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**When Planning is Not Enough: The Self-Regulatory Effect of Implementation Intentions
on Changing Snacking Habits**

Leona Tam
Old Dominion University
ltam@odu.edu

Richard P. Bagozzi
University of Michigan
bagozzi@bus.umich.edu

Jelena Spanjol
University of Illinois at Chicago
spanjol@uic.edu

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Abstract

Objective: This study examined whether matching implementation intentions to people's regulatory orientation affects the effectiveness of changing unhealthy snacking habits. **Design:** Participants' regulatory orientation was either measured (as a chronic trait) or manipulated (as a situational state), and participants were randomly assigned to implementation intention conditions to eat more healthy snacks or avoid eating unhealthy ones. **Main outcome measures:** A self-reported online food diary of healthy and unhealthy snacks over a two-day period.

Results: Participants with weak unhealthy snacking habits consumed more healthy snacks when forming implementation intentions (regardless of match or mismatch with their regulatory orientation), while participants with strong unhealthy snacking habits consumed more healthy snacks only when forming implementation intentions that matched their regulatory orientations.

Conclusion: Results suggest that implementation intentions that match regulatory orientation heighten motivation intensity and put snacking under intentional control for people with strong unhealthy snacking habits.

Keywords: snacking habits, implementation intentions, regulatory fit, regulatory focus

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“Changing food habits is not simply a question of ‘education’ . . . but food habits are interwoven with the entire way of life . . . [such that] resistance to change may come unexpectedly from any part of the social system and defeat well-planned attempts at change . . . and appeals to motivations at one time and place will prove empty and dead at another time and place”.

Guthe and Mead, 1945, pp. 14, 17

Guthe and Mead (1945), in their National Academy of Science report, provided an early recognition of the key, but contingent roles of motivation and planning in changing food habits. One food habit most people struggle to change is snacking. Snacking has become an important part of our eating habits, with people shifting from a traditional eating pattern of three meals a day to increasingly continuous eating (Tillotson, 2002). About 90% of Americans snack, and do so on average twice on any given day (Driskell, Kim, & Goebel, 2005; Zizza, Tayie, & Lino, 2007). Approximately one-half of total food consumption is considered habitual (Naik & Moore, 1996). Snacks now provide anywhere from 20% of our daily energy intake (Briefel & Johnson, 2004; Kant & Graubard, 2006) to more energy than is derived from main meals (Ovaskainen et al., 2006). However, snacks only account for 3-8% of our daily vegetable and fruit consumption (Bowman, 1997), potentially posing a significant threat to healthful living.

Compared to main meals, which are structured around different times of the day, snacking is less structured, since it can be done at various times and locations, alone or with other people. Because of this lack of structure, factors that trigger unhealthy snacking are not always readily recognizable (Sobal & Wansink, 2007), making it even more difficult to adjust such behavior. Consistently, research finds most people eat more unhealthy snacks than they should and want, resulting in negative health consequences such as weight gain and poor nutrition (Christakis & Fowler, 2007; Colapinto, Fitzgerald, Taper, & Veugelers, 2007; Nestle,

2006; Roemmich, Wright, & Epstein, 2002). Thus, health experts try to help people modify their consumption from unhealthy to healthy foods (Epstein, Leddy, Temple, & Faith, 2007; Harris, Bargh, & Brownell, 2009).

Implementation Plans, Regulatory Orientation, and Regulatory Fit

One way for people to achieve a change in behavior is by planning those changes and forming specific *implementation intentions* (e.g., Bagozzi & Edwards, 2000; Gollwitzer & Sheeran, 2006; Koestner, Lekes, Powers, & Chicoine, 2002; Sheeran, 2002). This might be particularly helpful when the specified goal is difficult to attain (Gollwitzer & Brandstatter, 1997), as is the case with changing strong unhealthy snacking habits. Implementation intentions are explicit plans that link behavior with contextual features and thus cue subsequent opportunities for performing a specified behavior (Gollwitzer & Brandstatter, 1997). The purpose of implementation intentions is to identify specific steps to facilitate the initiation and execution of a desired behavior. They provide self-commitments to act by specifying that “when X occurs, I’ll do Y” and represent a cluster of decisions concerning when, where, and how to act.

Whereas implementation intentions are strategic self-regulatory tools (Gollwitzer & Brandstatter, 1997), regulatory orientation is the strategic focus reflected in promotion versus prevention outlooks (Higgins, 1997). Under a promotion (versus prevention) orientation, self-regulation (a) springs from ideals manifest in hopes and aspirations (versus oughts manifest in duties and obligations); (b) emphasizes the pursuit of positive outcomes (versus the avoidance of negative outcomes); (c) invokes heightened sensitivity to the presence and absence of positive outcomes (versus negative outcomes); and (d) employs approach (versus avoidance) strategies or eagerness-related (versus vigilance-related) strategies, which ensure the presence of gains (versus presence of non-losses) and the absence of nongains (versus the absence of losses). While both orientations are assumed to coexist in any person, one of them is expected to be chronically more operative. Furthermore, regulatory orientation has been studied both as a temporary, situationally-induced state and as a chronic, individual-difference trait. We investigate both approaches in this study.

This dual-motivation framework has been extended to include regulatory fit (Higgins, 2000). People experience regulatory fit when they use a goal pursuit strategy that matches their regulatory orientation. Since implementation intentions provide effective motivational tools, enhance behavior, and serve as self-regulatory implementation tools (Gollwitzer, Fujita, & Oettingen, 2004), people who form implementation intentions that match their regulatory orientation (whether situational or chronic) will experience regulatory fit. In turn, regulatory fit substantially and positively influences goal attainment (Cesario, Grant, & Higgins, 2004), by generating greater motivation intensity to attain a goal than regulatory non-fit. Since people can form implementation intentions to promote healthy snacking, as well as to demote unhealthy snacking (Block, 2004), implementation intentions that specify eating healthy snacks (promotion-oriented details) should generate higher motivational intensity for promotion-oriented than prevention-oriented individuals, while implementation intentions specifying the avoidance of unhealthy snacks (prevention-oriented details) should generate higher motivational intensity for prevention-oriented than promotion-oriented individuals.

In the context of food consumption, Sullivan and Rothman (2008) (in an extension of Armitage's [2004] study of how implementation intentions change low fat nutrition) examined whether people with snacking avoidance goals (e.g., "I will snack on fewer unhealthy foods over the next two weeks") are more likely to snack healthily depending on whether or not they form implementation intentions. They found that participants with avoidance goals were indeed more likely to consume healthy snacks when they formed implementation intentions. While the study provided important findings, Sullivan and Rothman (2008) did not distinguish between types of implementation intentions formed and whether they fit the participants' regulatory orientations. Participants were allowed to choose either an approach or avoidance goal. Consistent with the notion of "value from fit" from regulatory fit theory (Higgins, 2000), one possible explanation of the findings is that prevention-focused people who chronically focus on duties and responsibilities for self-regulation are more likely to emphasize the pursuit of avoidance goals and therefore choose these. Prevention-focused people might have applied *avoidance*

implementation intentions to when, where, and how to avoid calorie or fat intake, instead of *approach implementation intentions* to increase fiber or other essential nutrient intake. Since the outcome variables measured in Sullivan and Rothman (2008) were calorie and fat intake, which carry an implicit avoidance or prevention frame, participants may have picked the avoidance goal because they were prevention-focused; as a result, implementation intentions formed were more likely to be prevention-focused. Thus, participants in the avoidance goal condition with implementation intentions would have obtained regulatory fit.

Similarly, in Jackson et al.'s (2005) study on implementation intentions in low income areas, participants were asked to increase their fruit and vegetable consumption; the goal implicitly carried an approach frame. Given this approach goal, promotion-focused participants might have found this goal to better fit their self-regulatory orientation. Such regulatory fit could have generated heightened motivation intensity (Higgins, 2000) and resulted in healthier fruit and vegetable consumption. Interestingly, however, no beneficial effects of implementation intentions were found and intentions failed to influence behavior possibly due to entrenched habits of low fruit and vegetable consumption. Indeed, as Jackson et al. (2005) pointed out, their participants had the smallest proportion of people eating the recommended portions of fruit and vegetables, which is consistent with previous research demonstrating that low-income groups tend to eat less healthy foods, such as fruit and vegetable (Bowman, 1997). Thus, a reasonable hypothesis is that these participants might have had strong habits for eating unhealthy food. In that case, negative effects from automaticity in behavior generated by unhealthy habits were stronger than positive effects from implementation intentions needed to overcome habits.

Due to the remaining questions regarding habit strength and regulatory fit effects on implementation plans' role in changing habits, we suggest that an interaction between regulatory orientation, implementation plans, and habit strength exists and needs to be explored.

Habit Strength, Regulatory Fit, and Motivational Intensity

Habits are behaviors that are elicited automatically as a result of situational cues, and the strength of habit is represented by the frequency of the behavior and stability of the environment

(Ouellette & Wood, 1998). Given the high frequency of snacking, it is likely to constitute a habitual response and does not require deliberation and mediation by intentions (Norman & Conner, 2005). Indeed, people consume unhealthy snacks even after declaring their intentions to eat healthy snacks a day earlier (Weijzen, Graaf, & Dijksterhuis, 2009).

Researchers have been particularly interested in the question of whether unwanted or unintentional habits can be changed by planning ahead. Healthy snack choices were more often preceded by healthy choice intentions than by unhealthy choice intentions stated one day before measured consumption, suggesting that individuals who intend to make a healthy choice seem at least more likely to do so than those who do not make such plans (Weijzen et al., 2009). However, unintentional habits still find their way to influence snacking (Verplanken & Faes, 1999). Indeed, a number of studies have empirically demonstrated that past snacking predicts future snack consumption better than preferences, attitudes, and intentions (Conner, Norman, & Bell, 2002; Mullen, Hersey, & Iverson, 1987; Verplanken & Faes, 1999). Whereas the aforementioned habit research emphasizes situational factors in changing habits, our study approaches the topic of changing snacking habits from a self-regulatory perspective.

Implementation plans operate in a similar manner to habits and, in fact, the automaticity of the effects of implementation plans is echoed by demonstrations that habitual behavior is immediate, efficient, and occurs outside awareness (Sheeran, Milne, Webb, & Gollwitzer, 2005). There are also important parallels between implementation intentions and habits in terms of their underlying mechanism. In both cases, strong associations are developed between particular situational cues and specific goal-directed responses (Aarts & Dijksterhuis, 2000). However, the origins of these associations are different. In the case of habits, the pairing is behavioral in the sense that frequent and consistent performance of a behavior in a particular context promotes the development of strong links between the context and the behavior. In the case of implementation intentions, the pairing is cognitive in that similar linkages are achieved by getting people to form associations mentally via acts of will (Sheeran & Orbell, 1999). In other words, the automaticity of implementation intentions is strategic and serves the person's current goals, whereas the

automaticity of habits may be counter-intentional (Gollwitzer & Brandstatter, 1997; Sheeran et al., 2005).

Verplanken and Faes (1999) found that, when people were asked to form implementation intentions to eat healthier, habits apparently were not overruled. Recent research provides strong support for an individual differences approach to food consumption research (e.g., Conner, Fitter, & Fletcher, 1999; O'Connor, Jones, Conner, McMillan, & Ferguson, 2008), making it plausible to suspect that this "one size fits all" healthy eating strategy will not work for everybody, especially not for individuals with strong unhealthy snacking habits. Given the automaticity characteristic of unhealthy snacking for people with strong habits, additional motivation may be required to execute implementation intentions. To that end, we use regulatory fit theory to explore the source of motivation needed to change unhealthy snacking habits. Note also that Verplanken and Faes (1999) operationalized unhealthy habit strength as the number of categories of unhealthy foods consumed, which does not necessarily capture the central automaticity aspect of habits (Wood & Neal, 2007). Eating simply more types of unhealthy foods does not measure the frequency and stability of behavior necessary to define a strong habit.

Aarts and Dijksterhuis (2000, p. 61) posted, "Can a person increase the probability of performing the counter-habitual intended action by planning this action? This is presumably dependent on the relative strength of the habitual association and the association that is the result of planning. It is likely that an association developed through planning can override a habitual association if the former is stronger." Thus, for people with weak habits, associations developed by forming implementation intentions can override a habitual association since habitual associations are weaker than implementation intentions associations. Webb and Sheeran (2009) found empirical support of habit strength as a moderator for the implementation intention effects in smoking cessation such that implementation intentions only reduced smoking among people with weak or moderate habits, but not in people with strong habits. Therefore, for people with strong habits, a goal pursuit strategy like implementation intentions needs to deliver sufficient heightened motivation to ensure the enactment of the implementation plans laid out that go

against the strong habitual response to fulfilling snacking goals. Regulatory fit research indicates that matching the goal pursuit strategy to an individual's regulatory orientation creates regulatory fit conditions, which in turn generates heightened motivation and thus provides enhanced planning effects.

Based on the discussions above, we expect that people with strong versus weak unhealthy snacking habits will gain differential effectiveness in changing habits using different types of implementations intentions because of the heightened motivational intensity brought about through regulatory fit. Specifically, people with strong unhealthy snacking habits will only break their unhealthy snacking habits when their implementation intentions fit their regulatory orientations, while people with weak unhealthy snacking habits (regardless of their regulatory orientation) will change their snacking behavior when they form implementation intentions because of the automatic cues provided by the implementation intentions. By disrupting habits, people can place snacking under intentional control (Wood, Tam, & Guerrero-Witt, 2005). We hypothesize that people with strong unhealthy snacking habits will snack healthier when their implementation intentions match their regulatory orientation.

In sum, this research has four aims. First, we empirically test the importance of habit strength in behavior intervention applying implementation intentions and regulatory orientation. Second, we expect to replicate the beneficial effects of implementation intentions on changing behavior for people with weak habits. Third, we examine the underlying process of regulatory fit on changing habits. Finally, we incorporate both measures of healthy and unhealthy snacking in our outcome measure, in contrast to prior research which focused either on only one side of the healthy eating story, or, in some cases, regarded snacking simply as unhealthy behavior and used its frequency as a negative health measure (Cartwright et al., 2003)

Method

Participants

Five hundred and ninety one undergraduate students of different majors were recruited from a public university and participated in the study for partial course credit. 32 participants did

not complete all three questionnaires and were dropped from the study, resulting in 559 participants (308 females, 251 males) in the analysis. The mean age of participants was 22.8 years ($SD = 3.36$), and the mean body mass index (BMI) was 23.8 ($SD = 4.01$).

Procedure

Participants completed an initial questionnaire, followed by two snack diaries filled out daily online. Participants were divided into two groups: The regulatory orientation was measured for one group ($N=236$) and was manipulated for the other group ($N=323$). Results were consistent between measured and manipulated regulatory orientation groups. Therefore, data were combined and analyses are presented together. The initial questionnaire measured or manipulated participant's regulatory focus, then measured their snacking habits, and finally a manipulation of implementation intentions was administered. The other two instruments were self-report snack diaries filled out online at the end of each of the next two days. We used two same-day online snack reports (as opposed to one single snack report) to minimize memory loss. Each snack report was constructed as a combination of the 24-hour recall and diet diary used in prior research (Wolper, Heshka, & Heymsfield, 1995). Upon completion of all three questionnaires, participants were debriefed.

Measures

Unhealthy snacking habits. The strength of unhealthy snacking habits was measured by the 12-item habit scale (Verplanken & Orbell, 2003), ranging from (1) *Strongly disagree* to (7) *Strongly agree*. The habit scale was used instead of simple behavioral frequency because it captures different dimensions of habit such as history of repetition, automaticity, and the expression of identity (Norman & Conner, 2005). Participants were told that "unhealthy snacks are those high in calories, saturated fat, sugar, and salt, and low in fiber and nutrients." A sample item of unhealthy snacking habits is "Eating unhealthy snacks is something I would find hard not to do." The habit strength index was formed by averaging all 12 items (Cronbach's $\alpha = .96$).

Regulatory focus measure. For half of the participants, regulatory focus was measured using two 7-point subscales from the 11-item Regulatory Focus Questionnaire (RFQ; Higgins et

al., 2001) consisting of the promotion- and prevention-focus scales, with response options from (1) *Strongly disagree* to (7) *Strongly agree*. A sample item of promotion-focus scale is “I often have accomplished things that got me excited to work even harder” and a sample item of prevention-focus scale is “Not being careful enough has gotten me into trouble at times” (reverse coded). Following the procedure proposed by Higgins et al (2001), we computed the difference between the averaged RFQ promotion (Cronbach’s $\alpha = .91$) and RFQ prevention (Cronbach’s $\alpha = .93$) scores, and classified participants in terms of whether, compared to others, they were relatively more promotion- or prevention-focused based on a median split ($Mdn = 0.37$).

Regulatory focus manipulation. For the other half of the participants, regulatory focus was manipulated by asking them to read one of two articles (Lee & Aaker, 2004) that explained either the benefits of healthy snacking (promotion-focused) or the harms of unhealthy snacking (prevention-focused). Each article was about 300 words in length and is available upon request.

Implementation intentions. Participants were then randomly assigned to one of the three implementation intentions groups: (1) control - no implementation intentions, (2) promotion-focused implementation intentions, and (3) prevention-focused implementation intentions. Participants in the control group did not form any implementation intentions on snacking. While participants in the promotion-focused implementation intentions group picked three healthy snacks and formed implementation intentions to eat more of these three healthy snacks, participants in the prevention-focused implementation intentions group picked three unhealthy snacks (Briefel & Johnson, 2004) and formed implementation intentions to avoid eating them. Specifically, the promotion-oriented (prevention-oriented) manipulations read as follows:

“According to nutrition experts, the most effective way to improve your snacking habit is to focus on the benefits of healthy snacking (drawbacks of unhealthy snacking) for you personally and to commit yourself to eat more healthy snacks. Please pick three snacks from the healthy (unhealthy) snack list that you would like to try eating (avoid eating) more in the coming few days.

Next, we ask you to let us know approximately when, where, with whom, and in what situations you will eat (avoid eating) the chosen healthy (unhealthy) snacks. Now, imagine as vividly as possible, when you will eat (avoid eating) the chosen healthy (unhealthy) snacks, where you will eat (avoid eating) them, and other details of the situation you anticipate to eat (avoid eating) the chosen healthy (unhealthy) snacks.”

Regulatory fit. The regulatory fit condition included promotion-focused participants forming promotion-focused implementation intentions and prevention-focused participants with prevention-focused implementation intentions; the regulatory non-fit condition included promotion-focused participants with prevention-focused implementation intentions and prevention-focused participants with promotion-focused implementation intentions; the control condition included promotion- and prevention-focused participants without implementation intentions formed.

Motivation intensity. After the implementation intentions manipulation, participants reported the extent of motivation, importance, encouragement, and stimulation to improve unhealthy snacking habits with response options ranged from (1) *Very low* to (7) *Very high*. A sample item is “How motivated are you to improve your snacking habits?” Motivation intensity was calculated by averaging the 4-item scale (Cronbach’s $\alpha = .90$).

Behavioral intentions. Participants indicated their behavioral intention to eat healthy snacks in three items (i.e., “I intend to snack healthily”; “It is likely for me to snack healthy”; and “I am going to snack in a healthy way”) using 7-point scale ranging from (1) *Does not describe me at all* to (7) *Describes me very well*. Higher scores on this scale (Cronbach’s $\alpha = .88$) imply more favorable intentions towards healthy snacking behavior.

Snacking behavior. Participants reported all the snacks as well as portion sizes consumed. Snacking behavior was measured by the number of portions of healthy snacks compared to unhealthy snacks consumed over two subsequent days (1 = consumed three or more portions of unhealthy snacks more than healthy snacks; 2 = consumed two portions of unhealthy snack more than healthy snacks; 3 = consumed one portion of unhealthy snack more than healthy snacks; 4 =

consumed same number of portions of healthy and unhealthy snacks; 5 = consumed one portion of healthy snacks more than unhealthy snacks; 6 = consumed two portions of healthy snacks more than unhealthy snacks, and 7 = consumed three or more portions of healthy snacks more than unhealthy snacks). Snacks are coded as healthy (versus unhealthy) if they meet (versus not meet) the guidelines (e.g., 250 calories or less, fat contributes less than 35% of calories, saturated fat accounts for less than 10% of calories, and sugar attributes for less than 35% calories) provided by the American Dietetic Association (Duyff, 2006).

Body measures. Participants also reported their height in feet and inches and weight in pounds. Participants indicated their perceived weight with response options 1 (*quite a bit underweight*), 2 (*a little underweight*), 3 (*neither underweight nor overweight*), 4 (*a little overweight*), and 5 (*quite a bit overweight*). Body Mass Index (BMI) was calculated using height and weight reported.

Stress and smoking. To control for the effect of stressful eating (Grunberg & Straub, 1992), stress was measured by three items as the extent of the participants being anxious, tense, and nervous with response ranging from (Cronbach's $\alpha = .86$). Participants also reported if they smoked, to capture the potential effect of smoking on snacking (Hatsukami, LaBounty, Hughes, & Laine, 1993).

Results

Descriptive Statistics

Female participants ($n = 308$) weighed, on average, 139.58 pounds ($SD = 22.24$) and male participants ($n = 251$) weighed, on average, 178.49 pounds ($SD = 34.80$). Overall, participants reported perceiving themselves as neither underweight nor overweight ($M = 3.29$, $SD = 0.71$). Men were slightly less likely to perceive themselves as overweight, than were women, $M = 3.23$, $SD = 0.78$ versus $M = 3.35$, $SD = 0.71$, $F(1, 557) = 4.40$, $p = .036$, $\eta^2 = .01$ (see Table 1 for more details). There were no significant differences between participants whose regulatory orientations were measured or manipulated in gender distribution, age, ethnicity

distribution, body measures, smoker proportion, stress level, behavioral intention, or habit strength, $F(1, 557) < 2.42$, $ps > 0.12$, $\eta^2 < .005$.

Manipulation checks. Participants whose regulatory orientations were manipulated as promotion-focused reported thinking more about the benefits of eating healthy snacks ($M = 3.32$, $SD = 0.95$) and less about the harms of eating unhealthy snacks ($M = 1.83$, $SD = 0.88$), compared to participants whose regulatory orientations were manipulated as prevention-focused, $M = 2.94$, $SD = 1.11$, $F(1, 277) = 7.68$, $p = .001$, $\eta^2 = .02$, and $M = 2.35$, $SD = 1.02$, $F(1, 277) = 33.36$, $p < .001$, $\eta^2 = .09$, for benefits of eating healthy snacks and harms of eating unhealthy snacks, respectively.

Snacking behavior. A 2 (regulatory orientation: promotion versus prevention focus) x 3 (implementation intentions: control versus promotion versus prevention focus) x 2 (habit: strong versus weak) ANOVA with snacking behavior as the dependent variable and age, gender, ethnicity, hours of sleep, BMI, exercise pattern, smoker status, and stress as covariates was conducted. The results revealed significant main effects for unhealthy snacking habits, $F(1, 538) = 8.72$, $p = .003$, $\eta^2 = .01$, and implementation intentions, $F(2, 538) = 10.65$, $p < .001$, $\eta^2 = .02$, a significant 3-way interactions, $F(2, 538) = 3.60$, $p = .03$, $\eta^2 = .04$, and a significant covariate for regular exercise, $F(1, 538) = 4.43$, $p = .04$, $\eta^2 = .01$.

The results are graphed in Figure 1, and planned contrasts show that participants with strong unhealthy snacking habits snacked healthier when they formed implementation intentions that fit their regulatory orientation (i.e., promotion-focused participants with promotion implementation intentions or prevention-focused participants with prevention implementation intentions) than when they formed implementation intentions that did not fit their regulatory orientation (i.e., promotion-focused participants with prevention implementation intentions or prevention-focused participants with promotion implementation intentions) or no implementation intentions at all, $M = 3.93$, $SD = 1.57$ versus $M = 3.00$, $SD = 1.38$, $F(1, 538) = 32.54$, $p < .001$, $\eta^2 = .09$. For participants with strong unhealthy snacking habits, making implementation intentions that did not fit their regulatory orientation or not making any implementation intentions at all

resulted in similar snacking behavior, $M = 3.10$, $SD = 1.38$ versus $M = 2.85$, $SD = 1.37$, $F(1, 538) = 1.13$, $p = .29$, $\eta^2 < .01$.

Planned contrasts show that participants with weak unhealthy snacking habits snacked healthier when they formed implementation intentions (either fitting or not fitting their regulatory focus) than no implementation intentions formed, $M = 3.79$, $SD = 1.07$ versus $M = 3.32$, $SD = 0.98$, $F(1, 538) = 6.73$, $p = .01$, $\eta^2 = .04$. For people with weak unhealthy snacking habits, forming implementation intentions that either fit or did not fit their regulatory orientation resulted in similar snacking behavior, $M = 3.68$, $SD = 1.05$ versus $M = 3.89$, $SD = 1.09$, $F(1, 538) = 1.67$, $p = 0.20$, $\eta^2 < .01$.

Motivation intensity. A 3 (implementation intentions: control versus promotion versus prevention) x 2 (regulatory orientation: promotion versus prevention) ANOVA with motivation intensity as dependent variable was conducted and revealed a significant main effect of implementation intentions, $F(2, 553) = 29.19$, $p < .001$, $\eta^2 = .10$, and a significant interaction effect, $F(2, 553) = 12.06$, $p < .001$, $\eta^2 = .04$. Consistent with the value from fit notion in the regulatory fit research, planned contrasts show that regulatory fit between participants' regulatory orientations and implementation intentions resulted in higher motivation intensity compared to conditions of regulatory non-fit or no implementation intentions, $M = 3.04$, $SD = 0.81$ versus $M = 2.76$, $SD = 0.98$, $F(1, 553) = 12.16$, $p < .001$, $\eta^2 = .03$.

Motivation intensity as mediator. To test the mediation effect of motivation intensity between regulatory fit and snacking behavior, the 3-step procedure to test mediated moderation described by Baron and Kenny (1986) and detailed by Muller, Judd, and Yzerbyt (2005) was followed. To test motivation intensity as a mediator between regulatory fit (interaction between regulatory orientation and implementation intentions) and snacking behavior, three regression models were estimated: (a) regressing motivation intensity on regulatory orientation, implementation intentions, and the interaction term between regulatory orientation and implementation intentions; (b) regressing snacking behavior on regulatory orientation, implementation intentions, and the interaction term between regulatory orientation and

implementation intentions; and (c) regressing snacking behavior on motivation intensity, regulatory orientation, implementation intentions, the interaction term between regulatory orientation and implementation intentions, and the interaction term between motivation intensity and regulatory orientation. The mediator role of motivation intensity is supported when the interaction term between regulatory orientation and implementation intentions in (a) and in (b), but not in (c), is significant, and motivation intensity is significant in (c). The regression results are shown in Table 2. Regulatory fit (interaction of regulatory orientation and implementation intentions) was found to significantly affect both motivation intensity, $t(558) = 9.39, p < .001$, and snacking behavior, $t(558) = 2.91, p = .004$. The mediation effect was demonstrated, as regulatory fit no longer significantly affected snacking behavior, $t(558) = 1.56, p = .12$, when motivation intensity and the interaction term of motivation intensity and regulatory orientation were included in the model, while motivation intensity was found to be the significant predictor, $t(558) = 5.19, p < .001$, for snacking behavior.

Behavioral intentions. A regression model with unhealthy snacking habit, intention to snack healthily, regulatory fit, and all the 2-way and 3-way interactions of habit, intention, and regulatory fit as independent variables and snacking behavior as dependent variable revealed significant main effects for unhealthy snacking habit, $t(558) = -3.87, p < .001$, intention, $t(558) = 2.49, p = .01$, and regulatory fit, $t(558) = 2.96, p = .003$, and a significant interaction effect for unhealthy snacking habit and regulatory fit, $t(558) = 4.50, p < .001$. More importantly, the 3-way interaction between unhealthy snacking habit, intention, and regulatory fit was significant, $t(558) = 3.03, p = .003$. This interaction essentially indicates that when people make plans that fit their regulatory orientation not only are their habits disrupted but also snacking behavior is brought under intentional control. To further interpret this interaction, we calculated the simple regression slopes between intention and healthy snacking behavior at varying levels of unhealthy snacking habit with regulatory fit and non-fit (Aiken & West, 1991). To identify the levels of habit to use in the simple regressions, we calculated the scores that were one standard deviation above the mean and one standard deviation below the mean. Thus, the relationship between

behavior and intention was calculated for six separate combinations of habit strength and regulatory fit (strong habits/regulatory fit, weak habits/regulatory fit, strong habits/regulatory non-fit, weak habits/regulatory non-fit, strong habits/control, weak habits/control).

For people who had weak unhealthy snacking habits, intention was positively related to behavior, regardless of implementation intentions being formed or not, nonstandardized betas = 0.10, 0.29, 0.20, $t(558) = 2.07, 5.99, 4.03$, $p = .038, < .001, < .001$, for weak habit/regulatory fit, weak habit/non-fit, weak habit/control, respectively. As predicted, people with strong unhealthy snacking habits only followed their intentions when they formed implementation intentions that fit their regulatory orientations, nonstandardized betas = 0.33, $t(558) = 4.53$, $p < .001$. That is, regulatory fit disrupted unhealthy snacking habits and put snacking under intentional control for people with strong habits. The simple slope of the relationship between healthy snacking behavior and intentions was nonsignificant for people who had strong unhealthy snacking habits and who formed no implementation intentions, nonstandardized betas = 0.05, $t(558) = 0.64$, $p = .52$, implying that these participants continued to snack unhealthily at the same level. Participants with strong unhealthy snacking habits who formed regulatory non-fit implementation intentions fared significantly worse, nonstandardized betas = -0.24, $t(558) = -4.87$, $p < .001$, and actually reduced their healthy snacking behavior despite their best intentions.

Discussion

This study investigated the hypothesis that forming implementation intentions which match one's regulatory orientation will change strong unhealthy snacking habits. We also replicated the beneficial effect of implementation intentions alone on people with weak unhealthy snacking habits. The consideration of people's habits helped to resolve the inconsistency in prior research findings that implementation intentions were helpful in promoting healthy behavior in some cases (cf. Gollwitzer & Sheeran, 2006) but proved ineffective or minimally effective in other cases (Jackson et al., 2005).

In our study, we reveal a differential effectiveness of forming implementation intentions to snack more healthily between participants with strong versus weak unhealthy snacking habits.

Specifically, people with weak unhealthy snacking habits snacked more healthily as long as they formed any kind of implementation intentions, whereas people with strong unhealthy snacking habits broke their habits and snacked more healthily only when they made implementation intentions that fit their regulatory orientation. Indeed, when individuals with strong unhealthy snacking habits made implementation intentions that did not fit their regulatory orientation, this resulted in snacking behavior similar to or worse than that under conditions of not making implementation intentions at all. To extend the application of our findings, we measured participants' regulatory orientations in half of the cases and manipulated regulatory orientations in the other half.

Our findings also reveal that the healthy snacking behavior resulting from regulatory fit in habitual food consumption is influenced by two distinct processes: the heightened motivation intensity resulting from regulatory fit, and the intentional control of snacking behavior. The “value from fit” happens when regulatory orientation and implementation intentions correspond and influence behavior through heightened motivation intensity. Increased motivation as a consequence of regulatory fit has been speculated to occur in a number of other studies. To the best of our knowledge, ours is the first study to provide empirical evidence for the mediating role of motivation intensity between regulatory fit and behavior. Consistent with predictions in prior research (Wood et al., 2005), we found evidence that everyday behavior like snacking is under intentional control when individuals with strong snacking habits are motivated to change their habits as a function of regulatory fit.

One common goal in health psychology research is to improve the overall healthiness of people's diets by switching behavior from unhealthy to healthy snacking. Our research provides suggestions for change agents who hope to help people who have been snacking unhealthily for a long time and seem mired in bad habits. People with goals to improve their eating behaviors may get frustrated if they find themselves failing to overcome unhealthy food habits. Rather than provide a “one size fits all” approach (common in most existing diet plans), our results indicate

that the “right” strategies to promote healthy eating can be identified and monitored for their effectiveness. We suggest three specific steps.

First, finding out the unhealthy snacking habit strength informs whether further attention needs to be paid to how implementation intentions are formed. While any type of implementation intention encourages healthier snacking for people with weak unhealthy eating habits, people with strong unhealthy eating habits who form implementation intentions that do not fit their personal disposition (i.e., regulatory orientation) will get as little result (or less) from their plans as people who form no implementation intentions at all.

Second, people with goals to improve their eating behaviors may get frustrated if they find themselves failing to overcome unhealthy food habits. Over time, they may abandon such goals completely. Since forming regulatory non-fit implementation intentions under strong unhealthy snacking habits is ineffective, even people who put in the effort to form plans might experience minimal or no success. Thus, our study points to the importance of monitoring how effectively behavioral intentions translate into heightened motivation and finally snacking behavior improvement. More specifically, we demonstrated that higher motivation intensity is necessary to translate intentions into actual behavior. Thus, health professionals should assess whether such motivational intensity actually is resulting from the effort people spend on forming plans to eat more healthily. If motivation is not significantly heightened, especially for entrenched unhealthy habitual snackers, it means that a person will struggle to achieve the desired change in snacking behavior and need to revisit how they make plans.

Third, we also demonstrated that the most challenging behavioral changes (in habitually unhealthy eaters) can be achieved successfully when such heightened motivation translates into bringing the undesired behavior under intentional control, which is only possible when the right implementation plans are formed. While people with strong unhealthy eating habits need to form implementation intentions that fit their regulatory orientation if they hope to change their unhealthy habits, people with weak unhealthy eating habits have an easier time implementing

their intentions to healthy snacking. Thus, implementation intentions in regulatory fit conditions put snacking back to intentional control for people with strong unhealthy eating habits.

It is important to note that both chronic and manipulated regulatory orientations significantly influence how people make decisions and behave. For example, in the context of smoking cessation and weight loss, Fuglestad, Rothman, & Jeffery (2008) show that chronic (measured) regulatory focus differentially impacts initiation and maintenance of behavioral change. Similarly, situational (manipulated) regulatory focus has also been demonstrated to significantly affect behaviors and decision-making (e.g., Lee & Aaker, 2004). By including both measured (chronic) and manipulated (situational) regulatory orientation in our study, we explored whether there were any differences between chronic and situational regulatory orientations in the snacking context. Both approaches proved effective in our study, perhaps due to the short time period (2 days) over which we examined behavioral change. This suggests that similar effects on behavioral change could be observed by manipulating regulatory focus compared to measuring chronic regulatory focus. Since Adriaanse, de Ridder, and de Wit (2009) found that personally-tailored interventions were more effective in changing one's diet, we suspect chronic regulatory orientation may play a more important role. Since empirical findings showed that initial behavioral changes are crucial for ongoing behavioral change in health behavior (Jeffrey, Wing, & Mayer, 1998), regulatory orientation manipulations could be effective if the manipulations are administered repeatedly over time to enforce the effect. Further research should explore the long-term effects of regulatory orientation manipulation, particularly since measuring chronic regulatory focus is not always a viable option.

Though our research focuses on implementation intentions and regulatory fit in improving healthy eating patterns, there are other non-food alternatives, such as exercising, that can be incorporated into health programs to achieve goals (Epstein et al., 2007). Future research should examine the effects of implementation intentions and regulatory orientation to exercise or engage in other non-food activities related to a healthy lifestyle. Ultimately, health experts would understand healthful gains achieved through regulatory fit and develop bundles of healthy

lifestyle choices, resulting in greater gains to individuals than single choices applied one at a time or in an ad hoc manner.

In conclusion, we developed a theory behind and tested an intervention for helping people to change unhealthy snacking habits. The intervention focused on matching implementation intentions with individuals' regulatory orientations. A better understanding of the processes through which people automatically snack and break such routines will inform health psychologists about how to help people get on to and maintain a healthy lifestyle.

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Table 1. Means and Standard Deviations by Experimental Groups

Implementation intentions Regulatory orientation Variable	Promotion (Prom)		Prevention (Prev)		Control		Overall
	Prom	Prev	Prom	Prev	Prom	Prev	
Sample size	141	80	107	102	56	73	559
Demographics							
Age	21.98 (1.38)	21.94 (1.34)	22.01 (1.31)	22.05 (1.47)	21.96 (1.18)	21.97 (1.40)	21.99 (1.36)
Female	43.26%	59.75%	48.60%	53.92%	50.00%	53.42%	52.24%
Caucasian	53.90%	55.00%	59.53%	50.00%	53.57%	47.95%	55.64%
Body measures							
Weight perception	3.26 (0.67)	3.30 (0.72)	3.24 (0.73)	3.29 (0.77)	3.30 (0.67)	3.30 (0.72)	3.29 (0.72)
Height	5' 8" (4.1")	5' 7" (4.0")	5' 9" (5.6")	5' 8" (3.8")	5' 7" (3.8")	5' 7" (3.0")	5' 8" (4.3")
Weight (lbs)	159.56 (35.87)	154.10 (39.05)	158.45 (32.73)	155.40 (35.34)	157.11 (33.06)	154.42 (27.92)	156.89 (34.37)
Body Mass Index (BMI)	23.79 (4.30)	23.78 (5.17)	23.33 (3.49)	23.29 (3.69)	22.50 (3.20)	22.70 (3.31)	23.34 (3.98)
Lifestyle							
Smoker	4.96%	1.25%	3.88%	1.87%	7.14%	1.37%	3.58%
Hours of sleep	6.67 (1.09)	6.74 (1.13)	7.03 (1.11)	6.70 (1.02)	6.93 (1.28)	7.03 (1.22)	6.83 (1.13)
Stress	2.12 (0.87)	2.07 (0.92)	2.00 (0.85)	2.07 (0.79)	2.04 (0.60)	2.19 (0.79)	2.11 (0.88)
Snacking							
Unhealthy snacking habits	3.95 (1.53)	3.20 (1.35)	3.55 (1.55)	3.59 (1.45)	3.84 (1.48)	3.55 (1.23)	3.63 (1.47)
Attitude towards snacking	5.67 (1.03)	5.88 (0.89)	5.45 (1.16)	5.74 (0.95)	5.25 (1.01)	5.41 (1.12)	5.60 (1.05)
Intention	3.37 (0.99)	3.43 (0.86)	3.33 (0.91)	3.21 (0.96)	3.23 (1.45)	3.42 (1.32)	3.55 (1.13)
Motivation intensity	3.00 (0.85)	2.58 (0.92)	2.62 (1.07)	2.96 (0.77)	3.30 (0.84)	3.64 (0.67)	2.98 (0.93)
Healthy snacking behavior	3.67 (1.38)	3.85 (1.10)	3.42 (1.32)	3.74 (1.35)	3.11 (1.15)	3.09 (1.22)	3.53 (1.31)

Note. With higher numbers reflecting higher levels, weight perception and stress were measured on 5-point scales while unhealthy snacking habits, attitude, intention, and healthy snacking behavior were measured on 7-point scales.

Table 2

Regression Analyses Examining the Mediation of Motivation Intensity between Regulatory Fit and Healthy Snacking Behavior

Predictor	<i>B</i>	<i>SE B</i>	β
Predicting healthy snacking behavior ($R^2 = .02$; $N = 559$)			
Implementation intentions (Imps)	0.068	0.063	0.046
Regulatory orientation (RO)	-0.033	0.055	-0.025
Imps x RO (Fit)	0.184	0.063	0.123**
Predicting motivation intensity ($R^2 = .14$; $N = 559$)			
Implementation intentions (Imps)	0.104	0.045	0.090*
Regulatory orientation (RO)	-0.077	0.039	-0.077^
Imps x RO (Fit)	0.425	0.045	0.371**
Predicting healthy snacking behavior ($R^2 = .09$; $N = 559$)			
Implementation intentions (Imps)	0.061	0.062	0.041
Regulatory orientation (RO)	-0.117	0.108	-0.045
Imps x RO (Fit)	0.141	0.090	0.101
Motivation intensity	0.366	0.070	0.216**
Motivation intensity x RO	0.203	0.118	0.110^

Note. Regression models were estimated with all predictors entered simultaneously.

^ $p < .10$. * $p < .05$. ** $p < .01$.

Figure 1. Healthy snacking behavior as a function of regulatory fit and unhealthy snacking habits.

