The Challenge study: theory-based interventions for smoking and weight loss

C. M. King, A. J. Rothman and R. W. Jeffery

Abstract
Both smokers and overweight persons report frequent efforts to change their behavior. Long-term success, however, is achieved by few. Interventions are needed to improve long-term success in smoking cessation and weight loss. Our research program is designed to address this need and to test a novel conceptualization of health behavior change that is based on the premise that the initiation and the maintenance of behavior change involve different decision processes. Positive expectations about the consequences of behavior change are thought to guide decisions to initiate behavior change, whereas satisfaction with the outcomes afforded by one’s behavior guides decisions about maintenance. In the first phase of our research program, we are evaluating the effect people’s expectations about the benefits of behavior change have on immediate and long-term behavioral outcomes. Specifically, participants are assigned to either an ‘optimistic’ treatment condition that emphasizes positive expectations for outcomes or a ‘balanced’ treatment condition that gives equal weight to the benefits and costs associated with behavior change. The impact of manipulating people’s expectations about behavior change will be examined in the areas of smoking cessation and weight loss. Results of these studies will advance research on health behavior change by informing practical and theoretical understanding of the factors that control decisions to initiate a new pattern of behavior and to maintain it.

Introduction
Permanent changes in health behaviors are difficult for many people. Although individuals realize that their current behaviors are not optimal for their health and make efforts to change them, failure to maintain any lasting change in behavior is very common. For example, people are well aware of the health risks posed by obesity and by cigarette smoking, and individuals who are overweight or smoke report frequent attempts to change their behavior. However, even with the aid of professionals, long-term success rates in these areas are quite low (Jeffery et al., 2000; Ockene et al., 2000).

The purpose of the current program of research is to test a conceptual model which suggests that part of the difficulty with health behavior maintenance may be that decisions regarding the initiation of a behavior involve fundamentally different decision criteria from those regarding the maintenance of these behaviors. Central to this model are people’s expectations about the costs and benefits associated with the process of behavior change, and how these expectations shape people’s perceptions of the consequences of the actions they perform. This model will be tested in a series of theory-based interventions designed to influence how people make decisions about their behavior. In this paper, we describe the first phase of this
The Challenge study: theory-based interventions

research program in which we evaluate the immediate and long-term effects of an intervention protocol that was developed to modify people’s expectations about the processes and outcomes associated with participating in a smoking cessation program and, in a parallel study, with participating in a weight loss program. Although the improvement of health through behavior change is a penultimate goal of this research program, the principal goal of the present research is to test the viability of a model of behavior change.

Current theories of health behavior change

Most theories of health behavior change view the decision to initiate and maintain a new health behavior as governed by individuals’ evaluations of the associated costs and benefits (Weinstein, 1993). This value expectancy orientation, focused on future outcomes resulting from a behavior change, is shared by many current theories: Health Belief Model (Janz and Becker, 1984), Theory of Reasoned Action (Ajzen and Fishbein, 1980), Theory of Planned Behavior (Ajzen, 1991), Social Cognitive Theory (Bandura, 1986), Subjective Expected Utility Theory (Sutton, 1987), Protection Motivation Theory (Maddux and Rogers, 1983) and the Transtheoretical Model of Health Behavior Change (Prochaska et al., 1992). Although the theories differ in the specific factors that are hypothesized to guide people’s behavioral decisions (e.g. social norms, self-efficacy, perceived risk and perceived severity), they also all assume—either explicitly or implicitly—that the processes that underlie the initiation of a new behavior are the same as those that determine maintenance of an initiated changed in behavior (Rothman, 2000).

Initiating behavior change

Interventions based on current theories of behavior change place heavy emphasis on benefits to be accrued by behavior change and the relative ease of change, and this approach has proven effective at helping people initiate changes in their health practices (Lichtenstein and Glasgow, 1992; Wing, 1997). Intervention strategies designed to heighten people’s awareness of the benefits have included education about health benefits and testimonials from people who have successfully changed their behavior. Strategies designed to lessen the costs of behavior change include practical aids such as meal replacements (Pirie et al., 1992; Jeffery et al., 1993). The major shortcoming of these interventions has been their limited success in promoting behavioral maintenance, i.e. the interventions have the ability to elicit the initiation of new behaviors, but not the ability to sustain those changes over time.

Maintaining behavior change

Investigators who have developed interventions specifically targeting the maintenance of behavior change have, consistent with prevailing theory, relied on strategies similar to those used to promote initiation [e.g. increasing the intensity and/or duration of the original intervention (Miller and Taylor, 1980; Lando, 1993; Wadden et al., 1994; Lando et al., 1996; Perri, 1998)]. Although the continued application of these strategies can delay the onset of relapse, rates of long-term maintenance have improved little. We believe that the differential impact of prevailing theory-based intervention strategies on short- and long-term behavioral outcomes may be informative in that it suggests that the processes that underlie the initiation of a new behavior differ from those that underlie the maintenance of that behavior over time.

A new model of behavior initiation and maintenance

We have developed a new conceptual model of health behavior change that is based on the idea that the initiation of behavior change and the maintenance of that change rely on different decision criteria [see (Rothman, 2000) for a more complete discussion of the model]. According to the model, decisions regarding behavioral initiation are based on beliefs about the favorability of future outcomes that result from a change in behavior. Thus, initiation can be conceptualized as an
‘approach’-based self-regulatory process in which people strive to reduce the discrepancy between their current state and a desired goal state (Carver and Scheier, 1990; Higgins, 1997). In contrast, the decision to maintain an established pattern of behavior is based on people’s satisfaction with the outcomes produced by current behavior. The feeling of satisfaction indicates that the initial decision to change the behavior was correct, and, furthermore, it sustains the effort people must put forth to monitor their behavior and minimize vulnerability to relapse. People choose to maintain a behavior in order to preserve a favorable situation and to avoid reverting back to a previous, less favorable state. Thus, maintenance can be conceptualized as an ‘avoidance’-based self-regulatory process in which people strive to maintain a discrepancy between their current state and an undesired goal state (Carver and Scheier, 1990).

In sum, we believe that the successful initiation of a change in behavior is driven by a desire to change one’s current situation, whereas successful maintenance is driven by a desire to preserve one’s current situation.

One interesting implication of conceptualizing initiation and maintenance of health behavior change as relying on different decision processes is that factors that facilitate one outcome may not necessarily facilitate the other. A specific example of this is the effect that outcome expectancies might have on the initiation and maintenance of behavior change. High outcome expectancies regarding change (e.g. I am going to feel physically fit after quitting smoking; I can lose 50 pounds by cutting back on sweets and walking 3 times per week) should facilitate the initiation of the initial behavior. However, because satisfaction with a new pattern of behavior depends in part on experiencing outcomes that meet or exceed one’s expectations, initial outcome expectancies that are unobtainable may produce feelings of dissatisfaction and thus, undermine behavioral maintenance. Thus, intervention efforts designed to motivate people to implement changes in their behavior may have the ironic effect of reducing the likelihood that the new pattern of behavior is maintained.

According to the model, intervention strategies that raise people’s expectations about the benefits of a behavior change should help them to implement short-term changes in their behavior. This will be true especially for behavioral domains such as smoking cessation in which people typically have modest expectations about the consequences of changing their behavior. Most smokers readily admit to enjoying some aspects of smoking and can feel quite ambivalent about the relative attractiveness of the pleasure of smoking versus the health benefits of quitting (Prochaska et al., 1992). They also expect the process of cessation to be difficult. We believe that these modest expectations are instrumental to understanding why smokers have a difficult time initiating quit attempts, and experience high rates of relapse in the first days and weeks of quitting (Lichtenstein and Glasgow, 1992; Hennrikus et al., 1995). We believe that smoking interventions should employ strategies specifically designed to raise outcome expectancies. Although raising people’s expectancies may motivate smokers to quit, its ultimate impact on long-term cessation is uncertain and should depend upon whether these expectations are realized.

Although not discussed in these terms, smoking cessation programs have often employed intervention strategies that can be viewed as expectancy raising. To the best of our knowledge, cessation programs never ask participants to quit at the first session. Instead, prior to quitting, program participants are educated about the health, social and economic benefits of cessation, and given a variety of self-management strategies designed to minimize the stress of quitting, all of which may serve to enhance their motivation and ability to quit smoking (Lando, 1993). Even though interventions regularly utilize these intervention strategies, there has been no systematic examination of how manipulating smokers’ expectations about quitting might affect either the initiation or the maintenance of cessation. A primary objective of the present research is to manipulate expectations about quitting in order to evaluate the predictions derived from our model.
In an initial study, we plan to randomly assign smokers to an intervention program that provides them with either an optimistic or a balanced set of expectations about the outcomes and processes associated with smoking cessation. We predict that providing smokers with a set of ‘optimistic’ expectations will lead to higher rates of quit attempts and will reduce rates of early relapse as compared to providing them with a set of ‘balanced’ expectations. Thus, quit rates at the end of the 8-week treatment program are expected to be higher for participants in the optimistic group than for those in the balanced group.

Although the modest expectations emphasized in the balanced condition may dampen smoker’s commitment to initiate a quit attempt, smokers in this condition should find it easier to realize, perhaps even exceed, their expectations and thus be motivated to maintain their quit over the long term. Thus, the discrepancy in quit rates between conditions is expected to dissipate during the 16-month follow-up period that follows the intervention program. In fact, to the extent that the outcome expectations engendered in the optimistic intervention condition prove to be too high to be realized, participants in the balanced intervention condition may have relatively higher rates of long-term success in quitting smoking than those in the optimistic condition (see Figure 1).

**Method**

**Study design**

Our initial study is designed to test the effects of interventions targeting participants’ outcome expectations on short- and long-term smoking cessation. Smokers are randomly assigned to one of two group treatment programs designed to modify their expectations about the outcomes and the processes associated with changing their behavior. One approach, labeled ‘optimistic’, focuses on increasing people’s expectations about the benefits of changing their behavior while minimizing their expectations about the costs associated with the process of change. The objective is to have participants focus their attention on the benefits of quitting (e.g. money saved) and to view quitting in the most positive light possible (e.g. withdrawal won’t last long). The optimistic condition also seeks to have participants attend to the costs of continuing to smoke. The second approach, labeled ‘balanced’, attempts to have participants give equal weight to the benefits and costs afforded by quitting smoking, as well as to the benefits and costs associated with the process of changing their behavior. Although participants in the balanced group receive factual information
identical to that received by the participants in the optimistic condition, the goal is to have them recognize what they will miss by not smoking (e.g. socializing with other smokers) as well as the difficulty of enduring the process of quitting (e.g. withdrawal symptoms). The greater focus on the costs of quitting smoking is intended to create more modest expectations for the process of quitting smoking.

Participants
Six hundred smokers are being randomly assigned to one of the two intervention conditions. Eligible smokers are over the age of 18 with at least a 2-year history of smoking 10 or more cigarettes per day. Pregnant women are excluded because the pregnancy might introduce motivational issues that would increase variability in their outcome expectations. Participants are being recruited from a major metropolitan area primarily through public advertisements. Interested smokers are screened for eligibility over the phone and invited to an orientation session where the study is described in detail. Those who wish to participate complete consent forms, baseline measures and then are randomized to a treatment condition.

Program structure
The treatment program consists of eight 1-h weekly group sessions. Groups are comprised of 10–15 participants and are lead by a trained facilitator. Supervision and training of the intervention staff is conducted by a PhD-level therapist with experience in cognitive-behavioral interventions for health-related behaviors.

Intervention sessions consist of an informational presentation by the group facilitator and group discussion. Between sessions, participants are asked to complete homework assignments which instruct participants to describe their smoking-related behavior during the week and to respond to questions designed to elicit specific types of cognitions. Typically, these assignments extend activities begun during the session.

The general topics covered in each session and the schedule of session topics are the same for both treatment conditions. Sessions 1–4 help participants identify their reasons for quitting, provide information about the physiology of smoking and teach skills for quitting. Participants in both groups are encouraged to quit smoking between Sessions 4 and 5. Sessions 5 and 6 focus on helping participants through the initial withdrawal period. Sessions 7 and 8 address the issue of maintaining cessation.

Changing smokers’ expectations
In the present study, cognitive-behavioral techniques for modifying cognitions are applied to the task of changing smokers’ expectations about the process of quitting smoking and the outcomes produced by quitting. Research in other areas of clinical intervention has demonstrated the effectiveness of techniques to modify people’s thoughts in order to effect change. Cognitive-behavioral interventions for a variety of psychological problems (e.g. depression, anxiety disorders and sexual dysfunction) have targeted patients’ expectations about treatment, themselves and future events (Masters and Johnson, 1970; Beck, 1976; Foa and Kozak, 1985). Although these techniques primarily focus on modifying dysfunctional cognitive processes (e.g. negative biases and illogical conclusions) rather than the content of the expectations per se, there is no reason to indicate that they would be less effective in a non-clinical sample seeking to optimize their physical health. In fact, researchers have developed a clinical intervention for alcohol abuse based on the well-substantiated finding that expectations for the effects of alcohol influence drinking behavior (Darkes and Goldman, 1993).

Treatment strategies that are designed to change expectations are the primary focus of the intervention. In order to test the current theory of health behavior change and to evaluate the meditational role of positive and negative expectations for the initiation and the maintenance of change, it is essential that participants’ expectations are modified differentially in each treatment condition.

Structured activities are used in both the balanced and optimistic treatment conditions to help parti-
cipients selectively attend to particular aspects of the quitting experience and its outcomes. Intervention strategies include those that directly target expectations about quitting smoking and those that primarily fulfill another treatment task (e.g. encouraging environmental changes prior to quitting). Treatment strategies targeting expectations include structured discussion, written tasks to elicit selected categories of cognitions, education, and strategic coping suggestions. For example, in the optimistic condition, participants are repeatedly encouraged to focus their attention on what they like about quitting (e.g. reduced health risks and fresher breath) and what they dislike about continuing to smoke (e.g. stained teeth and feeling socially ostracized). In order to maintain positive expectations, the optimistic condition encourages coping strategies such as reframing withdrawal symptoms in an optimistic light (e.g. symptoms are signs of my body healing) and focusing on the positive side of quitting (e.g. attend to personal reasons for quitting) in addition to more practical strategies for quitting (e.g. getting rid of smoking materials). In contrast, the balanced condition encourages participants to focus on both their reasons for quitting (i.e. the things they like about quitting/dislike about smoking), as well as things they like about smoking (e.g. relaxing and stress relief) and dislike about quitting (e.g. withdrawal and stress). Coping strategies encouraged within the balanced condition include those suggested to the optimistic group as well as strategies that focus attention on the drawbacks of choosing to quit, and the discomfort and difficulties of the quitting process. The functions of the strategies presented only to the balanced group are designed to increase skills for handling tempting situations, increase tolerance for stressful withdrawal symptoms through exposure, validate the smoker’s experience of difficult symptoms and encourage personal control over behavior. Care is taken to ensure that participants in the balanced treatment condition are led to believe that although quitting smoking is a difficult and unpleasant task, it is something that they can do. The described differences between the optimistic and balanced treatment conditions are also reflected in homework activities and discussions during the sessions.

Measurement strategy
Participants in this study are asked to complete measures at a baseline orientation session, weekly during the 8-week treatment program and monthly for 16 months post-treatment. Because the primary goal of this study is to test a series of predictions concerning the effect that expectations about the outcomes and process of behavior change have on cessation and people’s satisfaction with their new behavioral practices, measures were specifically designed to assess these constructs within the context of smoking cessation (see Figure 1). A few selected measures included in this study are described below. Information about the complete set of measures used in this study can be obtained from the authors.

Expectations about outcomes and process
The intervention goal of the optimistic condition is to increase participants’ perceptions of favorable outcomes—both in the number of preferred outcomes and in the increased value of those outcomes. In order to assess participants’ expectations about the smoking cessation, they are asked to describe their expectations about how quitting smoking would affect different aspects of their lives including personal characteristics (i.e. attractiveness, odor, self-esteem and emotional states), activities (i.e. physical activities and saving/spending money), relationships (i.e. friends and family, and smokers and non-smokers) and health (i.e. cancer and heart disease). In each case, participants rate the extent to which they expect change in various domains and how they feel about the expected change. Expectations are assessed at baseline and at Session 4, prior to the quit date, in order to assess the intervention’s ability to change people expectations about quitting smoking.

Beliefs about the consequences of quitting smoking
In order to evaluate the predicted longer-term effects that expectations have on behavior change,
we assess how participants feel about the consequences of their action throughout the quit process. In the same domains for which participants reported their expectations, participants are asked to rate the extent to which they are experiencing changes (e.g. less coughing and feeling healthier) and how satisfied they are with these changes. In addition, information is gathered on how much effort participants are putting forth to stay smoke-free, how difficult it has been and how satisfied they are with experienced outcomes. These beliefs are assessed weekly for the first month following the quit date (Session 4) and then monthly until the final contact. With these data, we will be able to compare participants’ expectations for what quitting will be like for them with their actual perceptions of the experience of quitting smoking. Moreover, we can test whether participants’ satisfaction with the consequences of quitting smoking predicts sustained cessation.

**Approach versus avoidance goals for quitting smoking**

One of the primary features of the theoretical framework that guides the intervention is whether the motivation to change health behavior is conceptualized as an approach or an avoidance goal. Because behavioral initiation is conceptualized as an approach-based self-regulatory process, we believe that people who describe their reasons for quitting smoking in terms of approach goals will have greater success at initiating a change in their behavior than will those who describe their reasons for quitting in terms of avoidance goals. In order to evaluate this hypothesis, participants are asked at baseline to generate their goals for quitting smoking in an open-ended format. Each goal is then coded as to whether it indicates an approach or an avoidance goal. For example, the statement that someone wants to quit so they do not develop emphysema would be coded as an avoidance goal, whereas the statement that one wants to quit smoking in order to be able to breathe better would be identified as an approach goal.

**Smoking behavior**

Smoking behavior is measured at a baseline orientation session, weekly during treatment and then monthly post treatment. Weekly and monthly assessments of smoking include number of days of smoking in the past week, number of cigarettes smoked daily or, if they have quit, the date of their last cigarette. At the final assessment, 18 months from baseline, abstinence from smoking will be determined from self-report. These data will allow us to calculate rates of 7-day point prevalence and periods of continuous abstinence.

**Weight loss intervention**

As indicated earlier in this paper, the theoretical approach being tested in the smoking cessation intervention study will also be tested in the context of a weight loss intervention. According to our theoretical model, the ease with which people can generate optimistic expectations about the consequences of a new set of actions, the more likely they are to initiate a change in their behavior. Because behavioral domains differ naturally in the degree to which people are optimistic about the consequences of behavior change, we believe that testing our theoretical model in two areas that are characterized by very different sets of outcome expectations would be extremely informative. In contrast to people who express interest in quitting smoking, people interested in losing weight typically hold high expectations for the benefits of weight loss (e.g. more attractive appearance and improved social life) and are eager to initiate new weight loss plans (Jeffery et al., 1998). These expectations are further evidenced by the fact that weight loss programs do not need to devote their initial meetings to motivating participants to commit to losing weight. Although there is some evidence that overweight individuals who fail to meet their initial expectations about weight loss are disappointed about their efforts (Foster et al., 1997), there has been no direct test of how manipulating overweight persons’ expectations about weight loss might affect the initiation or maintenance of behavior change.

The set of predictions that were developed for the smoking cessation study about the effects of expectancy modification on behavior change can
be similarly generated for weight loss. Once again, heightening people’s expectations about the benefits of weight loss should facilitate initial success, but over time it may lead people to be disappointed with their efforts and impair weight maintenance. Because people who enroll in weight loss programs typically have high outcome expectations, it is not clear whether our optimistic intervention program will enhance initial weight loss. However, it is expected that the balanced intervention program will provide weight loss participants with a more realistic set of expectations that will allow them to be more satisfied with the weight losses they achieve and thus enhance long-term maintenance of their weight loss. Overall, we predict that participants who receive the balanced treatment program will be more successful at the 18-month follow-up visit than will those who receive the optimistic treatment program.

The same principles used to design the smoking cessation intervention are being used to develop an 8-week weight loss intervention. Although the interventions will be similar in terms of their general structure, several differences between the two behavioral domains affect how the conceptual model used in the smoking cessation intervention is transformed into a weight loss intervention. For example, quitting smoking requires the elimination of a single, although frequent, behavior, whereas weight loss requires the adjustment rather than elimination of multiple behaviors involved in eating and physical activity. This difference means that more intervention session time has to be used to provide information about weight loss specific skills.

Concluding remarks

Many of today’s health problems are due in part to long-standing behavioral patterns. Patterns of eating, physical activity, tobacco and alcohol use contribute to health problems such as diabetes, hypertension, heart disease, stroke and cancer. An understanding of the factors that permit individual change in health behaviors is critical to developing new treatments and interventions that can prevent and ameliorate chronic disease conditions resulting from lifestyle choices. Results of the present study will advance research on health behavior change by informing our practical and theoretical understanding of the psychological variables that control people’s decisions to initiate changes in these behaviors and their ability to maintain those changes.

A unique aspect of the present research program is that, unlike prevailing theories, it explicitly differentiates the decision processes that guide the initiation and maintenance of health behavior and explicitly tests a series of predictions derived from the model. Should suggestive evidence be obtained, this information could be used to design a new set of intervention studies that are based on a more precise understanding of how people’s expectations and perceived satisfaction affect the behavioral decisions they make. These studies would focus on specifying the most effective way to design interventions such that they are able to maximize people’s expectations about the benefits of behavior change without undermining their subsequent satisfaction with the outcomes afforded by behavior change. Data from our current program of research will also inform our understanding of when the processes that underlie the initiation of a new behavior transitions into the processes that underlie the maintenance of a behavior. Although the timing of initiation from maintenance is likely to vary across health domains, a better understanding of this transition process would have important implications for the timing of different intervention strategies.

Notes

The Transtheoretical Model does explicitly distinguish between people in the action and maintenance stages of the behavior change process, but the basis for this classification rests on a somewhat arbitrary distinction in the length of time that a behavior has been adopted (Weinstein et al., 1998). Moreover, the set of cognitive and behavioral strategies that are thought to facilitate initial action are similarly predicted to help them sustain that action over time (Prochaska et al., 1992; Prochaska and Velicer, 1997).
Acknowledgements

This research was supported by the National Institute of Neurological Disorders and Stroke Grant NS38441.

References


C. M. King et al.


Received on February 14, 2001; accepted on December 31, 2001