
CHANGING HEALTH-RISK BEHAVIORS: A REVIEW OF THEORY AND EVIDENCE-BASED INTERVENTIONS IN HEALTH PSYCHOLOGY

Adriana BABAN*, Catrinel CRACIUN

Babes-Bolyai University, Cluj-Napoca, Romania

Abstract

Changing health-risk behavior has been shown to decrease morbidity and mortality and enhance quality of life. The present review aims to describe the models and theories that underpin effective interventions and the empirical studies that warrant their successful use with specific health risk-behaviors. Motivational, behavioral enactment and multi-stage models are critically discussed in the context of identifying the ingredients that help translate theories into practice by designing effective behavior change interventions. Future research directions are outlined for continuing the development of a theory and evidence based practice in health psychology and its integration with evidence-based theory and practice of cognitive-behavioral psychotherapies, as both are focused on behavioral change.

Key words: health-risk behavior, models of change, effectiveness, evidence-based interventions.

INTRODUCTION

Human behavior plays a central role in the maintenance of health and the prevention of disease. *Health-risk behavior* can be defined as any activity undertaken by people with a frequency or intensity that increases risk of disease or injury (Steptoe & Wardle, 2004). The health risk behaviors might cluster together into a *risky lifestyle*. Much of the mortality and morbidity is caused by individual behavioral patterns, polluted environment or poverty. Statistics show that half of the premature death from the 10 leading causes in developed countries is caused by preventable factors, such as: tobacco use, alcohol abuse, physical inactivity, unhealthy dietary habits, risk sexual practices, non-adherence to effective medication regimens and to screening programs (Gray, 1993). Health risk behaviors also influence cognitive performance, emotions, and the overall

* Correspondence concerning this article should be addressed to: Dr. Adriana Baban, No. 37 Republicii St., 400015, Cluj-Napoca, Romania; Email: adrianababan@psychology.ro

quality of life (Hawkins & Anderson, 1996). Although epidemiologic data on the relationships between these behaviors and various health outcomes were available in the early 1980s, many refinements in knowledge have occurred since then. Causal conclusions have been strengthened by more sophisticated research designs, and program implementations. The impact of these risk behaviors on health is of such magnitude that it has become one of the priorities of the most important national and international health organizations (Rutter & Quine, 2004). To advance in the field of risk behaviors change, the Behavior Change Consortium (BCC) was created as a collaborative network of institutions and specialists. BCC reviews currently informs about links between health and behavior, about the influence of the social environment on these behaviors, and about interventions to improve quality of life through modifying behavior. It also addresses what must still be learned in order to answer questions and to discover and share what works, and what does not regarding health and behavior (Prochaska, 2005).

There are some important issues regarding the field. First, there is an overlapping of constructs among social cognition models of health and illness. Bandura (2000) criticizes the way the proliferation of models of health behavior determines “cafeteria style research” where a mixture of theoretical concepts are used and unnecessarily multiply predictors in the name of theoretical integration. For instance, the self-efficacy concept from Social Cognitive Theory (SCT) overlaps with perceived behavioral control from the Theory of Reasoned Action and the Theory of Planned Behavior (see below) or the barriers concept from SCT overlaps with the barriers concept from Health Belief Model. More studies are needed in order to provide evidence for discriminant validity among these constructs, and their integration with already validated theories of cognitive-behavioral practice in the clinical field (David, Miclea, & Opre, 2004), as both target health promotion and/or behavioral treatment. Second, interventions in the clinical field can be considered theory and evidence-based when (1) the theory that is used for data interpretation fulfills two criteria: (a) it provides a clear account of the hypothesized underlying psychological mechanisms that generate behavior change following the intervention; (b) the theory has been empirically tested before being used with behavior modification interventions (Michie & Abraham, 2004); researchers argue for the use of evidence obtained with specific populations and particular circumstances in order to build and improve behavior change theory, and (2) research in health psychology includes randomized control trials (RTC), elaboration and process evaluations in order to measure the impact of interventions and help identify the strategies that work in health behavior change. This, combined with cost-effectiveness analysis, is considered (David et al., 2004) the only path for developing a theory and evidence-based approach to behavior modification that would resemble the evidence-based practice in medicine and clinical psychology (e.g., evidence-based psychotherapy).

Considering the importance of health-risk behavior as the target of interventions that facilitate the decrease of morbidity and mortality and augment quality of life, the present paper has several aims: *first*, to describe and critically analyze the most important psychological models that intend to explain and predict health behavior and *second*, to discuss their effectiveness in relation to behavior change strategies that would help develop a theory and evidence-based practice in health psychology, integrated with the current evidence-based practice of clinical psychology and cognitive-behavioral psychotherapies. (e.g., evidence-based psychotherapy).

HEALTH BEHAVIOR CHANGE MODELS

Armitage and Conner (2000) in a review on social cognition models of health behavior describe three categories of models: motivational, behavioral enactment and multi-stage. *Motivational models* are based on the assumption that drive is enough for successful behavioral enactment and therefore focus on the motivational factors that determine performance. As intention is considered to be the most proximal determinant of behavior, it is widely used as the dependent variable in research founded on motivational models (Godin & Kook, 1996). The *behavioral enactment models* have developed as a response to the criticisms brought to motivational models. The critics of motivational models described the existence of a gap between the formation of intentions and the actual actions (Sniehotta, Scholz, & Schwarzer, 2005). Consequently, behavioral enactment models center on the action control strategies that help translate motivation into action. Last but not least, *multi-stage theories* are considered the most complex ones because they include variables that facilitate the adoption of behavior as well as variables that guarantee its maintenance (Armitage & Conner, 2000).

1. Motivational Models

The motivational models have been created to predict health behavior at particular points in time. They were also elaborated in order to discover the variables that determine health behavior and assess their ability to predict it (Armitage & Conner, 2000). In the following paragraphs we are going to briefly describe and review the efficacy of the following models: the health belief model, protection motivation theory, social cognitive theory, the theory of reasoned action and the theory of planned behavior.

The Health Belief Model

The Health Belief Model (HBM; Rosenstock, 1974) assumes that the likelihood of a person engaging in a specific health behavior is a function of several beliefs: the extent to which she/he believes that she/he is *susceptible* to a particular illness; her/his perception of the *severity* of the illness consequences;

perceived *barriers/costs* of adopting a health behavior; perceived *benefits* of adopting the targeted health behavior. These cognitive factors determine beliefs in personal *health threat* and in the *effectiveness of a health behavior*. Also, the model suggests that certain *cues to action* can trigger health behavior when the suitable health beliefs are held. A number of factors can serve as action triggers: internal cues (i.e., having an accident oneself, feeling pain etc) or external cues (i.e., reading a mass-media article about the effects of an unhealthy diet, a close friend discovering she has cancer etc). In this model behavioral intention is considered a mediating factor between the above described components and action.

One problem with the HBM is that it does not specify how the different beliefs influence one another or how the explanatory factors are combined to influence behavior. This resulted in different studies using numerous combinations of variables or different ways of analyzing variables: multiplying vulnerability and severity (Conner & Norman, 1994) or subtracting barriers from benefits (Wyper, 1990). Another problem is that the authors offered no operational definition of the variables and this led researchers to use a diverse methodology in their studies.

Despite these theoretical problems, the HBM has received empirical support for predicting a wide range of health behaviors: mammography and cervical screening (Breners & Skinner, 1999; Fishera & Frank, 1994; Orbell, Crombie, & Johnston, 1996), breast self-examination (Champion, 1990; Friedman, Nelson, Webb et al., 1994; Millar, 1997), adherence to medication (Budd, Hughes, & Smith, 1996; Hughes, Hill, & Budd, 1997; Nageotte, Sullivan, Duan, & Camp, 1997), exercise behavior (Corwyn & Benda, 1999) and safe-sex behaviors (Bakker, Buunk, Siero, & Van den Eijden, 1997).

The results of a meta-analysis conducted by Sheeran and Abraham (1996) concluded that the HBM constructs are frequently significant predictors of behavior but their effects are small.

Protection Motivation Theory

Protection Motivation Theory (PMT; Rogers, 1975) developed starting from the scientific literature that argued for the effectiveness of fear-arousing communication. The level of induced fear influences the adoption of adaptive responses in a linear way. It has been shown that a medium level of fear brings forth cognitive responses that lead to behavioral implementation.

Protection motivation is the result of both threat appraisal and coping appraisal. The evaluation of the health threat and the appraisal of the coping responses result in the intention to perform adaptive responses (protection motivation) or maladaptive responses that place individuals at health risks. Perceived vulnerability to the disease and perceived severity of the illness are expected to inhibit the probability of maladaptive responses. Fear arousal indirectly enhances the protection motivation by increasing perceived severity and

perceived vulnerability to the disease. The coping appraisal process evaluates the components that are related to the appraisal of the coping responses: the individual's expectation that carrying out recommendations will determine threat removal (response efficacy) and the belief in one's ability to perform the necessary actions successfully (self-efficacy). Protection motivation is the result of perceived severity and perceived vulnerability, as well as response efficacy and self-efficacy. It is a mediating variable that arouses, maintains and guides protective health behavior. It facilitates the implementation of adaptive behaviors and can be best measured by behavioral intentions.

PMT has been used as a framework for predicting various behaviors: reducing alcohol use (Stainback & Rogers, 1983), enhancing healthy lifestyles (Stanley & Maddux, 1986), exercise, enhancing diagnostic health behaviors and prevention of sexually transmitted diseases (Van der Velde & Van der Pligt, 1991).

In order to evaluate PMT as a predictive social cognition model, several criteria have been used. One refers to the variance of preventive behavior that can be explained by using the PMT components as predictors. Various studies have shown that PMT can be used successfully for the prediction of intentions to adopt preventive health behavior (Boer & Seydel, 1996). However, further research revealed that threat appraisal plays a role in the implementation of protective health behaviors only in the cases where the person is faced with a new threat.

The Theory of Reasoned Action

Another model which stresses the role of cognitive factors in motivating actions for behavior change is the Theory of Reasoned Action (TRA; Fisbein & Ajzen, 1975). TRA states that the most proximal cause of behavior is one's intention to adopt the targeted action. Intentions represent a person's motivation that takes the form of a conscious plan to exercise a certain amount of effort and perform the desired behavior. Thus, the more a person wants to adopt a behavior, the more it is likely to do so. Intentions are influenced by attitudes towards performing a particular behavior and social norms. *Attitudes* are a function of a person's belief about the consequences of actions, namely: the perceived likelihood that adopting certain behavior will lead to a particular outcome and the evaluation of that outcome. If the behavioral outcomes are perceived as desirable, a person is more likely to have a positive attitude towards that particular behavior. For instance, if adopting a low fat diet is perceived as leading to weight loss and weight loss is valued as being helpful, the person will develop a positive attitude towards adopting a low fat diet.

Subjective norms represent a person's belief that significant others (people whose opinion is valued as important) think that he/she should adopt a certain behavior. Subjective norms are determined by normative beliefs and people's motivation to comply with the opinions of significant others. There is a distinction between *injunctive social norms* that reflect the concern with others'

social approval and *descriptive norms* that describe what others actually do. However, there are researchers that consider both norms to be indicators of the same underlying concept, social pressure (Conner & Sparks, 1996).

The Theory of Planned Behavior

The Theory of Planned Behavior (TPB; Ajzen & Fishbein, 1980; Ajzen, 1991) was developed in an attempt to broaden the applicability of the TRA by including perceived behavioral control as an additional predictor of behavior. The basic assumption of TPB is the fact that beliefs are the fundamental determinants of any behavior and therefore, risk behavior can be changed by modifying the underlying beliefs. According to the TPB, attitudes, social norms and perceived behavioral control influence intention that represents the proximal determinant of behavior. *Perceived behavioral control* is the individual's perception regarding the extent to which performing a certain behavior is easy or difficult. The concept is similar to the one of self-efficacy (Bandura, 1986). The relationship between perceived behavioral control and behavior suggests that we are more likely to engage in behaviors over which we have control. Perceived behavioral control is influenced by both internal factors (i.e., skills, information, abilities, emotions, personal deficiencies) and external factors (i.e., opportunities, dependence on others, barriers). Thus, perceived behavioral control is determined by perceived presence or absence of resources and opportunities and the perceived ability of these to induce or hinder performance.

The TPB has been widely used because it offers a clear theoretical account of the links between attitudes, intentions and behavior. Also, it states how these constructs should be operationalized, which makes the design of behavior change interventions easier. Fishbein and Ajzen (1975) provide a frame for understanding the ways in which models like the TPB can be used to change behavior. Successful behavior change can be achieved when intentions are changed thorough either attitudes, subjective norms or perceived behavioral control. Fishbein and Ajzen (1975) also present two strategies for changing beliefs: introducing new salient beliefs or changing existing prominent beliefs of the target population.

Both the Theory of Reasoned Action and the Theory of Planned Behavior have been used to predict several health behaviors: smoking, drinking, dental behavior, health screening (Conner & Sparks, 1996) and AIDS preventive behavior (Terry, Gallois, & McCamish, 1993). However, Godin and Kok (1996) conducted a review that showed components of the TPB to explain on average 41 percent of the variance in intention, but only 31 percent of the variance in behavior.

Social Cognitive Theory

Social cognitive theory (SCT; Bandura, 1986) states that behaviors are performed if people believe that they have control over the outcome, perceive few

external barriers towards reaching their goals and have confidence in their ability to achieve these. *Self-efficacy* and *outcome expectancies* (related to the situation and to action) represent the two central concepts of SCT.

Self-efficacy refers to a personal sense of control that facilitates behavior change. If people believe that they can take action to solve a problem instrumentally, there is a higher probability that they will actually do so and they feel more committed to the decision. Self-efficacy influences people's feelings, thought and actions. A low self-efficacy has been linked to depression, anxiety and helplessness. Also, persons with low self-efficacy are characterized by pessimistic thoughts and low motivation to act. In contrast, individuals with a strong sense of self-efficacy tend to accept challenges, set themselves higher goals and stick to them. Moreover, once they have taken a particular action these people tend to invest more effort, persist longer and recover when encountering setbacks.

It has been shown that a strong sense of personal efficacy is related to better health, higher achievement and social integration. Therefore, self-efficacy has become a key variable in clinical, educational, social, developmental health and personality psychology.

Outcome expectancies differ in the sense that they refer to the perception of possible consequences of one's actions. Situation-outcome expectancies refer to the fact that certain behavioral consequences are determined by the environmental factors and are not subject to personal control. Action-outcome expectancies represent the belief that actions lead to a certain results.

SCT has been used in several studies to predict a variety of intentions and health behaviors. However, SCT has been shown to account for only a small to medium amount of variance in behavior (Armitage & Conner, 2000). The main predictor of behavior is considered to be the self-efficacy component of SCT. Several studies have shown the potential of self-efficacy to influence initiating and maintaining behavior change: preventing unprotected sexual behavior, physical exercise, nutrition and weight control, resistance self-efficacy for addictive behaviors and recovery-self-efficacy related to addictive behaviors (Schwarzer & Fuchs, 1996). Moreover, the central role played by self-efficacy in several other health behavior models (i.e., PMT, TPB, HAPA), has led health psychologists to state that self-efficacy is more important in itself than SCT (Armitage & Conner, 2000).

2. Behavioral Enactment Models

Motivational models of health behavior are based on the assumption that there is an almost perfect association between intention and behavior. However, meta-analyses have shown that motivational models explain a large proportion of the variance in intention but not of behavioral variance (Conner & Armitage, 1988). In the next paragraphs we are going to describe and discuss the

effectiveness of the main behavioral enactment models that developed in order to explain the gap between intentions and behavior.

Implementation Intentions

Studies have shown that intentions are not perfect predictors of action, as they explain only 20 or 30 % of behavior variance. The question arises “what happens to the ones that have good intentions but fail to turn them into action?” In order to provide an answer, Orbell and Sheeran (1998), suggest there are strategies that help translate intentions into action. One of these strategies is represented by the concept of implementation intentions (Gollwitzer, 1999). According to Gollwitzer (1990; 1993) and Heckhausen (1991), following the motivational phase that ends with the formation of a goal intention, there is a volitional phase during which plans are made to ensure behavioral enactment. These plans have been called implementation intentions and they take on the specific form of “*I intend to do X at time and place Y*”. Empirical evidence has been provided that the formation of implementation intentions increases the likelihood that a goal will be achieved (Gollwitzer & Brandstätter, 1997). This success is explained by the fact that specifying the particular time and place for performing the intention helps in overcoming difficulties with getting started. The mental link between the targeted behavior and the context of apparition is traced from memory and makes good performance opportunities less likely to be missed.

Previous meta-analyses (Sheeran, 2002) have shown implementation intentions to have a “medium” effect size on behavior ($r=0.33$). Also, their effectiveness in promoting behavior has been proven for various behaviors: attendance to cervical cancer screening (Sheeran & Orbell, 2000), vitamin supplement use (Sheeran & Orbell, 1999), exercise behavior (Milne, Orbell, & Sheeran, 2002), condom use (Sheeran Abraham, & Orbell, 1999).

Two kinds of planning are distinguished in the scientific literature: action planning and coping planning. Action planning is identified with implementation intentions (Gollwitzer, 1999) while coping planning refers to anticipating personalized risk situations and the planning of adequate coping responses (Sniehotta, Scholz, Schwarzer, Fuhrmann, Kiwus, & Voller, 2005). Interventions including action planning have been successfully applied to: maintaining a healthy diet (Verplanken & Faes, 1999), regulating alcohol consumption (Murgraff, White, & Phillips, 1996), physical exercise (Lippke, Ziegelmann, & Schwarzer, 2004). For long-term behavioral changes, action coping has been shown to be more efficient in inducing behavior enactment. Action plans proved to be more useful early in the behavior change process, while coping plans were more helpful later on for behavior maintenance. Consequently, both kinds of planning are effective for designing interventions at different stages of behavior change (Sniehotta, Schwarzer, Scholz, & Schuz, 2005).

Goal Theory

The theory of goal pursuit, developed by Bagozzi (1992, 1993) builds on the motivational models by examining the motivational influences on goal intentions and trying. Attitudes (toward process, success and failure), subjective norms and goal efficacy determine a desire which influences the formation of a goal intention. "Trying" is determined by goal intentions and refers to processes that initiate and regulate the instrumental acts that lead to goal attainment. After the goal intention has been formed, three appraisals decide the means of reaching the proposed goal: self-confidence, the likelihood of goal attainment and the perception of pleasantness/unpleasantness. The initiation of goal pursuit is determined by the "trying" variable. Bagozzi (1992) considers trying to be a function of three processes: decisions regarding the means of action, planning and control of goal-directed behavior and maintenance of commitment. In addition, planning and control of goal-directed behavior are a function of implementation intentions (Gollwitzer, 1993) and goal commitment reflects the dispositional and purposive mental activities that are necessary in order to maintain or disengage from goal commitment.

Bagozzi's model has not been widely applied to the field of health psychology; however there are a few comparison studies that show larger proportions of variance in behavior to be accounted for by variables from goal theory as compared to the ones of TRA or TPB. Further empirical investigations are needed in order to explore the applicability and utility of this theory in the field of health psychology.

3. Multi-Stage Models

One of the assumptions in health psychology is that behavioral change is the outcome of a conscious decision making process, where benefits and costs of adopting a particular behavior are carefully considered before acting. Several models like: the Theory of Reasoned Action (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975), the Theory of Planned Behavior (Ajzen, 1988; 1991), the Health Belief Model (Rosenstock, 1974) and the Protection Motivation Theory (Rogers, 1975) were developed starting from this idea. Another common characteristic is that each of the above mentioned theories has a single prediction equation that describes the probability that a certain individual will act. Because their prediction rules place each individual along a continuum of action likelihood, these theories have been called "*continuum theories*". Designing an intervention based on one of these theories would mean that one should aim to move people along the action continuum and increase their likelihood of adopting the targeted behavior.

However, this continuum perspective has been criticized by people who state that behavior change requires progression through several stages, with different variables determining behavior at each particular phase. These are called

stage theories and are based on the assumption that one has to identify the determinant variables and their combination, characteristic for each stage transition. Health behavior is complex and a single prediction equation is not enough to design effective behavior change interventions. Moreover, there are certain barriers that people face when trying to change their behavior and these are different at various stages. This has important implications for the way in which interventions are planned. Contrary to continuum theories, stage theories aim to match interventions to people by identifying the stage they have reached in changing behavior and helping them overcome the specific barriers that hinder transition to the next stages (Briedle, Riemsma, Pattenden, Sowden et. al, 2005).

Weinstein (1988) described four important characteristics of stage theories. First, they possess a category system that defines the stages. A stage is a theoretical construct that includes certain elements. Second, there is an exact ordering of the stages, based on the assumption that individuals must pass through all stages in order to reach the point of action and behavior maintenance. However, people can reverse to a previous stage or can remain “stuck” at a certain stage. A third characteristic is that these theories describe a common set of obstacles that have to be overcome at particular stages. Fourth, different barriers are being faced by individuals at different stages.

The main stage models in health psychology are: the *Transtheoretical Model of Change* (TTM, Prochaska & DiClemente, 1983), the *Precaution Adoption Process Model* (PAPM, Weinstein, 1988) and *Health Action Process Approach* (HAPA, Schwarzer, 1992).

The Transtheoretical Model of Change

The Transtheoretical Model (TTM) or Stages-of Change Model (Prochaska & DiClemente, 1983) includes five stages: (1) *precontemplation* where there is no intention to change behavior, (2) *contemplation* where the individual is beginning to consider change at some nonspecific time in the next months; (3) *preparation* where the person is planning to change in the immediate future; (4) *action* where the individual engages in behavior change and (5) *maintenance* where a constant state of behavior change is reached. *Relapse prevention* describes the fact that most people find themselves “recycling” through the stages of change several times before the change becomes truly established. In this stage, the individual is taught to reframe “the failure” into a “new lesson” and to re-engage in the change process (Zimmerman, Olsen, & Bosworth, 2000).

According to TTM, there are also nine processes of change that affect the transition between stages: consciousness raising, social liberation, emotional arousal, self-reevaluation, commitment, countering, environment conferral, rewards and helping relations. The model also includes a series of outcome variables: decisional balance, self-efficacy, behaviors and any other psychosocial or biological variables that describe the targeted area of change.

One of the advantages of the TTM is that it has general implications for several areas of intervention development and implementation. The TTM is an appropriate model for the *recruitment* of a target population because it makes an assumption about the readiness for change of various individuals. Consequently, a person should be included in an intervention group based on their belonging to one of the TTM stages.

According to the TTM, individuals find themselves in different stages and interventions have to be adapted to meet their specific needs. Moreover, traditional interventions often have high dropout rates because the program does not match their particular needs. As the TTM based interventions are designed to accommodate the requirements of a certain group, this guarantees a smaller drop out rate.

Another advantage of the TTM is that it can provide sensitive *measures of progress*. Contrary to continuum models that usually use a single measure of outcome, the TTM includes a set of outcome measures and therefore reinforces the steps that an individual takes toward behavioral change. Also, the TTM can ease the analysis of mediation mechanisms. Because of its stage like structure, the model facilitates a process analysis of transition patterns from one stage to another and decides which interventions are effective for which stage (Briedle, Riemsma, Pattenden, Sowden and al, 2005).

The TTM has been successfully applied to several health behavior change interventions: smoking cessation (DiClemente, Prochaska, Fairhurst et al., 1991), exercise (Prochaska & Marcus, 1994), addictive behaviors (Prochaska, DiClemente, & Norcross, 1992) and dietary change (Povey, Conner, Sparks, James, & Shepard, 1999). However, the majority of these studies have used cross-sectional designs which make the true evaluation of the TTM difficult (Armitage & Conner, 2000). Meta-analyses on TTM effectiveness recommend research on the mediators and moderators of stage transition (Marshall & Biddle, 2001).

The Precaution Adoption Process Model (PAPM)

The PAPM (Weinstein, 1988; Weinstein & Sandman, 2004) includes seven stages among a path from lack of knowledge to the initiation of behavior and maintenance. Initially people do not know anything about the issue (stage 1). After they receive information on the issue they may be aware but still unengaged (stage 2). When they eventually become engaged by the matter they reach a decision-making stage (stage 3). The decision-making process may have two outcomes: if the person decides not to act at the moment (stage 4) or decide to act (stage 5). Stage six represents the initiation of action, while stage seven the maintenance phase. The model assumes that people usually pass through all the stages, but there is no indication of the time spent in each one of them. Movement back and forth among the stages is possible, although, once the person has information; it will not go back to the stages of unawareness for instance (Weinstein, Rothman, & Sutton, 1998).

The PAPM model differs from the other stage theories like the Transtheoretical Model (TTM) because it distinguishes among people who are unaware of the issue and those who know something but are not yet interested (stage 1 and 2). Moreover, the assignment to stages is made based on the person's current thoughts about the behavior, without considering a time frame like the TTM does.

The PAPM model has been applied to several behaviors: osteoporosis prevention (Blalock, DeVellis, Giorgino et al, 1996), mammography (Clemow, Costanza, Haddad *et al.*, 2000), hepatitis B vaccination (Hammer, 1997) and home radon testing (Weinstein & Sandman, 2004).

Health Action Process Approach

The Health Action Process Approach model (HAPA; Schwarzer, 1992) is considered to connect the motivational, behavioral enactment models and multi-stage models presented above (Armitage & Connor, 2000). The basic assumption of the HAPA model is that the initiation and maintenance of health behavior must be considered as a process consisting of at least two stages: a motivational phase and a volition phase. The latter is further subdivided into a planning phase and a maintenance phase.

In the motivational phase, an individual forms an intention either to adopt an adaptive behavior or to change risk behaviors. Self-efficacy and outcome expectancies are the major predictors of intention at this stage. Outcome expectancies are considered precursors of self-efficacy because people make suppositions about the possible consequences of behaviors before thinking whether they can actually perform the targeted behavior themselves. Self-efficacy is regarded as a mediator between outcome expectancies and intentions. Another indirect factor that has an important influence within the motivational phase is the perception of risk. These help to stimulate outcome expectancies which further encourage self-efficacy. A minimum level of threat must be perceived before people begin to think about the benefits of performing certain behaviors and their competence of performing them.

The action phase describes the processes that take place after an intention to perform a certain health behavior has been formed. The volitional processes are mainly influenced by self-efficacy, as the number and quality of action plans depend on one's perceived competence and experience. When an action is performed, self-efficacy plays a role in determining the amount of effort invested and the perseverance. People with high self-efficacy will develop success scenarios that will guide action and help them face the possible obstacles.

The HAPA model has been used as the basis for intervention for modifying risk behaviors like: alcohol consumption (Murgraff & McDermott, 2003) or unhealthy eating habits (Satow & Schwarzer, 1998). It was also used for interventions promoting health-enhancing behaviors: low-fat food consumption (Renner, Knoll, & Schwarzer, 2000) or performing regular breast self-

examination (Garcia & Mann, 2003; Luszczynska & Schwarzer, 2003). When applying the HAPA model to preventive behaviors, self-efficacy has been shown to represent the best predictor of intention and plans of performing breast self-examinations, while planning proved to be the best predictor of the actual behavior (Luszczynska & Schwarzer, 2003).

HOW DO EFFECTIVE THEORIES WORK?

Previous reviews have shown that when it comes to predicting behavior, the efficacy of motivational models is smaller compared to behavioral enactment and multi-stage theories. This has been explained by referring to the fact that behavioral enactment models clarify the intention-behavior gap and the quality of multi-stage models to conceptualize behavior as consisting of a number of stages that lead to behavior change and maintenance. However, further studies should assess the effectiveness of behavioral enactment versus multi-stage models in what concerns their utility for intervention design (Armitage & Conner, 2000).

Based on the research data analyzed in the first part of the article, we present in Table 1 a summary of the various models and the particular behaviors where interventions proved effective.

Table 1. Summary of theories related to risk behavior modification effectiveness.

Theory	Smoking	Sexual behavior	Alcohol abuse	Eating habits	Exercise	Screening behaviors	Medication adherence
HBM					X	X	X
PMT		X	X			X	
TPB	X	X	X	X		X	
SCT		X	X	X	X		
Implementation intentions		X		X	X	X	X
TTM	X		X	X			
HAPA			X	X		X	
PAPM						X	

Nevertheless, it is important to take into account, that sometimes, the effectiveness of an intervention does not necessarily mean behavioral change. For instance, a study conducted by Milne et al. (2002) found that an intervention designed to promote exercise, based on protection motivation theory, resulted in changes in cognitions but not in actual behavior change. When implementation intentions were added to the intervention, the participants who formed these specific plans to exercise were more likely to do so, compared to those who didn't plan. These kinds of example represent arguments in favor of using experimental testing of particular change strategies, separately and in combination, in order to

identify the change-generating methods causing a successful intervention (Michie & Abraham, 2004).

Most meta-analyses examining the intention-behavior relation rely mainly on correlational studies (Godin & Kok, 1996; Sheeran, Abraham, & Orbell, 1999). Because these studies don't provide a good base for stating whether intentions have a causal impact on behavior, Webb and Sheeran (2006) set out to explore in their meta-analysis the extent to which changes in intention lead to changes in behavior. Results showed that a medium to large change in intention ($d=0.66$) leads to a small to medium change in behavior ($d=0.36$). Furthermore, their study looked at the characteristics of interventions that are effective in changing intentions and behaviors. As can be seen in Table 2, findings demonstrate a strong relationship between the effect size for intention and the one for behavior, meaning that interventions that cause great changes in intention also engender significant changes in behavior.

According to the results depicted in Table 2, interventions are most likely to determine intention and behavioral change if they are based on: protection motivation theory or the theory of reasoned action/planned behavior, use change strategies such as social encouragement and incentives for behaving or remaining in the program and are delivered on a one-to one or group basis by a research assistant or health educator. The importance of the PMT for designing behavior change interventions has been demonstrated in previous reviews (Milne et al., 2002), as well as the utility of using TRA/TPB (Hardeman, Johnston, Johnston, Bonnetti, Wareham, & Kinmonth, 2002). In what concerns behavior change strategies, the provision of incentives and offering social support are both well established as effective methods for behavior modification. For example, task-independent rewards have been proven useful when it come to performing difficult goals, while task-dependent rewards are better used for reaching moderate goals (Mowen, Middlemist, & Luther, 1981). Social support offered by the partner has been shown to help with smoking cessation (Mermelstein, Lichtenstein, & McIntyre, 1983) or performing breast-self examinations (Prestwich, Conner, Lawton, Bailey, Litman, & Molyneaux, 2005). The fact that there were no major differences between the effectiveness of group interventions compared to delivering one-to one based ones is important for designing programs that target large populations (Webb & Sheeran, 2006).

Table 2. Effect sizes for Intervention Characteristics (adapted after Webb & Sheeran, 2006).

Intervention characteristics	N	K	D	
			Intention	Behavior
Theoretical basis				
PMT	1.510	11	0.69	0.46
TRA/TPB	3.548	18	0.58	0.40
HBM	1.090	8	0.52	0.29
Multi-Stage models	1.654	5	0.53	0.22
SCT	4.409	13	0.28	0.15
Behavior change methods				
Incentives for behaving or remaining in the program	1.153	6	0.96	0.58
Social encouragement, social pressure, social support	2.365	8	0.64	0.54
Modeling	3.529	14	0.41	0.28
Environmental changes	162	2	0.77	0.27
Increasing skills	6.302	26	0.38	0.27
Using personalized messages	2.044	8	0.10	0.26
Using risk awareness materials	5.345	31	0.56	0.25
Monitoring, self-monitoring	1.721	3	0.36	0.13
Mode of delivery: group format				
One-to one	4.834	24	0.66	0.38
Group	4.177	23	0.42	0.31
Classroom	2.839	14	0.48	0.28

CONCLUSIONS AND DISCUSSION

This review provides useful information for health professionals to facilitate risk lifestyle modification. Health professionals can optimize people's risk behavior, ensuring that they are: exposed to correct information about risk behaviors; develop a positive intention to perform a health behavior; identify social and personal barriers to performing that behavior; perceive themselves as having enough control over engaging in behavior change; and have a positive affect regarding the behavior and its outcome.

The present review aimed to briefly describe the most important health psychology models that set out to explain and predict health behavior. Also it intended to give an account of their effectiveness in providing a base for successful behavior change strategies. Answering the question “*How does it work?*” helps to identify the psychological means underlying effective behavior change interventions. These can be used to design programs that modify risk behavior to prevent illness and promote health. However, one of the first problems that arise when trying to design efficient health behavior change interventions is that identifying the main predictors of behavior does not mean that one has found the determinants of behavior change. Researchers should focus more on applying the existing theories from health psychology and integrate them with the more advanced evidence-based theory and practice of cognitive-behavioral psychotherapies, in order to identify the determinants of the required change instead of the predictors of the present behavior only. For example, when using the TPB to design and measure the effectiveness of an intervention, one should measure attitudes, subjective norms and perceived behavioral control toward behavior change (Brug, Oenema, & Ferreira, 2005). HBM could be easily integrated with the more validated ABC model of cognitive-behavioral psychotherapies (Beck, 1976; Ellis, 1962), which is the most widespread form of psychological intervention in the clinical practice, the platform of evidence-based clinical practice in psychology.

Another problem with identifying interventions that encourage behavior change is the fact that these do not equal discovering the best psychological change strategies that cause behavior change. This is a consequence of the fact that intervention descriptions are not explicit about what particular strategies they have used and therefore don’t facilitate replication. A solution could be provided by designing randomized control trials (RCTs) to understand what type of interventions promote a certain kind of behavior modification. Also, evaluating theory-based strategies, separately and in combination, can help promote a theory and evidence-based approach to risk behavior change (Michie & Abraham, 2004).

Theories often only suggest *what* needs to be changed in order to generate behavior modification and don’t focus on *how* this can be induced. Future studies should explore *how* to translate behavior-change predictors into successful behavior change strategies and intervention tools. For example, in order to increase the impact of intentions on behavior, future behavior change interventions should aim to promote intention stability and implementation intention formation that have been proven to facilitate the translation of intentions into action. Stable intentions were shown to resist situational pressure (Cooke & Sheeran, 2004), reduce the impact of past habits on future performances (Conner, Sheeran, Norman, & Armitage, 2000) and facilitate behavior change maintenance (Conner, Norman, & Bell, 2002). In what concerns implementation intentions, meta-analysis show that their formulation increase rates of behavioral enactment and goal attainment compared to the formation of a single behavioral intention

(Sheeran, 2002). This has been explained by the fact that implementation intentions delegate action control to particular situational cues that then elicit performance automatically. The *if-then* plan determines action control to switch from a conscious effort to the automatic control of behavior by situational cues that have been selected in advance (Sheeran, Webb, & Gollwitzer, 2005). Future behavior change interventions should also use non-intentional ways of inducing action such as the formation of habits (Reach, 2005; Webb & Sheeran, 2006). Because intentional behavior change requires motivation and skills but also opportunity to change, additional development of behavior change theory should also center on the use of environmental change strategies like stimulus control (Brug, Oenema, & Ferreira, 2005). Behavioral interventions must also recognize that people live in social, cultural, political, and economic systems that shape behaviors and access to the resources they need to maintain good health.

Many interventions may profit from a multi-theories approach. For example, one theory can be used to identify cognitions related to health while another describes psychological change processes (Kok & Schaalma, 2004). However, following the model of cognitive-behavioral psychotherapies, a cost-effectiveness analysis should be used with these interventions.

Health psychology models and theories provide key underpinning to health promotion and disease prevention programs at all levels of intervention: individual, group and community. According to the statement that “there is nothing more practical than a good theory”, discovering and integrating theory-rooted strategies that aim to develop motivation, abilities and environmental conditions that cause intention and behavior change will bring an important contribution to the development of a theory and evidence based practice in health psychology. Their integration into current evidence-based practice based on cognitive-behavioral models could seriously enhance the efficacy and effectiveness of these interventions, their validated theory of change and economical information regarding their cost-effectiveness. Constant research for developing and validating theories make health promotion and disease prevention strategies more effective, and ultimately contribute to the improvement of public health.

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