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Toward a Theory-Based Analysis of Behavioral Maintenance

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Intervention strategies that can produce successful rates of long-term behavior change have proven elusive and indicate the need for new approaches to this vexing problem. However, the development of new intervention strategies is constrained by our current conceptualization of behavioral maintenance. This article reviews how the dominant models of health behavior change have operationalized the psychological processes that guide the initiation and maintenance of a new pattern of behavior. In light of this review, an alternative framework is proposed based on the premise that the decision criteria that lead people to initiate a change in their behavior are different from those that lead them to maintain that behavior. Decisions regarding behavioral initiation are predicted to depend on favorable expectations regarding future outcomes, whereas decisions regarding behavioral maintenance are predicted to depend on perceived satisfaction with received outcomes. The implications of this framework for behavioral interventions are addressed.

Key words: maintenance, decision making, behavior change

Given that sustained changes in people's lifestyles can lead to substantial reductions in disease morbidity and mortality, effective behavioral interventions offer the possibility of enhanced quality of life and reduced health care costs (U.S. Department of Health and Human Services, 1991). As has been documented in the preceding series of articles in this issue, intervention approaches have been identified that reliably elicit healthy changes in behavioral practices such as smoking, weight control, and exercise. Yet, impressive rates of initial changes in behavior have not consistently translated into similar rates of behavioral maintenance.

Why have intervention strategies that produce favorable rates of initial behavior change failed to facilitate long-term maintenance? In this article, I consider this question in light of how the dominant models of health behavior change have conceptualized behavioral maintenance. Specifically, investigators have assumed, either implicitly or explicitly, that the psychological processes that underlie the decision to initiate a change in behavior generalize to decisions regarding behavioral maintenance, and, therefore, interventions that facilitate an initial change in behavior will assist—or at least not undermine—subsequent efforts to maintain that change. I believe it is time to reconsider this assumption and to recognize that the psychological factors that enable people to adopt a new pattern of behavior are not necessarily those that help them to sustain that behavior over time.

Current Conceptualizations of Behavioral Maintenance

Current models of health behavior—for example, health belief model (Rosenstock, Strecher, & Becker, 1988); protection motivation theory (Maddux & Rogers, 1983); social cognitive theory (Bandura, 1986); theory of planned behavior (Ajzen, 1991); theory of reasoned action (Ajzen & Fishbein, 1980); transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992)—have focused on elucidating how people determine whether to adopt a given behavioral alternative. The conceptual framework underlying these theories has been shown to be quite similar, although some distinctions can be made between stage-based and continuum-based models (Weinstein, Rothman, & Sutton, 1998). The decision to adopt a new behavior is based on an analysis of the relative costs and benefits associated with different courses of action; the primary difference between theories is captured in the particular set of beliefs that is predicted to be most closely associated with a decision to take action (Salovey, Rothman, & Rodin, 1998; Schwarzer, 1992; Weinstein, 1993). Investigators have used these theoretical models to explain why people adopt unhealthy and healthy behavioral practices and have successfully relied on their specifications to design interventions that promote the adoption of healthier behavior (Salovey et al., 1998).

How have these models dealt with the process of behavioral maintenance? Some models such as the health belief model (Rosenstock et al., 1988) and protection motivation theory (Maddux & Rogers, 1983) make no direct reference to issues regarding behavioral maintenance, and empirical tests of these models have focused primarily on predicting a

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single behavioral outcome. To the extent that maintenance has been addressed, it has been defined as a course of action sustained over a specified period of time, and, thus, the processes that govern the decision to maintain a pattern of behavior are thought to be the same as those that govern its initiation.

Theoretical approaches such as the theory of reasoned action (Ajzen & Fishbein, 1980) and the theory of planned behavior (Ajzen, 1991) also make no formal distinction between decisions regarding the initiation of a behavior and those regarding the maintenance of that behavior over time. In each case, people's volitional behavior is considered to be a function of their intentions, which, in turn, reflect their attitudes toward the behavior and the perceived social norm. Although the specific attitudinal and normative beliefs that guide people's behavior are allowed to change over time, the specific factors that determine how or whether these beliefs change are not delineated. Some investigators have integrated a measure of prior behavior into these models to help address the persistence of behavior. In behavioral domains that involve a repeated series of actions over time, a person's prior behavior may become a better predictor of continued action than his or her attitudes or intentions regarding the behavior (Ronis, Yates, & Kirscht, 1989; Sutton, 1994; Triandis, 1977). Although including a measure of prior behavior can improve the model's ability to describe the stability in people's behavior, it provides little additional guidance as to the conditions that determine whether a change in behavior is successfully maintained. Moreover, the thesis that prior behavior predicts future action is difficult to reconcile with the repeated observation that people, in fact, fail to maintain successfully enacted changes in their behavior.

According to social–cognitive theory (Bandura, 1986), self-efficacy beliefs are a crucial determinant of both the initiation and the maintenance of a change in behavior. Confidence in one's ability to take action serves to sustain effort and perseverance in the face of obstacles. The successful implementation of changes in behavior bolsters people's confidence, which, in turn, facilitates further action, whereas failure experiences serve to undermine personal feelings of efficacy. Although the reciprocal relation between perceived self-efficacy and behavior is well documented, this relation in and of itself cannot explain why successfully enacted changes in behavior are not maintained (e.g., McCaul, Glasgow, & O'Neill, 1992).

Schwarzer (1992) has proposed a conceptual model that delineates how self-efficacy beliefs affect behavioral maintenance. Specifically, these beliefs motivate the formulation and execution of a plan of action that guides behavior over time. Successful maintenance is predicted to depend on the implementation of an action plan that includes a set of cognitive and behavioral skills that help people cope with behavioral lapses and, thus, prevent relapse (Brownell, Marlatt, Lichtenstein, & Wilson, 1986; Marlatt & Gordon, 1985). Although Schwarzer's proposed framework has intuitive appeal, empirical support for interventions that provide people with relapse prevention skills has been modest at best (Curry & McBride, 1994).

Even when maintenance is characterized as a distinct stage within a theoretical framework, its conceptualization has been limited. The transtheoretical model of behavior change (Prochaska et al., 1992) explicitly distinguishes between people in the action and maintenance stages of the behavior change process. Yet, the basis for this classification rests primarily on a somewhat arbitrary distinction in the length of time that a behavior has been adopted (Bandura, 1997; Weinstein et al., 1998). According to the model, the array of cognitive and behavioral strategies that people rely on to enact a change in their behavior are similarly predicted to help them sustain that action over time. Once again, the factors that determine whether someone will successfully maintain a pattern of behavior are not specified sufficiently for an investigator to predict a priori the psychological conditions that lead to relapse.

Taken together, the dominant theoretical approaches to the study of health behavior offer little guidance as to how the processes that govern the initiation and the maintenance of behavior change might differ. Because maintenance has been operationalized as action sustained over time, it is predicted to rely on the same set of behavioral skills and motivational concerns that facilitate the initial change in behavior. Yet, this perspective is at odds with the repeated finding that those who successfully initiate a change in their behavioral practices frequently fail to maintain that pattern of behavior. Moreover, interventions that have increased the intensity or the duration of a successful behavioral treatment program can delay the onset of relapse but they do not substantially improve rates of long-term maintenance (e.g., Curry & McBride, 1994; Jeffery et al., 1993; McCaul et al., 1992; Perri, Nezu, Patti, & McCann, 1989). Given that the repeated application of intervention strategies that facilitate short-term success does little to improve rates of long-term success, the premise that there are important differences in the psychological processes that govern behavioral initiation and maintenance appears worthy of consideration.

A New Approach to Behavioral Maintenance

There are likely to be numerous factors that are differentially associated with the successful initiation and the successful maintenance of a new pattern of behavior. Some investigators have described aspects of people's social environments that are differentially related to behavioral initiation and maintenance (e.g., Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986), whereas others have pointed toward personality characteristics (e.g., Stein, Newcomb, & Bentler, 1996). Models of relapse prevention (Marlatt & Gordon, 1985) focus on the specific tasks that are required to effectively cope with a behavioral lapse, but these strategies, by definition, are relevant only after someone has adopted a new pattern of behavior. However, none of these investigative approaches can account for the observed dissociation between rates of successful initiation and maintenance.

Behavioral decisions, by definition, involve a choice between different behavioral alternatives. What differentiates decisions concerning initiation from those concerning

maintenance are the criteria on which the decision is based. People's decisions regarding behavioral initiation involve a consideration of whether the potential benefits afforded by a new pattern of behavior compare favorably to their current situation, and thus, the decision to initiate a new behavior depends on people holding *favorable expectations* regarding future outcomes. In comparison, decisions regarding behavioral maintenance involve a consideration of whether the outcomes associated with the new pattern of behavior are sufficiently desirable to warrant continued action. Thus, the decision to maintain a behavior depends on people's *perceived satisfaction* with received outcomes.

The premise that the decision to maintain a behavior reflects people's on-going experience with a pattern of behavior is consistent with the general framework of Leventhal's self-regulatory model of illness behavior (Leventhal & Cameron, 1987; Leventhal, Nerenz, & Steele, 1984). Leventhal and his colleagues have argued that models of health behavior change must capture the dynamic nature of the behavior change process and be responsive to changes in people's behavioral, psychological, and physiological experiences. However, Leventhal's self-regulatory model makes no formal distinction between the criteria that underlie decisions regarding behavioral initiation and those that underlie decisions regarding behavioral maintenance.

Behavioral Initiation

Because the proposed conceptualization of behavioral initiation is not controversial and, in fact, is consistent with current models of health behavior change, it will considered only briefly. People attempt to change their behavior when their expectations regarding the outcomes afforded by a new pattern of behavior are perceived to be significantly more favorable than those provided by their current behavior (Weinstein, 1993). The more optimistic people are about the value of potential outcomes and their ability to obtain those outcomes, the more willing they will be to take action. Because the process of behavioral initiation is oriented toward obtaining future outcomes, it can be conceptualized as an approach-based self-regulatory system in which people's progress toward their goals is indicated by a reduction in the discrepancy between their current state and a desired reference state (Carver & Scheier, 1990).

There is considerable empirical evidence to support the proposed conceptualization of behavioral initiation. Numerous studies have demonstrated that rates of behavioral initiation are positively related to people's beliefs about both the likelihood and the value of future outcomes (for reviews, see Bandura, 1997; Salovey et al., 1998; Schwarzer, 1992). Moreover, behavioral interventions that emphasize the desirable consequences afforded by a new pattern of behavior have had considerable success generating changes in behavior (Lichtenstein & Glasgow, 1992; Wing, 1997).

Behavioral Maintenance

Whereas behavioral initiation is thought to be based on expectations about future outcomes, the decision to maintain an adopted pattern of behavior is thought to be based on people's satisfaction with the outcomes they have obtained. The guiding premise is that people will maintain a change in behavior only if they are satisfied with what they have accomplished. 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 strive to avoid an alternative, less favorable state. Thus, the decision processes that guide behavioral maintenance can be conceptualized as an avoidance-based self-regulatory system in which progress is indicated by a sustained discrepancy between a current state and an undesired reference state (Carver & Scheier, 1990).

How do people determine whether they are satisfied with the outcomes afforded by a new pattern of behavior? People can monitor how a change in their behavior has influenced how they feel, what they can or cannot do, and the quality of their interactions with friends and families. But, how do they ascertain the value of these outcomes? For example, people may find it reinforcing to be complimented about a change in their weight but still find it difficult to determine whether they have received enough compliments to justify their efforts. In informationally ambiguous situations people compare their obtained outcomes to an available standard (Festinger, 1954). Moreover, people's expectations frequently serve as a standard against which people evaluate the outcomes they have obtained (e.g., Gollwitzer, 1996; Rusbult & Van Lange, 1996; Schwarz & Strack, 1991). Given the focal role that expectations serve in the process of behavioral initiation, people are likely to hold clear expectations about what a new pattern of behavior will provide. To the extent that people's experiences meet or exceed their expectations, they will be satisfied with the behavior and motivated to maintain it. However, when people's experiences fail to meet their expectations, they will be dissatisfied with the change in their behavior and less motivated to sustain it. An important implication of this framework is that interventions that heighten people's expectations about a new pattern of behavior may encourage them to initiate a change, but over time may lead people to be less satisfied with the outcomes they actually obtain, thus undermining maintenance.

Because research has focused on the processes underlying the initiation of behavior change, little empirical evidence is available to evaluate the thesis that behavioral maintenance is guided by perceived satisfaction. However, several investigators have found behavioral maintenance to be associated with perceived satisfaction with the outcomes afforded by the new pattern of behavior. Surveys of individuals who have maintained a change in their behavior over an extended period of time have found that people who are successful report a high degree of satisfaction with how the change has affected their lives (e.g., Klem, Wing, McGuire, Seagle, & Hill, 1997). In a similar manner, Jeffery and I have found that women who maintained weight losses a year after the end of a behavioral treatment program attributed greater benefits to having lost weight than did women who had

failed to maintain their weight loss (Rothman & Jeffery, 1998). Moreover, successful and unsuccessful maintainers did not differ in their initial weight nor in the amount of weight they had lost during the treatment program. Urban, White, Anderson, Curry, and Kristal (1992) examined whether women's personal experiences during the intervention component of the Women's Health Trial predicted long-term maintenance of a low-fat diet. Women who reported greater costs associated with following the diet and stronger feelings of dissatisfaction with low-fat foods had poorer rates of long-term compliance with the low-fat diet.

A second set of studies offers some tentative support for the thesis that long-term maintenance may be undermined by expectations that are overly optimistic. For example, Oettingen and Wadden (1991) reported that women who initially held exceedingly optimistic fantasies about what their life would be like if they lost weight subsequently had less success in a 12-month weight treatment program. More recently, Sbrocco, Nedegaard, Stone, and Lewis (1999) found that women enrolled in a weight control program that emphasized modest treatment goals lost less weight during treatment compared to those in a traditional behavior therapy, but that at 12 months post-treatment these women had, in fact, lost more weight than those who had participated in the traditional program. Although taken together these findings are consistent with the proposed framework, any conclusions that can be drawn are constrained by the absence of studies that have comprehensively tested the predicted relation between expectations, perceived satisfaction, and long-term behavioral maintenance.

Implications for Different Behavioral Domains

One implication of the proposed framework is that people should find it easier to initiate a behavior when it is motivated by a desire to reach a favorable goal-state (i.e., an approach-oriented process) than when it is motivated by a desire to avoid an unfavorable goal-state (i.e., an avoidance-oriented process). Specifically, people who strive toward a desirable goal should have little difficulty constructing the optimistic expectations about future outcomes that serve to motivate behavioral initiation. However, these optimistic expectations may be difficult to satisfy, and thus, people may find it harder to maintain a change in an approach-oriented behavior than an avoidance-oriented behavior. Thus, the model suggests that the manner in which people are motivated to change their behavior will affect the extent to which they it find more difficult to initiate or to maintain a specific pattern of behavior.

This proposition may help to explain differences in the relative rates of initiation and maintenance that have been observed across different behavioral practices. For example, weight control behavior is typically motivated by a desire to reach a positive goal, characterized by improvements in one's appearance and physical comfort (Foster, Wadden, Vogt, & Brewer, 1997), whereas smoking cessation is typically motivated by a desire to avoid the health threats associated with smoking (Gibbons & Eggleston, 1996; Gibbons, Eggleston, & Benthin, 1997). Consistent with this analysis, overweight persons have been shown to be *more* likely to enroll in weight loss programs than are smokers to enroll in cessation programs (e.g., Jeffery et al., 1993; Schmid, Jeffery, & Hellerstedt, 1989). Even those smokers who enroll in a cessation program typically complete a series of treatment sessions that systematically promote the benefits of cessation before they are sufficiently motivated to initiate a quit attempt. By way of comparison, individuals in a weight control program are prepared to enact changes in their weight control practices at the first treatment session. Although rates of behavioral initiation are more impressive in the area of weight control than that of smoking cessation, rates of long-term maintenance reveal a different pattern of results. Smokers who remain abstinent for at least six months appear to be more likely to sustain their new pattern of behavior than are overweight persons who have successfully lost weight for a similar period of time (e.g., Hunt, Barrett, & Branch, 1971; Kramer, Jeffery, Forster, & Snell, 1989). The greater likelihood of long-term success among smokers may reflect, in part, their more modest expectations about what it would be like to be nonsmokers. These modest expectations may dampen smokers' interest in initiating a change in behavior, but they should increase the chance that smokers will be satisfied with how cessation has affected their lives. On the other hand, participants in weight control programs may find it difficult to satisfy their expectations as to how a change in weight will affect their lives, even in the face of significant changes in body weight.

Of course, any conclusion based on a comparison across behavioral domains such as smoking and weight control is constrained by the numerous differences between these two domains. However, converging evidence for the proposed framework could potentially be obtained within each behavioral domain. For example, although overweight people may typically be motivated to lose weight in order to be thin, some are motivated by the desire to avoid being overweight. In light of the proposed framework, people who are motivated to avoid being overweight should have greater difficulty initiating a change in their behavior than those who are motivated by the desire to be thin. However, they should have greater success at maintaining the change in behavior over time. A similar distinction could be made between smokers who are motivated to quit in order to avoid being a smoker and those who are motivated by the desire to become a nonsmoker. In fact, Gibbons and Eggleston (1996) have shown that a smoker's negative image of the typical smoker—but not their image of the typical nonsmoker—predicted 12-month cessation status.

Future Directions for Research

The need for new, innovative models of behavioral maintenance is clear. However, any advance in our understanding of how people maintain changes in their behavior is currently constrained by the limited scope of the empirical literature. Too few studies have systematically examined the decision processes that underlie both the initiation and maintenance of behavior change. The absence of empirical data undermines our ability to rigorously evaluate and test

models of behavioral maintenance. Investigators need to extend their focus beyond the relation between the beliefs participants report prior to or immediately following treatment and their maintenance practices. Although some investigators have collected retrospective reports of these experiences (e.g., Urban et al., 1992), we know surprisingly little about people's psychological experience during their participation in a behavioral change program. The repeated assessment of participants' thoughts and feelings both during and after a behavioral treatment program would provide investigators with the opportunity to delineate the complex relation between people's beliefs and their behavior. This would enable us to develop a more sophisticated understanding of how the adoption of a new pattern of behavior affects people's beliefs about the behavior and, moreover, what effect these new beliefs have on subsequent behavioral decisions (e.g., Gerrard, Gibbons, Benthin, & Hessling, 1997; Gibbons et al., 1997). The development of measurement tools that capture people's experiences in their natural environments offers investigators new opportunities to systematically test theoretical predictions regarding the decision processes that guide maintenance (Shiffman & Stone, 1998). Moreover, due to recent advances in statistical modeling, investigators are no longer constrained by the requirement that they obtain the same set of measurements over time from each participant (Bryk & Raudenbush, 1992; Hedeker & Mermelstein, 1996). However, these tools will prove to be only as valuable as the theoretical frameworks that guide their application and use.

Although the distinction between the initiation and the maintenance phases of the behavior change process is a useful heuristic, the process by which people transition from one phase to the next is not well defined or understood. Further information about the natural history of the behavior change process across a range of behavioral domains would be invaluable and would help to delineate how the process of maintenance unfolds. This information would improve our understanding of how and when people move from initiating to maintaining a change in their behavior, and it would enable investigators to determine whether there is a point in time when people can be said to have successfully terminated the process of behavior change.

Finally, research must also be directed toward identifying factors that moderate how people regulate their behavior. The previously drawn comparisons between smoking cessation and weight control illustrate how features of the behavioral domain can generate predictions as to whether people will have greater difficulty initiating or maintaining a change in their behavior. People's dispositional tendencies may also influence how they regulate their behavior. For example, Gibbons and his colleagues (Gibbons et al., 1997) have observed that self-esteem moderates how people respond to a failed attempt to quit smoking. Specifically, people with high self-esteem lowered their estimate of the dangers posed by smoking and their commitment to quit in order to justify their behavioral lapse, whereas people with low self-esteem who had relapsed reported limited changes in their beliefs. The implications of these cognitive adjustments for future behavioral practices is currently unclear. On the one hand, the ability to justify one's failure may render people less motivated to make a subsequent quit attempt. However, it is quite possible that these cognitive adjustments act to preserve people's self-confidence and thus ensure that they have the psychological resources to initiate another quit attempt. Other dispositional factors that may affect how people make decisions regarding behavioral initiation and maintenance include the extent to which people are dispositionally optimistic about the future (Scheier & Carver, 1985) as well as their chronic tendency to engage in either approach-based or avoidance-based self-regulation (Carver & Scheier, 1990; Higgins, 1998).

Taken together, a research program that is dedicated to specifying the psychological processes that guide the maintenance of behavior change will provide the empirical foundation on which a comprehensive model of behavioral maintenance can be based, which, in turn, can guide the development of interventions that can address the challenges posed by long-term behavior change.

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