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The Effects of Regulatory Focus on Responding to and Avoiding Slips in a Longitudinal Study of Smoking Cessation

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Abstract

Promotion and prevention focus have been shown to uniquely predict the initiation and maintenance of behavior change, but the behavioral tasks underlying these effects have not been specified. We examined the effects of regulatory focus on how smokers responded to initial slips and whether smokers were able to avoid slips after initial cessation. After slipping, smokers higher versus lower in promotion focus were more likely to quit again, particularly if they were high in self-efficacy. Of participants quit for 2 months, smokers higher versus lower in prevention focus more consistently avoided slips, but only if they were high in self-efficacy. Implications for regulatory focus theory and behavior change theory are discussed.

Keywords

smoking cessation; regulatory focus; self-efficacy; initiation and maintenance of behavior change

Intuitively, it would seem that once a person has successfully initiated a new behavioral routine (e.g., refraining from smoking), continuing to perform that routine over time should become easier. However, even after successfully initiating a new routine one must remain vigilant to avoid slips, and when a slip does occur one must work to keep the slip from leading to a return of the old behavioral pattern. These challenges would appear to be quite vexing given the poor rate at which people maintain behavioral changes over time (e.g., Jeffery et al., 2000; Marlatt & Donovan, 2005; Ockene et al., 2000). As such, greater understanding is needed of the processes that govern not only the initiation of behavior change, but also the maintenance of those behaviors over time. Working from a conceptual model of behavioral initiation and maintenance (Rothman, 2000), we examined how regulatory focus theory (Higgins, 1997) and social cognitive theory (Bandura, 1997) can inform our understanding of two crucial tasks for successful behavior change in a longitudinal study of smoking cessation: (a) responding to initial slips (i.e., responding to smoking after an initial period of cessation) and (b) avoiding slips after initial success (i.e., maintaining abstinence after an initial period of cessation).

Distinguishing Between Determinants of Initiation and Maintenance of Behavior Change

Rothman and colleagues (Rothman, 2000; Rothman, Baldwin, Hertel, & Fuglestad, 2011; Rothman, Hertel, Baldwin, & Bartels, 2008) have proposed a model of behavior change in which different processes influence behavioral initiation and behavioral maintenance. Initiation is conceptualized as an approach-based process in that one strives to reduce the

discrepancy between one's current, undesired behavioral pattern, and a new, desired pattern. Initiation is marked by the tension between one's ability and motivation to enact changes on the one hand and perceived barriers and obstacles on the other hand. Behavioral maintenance is conceptualized as an avoidance-based process as success is marked by maintaining a discrepancy between one's new, desired behavioral pattern and one's old, undesired behavioral pattern. Successful maintenance depends on one's ability and motivation to guard against lapses and undesired outcomes.

Regulatory Focus and Regulatory Fit

Regulatory focus theory (Higgins, 1997) proposes that self-regulation operates through two distinct motivational systems, promotion and prevention, which serve fundamentally different needs. Promotion focus involves self-regulation in the service of nurturance related concerns (e.g., growth and achievement) and the pursuit of benefits and gains (ensuring against the absence of positive outcomes), whereas prevention focus involves self-regulation in the service of security related concerns (e.g., safety and duty) and guarding against costs and losses (ensuring the absence of negative outcomes).

According to Higgins (2000), when an individual's goals and/or strategies of goal pursuit match his or her regulatory focus it elicits an experience of regulatory fit which increases the value of the behaviors that he or she is performing and the outcomes afforded by those behaviors. We suggest that fit can also emerge when regulatory focus corresponds to the behavioral task at hand. Examined within the context of Rothman's behavior change model, people high in promotion focus, because they are oriented toward the eager pursuit of new positive end-states, should be better able to initiate behavioral change, whereas people higher in prevention focus, because they tend to be vigilant in avoiding losses as a means to preserve desired end-states, should be better able to maintain change. In a laboratory study, Brodscholl, Kober, and Higgins (2007) reported findings consistent with this perspective; promotion focus facilitated efforts to attain a goal (e.g., solving anagrams to attain tokens which could be used to buy a prize), whereas prevention focus facilitated goal maintenance (e.g., solving anagrams to maintain tokens which could be used to buy a prize). Fuglestad, Rothman, and Jeffery (2008) provided the first test of this hypothesis within the context of a behavior change program. Specifically, across two separate samples—people enrolled in a smoking cessation program and people enrolled in a weight loss program—they found that people higher in promotion focus had better initial performance compared to those lower in promotion focus (e.g., better cessation rates over the first 6 months of follow-up), whereas people higher in prevention focus were better able to maintain change compared to those lower in prevention focus (e.g., better cessation rates after quitting for at least 2 months).

Crucial Behavioral Challenges: Responding to and Avoiding Slips

Despite initial evidence that regulatory focus predicts important behavioral outcomes, many questions remain unanswered. Why do individuals high in promotion focus have more success during the early stages of behavioral change? What exactly are they good at? Once people have attained initial success, do those who are high in prevention focus have more success because they are less likely to ever slip (i.e., less likely to ever engage in the old behavioral pattern), or are they better at refraining even though they slip occasionally? Furthermore, how does regulatory focus relate to established social cognitive predictors of behavioral change such as self-efficacy, outcome expectations, or behavioral intentions? Do variations in promotion and prevention focus have direct, independent effects on behavior, or is their influence dependent on other predictors of behavioral change? For example, successfully responding to slips may require both self-regulatory skills (e.g., self-efficacy) and the self-regulatory mindset to use those skills (e.g., promotion focus).

The present study of smoking cessation provides an ideal setting to answer some of these questions as smoking status provides a clear marker of whether or not an individual has slipped, and we have data on regulatory focus and smoking cessation self-efficacy, which is a key construct in most social cognitive theories of behavioral change (Bandura, 1997; Rothman & Salovey, 2007) and an established predictor of slips and relapse (e.g., Gwaltney et al., 2002; Shiffman, 2005; Shiffman et al., 2000). Furthermore, a growing body of research has established that dispositional variables can interact with traditional behavior change constructs to predict health behaviors (e.g., Conner, Grogan, Fry, Gough, & Higgins, 2009; Conner, Rodgers, & Murray, 2007; Rhodes, Courneya, & Hayduk, 2002; Rhodes, Courneya, & Jones, 2005; Tam, Bagozzi, & Spanjol, 2010). The present research has the potential to add to this body of research by examining the interplay of regulatory focus with smoking cessation self-efficacy in responding to and avoiding slips.

Responding to slips

An important aspect of successful initiation is how people deal with slips as they work to master new, effortful behaviors (Rothman et al., 2011). In smoking cessation, a slip occurs when one smokes after having achieved initial cessation (e.g., a week of cessation). We propose that the task of responding to slips in order to attain a desired outcome (become smoke-free again) fits with a promotion focus and, therefore, people who score higher on promotion focus should have greater success in responding to initial slips (i.e., making another successful quit attempt).

Work by Shiffman and colleagues (Shiffman, 2005; Shiffman et al., 2000) suggests that relatively stable individual differences in cessation self-efficacy predict whether people slip, but not whether a slip results in relapse (i.e., whether or not one quits again or continues to smoke). Therefore we did not expect a main effect of self-efficacy on responses to slips. However, theory and research on regulatory fit suggest that self-efficacy may interact with regulatory focus in the context of goal pursuit. Spiegel et al. (2004) theorized that social cognitive predictors of behavior change such as outcome expectations and self-efficacy may determine people's initial motivation to pursue goals, but that regulatory fit may determine the extent to which people continue to successfully act on their motivation. In a study of the effects of social comparison information on motivation to manage diabetes, Schokker et al. (2010) examined the interplay between self-efficacy and regulatory focus. They predicted that promotion focus would positively predict motivation when a patient with diabetes was exposed to a positive role model (upward social comparison) and that prevention focus would positively predict motivation when a patient with diabetes was exposed to a negative role model (downward social comparison). Further, they posited that these effects would be most apparent when patients were high in self-efficacy. Specifically, the motivation to manage one's diabetes would be highest when one not only felt efficacious, but also possessed the self-regulatory mindset that fit with a given social comparison condition (e.g., high prevention focus and downward social comparison information). The expected interaction was observed with prevention focus, but not with promotion focus. The authors suggest that possessing a strong promotion focus, regardless of self-efficacy, was sufficient to bolster motivation in this context. Based on the framework set forth by Spiegel et al. (2004) and Schokker et al. (2010), it was expected that in the challenging behavioral context of responding to slips, people who were high in both self-efficacy and promotion focus would have the greatest success in quitting again.

Avoiding slips

One potential route to successful maintenance is to remain vigilant regarding the new behavior and to actively avoid the possibility of slips (Rothman et al., 2011). We propose that the task of vigilantly maintaining smoking abstinence fits with a prevention focus. As

noted above, relatively stable individual differences in cessation self-efficacy predict whether people slip (Shiffman, 2005; Shiffman et al., 2000). Therefore, we hypothesized that both prevention focus and self-efficacy would predict avoiding slips after initial cessation. However, consistent with the framework set forth by Spiegel et al. (2004) and Schokker et al. (2010), it was expected that people who were high in both self-efficacy and prevention focus would have the greatest success in remaining abstinent.

Method

Participants and Procedure

Participants ($N = 590$; 53% women; 94% White; age 18 to 84, $M = 47$; years smoked $M = 28$; cigarettes per day $M = 22$) were recruited into a smoking cessation program from [location deleted to maintain the integrity of the review process]. Participants completed baseline measures and were then randomly divided into treatment conditions designed to manipulate expectations (optimistic vs. balanced expectations). The optimistic condition was designed to raise expectations about the benefits of quitting and to lower expectations about the costs of quitting. The balanced condition was designed to induce modest expectations by giving equal weight to both the benefits and costs of quitting smoking. The effects of these manipulations on both expectations and initial cessation varied by prior cessation experiences (see [citation deleted to maintain the integrity of the review process], for a more detailed description of expectation manipulations and effects). The active intervention consisted of 8 weekly 1-hr sessions; smokers were encouraged to quit after the fourth session. After the eighth session, participants provided monthly assessments for 15 months thereafter.

Measures

Regulatory focus—Promotion ($\alpha = .71$, $M = 3.72$, $SD = .59$) and prevention ($\alpha = .82$, $M = 3.20$, $SD = .88$) foci were measured at baseline using the Regulatory Focus Questionnaire (Higgins et al., 2001). Participants indicated how often they experienced specific events (5 prevention, 6 promotion) using a 5-point scale ranging from 1 (*never or seldom*) to 5 (*very often*). Higher scores indicate greater previous success in promotion and prevention self-regulation. Consistent with previous research (Higgins et al., 2001), promotion and prevention were positively correlated, $r = .15$, $p < .01$. At baseline, promotion focus was positively related to years of education, $r = .12$, $p < .01$, and age, $r = .10$, $p < .05$, and negatively related to addiction (assessed by the Fagerstrom Tolerance Questionnaire; Fagerstrom, 1978), $r = -.09$, $p < .05$. It was not significantly related to number of cigarettes smoked per day, years smoking, or sex. At baseline, prevention focus was positively related to age, $r = .18$, $p < .01$, and negatively related to addiction, $r = -.11$, $p < .05$. Women ($M = 3.31$) reported greater prevention focus than men ($M = 3.07$), $t(588) = 3.33$, $p < .01$. Prevention focus was not significantly related to years of education, number of cigarettes smoked per day, or years smoking.

Smoking cessation self-efficacy—At the end of the active intervention, self-efficacy was assessed with 18 items taken from three measures designed to assess people's confidence in their ability to refrain from smoking in different situations ($\alpha = .97$, $M = 5.38$, $SD = 1.80$; Baer & Lichtenstein, 1988; Colletti, Supnick, & Payne, 1985; DiClemente, Prochaska, & Gibertini, 1985). Example items include 'How confident are you that you could keep from smoking when you first get up in the morning?' and 'How confident are you that you could keep from smoking when you are sad or depressed?' Participants indicated their confidence on a scale ranging from 0 (*not at all confident*) to 8 (*extremely confident*). Self-efficacy was positively related to promotion focus, $r = .32$, $p < .01$, and prevention focus, $r = .12$, $p = .06$, and negatively related to number or cigarettes smoked per

day at baseline, $r = -.12$, $p < .05$, and baseline addiction, $r = -.23$, $p < .01$. Self-efficacy was not related to education, age, sex, or total years smoked.

Smoking status—During treatment sessions and follow-up, smoking status was assessed with self-reports that asked participants to indicate whether they had smoked at all in the last 7 days. Participants were classified as quit for a given time point if they reported no smoking within the 7 days prior to data collection. If they had smoked at any time in the 7 days prior, they were classified as smoking. People who had missing data at any assessment were assumed to be smoking.

Data Analyses

Survival analyses were conducted using SAS Version 9.2. Because the response variable is binary, a binomial distribution was used to model the data using SAS Proc Genmod. Proc Genmod models the logit (log odds of being quit) over time because it is unbounded (probabilities are bounded by 0 and 1, odds are bounded by 0 and undefined when probabilities are 0). It uses a population-average model, which predicts mean change in the log of the odds at each wave (the error is assumed to be 0). All subsequent analysis controls for baseline addiction (i.e., Fagerstrom score), sex, and treatment group.

Results

Responding to Slips

Using procedures outlined by Singer and Willet (2003), we examined responses to initial slips using survival analysis. To be included in this analysis, participants had to report having quit for at least one time point and then report smoking at a subsequent time point. Each participant's data were adjusted to start at the first time point after his or her first slip. For example, a participant could have reported not smoking at the end of active treatment and then a first slip during the first month after treatment. A participant in this position would then have follow-up behavioral reports for 14 months thereafter starting at 2 months after treatment. All participants entered the analysis at the same point—the first report of smoking after having been quit. If a participant made another successful quit attempt (i.e., was smoke-free at a subsequent time point), he or she exited the analysis; if a person did not make another successful quit attempt, he or she remained in the analysis. In this way, we were able to answer the questions of whether or not and how soon participants made another successful quit attempt after slipping. 122 participants met the criteria to be included in the analysis. Of these participants, most experienced their first success (i.e., reported not smoking) at the end of active treatment ($n = 99$), and most experienced their first slip within three months after initial success ($n = 90$). Of the 122 participants, 56 were able to quit again at some point during follow-up. In addition to Fagerstrom score (addiction), sex, and treatment group, the following analysis also controlled for length of successful cessation before slipping.

Before examining predictors of interest, we determined the specific slope terms (i.e., linear, quadratic) that modeled the data. An examination of the mean exit rates at each assessment point showed that most successful responses to slipping occurred in the first few months after slipping and that this rate leveled off over time. Therefore, an unconditional model using linear and quadratic predictors was tested. This analysis revealed that both the linear and quadratic coefficients were significant, $\gamma = -.47$, $z = -3.42$, $p < .001$, $\gamma = .03$, $z = 2.28$, $p < .001$. Across smokers, there was some initial successful response to having slipped, but this leveled off over time.

The influence of regulatory focus

Having established that the data were modeled using linear and quadratic terms, the conditional effects of prevention and promotion foci were tested. In conditional analyses, omnibus tests were run using interactions with all of the unconditional terms that modeled the data (e.g., intercept, linear term, quadratic term). If the omnibus test indicated that promotion or prevention focus was having an overall effect, but the highest order interaction terms or none of the individual interactions were significant, the model was rerun without the highest order interaction term. For example, if an omnibus test of promotion focus with intercept, linear, and quadratic terms indicated that promotion focus was having an effect, but none of the individual interaction terms were significant, the model would be rerun without the promotion focus $\times$ quadratic interaction term. In this way, the most parsimonious model would be specified and the nature of the conditional effect would be more interpretable (e.g., does promotion focus have relative constant effect on cessation rates over time—an intercept effect—or does promotion focus have an increasing effect over time—a linear effect).

In the conditional quadratic model, the prevention focus omnibus test was not significant, but the omnibus test for promotion focus was significant, $\chi^2(3) = 7.82, p < .05$. Further inspection revealed that only the promotion focus by intercept term was significant, $\gamma = 1.00, z = 2.26, p < .05$. Therefore the model was run without the quadratic interaction terms. An omnibus test for promotion focus was significant, $\chi^2(2) = 8.22, p < .05$, but the linear interaction term was not significant. A final model with only intercept interactions revealed that the promotion focus by intercept term was significant, $\gamma = .86, z = 2.90, p < .01$. Predicted survival curves revealed that people higher versus lower in promotion focus (evaluated at 1 *SD* above and below the mean) were better able to successfully respond to slips. The probability that low promotion people were still smoking was .76 at 6 months after a slip and .64 at the end of follow-up, whereas the probability that high promotion people were still smoking was .50 at 6 months after a slip and .29 at the end of follow-up.

The interaction of regulatory focus with self-efficacy

Examined as a main effect, an omnibus test for self-efficacy was not significant, $\chi^2(3) = 4.73, p = .19$. In order to examine the interactive influence of self-efficacy, interactions of regulatory focus variables with self-efficacy and slope terms were examined. An omnibus test for the interaction of self-efficacy with promotion focus was significant, $\chi^2(3) = 10.11, p < .05$. Further inspection revealed that the promotion focus by self-efficacy quadratic term was significant, $\gamma = -.02, z = -2.00, p < .05$, and the promotion focus by self-efficacy intercept term was marginal, $\gamma = .31, z = 1.87, p = .06$. As revealed in Figure 1, those participants who were high in both self-efficacy and promotion focus were more likely than all other participants to make successful quit attempts soon after slipping. In fact, by 3 months after a slip, the probability that someone who was high in both self-efficacy and promotion focus was still smoking was .49, whereas for everyone else, the probability was greater than .74. It should also be noted that although self-efficacy was beneficial for those high in promotion focus, by the end of follow-up, those high in promotion focus were likely to have quit again regardless of self-efficacy (probability $< .30$ still smoking). In responding to slips, possessing the confidence and skills to resist smoking was beneficial for those high in promotion focus, but not for those low in promotion focus. People who possessed both the self-regulatory skills and the regulatory focus that fit with the task of responding to slips were most able to quit again.

Unexpectedly, an omnibus test for the interaction of self-efficacy with prevention focus was significant, $\chi^2(3) = 9.83, p < .05$, but none of the prevention focus by self-efficacy interactions approached significance. Therefore the model was run without the quadratic

interaction terms. The self-efficacy by prevention focus omnibus test was again significant, $\chi^2(2) = 7.85, p < .05$, but only the prevention by self-efficacy intercept term was significant, $\gamma = -.43, z = -2.56, p < .05$. In a final model with only intercept interactions, the prevention focus by self-efficacy intercept term was marginal, $\gamma = -.27, z = -1.90, p = .06$. As revealed in Figure 2, of participants high in self-efficacy, those high in prevention focus were more likely to remain smoking than those low in prevention focus (probability of .49 versus .39 by the end of follow-up). Conversely, of those low in self-efficacy, those high in prevention focus were less likely than those low in prevention focus to remain smoking (probability of .30 versus .67 by the end of follow-up). Put another way, after a slip, high self-efficacy was somewhat detrimental for those higher in prevention as compared to those lower in prevention. However, if one was low in self-efficacy, high prevention focus was beneficial for making another successful quit attempt.

Avoiding Slips

Using survival analysis, we next examined the extent to which people were able to avoid slipping after initial cessation. Guided by the observation that most people will slip within a month of making an initial quit attempt (Ockene et al., 2000), participants had to be quit for two consecutive time points to be included in this analysis. Each participant's data were adjusted to start at the first time point after reporting cessation for two months. In this way, all participants entered the analysis at the same point – cessation for two consecutive months. If a participant was smoking at any time point thereafter, he or she exited the analysis; if a person maintained cessation (i.e., avoided slipping), he or she remained in the analysis. This analysis allowed us to answer the questions of how soon and whether or not participants ever slipped after making a successful quit attempt. 169 participants met the criteria to be included in the analysis. Of these participants, most achieved two months of consecutive cessation a month after active treatment ($n = 121$). Of the 169 participants, 100 slipped at some point during follow-up. In addition to Fagerstrom score (addiction), sex, and treatment group, the following analysis also controlled for month of consecutive cessation. Unconditional analysis revealed that these data were modeled by linear and quadratic slope terms, $\gamma = -.45, z = -5.54, p < .001, \gamma = .03, z = 3.78, p < .001$.

The influence of regulatory focus

In the quadratic conditional model (i.e., interactions of promotion and prevention foci with intercept, linear, and quadratic terms), the promotion focus omnibus test was not significant, but the omnibus test for prevention focus was marginal, $\chi^2(3) = 6.29, p = .09$. Further inspection revealed that only the prevention focus by intercept term approached significance, $\gamma = -.27, z = -1.56, p = .12$, and a model was run without the quadratic interaction terms. An omnibus test for prevention focus was again marginal, $\chi^2(2) = 5.38, p = .07$, but the linear interaction term was not significant. A final model with only intercept interactions revealed that the prevention focus by intercept term was significant, $\gamma = -.28, z = -2.20, p < .05$. Predicted survival curves revealed that people higher versus lower in prevention focus (evaluated at 1 *SD* above and below the mean) were more likely to never slip. By the end of the follow-up, the probability that someone low in prevention had never slipped was .24, whereas the probability that someone high in prevention had never slipped was .40.

The interaction of regulatory focus with self-efficacy

Examined as a main effect, an omnibus test for self-efficacy was significant, $\chi^2(3) = 9.39, p < .05$. However, only the self-efficacy by intercept term was significant, $\gamma = -.26, z = -2.39, p < .05$. In a model with only intercept interactions, the self-efficacy by intercept term was again significant, $\gamma = -.18, z = -2.49, p < .05$. Similar to prevention focus, greater self-

efficacy predicted never slipping. By the end of follow-up, the probability that someone low in self-efficacy had never slipped was .20, whereas the probability that someone high in self-efficacy had never slipped was .37.

In order to examine the interactive influence of self-efficacy, interactions of regulatory focus variables with self-efficacy and slope terms were examined. An omnibus test for the interaction of prevention focus with self-efficacy was marginal, $\chi^2(3) = 6.81, p = .08$. Further inspection revealed that the prevention focus by self-efficacy linear and quadratic slope terms were significant, $\gamma = -.15, z = -2.38, p < .05, \gamma = .015, z = 2.59, p < .01$; the intercept term was not significant. As revealed in Figure 3, those participants who were high in both self-efficacy and prevention focus were more likely to never slip over the course of the study. By the end of follow-up, the probability that someone who was high in both self-efficacy and prevention focus had never slipped was .51, whereas for everyone else, the probability was less than .28. People who possessed both the self-regulatory skills and the regulatory focus that fit with the task of avoiding slips were most able to remain smoke free.

Unexpectedly, an omnibus test for the interaction of promotion focus and self-efficacy was significant, $\chi^2(3) = 9.07, p < .05$. Further inspection revealed that the promotion focus by self-efficacy intercept, linear, and quadratic slope terms were significant, $\gamma = -.42, z = -2.45, p < .05, \gamma = .24, z = 2.60, p < .01, \gamma = -.02, z = -2.38, p < .05$. As revealed in Figure 4, for participants high in self-efficacy, promotion focus did not predict large differences in avoiding slips; by the end of follow-up, the probability of never having slipped was .43 for those high in promotion focus and .37 for those low in promotion focus. However, the pattern was different for participants low in self-efficacy; they were more likely to have slipped if they scored higher on promotion focus. By the end of follow-up, the probability of having never slipped was only .13 for people low in self-efficacy and high in promotion focus. Remaining smoke-free was most difficult for people who lacked self-regulatory skills and possessed the regulatory focus that did not fit the task of avoiding slips.

Discussion

In order to gain insight into processes regulating the initiation and maintenance of behavior change and to clarify the behavioral tasks that underlie the effect of regulatory focus on behavior change, we examined two behavioral tasks in a study of smoking cessation: a) responding to initial slips and b) avoiding slips after initial cessation. Survival analysis of responses to initial slips revealed that people higher in promotion focus, but not prevention focus, were more likely to quit again. Of participants quit for 2 months, survival analysis of avoiding slips revealed that people higher in prevention focus, but not promotion focus, were less likely to ever slip. Consistent with prior studies in both the lab and the field (e.g., Brodsholl et al., 2007; Cesario, Grant, & Higgins, 2004; Fuglestad et al., 2008), these findings suggest that a fit between task and regulatory focus facilitates successful performance. In our view, promotion focus and responding to initial slips and prevention focus and avoiding slips (once initial success has been achieved) represent fits between dispositions and behavioral tasks, which facilitate successful smoking cessation.

Building on the growing body of health behavior research on the interplay between dispositions and traditional social cognitive predictors of behavior change (e.g., Conner et al., 2007, 2009; Rhodes et al., 2002, 2005; Tam et al., 2010), we investigated the extent to which these processes were influenced by self-efficacy. Promotion and prevention foci interacted with self-efficacy in predicting both responding to slips and avoiding slips. When regulatory focus matched the behavioral task at hand, higher self-efficacy was beneficial. People who were high in both promotion focus and self-efficacy were particularly likely to quit again soon after their first slip. Likewise, people who were high in both prevention

focus and self-efficacy were particularly likely to avoid slipping after initial success. It appears that successful behavioral change is predicated upon possessing both the self-regulatory skills and regulatory focus that fit with a particular behavioral challenge. Unexpectedly, self-efficacy also interacted with the dimension of regulatory focus that did not match the behavioral task at hand. For example, among participants high in self-efficacy, those higher in prevention focus were less successful in responding to slips than those lower in prevention focus. Conversely, among participants low in self-efficacy, those higher in prevention focus had greater success than those lower in prevention focus.

Implications for Regulatory Focus, Regulatory Fit, and Behavior Change

Our results add to a growing body of literature demonstrating that regulatory focus influences health behavior and health behavior change (e.g., Latimer et al., 2008a, 2008b; Schokker et al., 2010; Tam et al., 2010). Prior research on regulatory focus and behavior change established that promotion focus was important for initiating change, whereas prevention focus was important for maintaining changes (Fuglestad et al., 2008). The present analysis clarifies these results by demonstrating particular behavioral tasks that underlie these general initiation and maintenance findings. It appears that the ability of high promotion people to successfully respond to initial slips accounts, at least partially, for their ability to initiate behavior change. Consistent with studies of regulatory focus and weight loss (Fuglestad et al., 2008; Fuglestad, Rothman, & Jeffery, 2009), promotion focus appears particularly beneficial for the *continued response* phase of initiation, during which people strive to gain mastery over their newly enacted behaviors in the face of obstacles and unpleasant experiences (Rothman et al., 2008, 2011). Complementing the role promotion focus plays in initiating change, it appears that high prevention people have greater success in maintaining behavioral changes because they are able to remain vigilant and avoid slipping altogether.

The findings also point to the complexity of the fit between regulatory focus and situational challenge. When there was a fit between regulatory focus and the behavioral task (i.e., promotion focus and responding to slips, prevention focus and avoiding slips), greater self-efficacy was beneficial. In essence, having confidence in one's ability to resist temptation facilitated eagerly responding to slips for high promotion people and vigilantly guarding against lapses for high prevention people. Having the self-regulatory skills allowed the fit between regulatory focus and task to facilitate performance and progress towards the goal of becoming a non-smoker.

However, when there was a non-fit between regulatory focus and behavioral task (i.e., prevention focus and responding to slips, promotion focus and avoiding slips), the role of self-efficacy was more complex. Consistent with research on regulatory fit and task performance (e.g., Förster, Higgins, & Idson, 1998; Spiegel, Grant-Pillow, & Higgins, 2004), conditions of non-fit can result in poorer functioning and, in the current study, this appeared to be particularly true if one's level of self-efficacy made the situation more of a non-fit. After slipping, high self-efficacy was problematic for people higher, versus lower, in prevention focus. Given that these people were confident in their ability to stay quit but still ended up returning to smoking, they may have perceived their situation to be particularly distressing or anxiety-provoking, which, in turn, may have led them to exit the behavior change process. Interestingly, high prevention people did well after a slip if they were low in self-efficacy. Perhaps under these conditions, the slip was perceived to be less distressing and served to reinforce the need for persistence and vigilance. Higgins (2005) has argued that failure can facilitate vigilance, and this appears to be the case, at least under conditions of low efficacy, for high prevention people. For high promotion people who had been quit for consecutive months, low self-efficacy predicted returning to smoking. These high

promotion people may have been too eager and cavalier without possessing the necessary behavioral skills to resist temptation. Facing the task of guarding against slips without the necessary regulatory skills proved to be quite difficult for high promotion people. Given that we did not expect interactions of self-efficacy with (a) prevention focus in responding to slips and (b) promotion focus in avoiding slips, these effects and interpretations need further empirical testing.

In future research, we hope to illuminate the psychological states that underlie successful and unsuccessful responses to slips (e.g., perceptions of difficulty, emotional reactions) and avoiding slips (e.g., satisfaction with outcomes, perceptions of effort and difficulty, behavioral strategies). This could best be accomplished with frequent assessment of people's emotional, cognitive, and behavioral experiences (e.g., data collection via mobile devices). If our findings were indeed driven by fit between regulatory focus and situational task, then people's perceptions of the value of the behaviors they are performing should be increased by fit. This increase in value should be manifest in people's evaluation of the treatment process, motivation to engage in the behaviors, positive feelings about the behaviors, value assigned to the behaviors, and their satisfaction with the behavior change process.

Implications for Social Cognitive Theory

The results also inform social cognitive theory by specifying when self-efficacy is most beneficial and when it can actually be detrimental (see also, Baldwin et al., 2006). High self-efficacy appears to be a necessary, but not sufficient, condition for successfully responding to slips and avoiding slips altogether. High self-efficacy is most beneficial when one's regulatory focus fits with a behavioral challenge. When faced with responding to slips, individuals who are high in promotion focus benefit from having high self-efficacy. Likewise, when faced with maintaining cessation after successfully quitting for two months, individuals who are high in prevention focus benefit from having high self-efficacy. For each task, if one possesses the right regulatory focus, confidence in one's ability to resist temptation across a wide range of situations is beneficial. These results are somewhat consistent with Schokker et al. (2010) who found a fit effect for prevention focus with downward social comparison information, but only when participants had high efficacy. The results are also consistent with findings reported by Tam et al. (2010) which indicated that regulatory fit heightens the degree to which social cognitive constructs (e.g., intentions to snack) predict health behavior change (e.g., snacking behavior). Looking at the present research from this perspective, self-efficacy was a stronger predictor of performance when people's regulatory focus fit with the behavioral task at hand. In responding to slips, self-efficacy was a stronger predictor of quitting again for those higher versus lower in promotion focus (see Figure 1). Similarly, in avoiding slips, self-efficacy was a stronger predictor of maintaining cessation for those higher versus lower in prevention focus (see Figure 3).

In the present research we have considered cessation self-efficacy that was measured at the end of active treatment. Although this measure is more informed by cessation experiences than a baseline measure, it did not assess self-efficacy beliefs that are specific to recovery from lapses (Schwarzer, 2008), nor did it capture the dynamic changes in self-efficacy that have been shown to be associated with progression towards relapse (Gwaltney, Shiffman, Balabanis, & Paty, 2005; Shiffman et al., 2000). As such, it would be informative to see how regulatory focus relates to recovery specific self-efficacy and changes in self-efficacy in response to successes and failures and to see if these changes have different implications depending on regulator focus. Furthermore, it will be important to consider the interplay of regulatory focus with other social cognitive variables such as outcome expectations that have been shown to predict smoking cessation (e.g., Gwaltney et al., 2005).

Implications for Interventions

Recent studies have demonstrated the potential for messages that match people's regulatory dispositions to facilitate behavior change (e.g., Latimer et al., 2008a, 2008b; Schokker et al., 2010; Sherman, Mann, & Updegraff, 2006; Tam, Bagozzi, & Spanjol, 2010). Specific to regulatory focus theory, Latimer et al. (2008a) exposed inactive people to either promotion-focused (e.g., 'Being physically active may improve your health') or prevention-focused (e.g., 'Inactivity may lead to poor health') messages encouraging physical activity. Messages that matched individuals' regulatory focus led to greater rates of physical activity (assessed 2 weeks later) than did mismatched messages.

To date, studies that have demonstrated the positive effects of matching treatments to regulatory focus have focused on relatively short term outcomes. It will be important to establish whether matching messages and treatments to regulatory focus will continue to have effects into maintenance, or if specific interventions will be needed during specific phases of the behavior change process. Incorporating these ideas with Rothman's behavior change model, if someone is high in promotion focus, framing behavioral maintenance in terms of growth and achievement (e.g., optimizing health, promoting relationships, and attaining benefits) may be beneficial. Likewise, framing behavioral initiation in terms of security and duty (e.g., avoiding health risks, not hurting relationships, and fulfilling responsibilities) may be beneficial for someone who is high in prevention focus. Furthermore, the results of the present investigation suggest very specific intervention targets in terms of when and with whom to intervene. For example, it may be particularly important to intervene after slips for high prevention people who are high in self-efficacy. Conversely, high promotion people would appear to benefit most when they are facing behavioral maintenance with relatively low confidence in their ability to resist temptation. Targeting specific behavioral challenges for specific people has the potential to facilitate the performance of difficult behavior changes such as smoking cessation and diet and exercise modification.

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Figure 1.
Survival analysis of responses to slips by promotion focus and self-efficacy.

Figure 2.
Survival analysis of responses to slips by prevention focus and self-efficacy.

Figure 3.
Survival analysis of avoiding slips by prevention focus and self-efficacy.

Figure 4. Survival analysis of avoiding slips by promotion focus and self-efficacy.