

A Theory of Physical Activity Maintenance

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Regular physical activity is related to numerous psychological and physical benefits. Physical activity interventions have had varying degrees of success with adoption; however, maintenance over the long term is even more difficult to achieve, as the majority of individuals who start a physical activity program drop out or relapse. Although the physical activity maintenance literature is scant, there is evidence that the predictors of adoption are different from those of maintenance. Thus, it follows that physical activity adoption and maintenance require unique approaches. The explanatory power of such predictors, however, is limited by the absence of a cogent theoretical framework. Therefore, this paper presents the Physical Activity Maintenance (PAM) theory, which incorporates individual psychosocial variables (goal-setting, motivation, and self-efficacy), and contextual variables of the environment and life stress (triggers of relapse). Goal-setting is framed as satisfaction, attainment, and commitment; motivation as self-motivation and expectations; and self-efficacy as both barrier and relapse. The contextual variables may facilitate or impede physical activity maintenance directly and indirectly via the individual psychosocial variables. The PAM is presented to stimulate research on physical activity maintenance and advance our understanding of how and why people do and do not maintain physical activity long term.

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Une activité physique régulière procure de nombreux bénéfices psychologiques et physiques. Les investigations portant sur l'activité physique ont plus ou moins réussi pour ce qui est de la décision, mais l'étude du maintien à long terme est encore plus difficile à réaliser puisque la majorité des individus qui commencent un programme d'activité physique renoncent ou reprennent leur conduite antérieure. Quoique la littérature sur le maintien de l'activité physique soit parcellaire, il existe des indices selon lesquels les prédicteurs de la décision sont différents de ceux du maintien. Il s'ensuit que la décision d'avoir une activité physique et son maintien dans le temps doivent être abordés de la même façon. Le pouvoir explicatif de tels prédicteurs est cependant limité par l'absence d'un cadre théorique pertinent. En conséquence, cet article présente la théorie du Maintien d'une Activité Physique (PAM) qui intègre des variables psychosociologiques individuelles (fixation d'un objectif, motivation et auto-efficacité), et des variables relevant de l'environnement et du stress (déclencheurs d'abandon). La fixation d'un objectif est déclinée en termes de satisfaction, de réalisation et d'implication; la motivation en termes d'auto-motivation et d'expectations; et l'auto-efficacité en termes d'obstacle et de rechute. Les variables contextuelles peuvent faciliter ou entraver le maintien d'une activité physique directement ou indirectement par l'intermédiaire des variables psychosociologiques individuelles. Le PAM est présenté dans le but de stimuler la recherche sur le maintien d'une activité physique et de nous aider comprendre pourquoi et comment les gens maintiennent ou non à long terme une activité physique.

RATIONALE FOR MAINTENANCE OF PHYSICAL ACTIVITY

Several expert groups highlight the importance of maintenance of physical activity (PA). The 1995 NIH Consensus Conference on Physical Activity and Cardiovascular Health recommended that scientists conduct research on the social and psychological factors that not only influence the adoption of PA, but also those that influence the long-term *maintenance* of PA (NIH Consensus Development Panel on Physical Activity and Cardiovascular Health, 1996). The American College of Sports Medicine (ACSM) recommends that people engage in physical activity five times per week for 30 minutes per day at a moderate intensity for general health benefits, and three times per week at 20 minutes of high intensity in order to develop and maintain cardio-respiratory and muscular fitness, and flexibility in healthy adults (ACSM, 1998).

The US government's *Healthy People 2010* identified PA as one of the leading indicators of preventive health behaviors and emphasised the need for behavior health professionals to develop and provide more effective interventions and programs designed to promote and *maintain* healthy behaviors (USDHHS, 2000). The lack of PA has been associated with four of the top seven US population causes of death (diseases of the heart, cerebrovascular diseases, lung diseases, and diabetes; Murray & Lopez, 1996; National Center for Health Statistics, 1997). Throughout the industrialised world, inactivity is recognised as a serious public health burden (USDHHS,

1996; Villeneuve, Morrison, Craig, & Schaubel, 1998; World Health Organization, 1997).

While initiating PA is paramount, creating interventions that help individuals adhere to PA over the long term are needed (Belisle, Roskies, & Levesque, 1987). Although most young children are physically active, rates of PA drop sharply during adolescence and early adulthood, making relapse the norm for the majority of adults (Caspersen, Pereira, & Curran, 2000; Stephens & Craig, 1990). Research has shown that, without successful behavioral intervention, approximately 50 per cent of individuals who start a PA program will, on average, drop out within the first six months (Dishman & Buckworth, 1996). Further, US levels of adult PA and sedentarism have not changed significantly over the last decade (CDC, 2005). This indicates that although interventions have an impact on PA adoption, the vast majority of people do not remain regularly active; and that the PA intervention efforts have not had a meaningful impact at a population level. Although some researchers have studied theories and their application to PA maintenance (e.g. Transtheoretical Model [TTM]; Cardinal, 1999, and self-management; Martin & Dubbert, 1982), this area of research is quite limited. There is a lack of measures specific to maintenance and a lack of experimental interventions addressing maintenance in the PA literature.

PHYSICAL ACTIVITY ADOPTION VERSUS MAINTENANCE

Physical Activity

The PA literature shows consistent correlates of PA. These consist of (a) contextual variables: sex (male), ethnicity (Caucasian), program and facility access, and time spent outdoors; (b) psychological variables: PA preference, intention to be active, enjoyment, attitudes, confidence; and (c) behavioral variables: previous PA behavior, and healthy diet (Sallis, Hovell, & Hofstetter, 1992; Sallis, Prochaska, & Taylor, 2000; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007; Wendel-Vos, Droomers, Kremers, Brug, & van Lenthe, 2007).

Physical Activity Maintenance and Relapse

Reviewing the literature, Gintner (1988) recommended the following for preparing individuals and their environments for maintenance: prepare the client for long-term commitment; help the client anticipate and cope with high-risk situations; arrange conditions to foster self-responsibility; provide training in coping with setbacks; encourage supportive lifestyle and environmental changes. This is confirmed by PA studies (e.g. Martin, Dubbert, Katell, Thompson, Raczynski, Lake, Smith, Webster, Sikora, & Cohen, 1984; McAuley, Morris, Motl, Hu, Konopack, & Elavsky, 2007).

The differences between the correlates/predictors of PA versus PA maintenance are (a) the focus of the psychological variables and related temporal considerations (immediate versus long term); and (b) the inclusion of factors that deter regular PA.

Environmental Considerations

A recent review of 22 interventions suggests a synergistic approach considering that both environmental and individual factors may be an effective strategy for initiation *and* maintenance (Summerbell, Waters, Edmunds, Kelly, Brown, & Campbell, 2005). Social and environmental factors like an unsupportive partner and a lack of access to PA opportunities predict a return to previous PA levels after an intervention is completed (Gauvin, Levesque, & Richard, 2001; Laitakari, Vuori, & Oja, 1996). Therefore, interventions aimed at simultaneously impacting individual and environmental PA correlates may have strong and sustained effects.

Environments contain a range of behavior settings that are seen to provide, in different degrees, “opportunities” or “affordances” for desired behaviors; the extent and the ways that those behaviors occur are further dependent on factors that are conceptualised as “filters” (e.g. perception, cognition, motivation) and “antecedent conditions” (e.g. opening hours, income, physical ability) (Gibson, 1979; Michelson, 1977). The environment is represented as different constructs in several theories. Triandis’ theory of interpersonal behavior includes a facilitating factors construct; the Health Belief Model includes cues to action; the TTM includes environmental considerations through the processes of stimulus control and environmental re-evaluation. However, the majority of the theories such as the TTM, Health Belief Model, Theory of Planned Behavior, and the Precaution Adoption Process Model all focus on the individual and/or *intrapersonal* level. On the contrary, Social Cognitive Theory focuses on the *interpersonal* level, incorporating the individual, the behavior, and the environment. However, for long-term maintenance, we believe that a multi-level approach is needed, one that considers the social environment and community structures in addition to individual-level variables. This ecological perspective highlights people’s interactions with their physical and socio-cultural environments, with the individual shaping their environment, as well as being shaped by their environment (McLeroy, Bibeau, Steckler, & Glanz, 1988).

Environments exert, therefore, probabilistic influences, making behavior more or less likely. Thus, they vary in the support they provide for activities, enabling or promoting some, while preventing or discouraging others (Sallis, Bauman, & Pratt, 1998). Research also suggests that environmental modifications will have greater effects when combined with strategies that target individual and social factors to foster participation in PA

(Giles-Corti & Donovan, 2002) and we extend this to the maintenance of regular PA.

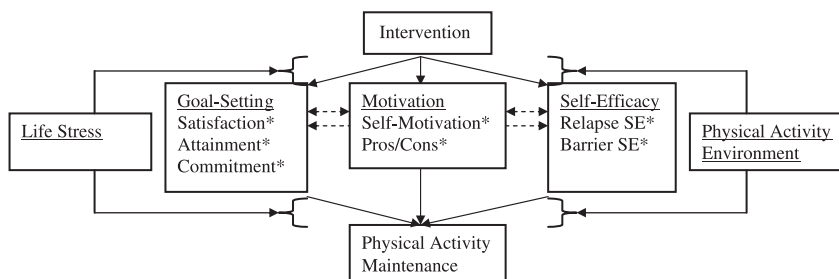
The Impact of Life Stress

Belisle et al. (1987) found that high-stress times, holidays, and injuries were reasons participants relapsed after adopting regular activity. Martin et al. (1984) found that participants who relapse within three months of PA program completion did so because of inclement weather or loss of their activity partner. Therefore, stressful life events/high risk situations, which may be positive (marriage, birth of child, graduation, promotion) or negative (death in the family, divorce, being fired, retiring), increase the likelihood of relapse (Marlatt & Gordon, 1985; Marcus & Stanton, 1993).

Life stress, as estimated by recent life change magnitude estimations, appears to have increased markedly across the past 30 years (Miller & Rahe, 1997). Research has shown that major life events can have a deleterious effect on PA adherence (Oman & King, 2000). Potential pathways include that life stress decreases and redirects available personal resources away from focusing on PA; increases negative affect (depression, anxiety) which decreases motivation to engage in an active lifestyle; and physiologically compromises the immune system and increases fatigue which results in physical weakness and lower ability to be active.

IMPORTANCE OF THEORY

While it is important to study correlates and predictors of PA and PA maintenance, the explanatory power of such predictors is limited without a cogent theoretical framework. Among the most popular theories to date for PA are Social Cognitive Theory (Bandura, 1986; McAuley & Blissmer, 2000), Theory of Planned Behavior (Ajzen, 1991; Hagger, Chatzisarantis, & Biddle, 2002), and the TTM (Marshall & Biddle, 2001; Prochaska & Velicer, 1997). The emphasis of these theories is on understanding the cognitive psychology of the individual, either alone or within the context of the individual's social environment, and from the point of view of several key constructs (i.e. motivation, intentions, and behavior; e.g. see Biddle & Nigg, 2000). Such theories reflect critically necessary "determinants" of health behavior adoption (Sallis & Owen, 1999). These theories explain a substantial portion of the variance in PA (30–40%; see Baranowski, Anderson, & Carmack, 1998; Godin & Kok, 1996; McAuley & Mihalko, 1998), although intervention studies have yet to establish, using appropriate analytical tactics, whether the key variables of the theories directly mediate interventions designed to increase PA (Baranowski et al., 1998; Lewis, Marcus, Pate, & Dunn, 2002). A recent example documented that change in self-efficacy



* constructs specific to maintenance of PA which may be correlated to each other.

FIGURE 1 The Physical Activity Maintenance (PAM) model.

mediated part of the effect of a PA intervention with high school girls, whereas change in goal-setting did not (Dishman, Motl, Saunders, Felton, Ward, Dowda, & Pate, 2004). Moreover, while PA interventions often alter individual behavior initially, they have demonstrated limited success in promoting long-term maintenance of behavior change (Dishman & Buckworth, 1996; Marcus & Forsyth, 1999). Intervention approaches that are effective for adoption of PA evidently may not be suitably applied to the long-term maintenance of PA.

In this paper, we present a theoretical framework (see Figure 1) to better understand the long-term maintenance of PA. The PAM has several distinguishing features over the aforementioned theories/models: (a) it focuses explicitly on PA maintenance; (b) it incorporates the triggers for PA relapse; and (c) it integrates individual and environmental aspects deemed to be important for maintaining PA.

THE PHYSICAL ACTIVITY MAINTENANCE MODEL (PAM)

Mediator to Outcome Relationships

PA maintenance is an active process, requiring individuals to actively utilise strategies and techniques for continued adherence to PA. Bandura's (1986) social cognitive model and Locke and Latham's (1996) goal-setting framework are directly relevant for the examination of PA maintenance. Self-efficacy, or the belief in one's capability to perform a particular behavior (Bandura, 1986), not only determines one's choice of activities (i.e. goals) but also how much effort is expended in these activities, and how long one will persist in the face of adversity (e.g. high risk for relapse situations). According to Bandura's (1986) Social Cognitive Model, the components of self-efficacy, outcome expectancies, and satisfaction with goal attainment are orthogonal constructs, all of which add unique variance to impact the

relationship between goal-setting and PA maintenance. Goal-setting is important for both the initiation and maintenance of behavior change in general (Locke & Latham, 1996) and in PA in particular (Duncan & Pozehl, 2002; Kylo & Landers, 1995). Setting challenging but realistic goals that address both short-term and long-term PA maintenance is required to appropriately plan for overcoming tempting/high-risk situations, build short-term successes, plan to attain realistic outcomes of maintaining PA, and maintain a physically active lifestyle (e.g. Locke & Latham, 1996). Goal-setting also represents a potentially powerful method of maintaining PA by influencing the direction, regulation, and persistence of effort (Locke, 2000; Locke & Latham, 1996).

Self-efficacy, goal-setting, and self-motivation each provide a conceptually distinct and independent explanation of persistence in PA. Self-efficacy is constrained to beliefs about personal ability, is sensitive to reinforcement history in specific settings, and should be readily influenced by observational learning, persuasion, and perceived exertion (Bandura, 1997). Thus, focusing on the long-term benefits of PA, and seeing others have successes, will be important. Self-efficacy is thought to have direct and indirect effects on behavior through motivation and goal-setting. Self-motivation is a generalised, non-specific tendency to persist in the long-term pursuit of behavioral goals independently of context-specific beliefs about reinforcement history, ability, or control (Dishman, 1991). Goal-setting is more task oriented and operates through being committed and achieving sub-goals and related satisfaction (Locke & Latham, 1996). These constructs have been shown to be critical for both the initiation and maintenance of behavior change (Bandura, 1986, 1997; Borrelli & Mermelstein, 1994).

Mediator Interrelationships in the PAM

Motivation is important for adherence to the initial decision to change the behavior as well as for actually maintaining the behavior change. Tailoring treatment to cognitions that reflect current motivational level increases adherence to change (Prochaska & Velicer, 1997). Self-efficacy appears to be inherently linked to proximal goal-setting and to motivation. For example, in one study (Latimer & Ginis, 2005), increases in self-efficacy were associated with subsequent motivation to join a strength training program among older adults. On the other hand, very high levels of self-efficacy coupled with low motivation may produce unrealistic optimism and an overconfidence that may inhibit adherence (e.g. Haaga & Stewart, 1992). One pathway to relapse for the regularly active individual, for example, may involve the belief that they are no longer vulnerable to relapse to sedentary behavior during stressful time periods, and their overconfidence may decrease their motivation to set goals towards maintenance. In general, there is abundant

support for the association between high levels of self-efficacy and adoption and maintenance of PA, at least over the short term (e.g. six months; Marcus, Eaton, Rossi, & Harlow, 1994; McAuley & Mihalko, 1998; Sallis, Haskell, Fortmann, Vranizan, Taylor, & Solomon, 1986; Sallis, Pinski, Grossman, Patterson, & Nader, 1988; Sonstroem, Harlow, Gemma, & Osborne, 1991).

Self-efficacy, in combination with specific and challenging goals, can enhance motivation (Bandura & Cervone, 1986; Bandura & Schunk, 1981). When an individual perceives a discrepancy between where they are and where they would like to be (i.e. their goals), self-dissatisfaction is created, serving as a motivator to increase effort (Bandura & Cervone, 1986; Festinger, 1957) and desire to bring their behavior more in line with their goals (Miller & Rollnick, 1991). However, whether or not the discrepancy between current behavior and future goals is motivating or discouraging depends on the strength of one's perceived capability to attain the goal, or self-efficacy (Bandura & Cervone, 1986; Locke, Frederick, Bobko, & Lee, 1984). Borrelli and Mermelstein (1994) found that the achievement of specific sub-goals in smoking cessation treatment (e.g. self-monitoring cigarette consumption) predicted abstinence through its effect on levels of self-efficacy. In the PA area, regularly active people were more likely to view their PA goals as part of their life aspirations, whereas irregularly active people were more likely to consider that PA interferes with their goals (Chatzisarantis & Hagger, 2007).

The hypothesised PAM mediators are bidirectional (reciprocal). For example, although self-efficacy is clearly important in achieving both sub-goals and behavior change (Cervone, Jiwani, & Wood, 1991), it may not be sufficient. Prior sub-goal achievement affects levels of self-efficacy (Bandura & Schunk, 1981) and may be a fundamental determinant of self-efficacy (Locke et al., 1984). Motivation to change is also likely to influence sub-goal-setting and behavior change, especially when it is self-determined (as in client-centered techniques, such as motivational interviewing and self-change programs such as expert systems) in contrast to when it is controlled by external forces (Deci, 1992). Alternatively, stress is likely to have a negative effect on goal-setting and achievement (Louro, Pieters, & Zeelenberg, 2007); those who report more stress may be less likely to devote the time and resources to setting goals and maintaining PA. The research supporting the link between stress and PA relapse (e.g. Oman & King, 2000) leads to the suggestion that stress may hinder PA maintenance in part through its detrimental effect on setting and achieving the sub-goals necessary for long-term maintenance of PA.

Through identifying high-risk situations, planning on how to overcome them, and achieving short-term goals of PA maintenance, we hypothesise that self-efficacy for maintenance of PA will be strengthened. Through

setting realistic and well-defined goals in terms of the effects specific to maintaining PA, disappointment will be minimised and satisfaction with outcomes realised. Rothman (2000) theorised that satisfaction with one's accomplishments is important for longer-term maintenance of health behavior, which has been documented with realising fitness and psychological benefits predicting PA adherence (Neff & King, 1995).

In terms of the determinants of self-efficacy and outcome expectancies, as hypothesised by Self-Efficacy Theory (Bandura, 1997), goal-setting can be conceptualised as the mechanism to build mastery experiences (e.g. successful attainment of short-term goals); verbal persuasion (e.g. listening to credible health sources on the effects of long-term PA maintenance), emotional/physiological arousal (e.g. planning and coping with high-risk, stressful situations), and modeling (e.g. setting goals to maintain activity like others with similar characteristics). Domain specific self-efficacy (e.g. self-efficacy to prevent and deal with relapse, self-efficacy to be physically active in various environments, self-efficacy to deal with stressful life events, self-efficacy to schedule PA, etc.), and realistic outcome expectations (e.g. pros and cons), related to PA maintenance are also hypothesised to increase adherence to long-term PA (Bandura, 1997; McAuley & Mihalko, 1998).

Taken together, this suggests that self-efficacy, goal-setting, and motivation components are interrelated, bidirectional (reciprocal), and integral (each brings some unique contribution to the model) to maintenance of long-lasting behavioral changes. The goal-setting, motivation, and self-efficacy components represent different domains and are individually determined within these domains to maximise saliency. Therefore, intervention delivery mechanisms must allow for and incorporate individual differences. For that, motivational interviewing and/or expert system type intervention are thought to be the most appropriate.

Contextual Influences (Environment and Life Stress)

The environment increases motivation, self-efficacy, and goal-setting if it is supportive of PA. It can be supportive at several levels—from the immediate surroundings such as cues and reminders and supportive others to broader community and policy levels such as access to parks, sidewalks, walking school busses and PA breaks, mandatory PE in schools, etc. In other words, a supportive social surrounding along with a physical environment conducive to PA will positively impact the mediators of the PAM theory. The environment may also be deleterious to PA maintenance on several levels such as the competing environmental cues prompting behaviors (e.g. advertisements for video games) to the design of neighborhoods that minimise utilitarian PA (e.g. walking to stores).

Life stressors are thought to negatively impact PA maintenance in that they put individuals at risk (increase vulnerability) for relapse. This is thought to undermine the setting of long-term goals, the achievement of such goals, and the realisation of the satisfaction that can be gained from achieving goals. Life stressors also can negatively impact motivation and interfere with focusing on the determinants of self-efficacy.

MEASUREMENT CONSIDERATIONS

In an effort to standardise the measurement approaches used when applying/evaluating the PAM model, the following approaches to PAM construct assessment are recommended:

Goal-Setting, Commitment, Attainment, and Satisfaction

The measure of personal goals, commitment, attainment, and satisfaction with goal attainment is based on the outcome expectancy measure described by Steinhardt and Dishman (1989) and adapted to goal-setting for maintenance of PA. Items should correspond to commitment (commitment to PA maintenance goals), attainment (actual reaching of maintenance goals), and satisfaction with goal attainment (satisfaction with progress toward attaining the personal goal).

Self-Motivation

Measures of behavioral tendency to persist in the pursuit of behavioral goals independently of situational reinforcements are recommended (Dishman, Ickes, & Morgan, 1980; Motl, Dishman, Felton, & Pate, 2003) with focus of motivation for PA maintenance. This reflects more the intrinsic aspect which is thought to be important for long-term maintenance. In addition, a more extrinsic approach to motivation such as consideration of the pros and cons of maintaining regular PA, based on the Prochaska et al. framework (Prochaska, Velicer, Rossi, Goldstein, Marcus, Rakowski, Fiore, Harlow, Redding, Rosenbloom, & Rossi, 1994) is recommended. This is deemed important for recovering from relapses.

Self-Efficacy

A multidimensional self-efficacy approach is recommended (McAuley & Mihalko, 1998), addressing confidence to maintain long-term PA when encountering specific barriers. These barrier self-efficacy domains have to be developed or need to be adapted for maintenance and may be related

to negative affect, excuse making, being active alone, equipment access, resistance from others, and weather (Nigg & Riebe, 2002). The concept of relapse self-efficacy—how tempted an individual is to stop doing regular PA across situations—is thought to play a role in the success of long-term maintenance. This has been conceptualised as two domains— affective and competing demands in the PA literature (Hausenblas, Nigg, Dannecker, Symons, Ellis, Fallon, Focht, & Loving, 2001).

Physical Activity Environment

Upon reviewing the literature of environmental factors related to PA, evidence exists that access (Ball, Bauman, Leslie, & Owen, 2001; Booth, Owen, Bauman, Clavisi, & Leslie, 2000; Stucky-Ropp & Dilorenzo, 1993) and aesthetics (e.g. attractiveness, pleasantness, enjoyable scenery; Ball et al., 2001; King, Jeffery, Fridinger, Dusenbury, Provence, Hedlund, & Spangler, 1995) and social support (Ball et al., 2001) are important environmental correlates of PA. These concepts along with maintenance-specific concepts should be evident in the environmental measure. At this point we recommend that both perceived environment and actual environment (e.g. using Geographic Information Systems) assessments be included as which of these is the most salient approach for maintenance of PA is unknown.

Life Stress

The Recent Life Changes Questionnaire approach (Miller & Rahe, 1997) is recommended as a comprehensive approach with six-months and one-year guidelines. Looking at life hassles may also be important and could include issues such as being unemployed, financial issues, house repairs, being burgled, safety, partner violence, and family troubles. This acknowledges that maintenance occurs in individuals' external circumstances.

TESTING THE PAM

- The most effective study designs that have been adopted to examine *change* in PA are the randomised control trials (RCTs). However, for PA *maintenance* over time these RCTs need to be rethought on how to operationalise success. In a simple two-group RCT design testing PA maintenance, the approach should either: (a) start with participants who are regularly active and at risk for relapsing, then apply the PA maintenance intervention versus an appropriate control group intervention, and compare the groups on whether they continued to be regularly active or whether relapse occurred; or (b) start with inactive individuals, apply a PA adoption intervention to both groups, then

implement the PA maintenance intervention and a control group intervention as described above.

- Epidemiologically oriented studies (e.g. prospective cohort) of the PAM theory may be most appropriately investigated with time series analyses and cross-lagged panel designs, as they control for the influence of previous behavior and cognition, and for covariance stability and reciprocal effects of previous psychological variables, respectively. In fact, these investigations can inform on whether the theoretical ordering of our variable relationships are indeed mediating or moderating. Multi-level models (i.e. personal and group-level variables such as features of neighborhoods or workplaces) that use structural equations can also take into account moderating and mediating relations (MacKinnon, Fairchild, & Fritz, 2007) of variables in the theory and the influence of the proposed contextual variables over time. Discrete categories of physical activity can be clinically meaningful (e.g. program adherence and dropout or meeting and not meeting participation guidelines for public health). However, three or more measurement periods are needed to examine change (e.g. latent transition analysis or latent growth modeling), while assessing inter-individual variation in initial status (i.e. baseline) and inter- and intra-individual variation in change (Duncan, Duncan, Strycker, Li, & Alpert, 1999).

CONCLUSION

More research is needed to develop effective interventions that aim to help people achieve life-time PA maintenance while being cost-effective. The development of theoretical frameworks can provide some coherence to the literature that has identified a host of correlates and/or predictors of PA initiation and maintenance. Theory-based research will improve our understanding of maintenance of PA. Theory-based research allows for: (1) an understanding of the mechanisms of PA maintenance; (2) an understanding of the underlying reasons why the mechanisms worked or failed; (3) an understanding of which mechanisms influence short-term change and which influence long-term change; (4) identification of what mediators of PA maintenance an intervention should target; and (5) the design of evaluations that can determine why an intervention was (or was not) successful (i.e. process to outcome analyses; Nigg, Allegrante, & Ory, 2002). In addition, relatively little is known about the temporal relationship between mediators and contextual variables, and between mediators, contextual variables, and outcomes associated with PA adherence. Therefore, we have developed PAM and have presented it here in an effort to stimulate research and advance this area.

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