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Implicit theories of the body among college women: Implications for physical activity

Claire Lyons¹, Annette R Kaufman², and Brandi Rima³

¹University of Rochester, School of Medicine and Dentistry, USA

²National Institutes of Health, USA

³Department of Social Sciences, Bronx Community College, City University of New York, USA

Abstract

This study explored the relationship between implicit theories of the body (ITB) and self-reported physical activity. ITB are beliefs about the malleability of the body. Individuals may hold entity ITB (that body appearance is fixed) or incremental ITB (that body appearance can be changed). Female undergraduate students (N = 313) completed an online survey assessing ITB, physical activity, and discrepancy between actual and ideal body weight. Participants endorsing incremental ITB reported more physical activity. A significant ITB by weight discrepancy interaction emerged. Developing interventions targeting implicit theories of the body may be one way to increase physical activity.

Keywords

exercise; implicit theories; physical activity; weight discrepancy

Engaging in regular physical activity (PA) is important for weight management and preventing long-term conditions, such as obesity, diabetes, cardiovascular disease, and several cancers (US Department of Health and Human Services, 2010). The transition from high school to college has been noted as a period during which PA decreases (Baranowski et al., 1997; Bray and Born, 2004), contributing to weight gain (Vella-Zarb and Elgar, 2009). Weight gain during the transition from adolescence to young adulthood is particularly problematic because it often involves moving from a previously healthy body mass index (BMI) to an overweight or obese BMI (Gordon-Larsen et al., 2004), increasing the risk for later health problems (Guo et al., 2002). Intervening to promote PA at this critical juncture could help decrease the incidence of obesity and other chronic health conditions. Research indicates the importance of many theoretical constructs including self-efficacy, self-regulation, and outcome expectancy for informing interventions to increase PA (Loehr et al., 2013; Michie et al., 2009; Williams et al., 2005). Greater understanding of the other types of beliefs that promote PA can help further inform initiatives aimed at increasing PA.

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Corresponding author: Annette R Kaufman, Health Scientist/Program Director Tobacco Control Research Branch, Behavioral Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, 9609 Medical Center Drive, 3-E-546, Rockville, MD 20850, USA., kaufmana@mail.nih.gov.

Implicit theories are beliefs, or schematic knowledge structures, regarding the extent to which attributes (e.g. intelligence) are dynamic and changeable or static and fixed (Dweck et al., 1995; Ross, 1989). An incremental theory is characterized by the belief that a given attribute is relatively flexible or can be changed with effort, whereas an entity theory is characterized by the belief that a given attribute cannot be changed (Dweck and Leggett, 1988). This framework has been applied to help understand judgments, attributions, and actions in many contexts and to explain effort and resilience in the face of difficulties (Blackwell et al., 2007; Dweck et al., 1995). For example, there is extensive literature on implicit theories of intelligence, linking beliefs about the changeability of intelligence with learning strategies, goals, and coping within academic contexts (Blackwell et al., 2007; Dweck, 2007; Dweck et al., 1995). Students who hold an entity theory of intelligence are more likely than those holding an incremental theory to display helpless or maladaptive coping following an academic setback (Dweck et al., 1995).

Recent work has begun to explore the role of implicit theories in health domains, such as the role of implicit theories of body weight in the context of dieting (Burnette, 2010; Burnette and Finkel, 2012). Research suggests that holding an incremental theory of body weight may play a role in preventing weight gain among dieters (Burnette and Finkel, 2012). Implicit theories have also been examined in the domains of athletics and exercise (Biddle et al., 2003; Kasimatis et al., 1996; Moreno et al., 2010). Holding an incremental theory of athletic coordination and ability has been associated with more positive outcomes including less negative affect, greater self-efficacy, and greater motivation (Biddle et al., 2003; Kasimatis et al., 1996). It is important to recognize that implicit theories are domain specific (e.g. a person's implicit theory of intelligence may not be the same as their implicit theory of athletic ability). This article expands on this work by considering how beliefs about the malleability of body appearance may relate to PA.

The reasons for engaging in PA vary. For female college students, appearance, weight management, and positive health are three top motivations for PA (Egli et al., 2011). If concern for body appearance is one of the key motivators for PA in this group, then implicit theories of the body (ITB) in general may influence participation in PA. An individual holding an entity ITB believes that general body appearance is relatively stable and fixed, while an individual holding an incremental ITB believes that general body appearance is changeable.

We chose to assess implicit beliefs about body appearance as a whole (rather than specific implicit theories of body weight or musculature) because PA relates to many aspects of body appearance, including body weight, muscle tone, and overall health (Tremblay et al., 1990; US Department of Health and Human Services, 2010; Warburton et al., 2006). College women who hold an incremental ITB, that is, individuals who believe that people are capable of changing their body appearance, may be more likely to exercise than college women who hold an entity ITB. Because individuals who hold an incremental ITB believe that their body is changeable, they may be more motivated to exercise as a means to maintain and improve their body's appearance. Conversely, those who hold an entity ITB believe their body appearance is not malleable and thus may not believe that PA would

change their body's appearance. In this study, we explored the premise that young women who hold incremental ITB report more PA than young women who hold entity ITB.

Additionally, we analyzed the interaction of ITB and weight discrepancy (WD). WD is the difference between an individual's weight (actual weight) and what they report they would like to weigh (ideal weight). WD may relate to PA in a variety of ways and may be especially relevant in college women, a group in which weight management is a top motivation for PA (Egli et al., 2011). Studies have explored the relationship between PA and WD in adolescent and young adult women. Greater discrepancies have been associated with lower levels of PA among college women (Anton et al., 2000; Seggar et al., 1988). We expected that WD would moderate the relationship between ITB and PA. Among individuals with higher WD, the relationship between ITB and PA would be attenuated because WD and a focus on the desire to weigh less may supersede ITB as a predictor of PA. Thus, in individuals with high WD, we expect that the desire to weigh less will attenuate the effect of ITB on PA. High WD may present a barrier to PA and thereby weaken the relationship between ITB and PA. Among individuals with a low WD, ITB may relate to PA more strongly because the barrier of a high WD is not present.

We introduced a modified measure for ITB and aimed to explore the relationship between ITB and PA in college women. We predicted that incremental ITB would be associated with greater PA than entity ITB. We expected that WD would moderate this association such that ITB would not be differentially associated with PA when actual/ideal WD was high; individuals with greater WD may focus specifically on weight loss rather than overall body malleability.

Methods

Participants

Female undergraduate students ($N = 313$) completed a survey assessing ITB, actual weight, ideal weight, and PA. A post hoc power analysis was conducted using the software package, G*Power (Faul et al., 2007; 2009). With an alpha level of .05, sample size of 313, and medium effect size of .15 (Cohen, 1992), the power for detecting effects in the multiple regression analyses was .99. Thus, there was more than adequate power at the moderate effect size. The majority of participants (70.6%) identified as White. Participants ranged in age from 18 to 24 years ($M = 19.20$ years, standard deviation (SD) = 1.15 years). Most participants were freshmen (38.1%; $n = 114$) or sophomores (33.1%; $n = 99$). The average BMI of participants ($M = 22.91$ $SD = 4.30$) was within the normal BMI range (18.5–24.9) (Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults, 1998).

Procedure

Students were recruited from the Department of Psychology participant pool at a large private university in the mid-Atlantic. Inclusion criteria required all participants be at least 18 years old and female. Participation involved completion of an online survey. The informed consent document explained that the study's purpose was to understand how

women's health perceptions relate to their health behaviors. All recruitment and study procedures were approved by the university's Institutional Review Board.

Measures

PA—For the purposes of this study, PA was assessed by self-report. More objective measures of PA such as accelerometers were considered impractical within the context of the cross-sectional survey design of the study. Survey items to assess PA were developed for the purposes of this study by investigators' knowledge of PA using terminology from the Centers for Disease Control and Prevention Glossary for Physical Activity (Centers for Disease Control and Prevention, 2011).

Five items assessed the extent to which participants exercised over the past week and over the past year as well as how active participants perceived they were compared to their peers. Only participants who indicated that they had exercised in the past week answered questions about PA during that time period. All participants answered questions about PA over the past year.

Weekly PA—"How many times did you exercise in the past 7 days?" Participants gave a numeric response.

Exertion—"On average, what do you think was your physical exertion while you were exercising in the past 7 days?" Response options ranged from "very light exertion" to "very hard exertion" on a 5-point Likert scale.

Comparative PA—"In general, how active do you perceive yourself to be relative to other people of a similar age and sex?" Response options ranged from "much less active" to "much more active" on a 5-point Likert scale.

Yearly PA—"Over the past year, on average how often did you exercise?" Response options were "not at all," "less than once a month," "about 2–3 times a month," "about once a week," "two or more times a week," "four or more times a week," and "every day."

Routine PA—"Regular exercise refers to PA that is done on a routine basis (i.e. going for a 20-minute walk three times a week, lifting free weights two times a week). What statement best described your exercise routine over the past year?" Response options were "I exercised regularly every week for less than 2 months," "I exercised regularly every week for 3 months," "I exercised regularly every week for 6 months," "I exercised regularly every week for 9 months," and "I exercised regularly every week for more than 9 months."

WD—WD was assessed as the between self-reported current weight ("What is your current weight? (Please provide your best estimate)") and ideal weight ("How much would you currently like to weigh?"). The following equation describes how WD was calculated.

$$\text{WD (lbs)} = \text{Current weight (lbs)} - \text{Ideal weight (lbs)}$$

Implicit theory of the body—A 6-item *Implicit Theory of the Body Scale* (ITB scale) was developed for this study, based on Carol Dweck's measures of implicit theories of intelligence, personality, and morality (Dweck et al., 1995). For example, an item from the original morality scale states, "A person's moral character is something very basic about them and it can't be changed much" and the adapted item states, "A person's body is something about them that they cannot change very much." The ITB scale includes statements indicative of an incremental ITB as well as statements indicative of an entity ITB, addressing concerns about the traditional 3-item implicit theory measure which only assesses endorsement of an entity theory (incremental beliefs are assessed through participants' disagreement with entity statements) (Harackiewicz and Elliot, 1995). Appendix 1 contains the six items of the ITB scale. Response options were "strongly disagree," "mostly disagree," "somewhat disagree," "somewhat agree," "mostly agree," and "strongly agree." Responses were coded such that higher scores indicated endorsement of an incremental ITB. Continuous scores were used in this study to maximize statistical power (Blackwell et al., 2007). This scale was internally reliable (Cronbach's $\alpha = .83$), and all six items loaded on a single factor, which explained 54.69 percent of the variance in the individual items.

Covariates—The Drive for Thinness (DT) scale of the *Eating Disorder Inventory-2* is a 7-item scale that measures excessive dieting, pursuit of thinness, and preoccupation with weight (e.g. "I am terrified of gaining weight") (Garner, 1991). Responses were averaged to form an overall score (Cronbach's $\alpha = .92$). Higher scores corresponded to a greater DT. The DT scale was included because we hypothesized that preoccupation with weight and thinness might relate to the variables of interest in this study. At the end of the questionnaire, participants reported demographic information including age, year in college, and ethnicity.

Analysis

Descriptive statistics were generated. The bivariate associations between ITB, WD, demographic variables, and covariates were examined using correlations and regression. Linear regression models predicting each PA measure were performed including the main effect of ITB and WD, controlling for covariates. Finally, the interaction terms between ITB and WD were added to each of these models. Scores for ITB and WD were mean-centered to enhance interpretation of model estimates. In the presence of a significant interaction, simple slopes were generated to examine the association between ITB and WD at 1 *SD* above and below the mean.

Results

Preliminary analyses

We examined possible confounders of the primary relationships between WD, ITB, and the measures of PA. Age and school year were not significantly related to PA outcomes. Due to a low number of participants falling into certain ethnicity categories, we dichotomized ethnicity as "non-Hispanic White" (70.6%) versus "other ethnicity." Those who reported other ethnicity reported significantly less weekly PA ($t(193) = 2.34, p = .020$), exertion

($t(193) = 3.30, p = .001$), comparative PA ($t(193) = 2.09, p = .038$), yearly PA ($t(291) = 2.15, p = .032$), and routine PA ($t(288) = 3.04, p = .020$) than non-Hispanic White participants. Ethnicity was controlled for in all multivariate analyses.

About 65 percent ($n = 197$) of participants reported exercising in the past 7 days. Among these participants, the number of times exercised ranged from 1 to 10 ($M = 3.47, SD = 1.89$) and the majority (57.9%; $n = 114$) indicated that their average exertion was “somewhat hard.” Most respondents indicated that they were either somewhat more active (40.1%; $n = 79$) or had the same level of PA (24.2%; $n = 48$) compared to others of a similar age and sex. Most participants reported exercising either two or more times a week (31.1%; $n = 92$) or four or more times a week (26.4%; $n = 78$) during the past year. The largest proportion of respondents indicated that they had exercised routinely for more than 9 months during the past year (27.3%; $n = 80$), but the next largest proportion indicated that they had exercised routinely for less than 2 months (23.2%; $n = 68$). DT correlated with the number of times exercised in the past week ($r = .20, p = .005$), the frequency of exercise during the past year ($r = .26, p < .001$), and the number of months exercised routinely during the past year ($r = .16, p = .009$) and was therefore controlled for in the subsequent regression analyses.

Participants reported desired weights that ranged from 15 pounds above their actual weight to 126 pounds below their actual weight. On average, participants wanted to weigh about 7 pounds less than their actual weight ($SD = 16.17$). Participants endorsed a slightly more incremental view of the body ($M = 4.4899, SD = .78234$). WD and ITB were significantly negatively correlated ($r = -.129, p < .05$).

WD and PA

WD was not significantly related to weekly PA, exertion, yearly PA, or routine PA. However, greater WD was inversely related to comparative PA ($B = -.012, p = .015$), such that individuals with greater WD considered themselves less active than their peers.

Implicit theories

Participants who ascribed to an incremental ITB reported statistically significantly greater weekly PA ($B = .391, p = .037$), exertion ($B = .237, p = .011$), comparative PA ($B = .220, p = .031$), yearly PA ($B = .240, p = .042$), and routine PA ($B = .251, p = .030$) than those who ascribed to an entity ITB.

Regression analyses

To test the relationship between ITB, WD, and the five PA outcomes of interest, we conducted linear regression analyses. First, each PA outcome was regressed on ITB, WD, and covariates (Table 1). Individuals who held an incremental ITB reported significantly more exertion ($B = .223, p = .016$) compared to individuals who held an entity ITB. Individuals who held an incremental ITB also reported marginally significantly more comparative PA ($B = .170, p = .096$) and routine PA ($B = .193, p = .096$) than those who held an entity ITB. WD was significantly associated with comparative PA ($B = -.011, p = .031$), yearly PA ($B = -.014, p = .020$), and routine PA ($B = -.012, p = .038$).

The interactive effect of ITB and WD was added to each regression model (Table 1). Weekly PA was regressed on ITB, WD, and the interaction of ITB and WD controlling for DT and ethnicity ($F(5) = 4.815, p < .0001, R^2 = .093$) and a statistically significant ITB by WD interaction emerged ($B = -.035, p = .015$). Among participants reporting low WD, those who held an incremental ITB exercised more frequently in the past 7 days than those who held an entity theory (simple slope = $.798, t = 4.264, p < .0001$). Among those reporting high WD, there was no significant difference between incremental and entity theorists in weekly PA (simple slope = $-.3338, t = -.1458, p = .8888$). Yearly PA was regressed on ITB, WD, and the interaction of ITB and WD controlling for DT and ethnicity ($F(5) = 7.732, p < .0001, R^2 = .107$) and a statistically significant ITB by WD interaction emerged ($B = -.019, p = .018$). Among those reporting low WD, those who held an incremental ITB exercised more frequently in the past year than those who held an entity theory (simple slope = $.890, t = 2.2032, p = .0698$). Among those reporting high WD, there was no statistically significant difference between incremental and entity theories in yearly PA (simple slope = $-.2241, t = -1.2658, p = .2525$). Routine PA was regressed on ITB, WD, and the interaction of ITB and WD controlling for DT and ethnicity ($F(5) = 5.716, p < .0001, R^2 = .078$) and a statistically significant ITB by WD interaction emerged ($B = -.016, p = .049$; see Figure 1). Among those reporting low WD, those who held an incremental ITB exercised more routinely than those who held an entity theory (simple slope = $.4127, t = 2.3204, p = .0594$). Among those reporting high WD, there was no statistically significant difference between incremental and entity theories in routine PA (simple slope = $-.1047, t = .5885, p = .5777$). These interactions are shown in Figure 1. The interaction between ITB and WD was not a significant predictor for the remaining PA outcomes.

Discussion

The results from this study suggest that ITB is associated with PA among young women and that the relationship is moderated by WD such that the relationship between ITB and PA is stronger for those who had low WD. ITB may be an important mechanism to examine in the context of PA. This is a novel extension of the implicit theory framework and presents an area for future research and potential interventions to promote PA.

The results of this exploratory cross-sectional survey study may be used to inform theory and future intervention strategies. Other researchers have previously examined links between implicit theory and expectancy value theory in the domain of achievement motivation (Tempelaar et al., 2007). In light of our findings, it might also be useful to examine the relationship between implicit theories and expectancy value theory constructs in motivation for PA. Additionally, future studies should examine whether interventions that promote an incremental ITB increase PA levels. Researchers have developed successful interventions by increasing incremental beliefs in a variety of domains (Blackwell et al., 2007). For example, an intervention to increase ascription to an incremental theory of body weight reduced weight gain and eliminated the relationship between dieting setbacks and weight gain among adults who were trying to lose weight (Burnette and Finkel, 2012). The successes of past interventions in conjunction with the present findings point to the possibility of intervening to increase PA through programs designed to promote incremental beliefs about body appearance. More studies are needed to explore this possibility.

Greater WD was related to lower perceived levels of PA compared to others; however, WD was not related to the other measures of PA included in this study. This finding differs from previous findings indicating that greater WD relates to lower levels of PA among college women (Anton et al., 2000; Seggar et al., 1988). Inconsistent findings across studies may be due to differences in samples and/or the content of PA measures. Previous studies have employed PA measures that focus on leisure time (Anton et al., 2000) and athletic activity (Seggar et al., 1998), whereas our measure examines PA in general.

WD moderated the relationships between ITB and yearly PA, weekly PA, and routine PA. Among young women with low WD, incremental theorists reported exercising more often and routinely than entity theorists. However, among young women with high WD, there was no difference in reported PA frequency between entity and incremental theorists. These findings suggest that incremental ITB may be especially important in motivating PA frequency among individuals who have low WD. An incremental ITB may motivate young women who see no or only a small difference between their ideal and actual weight to engage in more frequent PA. Our findings suggest that young women who hold an entity ITB and are satisfied with their weight (i.e. perceive little to no difference between the ideal and actual body weight) may exercise less frequently. This may be because they are motivated by neither the belief that their body can be changed nor a desire to lose weight.

Although further study is needed, motivation to exercise for women who have greater WD might primarily depend on factors other than ITB. For example, weight loss goals might be particularly powerful motivators for women who have high WD as greater WD has been associated with weight management motivations for PA (Ingledeu and Sullivan, 2002). High WD may have attenuated the relationship between ITB and PA because in this group the desire to lose weight is a much more powerful motivation for PA (and therefore ITB is relatively less important). Women who perceive a large difference between their ideal and actual weight may also experience barriers to exercise, such as uncertainty regarding exercise practices, social stigma, or discomfort, that impact how often they exercise. Beliefs about the body's capacity to change may be less important than the desire to lose weight and/or barriers to exercise for predicting PA frequency in young women with high WD. Future studies should elucidate the mechanisms underlying these new findings.

It is worth noting that this interaction only occurred for measures of PA frequency (weekly PA, yearly PA, and routine PA) and not exertion and comparative PA measures. The exertion and comparative PA measures are based more on subjective perceptions (e.g. how much effort one made while exercising) rather than more quantified measures of PA frequency. Comparative PA is subject to the better-than-average effect, where individuals tend to evaluate themselves as better than their peers on a variety of desirable dimensions (Alicke, 1985).

The self-report measurements used to assess both PA and weight may lend themselves to reporting biases. However, many simple measures of PA have high reliability and validity (Li et al., 2000; Shephard, 2003), and given the cross-sectional survey design of the study, assessing PA by self-report was considered more practical than other more objective methods of measuring PA. Self-reported weight has been shown to be accurate in

adolescents (Elgar et al., 2005) and adult women (Lin et al., 2011). This study was based on a convenience sample of female students from one mid-Atlantic University and the majority of participants identified as non-Hispanic White women. The generalizability of our findings to other populations might therefore be limited. Given the nature of the psychological relationships examined in this study, we expect that the relationship between ITB and PA might extend to other populations (e.g. men, adolescents, older adults, individuals from different racial/ethnic groups), but future research is required. Other weaknesses of this study include the use of multiple self-report measures and the inability to explore predictive validity in this cross-sectional survey study. Future longitudinal and experimental work should be conducted to understand whether ITB predict PA.

Greater understanding of the beliefs that relate to PA can inform interventions aimed at increasing PA. As most health behavior theories propose many constructs (e.g. stages of change, self-efficacy, self-regulation, and outcome expectancy among others) are related to behavior change, interventions that target multiple factors for behavior change may therefore be the most effective (Prochaska et al., 2008). This article adds a new construct to consider when moving forward with interventions to promote PA in young women. Although future longitudinal and experimental research is needed, ITB may be one factor that can be targeted in interventions to increase PA. Given past research that has successfully influenced behavior through changing implicit theories (Blackwell et al., 2007; Burnette and Finkel, 2012), interventions that teach an incremental theory of the body may be a beneficial avenue to explore for increasing PA. Further research has shown that PA outcome expectancies are sensitive to within-person changes and subjective experience (Loehr et al., 2013). Teaching an incremental ITB as part of interventions may help participants overcome obstacles to PA as incremental beliefs relate to persistence and achievement following setbacks.

Our findings suggest that incremental ITB are associated with higher levels of PA and that incremental ITB are strongly associated with more frequent PA among individuals who have low WD. Holding an incremental ITB may help young women with low WD engage in more PA, and thus help prevent weight gain and promote overall health.

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References

- Alicke MD. Global self-evaluation as determined by the desirability and controllability of trait adjectives. *Journal of Personality and Social Psychology*. 1985; 49(6):1621–1630.
- Anton SD, Perri MG, Riley JR. Discrepancy between actual and ideal body images: Impact on eating and exercise behaviors. *Eating Behaviors*. 2000; 1(2):153–160. [PubMed: 15001058]
- Baranowski T, Cullen KW, Basen-Engquist K, et al. Transitions out of high school: Time of increased cancer risk? *Preventive Medicine*. 1997; 26(5):694–703. [PubMed: 9327479]

- Biddle SJH, Wang CJK, Chatzisarantis NLD, et al. Motivation for physical activity in young people: Entity and incremental beliefs about athletic ability. *Journal of Sports Sciences*. 2003; 21(12):973–989. [PubMed: 14748455]
- Blackwell LS, Trzesniewski KH, Dweck CS. Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development*. 2007; 78(1):246–263. [PubMed: 17328703]
- Bray SR, Born HA. Transition to university and vigorous physical activity: Implications for health and psychological well-being. *Journal of American College Health*. 2004; 52(4):181–188. [PubMed: 15018429]
- Burnette JL. Implicit theories of body weight: Entity beliefs can weigh you down. *Personality and Social Psychology Bulletin*. 2010; 36(3):410–422. [PubMed: 20179317]
- Burnette JL, Finkel EJ. Buffering against weight gain following dieting setbacks: An implicit theory intervention. *Journal of Experimental Social Psychology*. 2012; 48(3):721–725.
- Centers for Disease Control and Prevention. Physical activity: Glossary of terms. 2011. Available at: <http://www.cdc.gov/physicalactivity/everyone/glossary/>
- Cohen J. A power primer. *Psychological Bulletin*. 1992; 112(1):155–159. [PubMed: 19565683]
- Dweck, CS. Is math a gift? Beliefs that put females at risk. In: Ceci, SJ.; Williams, WM., editors. *Why Aren't More Women in Science: Top Researchers Debate the Evidence*. Washington, DC: American Psychological Association; 2007. p. 47-55.
- Dweck CS, Leggett EL. A social cognitive approach to motivation and personality. *Psychological Review*. 1988; 95(2):256–273.
- Dweck CS, Chiu CY, Hong YY. Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry*. 1995; 6(4):267–285.
- Egli T, Bland HW, Melton BF, et al. Influence of age, sex, and race on college students' exercise motivation of physical activity. *Journal of American College Health*. 2011; 59(5):399–406. [PubMed: 21500059]
- Elgar FJ, Roberts C, Tudor-Smith C, et al. Validity of self-reported height and weight and predictors of bias in adolescents. *Journal of Adolescent Health*. 2005; 37(5):371–375. [PubMed: 16227121]
- Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: Executive summary. *American Journal of Clinical Nutrition*. 1998; 68(4):899–917. [PubMed: 9771869]
- Faul F, Erdfelder E, Buchner A, et al. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavioral Research Methods*. 2009; 41(4):1149–1160.
- Faul F, Erdfelder E, Lang A-G, et al. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavioral Research Methods*. 2007; 39(2):175–191.
- Garner, DM. *Eating Disorder Inventory—2: EDI2; Professional Kit*. Odessa, FL: Psychological Assessment Resources; 1991.
- Gordon-Larsen P, Adair LS, Nelson MC, et al. Five-year obesity incidence in the transition period between adolescence and adulthood: The National Longitudinal Study of Adolescent Health. *The American Journal of Clinical Nutrition*. 2004; 80(3):569–575. [PubMed: 15321794]
- Guo SS, Wu W, Chumlea WC, et al. Predicting overweight and obesity in adulthood from body mass index values in childhood and adolescence. *The American Journal of Clinical Nutrition*. 2002; 76(3):653–658. [PubMed: 12198014]
- Harackiewicz JM, Elliot AJ. Life is a roller coaster when you view the world through entity glasses. *Psychological Inquiry*. 1995; 6(4):298–301.
- Inglelew DK, Sullivan G. Effects of body mass and body image on exercise motives in adolescence. *Psychology of Sport and Exercise*. 2002; 3(4):323–338.
- Kasimatis M, Miller M, Marcussen L. The effects of implicit theories on exercise motivation. *Journal of Research in Personality*. 1996; 30(4):510–516.
- Li SL, Carlson E, Holm K. Validation of a single-item measure of usual physical activity. *Perceptual and Motor Skills*. 2000; 91(2):593–602. [PubMed: 11065323]

- Lin CJ, Deroo LA, Jacobs SR, et al. Accuracy and reliability of self-reported weight and height in the Sister Study. *Public Health Nutrition*. 2011 Epub ahead of print 9 Dec. 10.1017/s1368980011003193
- Loehr VG, Baldwin AS, Rosenfield D, et al. Weekly variability in outcome expectations: Examining associations with related physical activity experiences during physical activity initiation. *Journal of Health Psychology*. 2013 Epub ahead of print 5 June 2013. 10.1177/1359105313488981
- Michie S, Abraham C, Whittington C, et al. Effective techniques in healthy eating and physical activity interventions: A meta-regression. *Health Psychology*. 2009; 28(6):690–701. [PubMed: 19916637]
- Moreno JA, Gonzalez-Cutre D, Sicilia A, et al. Motivation in the exercise setting: Integrating constructs from the approach-avoidance achievement goal framework and self-determination theory. *Psychology of Sport and Exercise*. 2010; 11(6):542–550.
- Prochaska JJ, Velicer WF, Nigg CR, et al. Methods of quantifying change in multiple risk factor interventions. *Preventive Medicine*. 2008; 46(3):260–265. [PubMed: 18319099]
- Ross M. Relation of implicit theories to the construction of personal histories. *Psychological Review*. 1989; 96(2):341–357.
- Seggar JF, McCammon DL, Cannon LD. Relations between physical activity, weight discrepancies, body-cathexis, and psychological well-being in college women. *Perceptual and Motor Skills*. 1988; 67(2):659–669. [PubMed: 3217221]
- Shephard RJ. Limits to the measurement of habitual physical activity by questionnaires. *British Journal of Sports Medicine*. 2003; 37(3):197–206. [PubMed: 12782543]
- Tempelaar, DT.; van der Loeff, SS.; Gijsselaers, WH. SStudents' self-theories, goal orientations and its relationship to expectancy-value based achievement motivations. *Proceedings of the 4th International Biennial SELF Research Conference*; Sydney: SELF; 2007.
- Tremblay A, Despres J, Leblanc C, et al. Effect of intensity of physical activity on body fatness and fat distribution. *The American Journal of Clinical Nutrition*. 1990; 51(2):153–157. [PubMed: 2305702]
- US Department of Health and Human Services. *The Surgeon General's Vision for a Healthy and Fit Nation*. Rockville MD: Department of Health and Human Services, Office of the Surgeon General; 2010.
- Vella-Zarb RA, Elgar FJ. The "Freshman 5": A meta-analysis of weight gain in the freshman year of college. *Journal of American College Health*. 2009; 58(2):161–166. [PubMed: 19892653]
- Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: The evidence. *Canadian Medical Association Journal*. 2006; 174(6):801–809. [PubMed: 16534088]
- Williams DM, Anderson ES, Winnet RA. A review of the outcome of expectancy construct in physical activity research. *Annals of Behavioral Medicine*. 2005; 29(1):70–79. [PubMed: 15677303]

Appendix 1

Implicit theories of the body scale

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1	A person's body is something about them that they cannot change very much. (Reverse coded)
2	Everyone had a certain body type and there is not much that can be done to really change that. (Reverse coded)
3	Even though people have certain body types, they can change the way their body looks.
4	For the most part, one cannot change the way his or her body looks. (Reverse coded)
5	A person's body is something about them that they can change substantially.
6	People can substantially change the way their body looks.
-

Figure 1.

Interaction of implicit theory of the body and weight discrepancy on physical activity. ITB: implicit theories of the body; *SD*: standard deviation.

Low levels of ITB and weight discrepancy are 1 *SD* below the mean; high levels are 1 *SD* above the mean.

Table 1

Regression analyses of PA outcomes.

Predictor variable	Weekly PA			Exertion			Comparative PA			Yearly PA			Routine PA		
	B	p	R ²	B	p	R ²	B	p	R ²	B	p	R ²	B	p	R ²
Step 1: Main effects															
Implicit theory of the body	.306	.106	.068	.223	.016	.058	.170	.096	.051	.127	.274	.092	.193	.096	.069
Weight discrepancy	-.010	.310		-.0001	.983		-.011	.031		-.014	.020		-.012	.038	
Drive for thinness	.047	.004		–			–	–		.053	<.0001		.032	.004	
Ethnicity	-.624	.057		-.442	.006		-.353	.047		-.423	.036		-.617	.002	
Step 2: Interaction															
Implicit theory of the body	.232	.220	.093	.226	.015	.053	.180	.082	.048	.083	.475	.107	.154	.188	.078
Weight discrepancy	-.029	.020		.001	.887		-.008	.189		-.023	.001		-.020	.005	
Drive for thinness	.056	.001		–			–	–		.055	<.0001		.034	.002	
Ethnicity	-.574	.077		-.444	.006		-.358	.045		-.388	.053		-.585	.004	
Implicit theory of the body × weight discrepancy	-.035	.015		.002	.787		.006	.465		-.019	.018		-.016	.049	

PA: physical activity.

Adjusted R² reported.