Implicit internalization of the thin ideal as a predictor of increases in weight, body dissatisfaction, and disordered eating

Adrienne S. Juarascio [a], Evan M . Forman [a,*], C. Alix Timko [b], James D. Herbert [a], Meghan Butryn [a], Michael Lowe [a]

[a] *Department of Psychology, Drexel University, Philadelphia, PA, USA*
[b] *Behavioral and Social Sciences Department, University of the Sciences, PA, USA*

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ABSTRACT

The freshman year of college has been identified as a time when some students experience large changes in their eating behaviors, body image, and weight. One factor that is predictive of changes in these variables is internalization of the thin ideal (i.e., the degree to which an individual has accepted societal values of thinness and applies these values to herself). However, given the limitation of self-report and previous research demonstrating the additional predictive validity implicit measurement provides, it may be important to develop an implicit paradigm for assessing internalization of the thin ideal. The Implicit Association Test is the most common implicit measurement technique. However this test is associational in nature, which reflects only one aspect of human cognition. The current study evaluates a newly-created implicit measure of internalization of the thin ideal that utilizes the Implicit Relational Assessment Procedure (IRAP). In particular, the study investigates concurrent and prospective associations between internalization of the thin ideal and disordered eating, body image dissatisfaction, and weight in a group of women at the beginning and end of their freshman year in college. Results of the study indicate that weight, disordered eating and body image dissatisfaction increased during the freshman year, and that these were predicted by implicit internalization of the thin ideal at the beginning of the year. Moreover, the new implicit measure was predictive above and beyond any predictive ability of the explicit measure. Results indicate that the thin ideal IRAP can successfully predict changes in many variables of interest at the freshman year of college, and suggest it may be a beneficial screening tool to assess at-risk freshman. This study also highlights the need for additional implicit measures in the realm of body image and disordered eating.

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1. Introduction

Previous research has demonstrated that caloric intake increases and physical activity decreases dramatically during the freshman year of college, and this in turn causes increases in weight (about 3–6 lbs), body image dissatisfaction, and levels of disordered eating (Anderson, Shapiro, & Lundgren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Timko, Mooney, & Juarascio, 2010). Longitudinal studies have indicated that weight (Anderson et al., 2003; Butler et al., 2004; Cooley & Toray, 2001a,b; Hoffman, Policastro, & Lee, 2006; Lowe et al., 2006; Pliner & Saunders, 2008), body image dissatisfaction (Delinsky & Wilson, 2008; Vohs, Heatherton, & Herrin, 2001), and disordered eating behavior (Cooley & Toray, 2001a,b; Striegel-Moore, Silberstein, Frensch, & Rodin, 1989; Vohs et al., 2001) all increase during the freshman year of college.

One variable that has consistently predicted increases in disordered eating and body image dissatisfaction is internalization of the thin ideal (ITI). Internalization implies that the individual is not only aware of the thin ideal, but has "bought into" it, and now is willing to modify her behaviors to meet these societal standards (Thompson & Stice, 2001). Although some degree of ITI might be healthy, problematic ITI often occurs among those who perceive themselves to weigh too much, but who are in the healthy weight range. Several longitudinal studies have suggested that ITI is predictive of body image dissatisfaction (Gross, 2003; Johnson, 2006; Stice & Whitenton, 2002; Zody, 2005), bulimia nervosa (Joiner, Heatherton, & Keel, 1997; Stice & Agras, 1998) and increases in dieting among normal weight women (Cattarin & Thompson, 1994; Stice, Mazotti, Weibel, & Agras, 2000; Stice, 2001). In contrast, the relationship between ITI and weight change is not well understood. Internalization might predict unhealthy weight loss in some, but unhealthy weight *gain* in others.

When measured by self-report, ITI is a robust predictor of body dissatisfaction and disordered eating. However, explicit measurement of attitudes and beliefs is subject to many potential problems, including presentational strategies to preserve self image (Greenwald, McGhee,

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& Schwartz, 1998), particularly when individuals are asked to provide information about sensitive topics such as eating behaviors or body dissatisfaction. Implicit assessment, on the other hand, uses involuntary behavior (e.g., latency of response in tasks requiring rapid responding) not subject to self-presentation (Vartanian, Polivy, & Herman, 2004) to measure attitudes about which respondents might be unaware, but that could still be affecting their behavior (Greenwald & Banaji, 1995). In the case of ITI, the implicit and explicit assessment procedures may measure slightly different aspects of a network of beliefs. For example, explicitly-measured beliefs may include "I shouldn't be judgmental about body size" whereas implicitly-measured beliefs could include more basic thoughts like "I want to be thin." Given that recent research into the nature of implicit and explicit measurement has demonstrated that they are predictive of different types of behavior (Wilson, Lindsey, & Schooler, 2000), measuring both may afford a better understanding of how they independently and synergistically predict behavior.

The role of implicitly-measured beliefs in the prediction of eating behaviors, body image, and disordered eating is a relatively new research area, but findings already suggest that future research in this area may be fruitful. Implicit assessment procedures have been used to assess fat biases (Teachman & Brownell, 2000), desire to eat certain foods (Hoefling & Strack, 2008; Vartanian et al., 2004, 2005; Vartanian, Herman, & Polivy, 2005), quantity eaten in mock taste tests (Friese, Hofmann, & WÃ¤nke, 2008), body image dissatisfaction (Ahern, Bennett, & Hetherington, 2008; Ahern & Hetherington, 2006) and weight loss (Craeynest, Crombez, Koster, Haerens, & De Bourdeaudhuij, 2008). The results often demonstrate that implicit versus explicit assessment of the same constructs result in different predictions, thereby suggesting that both types of procedures may be complementary tools when assessing eating behaviors. To date, however, there have been no attempts to use implicit measure of ITI to prospectively predict changes in eating behaviors, body image, weight, and disordered eating.

The freshman year of college could be an ideal time to investigate the predictive utility of an implicit measurement of ITI given the large literature base demonstrating that eating behaviors and weight change substantially during this year. If cognitive networks reflecting ITI are indeed present, these might be "activated" by the new food environment as well as the competitive and "thin" conscious nature of college campuses (French & Jeffery, 1994). Additionally, the onset of college typically coincides with an increase in individuals' regulation of their own eating and activity levels.

The Implicit Associations Test (IAT; Greenwald, McGhee, & Schwartz, 1998) is the most commonly used measure of implicit attitudes. However, a number of significant weaknesses of the IAT have been identified (Fiedler, Messner, & Bluemke, 2006). One concern is that the IAT is primarily an associational test, and therefore cannot assess the *directionality* or the *relations* between concepts (Hayes, 2001). The Implicit Relational Assessment Procedure (IRAP) is an implicit measurement paradigm similar to the IAT in that respondents are required to respond quickly and accurately in ways that are either consistent or inconsistent with their beliefs (Barnes-Holmes et al., 2006). However, rather than simply measuring the associations between two stimuli, the IRAP incorporates an additional relational component in order to clarify the nature and direction of the association. For example, an IAT designed to implicitly measure ideal body size might ask participants to match positive or negative words with images of fat and thin women. An IRAP might instead use target phrases such as "I want to look like "or "I don't want to look like" and have these phrases paired with images of fat and thin women. Participants should respond more rapidly on trials that reflect more basic, well established relational framing (i.e., so-called "automatic" responses) and will have longer response latencies on tasks that require responding in a way that is inconsistent with their relational frames (i.e., one that requires deliberative responses), or that is not part of their relational network.

Previous research using the IRAP has demonstrated that it can effectively measure implicit beliefs (Barnes-Holmes, Barnes-Holmes,

Stewart, & Boles, 2010). Most relevant to this present study, Timko et al., (2010a,b); Timko, England, Herbert, and Forman (2010a) used the IRAP to successfully assess body image dissatisfaction implicitly. One seeming limitation of the study was the use of verbal cues ("I am not… thin/fat word") rather than images of bodies, given that images may tap into body image more saliently. Juarascio, Timko, Forman, and Herbert (2010) created and validated an image-based thin ideal IRAP in part by demonstrating that it was associated with explicit measures of ITI and with several disordered eating subscales. However, the cross-sectional design of that study precluded any causal conclusions.

The current study sought to test the ability of Juarascio et al.'s thin ideal IRAP to prospectively predict changes during the freshman year of college. It was hypothesized that the IRAP would predict changes in weight, body image dissatisfaction, and eating behaviors over the course of the academic year, with high internalization predicting weight loss and increases in body image dissatisfaction, and disordered eating. It was also hypothesized that implicitly-measured ITI would be a stronger predictor of change in weight, body image dissatisfaction, and disordered eating than explicitly-measured internalization, and would predict changes in the variables of interest above and beyond any changes predicted by explicit measures.

2. Methods

2.1. Participants

The current study examined normal weight (i.e., BMI 18–25 kg/m^2) freshman women ($n = 80$) recruited from undergraduate courses at a large urban university, ages 18–25 years. Students were not allowed to participate if they were unable to see or read words from a computer screen, currently pregnant, or currently receiving treatment for an eating disorder. All recruitments took place during the first month of college so that baseline measurement would occur as closely as possible to the start of the school year. Follow-up assessments occurred between late April and late May, and the average time lapse between baseline and post scores was 7.8 months.

2.2. Measures

Body image dissatisfaction was measured by the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987), a 34-item measure designed to assess an individual's level of satisfaction or dissatisfaction with the shape of her body. The measure has acceptable validity and reliability ($\alpha = 0.95$ in current sample, 0.97 in Evans & Dolan, 1993).

Disordered eating behavior was assessed with the 26-item Eating Attitudes Test (EAT-26; Garner, Olmstead, & Polivy, 1983). The EAT-26 has three subscales: Unhealthy Dieting, Bulimia Nervosa and Food Preoccupation, and Oral Control. Adequate reliability has been demonstrated in the current ($\alpha = .83$) and previous samples (e.g., $\alpha = 0.83$; Aruguete, Yates, Edman, & Sanders, 2007).

Internalization of the thin ideal was measured explicitly via the Sociocultural Attitudes Towards Appearance Scale (SATAQ-3; Thompson, van den Berg , Roehrig, Guarda, & Heinberg, 2004). The SATAQ-3, which has adequate reliability (current sample $\alpha = 0.72$), has four subscales: Internalization-General (general influence of the media on perceived body size ideals); Internalization-Athlete (internalization of athletic ideals and sports figures in the media); Pressure (media pressure to achieve certain body size ideals); and Information (degree to which media is used as a source of information for determining body size ideal).

The Implicit Relational Assessment Procedure (IRAP) is an implicit assessment tool. The targets used in this study were images of six "fat" and six "thin" women that were derived from the Body Morph Assessment procedure (Stewart, 2003) and that were previously rated in terms of desirability by a separate sample ($n = 50$) of freshman

women (Juarascio et al., 2010).The average ratings for the six thin images indicated that the first two images were rated as relatively undesirable, but the other four images were all rated as desirable, with the fourth thinness image rated the most desirable image overall. The average ratings for the six fat images indicated that desirability went down uniformly as the images got heavier. The average rating for the six thin images together was significantly higher than the average rating for the six fat images, $t(59) = 8.57$, $p < 0.01$ (Juarascio et al., 2010).

The primary raw datum for the IRAP is response latency, defined as the amount of time from the beginning of a trial until a response is made. The total D_{IRAP} score reflects the difference in response latency between consistent and inconsistent trials. For the current IRAP task, there were two types of consistent trials: 1) trials in which the sample phrase was "I am" and the target image was a fat image, and 2) trials in which the sample phrase was "I want to be" and the target image was a thin image. Similarly, there were two types of inconsistent trials: 1) trials in which the sample phrase is "I am" and the target image is a thin image, and 2) trials in which the sample phrase is "I want to be" and the target image is a fat image. A positive D_{IRAP} score indicates that respondents took significantly less time to respond to consistent trial blocks, whereas a negative D_{IRAP} indicates that respondents took less time to respond to inconsistent test blocks. The determination of which samples to consider "consistent" versus "inconsistent" in the current context was derived from the literature on the thin ideal and fat biases (Rodin, Silberstein, & Striegel-Moore, 1984; Teachman & Brownell, 2001). Given this literature base, one would expect a non-clinical population to respond more quickly to fat images when relating to their current self and to thin images when relating to their desired self.

On the IRAP, a consistent test block was presented first, followed by an inconsistent test block. During half of the trials, participants saw "True" on the right and "False" on the left, and the other half of the trials were reversed. At least two practice blocks (one consistent, one inconsistent) and up to four practice blocks (alternating consistent and inconsistent) were presented. The purpose of the practice blocks was to familiarize the participants with the task and to train them to a 70% level of accuracy. A maximum average response latency of 2000 ms must have been reached before the participant completed the training blocks. This ensured that participants were responding quickly enough, since longer response times could allow for more elaborate relational framing. For participants who were unable to attain the required accuracy level ($n = 1$), the IRAP task automatically ended, and the participant was told she was finished the study. After passing the practice blocks, participants completed six alternating test trial blocks used to calculate the D_{IRAP} total and trial-type scores.

2.3. Procedure

The study began by having participants complete the IRAP and the above questionnaires. Participants then had height and weights measured. The second visit followed the same procedure. The study was approved by the Institutional Review Board at Drexel University.

3. Results

3.1. Descriptive findings

Eighty women completed the baseline visit. The average age was 18.24 years ($SD = 0.68$), with an average height of 64.26 inches ($SD = 2.55$) and weight of 57.09 kg ($SD = 6.92$). The sample was primarily Caucasian (72.6%; African American: 12.0%, Asian: 8.5%, Hispanic: 2.3%, Other: 4.6%), born in the US (90.5%) and native English speaking (89.9%). Sixty women (75% of the original sample) completed the follow-up visit at the end of the freshman year. A series of t-tests and chi square analyses were conducted to compare those who did and did

not attend the follow-up assessment; no differences were found on any variables (all p's > 0.05).

3.2. Baseline data

Of the 80 women who participated in the baseline assessment, 79 women were able to complete the IRAP training block with a minimum of 70% correct across trials (range = 78–100%). The total D_{IRAP} score at baseline ranged from −0.7541 to 0.6728, with a negative mean ($M = -.0294$, $SD = 0.2810$). A one-sample t-test indicated that the mean D_{IRAP} score was not significantly less than zero ($t(78) = -.93$, $p = 0.35$) which suggests no overall pattern in terms of ease in responding to both consistent and inconsistent trial-types. In order to calculate split-half reliability for the IRAP, two overall D scores were calculated, one for odd trials and one for even trials. The split-half correlations ($r = 0.72$) indicated acceptable reliability.

Consistent with previous IRAP research, the current study examined the IRAP at the level of individual trial types (i.e., the different types of self-referential phrases). Four mean $D_{IRAP-(trial-type)}$ scores were calculated, one for each of the four trial-types: I am [*fat image*] ($D_{IRAP-(trial-type)} = 0.1863$ ($SD = 0.5484$), I am [*thin image*] ($D_{IRAP-(trial-type)} = -0.2448$ ($SD = 0.4928$), I want to be [*fat image*] ($D_{IRAP-(trial-type)} = 0.1198$ ($SD = 0.4837$), and I want to be [*thin image*] ($D_{IRAP-(trial-type)} = -0.1698$ ($SD = 0.5237$); see Fig. 1. One-sample t-tests indicated that all four means were significantly different from zero, meaning that significant differences in response latencies between consistent and inconsistent test blocks were present, with more participants responding inconsistently to [*thin image*] trials and more participants responding consistently to [*fat image*] trials.

A repeated-measures ANOVA indicated differences between the four trial types ($F(3, 231) = 13.75$, $p < 0.001$, partial $\varsigma^2 = 0.15$; hypothesis of sphericity was not rejected, $p = 0.55$). Least Significant Difference post-hoc pairwise comparisons indicated several significant differences, namely the $D_{IRAP-(trial-type)}$ score for "I am [*fat image*]" was significantly higher than those for "I am [*thin image*]" ($MD = 0.435$, $p < 0.001$) and "I want to be [*thin image*]" ($MD = 0.355$, $p < 0.001$). The $D_{IRAP-(trial-type)}$ for "I want to be [*fat image*] was also significantly higher than that for "I want to be [*thin image*]" trials ($MD = 0.288$, $p < 0.001$) and the "I am [*thin image*]" trials ($MD = 0.368$, $p < 0.001$). The $D_{IRAP-(trial-type)}$ scores suggest that, overall, it was easier for participants to respond in the socio-culturally *consistent* manner for the "I am [*fat image*]" ($t(78) = 3.020$, $p < 0.05$) and "I want to be [*fat image*] trials" ($t(78) = 2.201$, $p < 0.05$) (i.e. responding "true" to "I am [*fat image*]" and "false" to "I want to be [*fat image*]"), and easier for participants to respond in the *inconsistent* manner for the "I am [*thin image*]" ($t(78) = -4.416$, $p < 0.05$) and "I want to be [*thin image*]" ($t(78) = -2.882$, $p < 0.05$) trials (i.e. responding
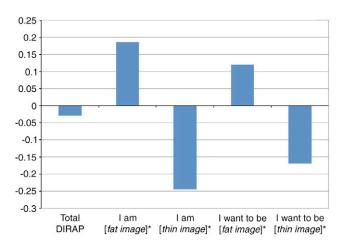

Fig. 1. Mean total D_{IRAP} and D_{IRAP} trial-type scores.

"true" to "I am [*thin image*] and "false" to "I want to be [*thin image*]"). These results indicate that the thin images may have promoted inconsistent responding, as no evidence of internalization was apparent on these trials. To determine whether the same individuals were responding "true" to the "I am [*thin image*]" and the "I am [*fat image*]," a correlation analysis was conducted, and no correlation was found ($r = 0.004$, $p = 0.972$), suggesting that different participants were responding 'true' to the different trial-types.

3.3. Predictive analyses for total D_{IRAP} scores

In order to examine changes in disordered eating, body image dissatisfaction, and BMI, a series of pair-wise comparisons were conducted for the 60 participants who completed both assessment points. Analyses demonstrated significant increases in body image dissatisfaction ($t(59) = 3.52$, $p < 0.01$; mean change = 10.60) and BMI ($t(59) = 3.27$, $p < 0.01$; mean change = 0.78). The overall mean changes for eating pathology did not reach significance; however, this does not rule out the possibility that D_{IRAP} scores would predict changes on these variables.

To determine the ability of total D_{IRAP} scores at baseline to predict changes in body image dissatisfaction, disordered eating, and BMI a series of regression analyses were conducted (Table 1). Total baseline D_{IRAP} scores were predictive of changes in body image dissatisfaction, disordered eating (total scores, not individual subscales), and BMI. To better understand the changes in BMI, weight change was analyzed separately for those with high, medium, and low ITI (as defined by trichotimizing total baseline D_{IRAP} scores). Results revealed substantial weight gain among those with low (6.72 kg; $t(15) = 3.22$, $p < 0.01$) and medium (5.95 kg; $t(15) = 2.94$, $p < 0.05$) ITI, but virtually no gain (0.4 kg; $t(15) = -0.09$, $p = 0.92$) among those with high ITI. The negligible relationship between baseline BMI and weight change ($r = -0.13$, $p = 0.34$) suggests that this finding was not due to weight changes occurring only in those with a higher starting weight.

3.4. Predictive ability of D_{IRAP} trial type scores

To better determine which aspects of ITI predicted changes, the regression analyses above were repeated using D_{IRAP} trial-type scores as the independent variable. As seen in Table 2 these analyses indicated that the "I want to be [*thin image*]" and the "I want to be [*fat image*]" trials generally did not predict changes in any of the variables of interest. However, "I am [*fat image*]" trials were predictive of changes in BMI, such that those who responded more quickly to these trials showed decreases in weight during the course of the year. Responses on "I am [*thin image*]" trials were predictive of both changes in disordered eating (EAT-total, EAT-diet, and EAT-bulimia scales) and body image dissatisfaction, with those who responded more quickly on these trials showing increases in disordered eating and body image dissatisfaction.

Table 2

Trial-type scores at the beginning of the year predict residualized changes in disordered eating, body image dissatisfaction, and BMI.

Measures	Trial-type	β	t	r^2	p
BMI	"I am [fat image]"	−0.113	−2.85	0.160	<0.01**
EAT total	"I am [fat image]"	0.006	0.43	0.003	0.66
EAT dieting	"I am [fat image]"	−0.003	−0.19	0.001	0.84
EAT oral	"I am [fat image]"	−0.030	−0.72	0.010	0.43
EAT bulimia	"I am [fat image]"	−0.060	−1.57	0.041	0.12
BSQ total	"I am [fat image]"	0.001	0.03	0.004	0.97
BMI	"I am [thin image]"	−0.052	−1.46	0.048	0.15
EAT total	"I am [thin image]"	0.039	3.63	0.186	<0.01**
EAT dieting	"I am [thin image]"	0.032	2.53	0.100	0.01*
EAT oral	"I am [thin image]"	−0.020	−0.56	0.005	0.57
EAT bulimia	"I am [thin image]"	0.088	2.57	0.102	0.01*
BSQ total	"I am [thin image]"	0.006	2.04	0.066	0.04*
BMI	" I want to be [thin image]"	−0.060	−1.52	0.051	0.13
EAT total	" I want to be [thin image]"	0.008	0.68	0.008	0.49
EAT dieting	" I want to be [thin image]"	−0.005	−0.32	0.002	0.74
EAT oral	" I want to be [thin image]"	0.002	0.04	0.005	0.96
EAT bulimia	" I want to be [thin image]"	0.032	0.85	0.013	0.39
BSQ total	" I want to be [thin image]"	0.004	1.24	0.025	0.22
BMI	" I want to be [fat image]"	−0.051	−1.24	0.012	0.22
EAT total	" I want to be [fat image]"	−0.006	−0.518	0.005	0.60
EAT dieting	" I want to be [fat image]"	−0.009	−6.53	0.007	0.51
EAT oral	" I want to be [fat image]"	−0.019	−0.536	0.005	0.59
EAT bulimia	" I want to be [fat image]"	−0.011	−0.303	0.002	0.76
BSQ total	" I want to be [fat image]"	0.004	1.61	0.042	0.11

Note: °$p < 0.10$; *$p < 0.05$; **$p < 0.01$.

3.5. Implicit vs. explicit assessment

We hypothesized that total D_{IRAP} scores would predict changes in weight, body image dissatisfaction, and disordered eating above and beyond explicitly-measured ITI. To test this hypothesis, a series of regression analyses were conducted with changes in BMI, body dissatisfaction, and disordered eating as dependent variables, and explicitly-measured (SATAQ-Internalization General subscale) and implicitly-measured (IRAP) ITI entered as independent variables. Before adding implicitly-measured ITI into the regression analyses, explicitly-measured ITI predicted increases in disordered eating and body image dissatisfaction (trend; Table 3). Even when controlling for explicitly-measured ITI, however, implicitly-measured ITI was a predictor of disordered eating (EATtotal: $\beta = 0.004$, $t = 2.74$, $p < 0.01$, $r^2 = 0.23$), BMI ($\beta = -3.31$, $t = -3.32$, $p = 0.02$, $r^2 = 0.21$), and body image dissatisfaction ($\beta = 0.016$, $t = 2.54$, $p = 0.014$, $r^2 = 0.21$). Moreover, explicitly-measured ITI explained less and/or an insignificant amount of variance across measures, compared to implicitly-measured ITI (Table 3). Furthermore, Fisher's Z transformations revealed stronger associations between implicitly-measured ITI and body image dissatisfaction ($Z = 2.17$, $p = 0.03$), disordered eating (EATtotal: $Z = 1.8$, $p = 0.07$; strong trend), and BMI ($Z = 2.49$, $p = 0.01$) than between these constructs and explicitly-measured ITI.

Table 1

D_{IRAP} scores at the beginning of the year predict residualized changes in disordered eating, body image dissatisfaction, and BMI.

Measures	β	t	r^2	p
BMI	−2.94	−3.31	0.20	<0.01**
EAT total	5.20	2.22	0.07	0.04*
EAT dieting	1.61	0.73	0.01	0.47
EAT oral	−0.31	−0.38	0.01	0.70
EAT bulimia	0.83	1.02	0.02	0.31
BSQ total	20.83	2.09	0.07	0.04*

Note: °$p < 0.10$; *$p < 0.05$; **$p < 0.01$.

Table 3

Predictive ability of SATAQ Internalization General and Variance explained by SATAQ Internalization General scores and total D_{IRAP} scores.

Measures	β	t	r^2	p	Explicit r^2	Implicit r^2
BMI	−0.069	−0.11	0.000	0.90	0.00	0.20
EAT total	−0.351	−1.87	0.057	0.05*	0.05	0.07
EAT diet	−0.071	−0.40	0.003	0.68	0.01	0.01
EAT oral	−0.514	−0.90	0.017	0.61	0.02	0.01
EAT bulimia	−0.050	−1.47	0.053	0.21	0.05	0.02
BSQ total	−0.097	−1.10	0.030	0.09°	0.03	0.07
IPAQ total	−0.150	−0.964	0.034	0.34	0.03	0.01

Note: °$p < 0.10$; *$p < 0.05$; **$p < 0.01$.

4. Discussion

Previous research has indicated that during the freshman year of college many young adults undergo large changes in their eating behaviors, body image, and weight (Anderson et al., 2003; Butler et al., 2004; Timko et al., 2010a,b). Internalization of the thin ideal has been identified as a predictor of change in these variables, with those who have higher ITI at the beginning of the year showing large increases in body image dissatisfaction and disordered eating (Gross, 2003; Johnson, 2006; Stice & Agras, 1998; Zody, 2005). The current study sought to evaluate a newly-created implicit measure of ITI that made use of the Implicit Relational Assessment Procedure (Barnes-Holmes et al., 2006). Specifically, the study aimed to determine whether the new measure could predict changes in disordered eating, body image dissatisfaction, and BMI across the freshman year and predict changes above and beyond an explicitly-measured version of the construct.

As hypothesized, implicitly-measured ITI at the beginning of the freshman year positively predicted changes over the course of the freshman year in disordered eating and body image dissatisfaction and negatively predicted changes in weight. The results of this study further support the research indicating that ITI is a risk factor for the development of body image dissatisfaction (Stice & Whitenton, 2002) and disordered eating (Joiner et al., 1997), and demonstrates for the first time that implicitly-measured ITI can also predict changes in weight. Interestingly, the strongest relationship (20% of variance explained) was between total D_{IRAP} scores at baseline and changes in weight, which is noteworthy given that explicit ITI has not been shown to consistently predict changes in weight. Although the average weight change was only about 1 BMI unit, some individuals showed very large changes in weight (-3 to $+6$ BMI units), and having a tool that could successfully predict who is at risk for these weight changes would be useful to aid in prevention efforts.

Implicit measurement of ITI and related constructs thus appears to be particularly promising, possibly because implicit measurement tools are highly predictive of impulsive behaviors (Dotsch & Wigboldus, 2008; Friese & Hofmann, 2008; Hoefling & Strack, 2008), and impulsivity is present in many eating behaviors (Friese et al., 2008) and in eating disorders (Claes, Vandereycken & Vertommen, 2005). An especially compelling finding was that, as hypothesized, the implicit measure of ITI robustly predicted changes in unhealthy eating behaviors, body image dissatisfaction and BMI over and above the predictive influence of the standard self-report questionnaire often used in ITI research (SATAQ); in contrast, the explicitly-measured ITI was a weak and insignificant predictor of these changes. Future research is needed to replicate these findings and to test whether implicit measurement may be a more reliable way to assess other variables within the domain of eating behaviors and body image.

To better understand which trials were leading to the D_{IRAP} effect, analyses were repeated by IRAP trial-type. Results for fat-image trials overall were in the socioculturally-consistent direction, with participants being quicker to respond that they were currently fat and did not want to be fat. However, results for thin-image trials were in the opposite direction, with participants finding it easier to indicate that they were thin and did not want to be thinner. One possible reason for these contradictory results is that African American or Hispanic participants (around 15% of the current sample) might have had somewhat larger body image ideals than Caucasian individuals, which could have led to the response sets seen above (Kronenfeld, Reba-Harrelson, Von Holle, Reves, & Bulik, 2010). Results could also be due to the variation of "thinness" seen in the images. Some images may have been considered by most to be "too thin," whereas other thin images were more healthy looking and appealing. If women were identifying with the slender but healthy images, which were closer to the normal end of the spectrum, they may respond true quickly to some thin images. Given that the average BMI of the sample was relatively low (i.e., BMI of 21 kg/m^2), many women did look like some of the images in the thin category.

Difficulties choosing the degree of thinness to present in the images highlight one potential difficulty when researching ITI. As mentioned earlier, some degree of ITI may be normative, and could reflect a healthy desire to stay within the normal weight range, with only those who desire a pathological level of thinness showing difficulties with body image and disordered eating (Lowe & Timko, 2004). Current results indicate that students who endorse some degree of ITI protects against weight gain, however additional research is needed to better understand any potential benefits of ITI and what degree of ITI reflects a normative desire to be healthily thin and what degree reflects a more pathological desire to be underweight.

Analyses by D_{IRAP} trial-types revealed that the "I am" rather than "I want to be," trials types were predictive of changes in BMI, disordered eating and/or body dissatisfaction. These results are surprising, and suggest that baseline perception of body size, rather than a desire to change current body size, drives subsequent changes in disordered eating, body image dissatisfaction, and weight. Because the "I want to be" trials showed no predictive ability, and the total D_{IRAP} score showed inconsistent responding, it is tempting to assume that implicit assessment of body size perception is the key predictor of change. However, it is important to note that evaluations of body size are highly influenced by internalization of the socio-cultural standards of thinness. In addition, although the total D_{IRAP} scores showed no consistent pattern of responding, they were highly predictive of change, even more so than the "I am" trials alone, suggesting that there is some predictive benefit from including the "I want to be" trials. Future research examining these distinct components would be beneficial, as it could help researchers target the more problematic belief and better understand what construct the thin ideal IRAP is assessing.

Several strengths of the current study are worth noting. For example, the use of the IRAP, as opposed to the IAT, allowed trial-type detailed examination of the specific beliefs that make up ITI. Given its pilot status, the study was relatively well powered, with 80 participants completing baseline measures and 60 completing measures at both times points. Additionally, the study was longitudinal, which allowed for the ability to examine how ITI at one time could predict later changes. The study is also strengthened by its relatively long follow-up period (average of 7.8 months), which corresponds with almost the entire first school year.

Despite the strengths of the study, there were also several limitations. The study used a relatively homogenous sample of undergraduates from only one university, and therefore these results may not generalize to other populations. The percentages of ethnic and racial minorities, although representative of the university at large, were too small to examine relationships between ethnic/racial groups, so it is not clear whether the thin ideal IRAP would be as strong a predictor in non-Caucasian individuals. Males were also excluded from this study, and so future research is needed to examine whether the IRAP would be equally predictive in a population of freshman males. A previous history of an eating disorder was not screened out, which could have complicated results. In addition, the main analyses for the study were based on response times for the total D_{IRAP} scores, some of which had mean scores insignificantly different from zero, indicating no clear pattern in terms of ease in responding to consistent versus inconsistent trial-types, thus making interpretation less clear. However, the trial-type analyses partly address this concern, as these trials were significantly different from zero and showed similar responses as the total D_{IRAP} scores. Lastly, as mentioned above, the study used very thin images which might have lead to inconsistent responding on these trials.

Overall, the results indicate that the thin ideal IRAP successfully predicted changes in hypothesized variables of interest. The study not only lends support to the notion that ITI is a strong predictor of increases in disordered eating and body image dissatisfaction, but is one of the first studies to attempt to measure ITI in an implicit

manner. The results support the addition of implicit measures of ITI when examining this construct, as the implicit measurement of ITI was more predictive in this study of changes in relevant variables than explicitly-measured ITI. In sum, the results of the current study suggest a place for implicit measurement in the realm of eating behaviors and body image, and demonstrate how implicit measurement tools can be used in a longitudinal design. Future research is needed to replicate and extend these findings, and to determine whether this tool could adequately be used as a screening tool for at-risk young women transitioning into college.

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