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Implicit Theories of Body Weight: Entity Beliefs Can Weigh You Down

Jeni L. Burnette¹

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Abstract

The current research extended the implicit theory approach to a weight management context and merged it with value expectancy theory. Three studies investigated the hypothesis that individuals are especially unlikely to self-regulate effectively after dieting setbacks when they believe body weight to be fixed (*entity theory*) rather than malleable (*incremental theory*). Study 1 examined avoidant coping after a hypothetical dieting setback. Study 2 examined the implicit theory–avoidant coping relation after naturally occurring challenges to participants' weight-loss goals. Across both studies, entity theorists, relative to incremental theorists, reported more avoidant coping after setbacks. In Study 2, avoidant coping, in turn, predicted difficulty achieving weight-loss success. Study 3 manipulated implicit theories of weight to test the causal effects of implicit theories on effortful regulation. Entity theorists, relative to incremental theorists, reported less persistence following setbacks. Across the three studies, expectations about the potential for future dieting success mediated the link between implicit theory and self-regulation.

Keywords

implicit theory, self-regulation, motivation, value expectancy theory, dieting

After 10 weeks on a diet program, you step on the scale and discover that you have failed to reach your dieting goal. How would you respond to such a setback? Would you redouble your weight-loss efforts? Would you avoid dieting entirely, believing that no amount of effort could result in success? The answers to these questions are important in light of the health consequences associated with being overweight, including an increased risk of developing many types of chronic diseases (Byers, 2006; Yach, Stuckler, & Brownell, 2006). Additionally, obese individuals are less likely than normal-weight individuals to marry or obtain desirable jobs and are more prone to psychological problems (e.g., Chenoweth & Leutzinger, 2006; Pingitore, Dugoni, Tindale, & Spring, 1994).

Considering the costs of being overweight, why do people continue to fail to reach their weight-loss goals? Maintaining a healthy body weight is challenging, with diverse processes working against thinness (Martinez, 2000). In addition to genetic and prenatal factors (e.g., Herbert et al., 2006; Krechowec, Vickers, Gertler, & Breier, 2008), environmental and psychological factors are also important. Environmental factors such as accessibility to fatty foods, large portion sizes, and limited opportunity for exercise have been cited as significant contributors to weight gain (e.g., Brownell & Horgen, 2004; Grilo & Pogue-Geile, 1991). Indeed, one scholar has aptly called the modern Western environment a “noxious gastronomic milieu” (Myslobodsky, 2003, p. 122). Psychological perspectives often build on social cognitive

principles (e.g., Bandura, 1986; Becker, 1974), with recent research suggesting that greater self-efficacy and an internal locus of control predict weight-loss success (e.g., Stotland & Zuroff, 1990; Warziski, Sereika, Styn, Music, & Burke, 2008). Additional predictors include self-control, optimism, and general psychological strength and stability (Benyamini & Raz, 2007; Elfhag & Rössner, 2005; Stotland, Larocque, & Kronick, 2006).

However, regardless of environment or psychological profile, a small minority of individuals succeed at losing weight and keeping it off (Mann et al., 2007). As the environment becomes particularly inhospitable to active lifestyles and healthy food and beverage choices, (e.g., Stroebe, 2008), researchers have noted that failure to maintain weight loss may be driven by a struggle to effectively self-regulate in the face of constant temptation (Baumeister, Heatherton, & Tice, 1994; Stotland et al., 2006). Thus, theoretical perspectives that offer insight into who persists following inevitable dieting setbacks may be effective in promoting weight-loss success. In the current article, I suggest that one such perspective is the implicit theory approach that has been used across achievement domains (e.g., athletics, academics) to

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predict self-regulatory responses to challenges (Dweck & Leggett, 1988; Molden & Dweck, 2006). The current article extends the implicit theory literature in two key ways. First, examining the theoretical implications of the implicit theory approach in the novel area of weight management sets the stage for consideration of relevant and important implications of implicit theories in an applied health-related domain. Second, I merge the implicit theory perspective with the value expectancy framework of motivation to explore additional mediators of the implicit theory and self-regulation link. Contributing new mediating mechanisms to the existing literature can identify fundamental processes involved in motivation and has relevance for future interventions.

Implicit Theories and Self-Regulation

Implicit theories have been conceptualized as specific beliefs about the stability of an attribute and are termed *implicit* because they usually are not explicitly articulated (Ross, 1989). Within Dweck and colleagues' (e.g., Dweck & Leggett, 1988) theoretical framework, a belief that personal attributes (e.g., intelligence, athletic ability) are fixed or invariant is called an *entity* theory, and a belief that traits can be improved or developed is called an *incremental* theory. Across various domains, substantial differences in self-regulatory success emerge based on people's theories. For example, shy individuals who hold an incremental theory self-regulate better in social settings and have more positive social outcomes than do shy entity theorists (Beer, 2002). Individuals who hold an incremental theory of intelligence persist on challenging academic tasks, reach their academic goals more frequently, report less self-handicapping, and adopt more effective coping strategies when setbacks arise than do entity theorists (Dweck, 2000). Individuals who hold incremental beliefs of athletic ability report more effective self-regulation and less anxiety about physical activity than do entity theorists (Ommundsen, 2003). Similarly, individuals induced to hold an incremental theory of athletic ability demonstrate greater persistence on a difficult segment of an exercise video relative to individuals induced to hold an entity theory (Kasimatis, Miller, & Marcussen, 1996).

Implicit theories of romantic relationships also predict coping strategies following interpersonal distress (Knee & Canevello, 2006). Individuals vary in the degree to which they subscribe to destiny beliefs (romantic relationships are or are not meant to be) and growth beliefs (relationships benefit from the effortful resolution of challenges; Knee, 1998). Especially robust effects reveal that holding a destiny belief, similar to holding an entity theory, can be detrimental in times of vulnerability or when the situation is less than ideal. For example, if an individual is anxious about his partner's love for him, belief in destiny is associated with coping strategies that reflect disengagement from the relationship (Finkel, Burnette, & Scissors, 2008).

Success Expectations as a Mediator

When challenges arise, incremental theorists adopt mastery-oriented coping strategies and increase their efforts. In contrast, entity theorists tend to adopt avoidant coping strategies such as disengagement from their goals and/or relationship partners. Why do these theories predict such contrasting responses to challenges? That is, why do entity theorists react to failure as though it is a painful condemnation, whereas incremental theorists see it as a surmountable obstacle to success? Past research suggests that entity theorists attribute failure to global, stable factors, which in turn leads to maladaptive reactions to setbacks and challenges. In contrast, incremental theorists attribute setbacks to unstable, controllable factors, which in turn leads to more adaptive regulatory reactions such as taking remedial action (Hong, Chiu, Dweck, Lin, & Wan, 1999). An additional mediator of the implicit theory and motivation link is the different goals systems that emerge based on belief systems. Incremental theorists tend to focus on mastering new things (learning goals), whereas entity theorists tend to focus on assessing their ability (performance goals). However, in the face of failure, performance goals tend to result in avoidant coping, whereas learning goals tend to result in more adaptive regulation including increased effort (e.g., Elliot & Dweck, 1988; Kray & Haselhuhn, 2007).

In the current article, I seek to extend existing research on relevant mediators of the implicit theory and motivation relation by linking the effects to the self-regulation literature through an expectancy value framework. Specifically, I focus on the expectancy component of motivation that has been defined as "a sense of confidence or doubt about the attainability of the goal value" (Carver & Scheier, 1998, p. 231). It is only when individuals have overcome doubt and have the confidence that their actions will help them obtain their goals that they persist in the face of adversity. Indeed, empirical demonstrations reveal that positive expectations are fundamental in promoting effective regulatory strategies in the wake of setbacks (Aspinwall & Taylor, 1992; Brissette, Scheier, & Carver, 2002; Carver & Scheier, 1998). However, whether one responds with doubt or confidence may depend, in part, on his or her implicit theory. Past research has not empirically tested this idea but anecdotal evidence supports the proposition. For example, when presented with failure feedback after working on a challenging academic task, a student with an entity theory noted that he or she "wouldn't feel smart enough to make it" on future tasks (Dweck, 2000, p. 46). In contrast, incremental theorists who experienced a failure remained confident that they could still succeed. After receiving failure feedback, an incremental theorist asserted, "The harder it gets the harder I need to try" (Diener & Dweck, 1978, p. 459). Building on a long line of expectancy research and merging it with an implicit theory perspective, I propose that incremental and entity theorists' responses to dieting

setbacks will be driven by their differing success expectations when challenges arise.

Hypotheses and Research Overview

Body weight management parallels existing implicit theories research in achievement domains such as athletics and academics. As individuals try to manage their weight, they set goals, experience setbacks, regulate their feelings of disappointment, and try to persist in the face of failure. My primary hypothesis is that individuals who hold entity beliefs of body weight will report more avoidant coping and less persistence in the wake of dieting setbacks than will individuals who hold incremental beliefs. My secondary hypothesis is that the association of implicit theories with these regulatory strategies (i.e., avoidance, persistence) will be mediated by success expectations. I tested these hypotheses in three studies. The first two studies examined links between implicit theories, expectations, and avoidant coping, with participants reporting their responses to a hypothetical dieting setback (Study 1) and their responses to challenges to their current dieting goal (Study 2). Study 2 also included weight-loss outcomes. Study 3 experimentally manipulated implicit theories of weight to test causal relations among theories, expectations, and effortful persistence.

Study 1

Method

Participants. Undergraduate students ($N = 264$; 160 women) in an introductory psychology class at a large South-eastern public university volunteered to take part in the research. Most participants were young adults ($M = 19.90$ years old, $SD = 3.50$). The composition of the sample was 45.8% White, 27.7% Black, 4.5% Hispanic, 15.5% Asian, and 6% Other.

Procedure. Participants completed a measure of implicit theories of weight and constructs related to successful dieting motivation (e.g., locus of control, self-control) before reading a scenario about a dieting setback in which they had hypothetically failed to effectively manage their weight. In this scenario, participants imagined that they enrolled in a 12-week weight-loss program. The scenario informed participants that most people lose 1-2 pounds per week for a total of 12-24 pounds of weight loss. However, we asked participants to imagine that instead of losing the expected weight they had gained weight instead. The reason for including weight gain rather than just an inability to achieve loss was twofold. First, past research suggests that implicit theories matter most when individuals are faced with clear inferior performance. It is only after obvious failures that holding an entity theory renders individuals vulnerable to helpless and defensive behavior (Hong et al., 1999). Thus,

this manipulation sought to leave no ambiguity about the poor performance in the dieting scenario. Second, although when first starting a diet, people typically lose 5%-10% of their body weight, a recent meta-analysis suggests that most people gain the weight back plus more (Mann et al., 2007). We asked participants to immerse themselves psychologically in the failure situation and imagine how they would feel and behave. After writing a few sentences about how it would feel to experience the setback, participants answered questions regarding success expectations before completing the avoidant coping measure.

Measures

Implicit theories of weight management. I adapted Dweck's (2000) six-item implicit theory measure of intelligence to the domain of weight management (see the appendix). Participants indicated their agreement or disagreement using a 6-point scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). Items were coded such that higher numbers represented a stronger orientation toward incremental beliefs of weight ($\alpha = .82$).

Avoidant coping and success expectations. Building on past implicit theory work (e.g., Hong et al., 1999; Ommundsen, 2003), I created a four-item measure of avoidant coping (e.g., "I would have given up on dieting all together"). Participants rated from 1 (*strongly agree*) to 6 (*strongly disagree*) how much they agreed that they would have avoided future dieting ($\alpha = .50$). I recoded such that higher numbers represented more avoidant coping. To assess expectations about dieting success, I adapted a situational optimism measure used in the dieting literature (Benyamini & Raz, 2007; e.g., "I feel confident that, in the future, I can do well managing my body weight"). The measure consisted of three items rated on a 6-point scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). I recoded such that higher numbers represented greater success expectations ($\alpha = .87$).

Potential confounds. To rule out potential alternative explanations for significant effects, I assessed psychological constructs related to successful dieting including dispositional self-control ($\alpha = .83$; Tangney, Baumeister, & Boone, 2004), dieting self-confidence ($\alpha = .80$), and general health locus of control ($\alpha = .72$; Wallston & Wallston, 1978). Additionally, I included a one-item assessment of each of the three factors of the Dieting Beliefs Scale. Specifically, I used the item with the highest factor loading based on the scale's psychometric properties (Stotland & Zuroff, 1990). For the external locus of control factors, I used the items, "A thin body is a result of genetics" and "Most people can only diet successfully when other people push them to do it." For the internal factor representing aspects within the individual, I used the item, "Each of us is directly responsible for our weight." I also included a single-item assessment of dieting experience. I asked participants, "How many times did you start a weight reducing diet in the last year?" Response

options ranged from 1 (*never*) to 6 (*continuously*). Finally, to ensure that the association of implicit theories with success expectations was not merely driven by a general positive tendency, I assessed dispositional optimism ($\alpha = .58$; Scheier & Carver, 1985).

Results

I hypothesized that entity theorists would be more likely than incremental theorists to cope with dieting setbacks by avoiding future weight-loss attempts and that success expectations would mediate this link. To test this hypothesis, I employed the recommended standard regression approach (Baron & Kenny, 1986; Kenny, Kashy, & Bolger, 1998).¹

Implicit theories, expectations, and avoidant coping. In the first step of the mediation model, implicit theories of weight predicted avoidant coping, with entity theorists exhibiting stronger intentions to avoid future dieting efforts than did incremental theorists, $\beta = -.14$, $t(255) = -2.21$, $p < .05$. In the second step, implicit theories of weight predicted success expectations, with entity theorists exhibiting weaker success expectations than did incremental theorists, $\beta = .17$, $t(255) = 2.74$, $p < .01$. In the third and fourth steps, success expectations negatively predicted avoidant coping, $\beta = -.27$, $t(254) = -4.43$, $p < .001$; after accounting for this effect, the association between implicit theories and avoidant coping decreased significantly, Sobel $z = -2.40$, $p < .05$, and became nonsignificant, $\beta = -.09$, *ns* (see Figure 1).

Ruling out alternative explanations. To rule out plausible alternative explanations for results, I examined all of the preceding steps of the mediation model, controlling for additional psychological predictors of weight-loss success including health locus of control, three dimensions of dieting locus of control, dieting self-confidence, dispositional self-control, the single-item dieting history question, and dispositional optimism. After controlling for these constructs, in the first step, implicit theories still accounted for significant variance in avoidant coping, $\beta = -.13$, $t(246) = -1.94$, $p = .05$. In the second step, implicit theories accounted for unique variance in success expectations, $\beta = .14$, $t(246) = 2.18$, $p < .01$. Moreover, the mediator (expectations), $\beta = -.20$, $t(245) = -3.13$, $p < .01$, accounted for unique variance in avoidant coping. When the variance accounted for by success expectations was partialled, the association between implicit theories and avoidant coping again was reduced (marginally in this conservative analysis) and became nonsignificant, $\beta = -.10$, *ns*; Sobel $z = -1.76$, $p = .08$ (see Table 1 for all correlations).²

Discussion

In extending implicit theories to weight management, results suggest that entity theorists, relative to incremental theorists, struggle to cope effectively following dieting setbacks.

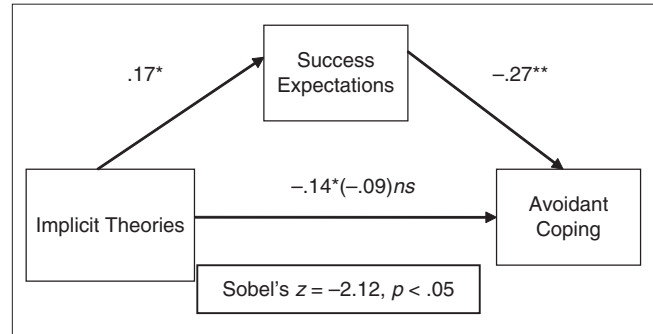


Figure 1. Study 1: Success expectations mediate the association of implicit theory with avoidant coping

The values in the figure represent standardized regression coefficients. The coefficient in parentheses represents the association of implicit theories with avoidance coping after controlling for the effect of success expectations.

* $p < .05$. ** $p < .01$.

Specifically, individuals who held entity theories of weight, relative to incremental theories, reported intentions to avoid future dieting in the wake of a hypothetical setback. When entity theorists think about failures, they evaluate them as insurmountable problems and thus anticipate future failures. In contrast, incremental theorists see failure as an indication that more effort is needed and success is still plausible. Supporting a long line of research on the importance of success expectations, the mediating results from the current work suggest that optimism about the potential for future dieting success drives the implicit theory–avoidant coping relation.

Although results supported hypotheses, Study 1 suffered from several limitations. First, the study employed a hypothetical dieting setback rather than a genuine one from participants' own lives. Although the use of hypothetical dieting setbacks allowed for experimental control, such setbacks are unlikely to arouse the intensity of affective and cognitive responses experienced following naturally occurring challenges. A second limitation of Study 1 is that it failed to assess responses to setbacks in a sample currently trying to lose weight and thus did not include body weight as a control variable or weight loss as a relevant outcome. A third limitation is that causal conclusions could not be drawn. To address the first two limitations, Study 2 employed a longitudinal design and assessed responses to naturally occurring dieting setbacks and weight-loss success with a sample of participants currently trying to lose weight. Study 3 employed an experimental design to address causal relations.

In Study 2, I sought to replicate and extend the findings from Study 1 by (a) assessing success expectations and coping in the wake of naturally occurring challenges to dieting goals and (b) examining how theories, expectations, and coping relate to body weight and weight-loss success. Additionally, I controlled for social cognitive constructs related to

Table 1. Study 1: Correlations Among Variables in the Mediation Model

Measure	1	2	3	4	5	6	7	8	9	10	11
1. ITWM	—										
2. Exp.	.17**	—									
3. Avoid	-.14*	-.16**	—								
4. DSC	.02	.31**	.21**	—							
5. TSC	.03	.17**	.23**	.28**	—						
6. Trait opt.	-.03	.19**	.16*	.23**	.18**	—					
7. HLC	.14*	.06	-.08	.20***	-.05	.08	—				
8. DBS1	.16*	.12	-.02	.11	.10	.00	.21***	—			
9. DBS2	-.21***	-.13*	.09	.03	-.09	.07	-.03	-.20***	—		
10. DBS3	-.19**	-.10	.01	-.08	-.01	.00	-.06	.01	.10	—	
11. DH	.19**	-.03	.01	-.24***	.01	.06	-.01	-.06	-.07	-.02	—

ITWM = implicit theories of weight; Exp. = expectations about future dieting success; Avoid = avoidant coping; DSC = dieting self-confidence; TSC = trait self-control; Trait Opt. = trait optimism; HLC = health locus of control; DBS1 = internal locus of control item from Dieting Beliefs Scale; DBS2 = external factor personal; DBS3 = external factor other; DH = dieting history in past year.

* $p < .05$. ** $p < .01$. *** $p < .001$.

dieting success, including nutrition and exercise self-efficacy, that had not been included in Study 1. Specifically, Study 2 used a two-wave design across an 8-week period.

Study 2

Method

Participants. Participants ($N = 287$; 180 women) of diverse ages ($M = 42.15$, $SD = 13.20$) were recruited online. All participants reported currently trying to lose weight. The ethnicity breakdown was 85% White, 1.5% Asian American, 2% Black or African American, 3.5% Hispanic or Latino, 1% Native American, and 7% Other or mixed. Based on the National Institutes of Health cutoff points for weight categories, I used the body mass index (BMI) to categorize individuals (18.5 or lower = underweight, 18.5–24.99 = average weight, 25–29.99 = overweight, and 30 or higher = obese). To calculate BMI, I used the imperial BMI formula ($BMI = \text{weight in pounds} \times 703 / \text{height in inches squared}$). Using the BMI categories, 1% of participants were categorized as underweight, 23% as average weight, 31% as overweight, and 45% as obese. I recruited participants through the StudyResponse Project, a not-for-profit academic service that matches researchers needing samples with individuals willing to volunteer. Participants earned an opportunity to win a \$100 gift card for completion of questionnaires at each period. Participants who completed both periods had an opportunity to win an additional \$200 gift card. This lottery strategy, as opposed to paying each participant individually, made participant retention lower than ideal (although not terrible); 68% of Time 1 participants completed the Time 2 surveys. The participants who participated at both periods did not differ significantly from dropouts in their implicit theories of body weight.

Procedure. At Time 1, participants reported their current weight and height and their exact weight-loss goal. Participants then completed the implicit theory measure from Study 1 and additional assessments related to successful dieting to be used as control variables. After completion of the measures at Time 1, participants were informed that they would be contacted in 8 weeks to report about their dieting goal and to answer questions related to dieting motivation. At Time 2, participants answered questions regarding their success expectations before completing the avoidant coping assessment. Participants also self-reported their current body weight.

Measures

Implicit theories of weight management. Participants completed the same six-item questionnaire from Study 1 ($\alpha = .82$). As in Study 1, items were scored such that higher numbers represented a stronger orientation toward an incremental theory of body weight.

Success expectations and avoidant coping. In Study 2, I used the same expectation ($\alpha = .94$) and coping ($\alpha = .75$) items as in Study 1. However, participants were asked to reflect on challenges to the weight-loss goal they had set 8 weeks before. Additionally, they rated how likely they would be to feel and enact the behaviors for future dieting goal pursuits. Higher numbers represented greater success expectations and more avoidant coping.

Potential confounds. To rule out potential alternative explanations for significant effects, I included the general health locus of control measure ($\alpha = .82$; Wallston & Wallston, 1978) and dieting history question used in Study 1. In addition, I included assessments of nutrition and exercise self-efficacy ($\alpha = .93$ and $.94$, respectively; Schwarzer & Renner, 2000). Self-efficacy is an individual's belief in his or her ability to perform and succeed in challenging situations (Bandura, 1977). Across a range of domains, including

Table 2. Study 2: Correlations Among Variables in Mediation Model

Measure	1	2	3	4	5	6	7	8	9
1. ITWM	—								
2. Exp.	.27***	—							
3. Avoid	-.20**	-.20**	—						
4. HLC	.23***	.32***	.13	—					
5. NSE	.35***	.37***	-.03	.34***	—				
6. ESE	.24***	.34***	.04	.26***	.58***	—			
7. IM	.09	.19**	-.06	.04	.12*	.12*	—		
8. Weight	.07	-.30***	.01	-.18**	-.04	-.07	-.04	—	
9. DH	-.06	.03	.07	-.02	.07	.06	-.10	.02	—

ITWM = implicit theories of weight; Exp. = expectations about future dieting success; Avoid = avoidant coping; HLC = health locus of control; NSE = nutrition self-efficacy; ESE = exercise self-efficacy; IM = impression management; Weight = Time 1 body weight; DH = dieting history in past year.

* $p < .05$. ** $p < .01$. *** $p < .001$.

weight management, self-efficacy has been linked with greater performance and is considered a significant feature of the behavior change process (e.g., Linde, Rothman, Baldwin, & Jeffery, 2006). I also incorporated an abbreviated version of the Balanced Inventory of Desirable Responding impression management subscale (Paulhus, 1984; $\alpha = .77$).

Results

To have adequate power to rule out potential alternative explanations and to replicate analyses from Study 1, I used an ordinary least squares regression approach to examine the implicit theory, success expectations, and avoidant coping mediation model. To examine how the overall motivation process model related to weight-loss success, I used structural equation modeling.³

Implicit theories, expectations, and avoidant coping. In replication of Study 1, implicit theories of weight predicted avoidant coping, with entity theorists exhibiting stronger intentions to avoid future dieting efforts than did incremental theorists, $\beta = -.20$, $t(186) = -2.76$, $p < .01$. In the second step of the mediation model, implicit theories of weight predicted success expectations, with entity theorists exhibiting weaker success expectations than did incremental theorists, $\beta = .27$, $t(186) = 3.86$, $p < .001$. In the third and fourth steps of the mediation model, success expectations negatively predicted avoidant coping, $\beta = -.16$, $t(185) = -2.11$, $p < .05$; after accounting for this effect, the association between implicit theories and avoidant coping decreased significantly, Sobel $z = -1.98$, $p = .05$, but remained significant, $\beta = .16$, $p < .05$.

Ruling out alternative explanations. The preceding analysis provides initial evidence in support of hypotheses. However, to rule out plausible alternative explanations, I examined the mediation model presented earlier, controlling for general health locus of control, nutrition self-efficacy, exercise self-efficacy, impression management, dieting history, and body weight. After controlling for these potential effects, implicit theories still predicted avoidant coping, $\beta = -.27$, $t(179) =$

-3.36 , $p < .001$, and success expectations, $\beta = .16$, $t(179) = 2.29$, $p < .05$. The third and fourth steps of the mediation model revealed that the mediator (expectations), $\beta = -.25$, $t(178) = -3.03$, $p < .01$, accounted for unique variance in avoidant coping. When the variance accounted for by expectations was partialled, the association between implicit theories and avoidant coping was reduced, $\beta = -.23$, $p < .01$; Sobel $z = -1.82$, $p = .07$ (see Table 2 for all correlations).

Structural equation modeling analysis strategy. I employed structural equation modeling with maximum likelihood (ML) estimation in Mplus (Muthén & Muthén, 2006) to test whether success expectations and avoidant coping mediated the relation between implicit theory and weight at Time 2, controlling for weight at Time 1 (see Figure 2). Based on recommendations (e.g., Williams & O'Boyle, 2008), I created three parcels for the six-item implicit theory measure (hypothesis tests yielded the same conclusions regardless of whether parceling was used). I did not parcel for other scales used in the model as those measures all had three or fewer indicators. The assumption of normality was met for all assessed variables. For body weight, I assumed perfect measurement, although all hypothesis tests yielded identical conclusions accounting for measurement error.

I report the chi-square and three goodness-of-fit indices for tests of the measurement and structural models: the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). A CFI above .95 and an RMSEA and SRMR between .05 and .08 suggest good fit (Hu & Bentler, 1999; Millsap, 2002). In line with recommendations, I estimated the fit of the measurement model before examining the overall structural model (Anderson & Gerbing, 1988). The measurement model fit the data well, $\chi^2(24) = 32.37$, CFI = .99, RMSEA = .04, SRMR = .05.

Overall model results. Before comparing two competing structural models, I directly tested the effect of implicit theories on weight at Time 2, controlling for weight at Time 1. After controlling for weight at Time 1, implicit theories

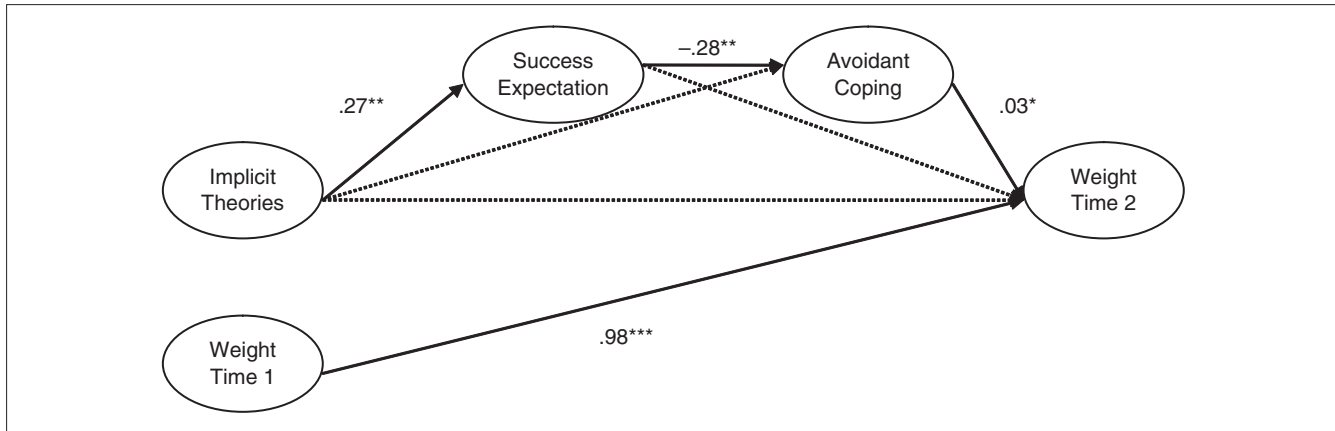


Figure 2. Study 2: Overall structural equation model predicting weight-loss success

Dotted lines represent paths tested in the partial mediation model and ultimately removed in the retained full mediation model.

* $p < .05$. ** $p < .01$. *** $p < .001$.

marginally predicted weight at Time 2, $\beta = -.02$, $t(189) = -1.70$, $p = .09$. Specifically, greater incremental beliefs predicted weight loss (to a marginal degree).⁴ Although there is some debate in the literature, a recent review notes that mediation can exist in the absence of a direct effect especially when this effect has less power than tests of the other links (MacKinnon & Fairchild, 2009). Thus, I tested the hypothesized model specifying that the relation between implicit theories and weight at Time 2 was completely mediated. This model exhibited adequate fit, $\chi^2(41) = 76.46$, $p < .001$, CFI = .98, RMSEA = .07, SRMR = .10. As a comparison, I tested a partial mediation model that had direct and indirect paths from implicit theories to avoidant coping (through success expectations), from implicit theories to weight at Time 2 (indirect through optimism and avoidance), and from success expectations to weight at Time 2 (indirect through avoidant coping). Model 2 also had adequate fit, $\chi^2(38) = 69.8$, $p < .01$, CFI = .98, RMSEA = .07, SRMR = .10.

However, a chi-square difference test revealed that adding the three paths to the mediation model did not significantly improve fit, $\Delta\chi^2(3) = 6.60$, $p > .05$. Thus, I retained the fully mediated model as the more parsimonious one. In this model, the effect of implicit theory on avoidant coping is fully mediated by success expectations, and the association between implicit theory and weight at Time 2 is mediated by success expectations and avoidant coping. That is, entity theorists expect failure and thus cope with setbacks using avoidance. This avoidant coping, in turn, predicts difficulty achieving weight-loss success (see Figure 2).

Discussion

Study 2 supported and extended the overall process model found in Study 1, with implicit theories predicting success expectations and avoidant coping when challenges arose in

the pursuit of dieting goals. Results remained robust even after controlling for variables related to dieting success, including health locus of control, nutrition and exercise self-efficacy, impression management, dieting history, and body weight. Study 2 also included relevant weight-related findings. First, results revealed that participants' theories did not differ as a function of BMI. Second, results suggested that theories marginally predicted weight-loss success and that this relation was mediated by avoidant coping and success expectations.

Although Study 2 offered support for hypotheses and revealed links to weight-related outcomes, it also has limitations. For example, although drop-out rates in the current study (32%) were in accordance with average rates for online studies (35%), retention is still a limitation (Musch & Reips, 2000). Furthermore, although participants who completed both periods did not differ significantly in their implicit theory of weight from those who dropped out of the study, it is possible that they differed in other ways. Additionally, considering the short period (8 weeks) and the strong relation between weight at Time 1 and Time 2, the direct link between implicit theories and weight was only marginally significant, and the link between avoidant coping and weight, although statistically significant, was small. Furthermore, because of limited power, I did not include control variables related to dieting success in the overall structural equation model, making it difficult to rule out alternative explanations for the link between theories, regulation, and weight loss. Thus, although Study 2 provides important evidence for the role of implicit theories in predicting responses to setbacks in a real-life context, it is important to rule out alternative explanations, especially for weight-loss outcomes.

To extend Studies 1 and 2, which only included avoidant coping in the wake of setbacks, in Study 3, I examined effortful regulation. The reason for investigating both avoidant

and active regulatory strategies in response to stressful events is twofold. First, these responses have different implications for health and achievement outcomes. For example, active regulatory strategies aimed at correction tend to result in more positive psychological health and behavioral outcomes, whereas avoidant coping is considered a psychological risk factor and can hinder achievement (e.g., Folkman, Lazares, Gruen, & DeLongis, 1986). Second, within the implicit theory literature, research suggests incremental and entity theorists differ in their emotion versus problem-solving tendencies in the wake of challenges. Recent work using a social-cognitive neuroscience model has found that after failure, entity theorists focus more on emotional regulation whereas incremental theorists are more attuned to processing feedback relevant to correcting potential mistakes (Mangels, Butterfield, Lamb, Good, & Dweck, 2006). To achieve weight-loss success, individuals need to respond not only with emotion regulation attuned to avoiding negative feedback but also with active regulation including increased effort. Considering the self-regulation required for weight maintenance, do incremental theorists, relative to entity theorists, report more effortful regulation in the face of setbacks? I address this question and additional potential limitations from Studies 1 and 2 by manipulating implicit theories of weight to explore causal relations between theories, success expectations, and effortful regulation in Study 3.

Study 3

Method

Participants. Undergraduate college students ($N = 60$; 44 women) participated in this study for partial fulfillment of the requirements of an introductory psychology course. Only students 18 years of age or older took part. The sample was 85% White, 5% Black, 1.7% Hispanic, 3.3% Asian, and 5% Other.

Implicit theory manipulation. Participants underwent procedures similar to those used in past implicit theory research (e.g., Hong et al., 1999). Specifically, participants read a *Psychology Today*-type article that presented compelling evidence for either the entity or incremental view of body weight. The articles included “extensive research” in support of the particular theory. In the entity condition, the article stressed the fixed nature of body weight. In the incremental condition, the article emphasized the malleable nature of body weight. Both articles cited longitudinal, twin, and intervention research as evidence. The key message in the entity article was, “These studies, in conjunction with many others, have demonstrated quite clearly the fact that people’s body weight is determined at an early age, remaining stable thereafter.” In contrast, in the incremental article, a similar passage read, “These studies, together with other

nationally recognized scientific reports, have made clear the fact that people’s body weight can be managed and changed.” The theoretical rationale behind the manipulation is that implicit theories, like other types of schemas and beliefs, can be seen as both stable over time and temporarily accessible situation-level constructs (Franiuk, Pomerantz, & Cohen, 2004).

I randomly assigned participants to either the entity or incremental theory of weight condition. The research assistant informed participants that the task was a “reading comprehension” assessment for articles to be used in a ninth-grade high school class for an unrelated study. Participants rated the comprehensibility of the article for high school students, offered suggestions for improvement, and commented on the most convincing argument in the article. The research assistant thanked participants for their help in this “unrelated” study and then proceeded to the “actual” study examining dieting motivation. The research assistant then gave participants the questionnaire that included the same hypothetical dieting setback as in Study 1, as well as a success expectation measure that was completed before the assessment of effortful regulatory intentions.

Measures

Success expectations and effortful regulation. To assess expectations about future success, I used the same measure as Studies 1 and 2 ($\alpha = .95$), with higher scores representing more optimistic expectations. To assess effortful regulation, in accordance with research by Dweck (2000), four items assessed aspects of effort or mastery-oriented regulatory strategies. An example item included, “I will exert more effort to adhere to an exercising program.” Participants rated from 1 (*strongly agree*) to 6 (*strongly disagree*) how much they agreed that they would have engaged in the particular behavior ($\alpha = .80$). I coded items such that higher scores represented more effortful regulation.

Manipulation checks. To assure that students understood the core entity or incremental message in the readings, at the end of the final questionnaire, the research assistant told participants that the researcher from the initial study asked us to include a recall question. Participants then indicated on a scale from 1 (*fixed*) to 5 (*changeable*) how the article they read described weight. Additionally, to assure that the setback was indeed interpreted as such, I also included a binary outcome question that asked: “Would you consider the situation you read about regarding the dieting program to be describing a successful or unsuccessful situation?” Participants circled either successful or unsuccessful.

Probing for suspicion. Before the debriefing, participants answered two questions that probed for suspicion about the nature of the articles. The questions were open-ended to avoid expectancy effects and hindsight bias. The questions asked participants to share with the researcher any additional

thoughts they had on (a) the nature of the two studies and (b) the article they read for the first study. We found no suspicions regarding the true nature of the articles. We fully debriefed participants and provided references for further reading that indicated both the entity and incremental theory of weight can be widely held.

Results

I predicted that individuals induced to hold the entity theory would report reduced effort relative to participants induced to hold the incremental belief and that this relation would be mediated by success expectations. To examine these predictions, I used the same hierarchical regression approach used in Studies 1 and 2.

Manipulation checks. For the “recall memory question” to assure participants understood the key theme of the article, an independent samples *t* test showed participants in the entity condition ($M = 1.41$, $SD = 0.66$) rated weight as fixed compared to participants in the incremental condition ($M = 4.62$, $SD = 0.75$) who rated weight as more changeable, $t(58) = 17.58$, $p < .01$. Results demonstrated that students rated the hypothetical dieting setback as indicative of a failure. Of the 60 participants, 58 responded that the situation was describing an unsuccessful experience.

Implicit theories, effort, and expectations. In the first and second steps of the mediation model, implicit theories accounted for a significant proportion of variance in effortful regulation, $\beta = .25$, $t(58) = 1.96$, $p = .05$, and success expectations, $\beta = .29$, $t(58) = 2.27$, $p < .05$. Individuals induced to hold an incremental theory reported more effortful intentions and greater success expectations than individuals induced to hold an entity theory. I completed the third and fourth steps of the mediation model in a single-regression analysis that revealed the mediator (expectations) accounted for unique variance in effortful regulation above and beyond implicit theories, $\beta = .37$, $t(57) = 2.92$, $p < .01$. As success expectations increased, individuals agreed more with increasing their effort after a dieting setback. When the variance accounted for by expectations was partialled, the association between implicit theory condition and effortful regulation became nonsignificant, $\beta = .15$, ns ; Sobel $z = 1.79$, $p = .07$ (see Figure 3).

Discussion

The results from Study 3 extended Studies 1 and 2 by using experimental methods and effortful regulation as an outcome. Individuals induced to hold an entity theory of body weight reported being less likely to persist on future diets when faced with a setback relative to individuals induced to hold a more incremental belief. The theory–persistence relation was mediated (at a marginally significant level) by expectations about success.

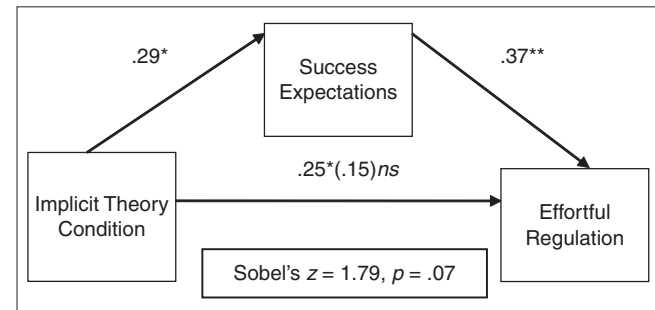


Figure 3. Study 3: Success expectations mediate the association of implicit theory condition with effortful self-regulation. The values in the figure represent standardized regression coefficients. The coefficient in parentheses represents the association of implicit theories with effortful regulation after controlling for the effect of success expectations.
* $p < .05$. ** $p < .01$.

General Discussion

The current article explored implicit theories as a relevant predictor of self-regulatory strategies in the wake of dieting setbacks. Specifically, in Study 1 and 2, I examined avoidant coping and in Study 3, I investigated active coping with a focus on effortful regulation. Extending a long line of implicit theory research in other achievement domains (Molden & Dweck, 2006), the three studies revealed that implicit theories of weight predicted responses to challenges in the pursuit of dieting goals. Studies 1 and 2 provided evidence of the implicit theory–avoidant coping link even after controlling for psychological variables related to dieting success, including trait self-control, dieting self-confidence, dispositional optimism, health locus of control, dieting locus of control, nutrition and exercise self-efficacy, impression management, previous dieting history, and initial body weight. Study 3 used experimental methods that allowed for causal conclusions regarding the relation between theories of weight and effortful regulation in the wake of setbacks.

Consistent with research demonstrating the emotional and cognitive effects of implicit theories, (e.g., Kasimatis et al., 1996; Niiya, Crocker, & Bartmess, 2004; Ommundsen, 2003), across all three studies, implicit theories of weight predicted not only coping strategies but also expectations about success. Specifically, the current research extended research on potential mediators of the implicit theory–regulatory link beyond attributions and goals to include the expectancy component of the value expectancy theoretical perspective. The mediation model supports research revealing that the effects of implicit theories are rarely the simple product of beliefs alone (Molden & Dweck, 2006). Rather, implicit theories serve as core assumptions that guide cognition and subsequent behavior.

Results supported the theory expectations regulatory model across distinct samples of college students and in a

sample of primarily overweight adults currently trying to lose weight. The overall model also emerged whether implicit theories were experimentally induced or naturally occurring and whether the dieting setback was genuine or hypothetical. The current work also revealed that implicit theories indirectly relate to weight-loss achievement. This finding is in line with work suggesting that the expectations and intentions people report in response to failures, especially when identities are threatened (e.g., appearance), can influence goal achievement (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001).

Limitations and Future Directions

Although the findings supported hypotheses, even after controlling for relevant variables related to dieting success, the studies suffered from a few limitations. First, like much research in personality and social psychology, the sample was limited to educated adults currently living in the United States. It is plausible that there could be cultural or socioeconomic differences in adherence to implicit theories of body weight. Also, the current studies did not address how differences in dieting history such as past goal achievement, stage of dieting, and/or method of weight loss influence both the development of beliefs and the overall motivation model. Furthermore, although nutrition and exercise may be aimed at weight loss, efficacy for these two behaviors may be independent of an ability to lose weight, especially for people who have repeatedly tried and failed. Based on these limitations, future research should examine the relation between implicit theories and dieting motivation across diverse samples with various dieting histories and should incorporate other relevant control variables such as a direct assessment of dieting self-efficacy.

Additionally, these studies do not delineate when and how implicit theories start to develop or whether the beliefs are malleable. For example, I did not directly assess implicit theories after the article manipulation in Study 3; thus, it is unclear whether a simple reading can change one's theory or whether it merely makes that belief temporarily salient. Recent research suggests that after reading persuasive arguments for a particular theory, participants can be led to adopt that mode of thought (e.g., Franiuk et al., 2004; Kray & Haselhuhn, 2007). However, research is still needed to explore the malleability of implicit theories of weight and to investigate when and how they develop across the lifespan.

A limitation of Study 2 is that in assessing weight loss as an outcome, I used an 8-week period without follow-up testing and without inducing or manipulating implicit theories. Thus, it is not possible to draw causal conclusions about the direction of the weight-loss effect. Additionally, the short testing period did not allow for tests of weight-loss maintenance—a relevant and important question in the

dieting literature. Another limitation of this study involves the reliance on self-report assessments of body weight, which have been criticized as being biased (e.g., Perry, Myers, Mokdad, Serdula, & Williamson, 1995). An ideal follow-up study could use an implicit theory intervention that seeks to change theories for long-term weight-loss success and uses regular weigh-ins conducted by experienced researchers.

Another important consideration is that lay theories and psychological contributors of weight loss only represent one aspect of a very complex array of factors that contribute to weight management. Thus, it is critical that future research explore whether an implicit theory perspective if combined with additional theoretical and environmental approaches can contribute not only to weight-loss success but also to weight-loss maintenance. Future work should also test whether implicit theories can be manipulated with more long-term changes in belief systems and whether such an intervention aimed at encouraging an incremental message could have lasting effects on weight-loss success (see Blackwell, Trzesniewski, & Dweck, 2007, for long-term achievement outcomes in academics).

However, one question that needs to be addressed before implementing interventions that encourage an incremental theory of weight is whether holding an incremental theory is ubiquitously positive. There are potential concerns with encouraging an incremental view of body weight. The first follows from the stereotype content model (Fiske, Cuddy, Glick, & Xu, 2002) that argues that believing someone is in control of their circumstances (i.e., an incremental theory of weight) leads to greater prejudice and discrimination (also see Crandall & Martinez, 1996). Weight-based discrimination can have devastating effects on its targets; obese individuals are less likely to marry, more likely to struggle to obtain desirable jobs, and often earn lower salaries than average-weight individuals (e.g., Pingitore et al., 1994). Another issue to consider before implementing implicit theory of weight interventions is the potential for excessive optimism. In light of work on false hope, it is possible that too strong of an incremental theory can lead individuals to suffer from overconfidence. Knowing when to abandon unattainable goals can be just as important as understanding when to persist (Polivy & Herman, 2002).

Conclusion

Successful weight management is a multifaceted issue, with several variables in the causal pathway. The “noxious gastro-nomic environment” (e.g., accessibility to fatty foods, larger portion sizes, and limited opportunity for exercise) has been cited as a key contributor. In light of the environmental shifts, researchers have noted that successful weight loss requires a great deal of self-regulation and persistence in the face of constant temptation (Stroebe, 2008). The goal of the current

article was to apply the implicit theory approach to the domain of weight management to offer a new theoretical perspective on self-regulatory responses in the wake of setbacks to weight management goals. Three studies revealed that implicit theories of body weight predict expectations about dieting success and subsequent self-regulatory strategies. As the obesity epidemic continues to be a central societal issue, an implicit theoretical approach might help broaden the understanding of what fosters positive expectations of dieting success and subsequent motivation by shedding light on the psychological context within which dieting goal achievement occurs. Although the current work offered insight into how implicit theories can be applied to a weight management context, more research is needed to assess long-term outcomes including weight-loss maintenance. I hope this initial research, extending the implicit theoretical approach to the domain of weight management and merging it with value expectancy theory, fosters such explorations.

Appendix

Implicit Theory of Weight Measure

Read each sentence below and then write the number that indicates how much you agree with each statement.

1	2	3	4	5	6
Strongly Agree	Agree	Mostly Agree	Mostly Disagree	Disagree	Strongly Disagree

- _____ 1. You have a certain body weight, and you can't really do much to change it
- _____ 2. Your body weight is something about you that you can't change very much
- _____ 3. No matter who you are, you can significantly change your body weight
- _____ 4. To be honest, you can't really change your body weight
- _____ 5. You can always substantially change your body weight
- _____ 6. You can change your basic body weight considerably

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Notes

1. I explored age and gender correlates of implicit theories of weight before conducting key mediation analyses. No significant relations emerged, $ps > .52$.
2. I examined gender and dieting history as potential moderators of the implicit theory relation with coping and success expectations. No significant interaction effects emerged, $ps > .50$.
3. I explored age and gender correlates of implicit theories of weight before conducting key analyses. No significant relations emerged, $ps > .32$. I also examined gender, dieting history, and body mass index (BMI) as potential moderators of the implicit theory relation to coping and success expectations. No significant effects emerged, $ps > .12$.
4. I examined whether BMI moderates the implicit theory effect on weight at Time 2 controlling for weight at Time 1. No significant interaction effect emerged, $p = .83$.

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