: promises and advances. *J Clin Psychol*. 2004;**60**(4):415–28.
- 23 Beck JS. In Session with Judith S. Beck, PhD: Cognitive-Behavioral Therapy. *Primary Psychiatry*. 2006;**13**(4):31–4.
- 24 Gatchel RJ, Mayer TG. Evidence-informed management of chronic low back pain with functional restoration. *Spine J*. 2008;**8**(1):65–9.
- 25 Whitfield G, Davidson A. Cognitive behavioural therapy explained. Vol. xii. Oxford: Radcliffe; 2007. p. 184.
- 26 Asenlöf P, Denison E, Lindberg P. Individually tailored treatment targeting activity, motor behavior, and cognition reduces pain-related disability: a randomized controlled trial in patients with musculoskeletal pain. *J Pain*. 2005;**6**(9):588–603.
- 27 Miller NE, Dollard J. Social learning and imitation. New Haven, CT, USA: Yale University Press; 1941.
- 28 Bandura A. Social foundations of thought and action: a social cognitive theory. Vol. xiii. Englewood Cliffs, NJ: Prentice-Hall; 1986. p. 617.
- 29 Bandura A. Evolution of social cognitive theory. great minds in management: the process of theory development. Oxford: Oxford University Press; 2007. p. 9–35.
- 30 Bandura A. Health promotion by social cognitive means. *Health Educ Behav*. 2004;**31**(2):143–64.
- 31 Annesi JJ, Unruh JL, Marti CN, Goralja S, Tennant G. Effects of the coach approach intervention on adherence to exercise in obese women: assessing mediation of social cognitive theory factors. *Res Q Exerc Sport*. 2011;**82**(1):99–108.
- 32 Elder JP, Ayala GX, Harris S. Theories and intervention approaches to health-behavior change in primary care. *Am J Prev Med*. 1999;**17**(4):275–84.
- 33 Jeffery RW. How can health behavior theory be made more useful for intervention research? *Int J Behav Nutr Phys Act*. 2004;**1**(1):10.
- 34 Miller WR, Rose GS. Toward a theory of motivational interviewing. *Am Psychol*. 2009;**64**(6):527–37.
- 35 Miller WR, Rollnick S. Motivational Interviewing, Third Edition: Helping People Change. New York, NY, USA. Guilford Publications; 2012.
- 36 Lundahl BW, Kunz C, Brownell C, Tollefson D, Burke BL. A meta-analysis of motivational interviewing: twenty-five years of empirical studies. *Res Soc Work Pract*. 2010;**20**(2):137–60.
- 37 Miller WR, Rollnick S. Ten things that motivational interviewing is not. *Behav Cogn Psychother*. 2009;**37**(2):129–40.
- 38 Vong SK, Cheing GL, Chan F, So EM, Chan CC. Motivational enhancement therapy in addition to physical therapy improves motivational factors and treatment outcomes in people with low back pain: a randomized controlled trial. *Arch Phys Med Rehabil*. 2011;**92**(2):176–83.
- 39 Rollnick S, Miller WR, Butler CC. Motivational Interviewing in Health Care: Helping Patients Change Behavior. New York, NY, USA. Guilford Publications; 2007.

Copyright of Physical Therapy Reviews is the property of Maney Publishing and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.