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Title: The Identity Impairment Model: A Longitudinal Study of Self-Schemas as Predictors of Disordered Eating Behaviors

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Corresponding Author: Dr. Karen F Stein, PhD

Corresponding Author's Institution: University of Michigan

First Author: Karen F Stein, PhD

Order of Authors: Karen F Stein, PhD; Colleen Corte, PhD

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Abstract: Background: There is broad consensus that the eating disorders of anorexia nervosa (AN) and bulimia nervosa (BN) stem from fundamental disturbances in identity development, but theoretically based empirical support is lacking. Objective: This study extends work on the identity impairment model (Stein, 1996) by investigating the relationship between organizational properties of the self-concept and change in disordered eating behaviors in an at-risk sample of college women as they transition between their freshman and sophomore years. Method: The number, valence and organization of self-schemas, availability of a fat body weight self-schema, and disordered eating behaviors were measured at baseline in the freshman year, 6 and 12 months later in a community-based sample of college women engaged in sub-threshold disordered eating behaviors (DEB: n=77) and controls (n=41). Results: Women in the DEB group had more negative self-schemas at baseline and showed information processing evidence of a fat self-schema compared to the Controls. The Groups did not differ in the number of positive self-schemas or interrelatedness. The number of negative self-schemas predicted increases in the level of disordered eating behaviors at 6 and 12 month follow-up and these effects were mediated through the fat self-schema. The number of positive self-schemas predicted the fat self-schema score but was not predictive of increases in disordered eating behaviors. Interrelatedness of the self-concept was not a significant predictor in this model. Discussion: Impairments in overall collection of identities are predictive of the availability in memory of a fat self-schema

which in turn is predictive of increases in disordered eating behaviors during the transition to college in a sample of women at risk for an eating disorder. Therefore, organizational properties of the self-concept may be an important focus for effective primary and secondary level prevention.

May 3, 2007

Dear Dr. Dougherty,

Attached is a manuscript that I co-authored with Dr. Colleen Corte, entitled "The Identity Impairment Model: A Longitudinal study of Self-Schemas as Predictors of Disordered Eating Behaviors" that we would like to ask you to consider for publication in *Nursing Research*. Please note that this manuscript is based on data from a study in which the treatment of participants was in accordance with the ethical standards of APA. These data not been published previously and are not under consideration for publication elsewhere. Both co-authors contributed significantly to the manuscript and consent to their names on the manuscript. Feel free to contact us if you have any questions about our manuscript.

We appreciate the time and effort necessary to have our manuscript reviewed and we look forward to your response.

Sincerely,

Karen Farchaus Stein, PhD, RN
Associate Professor
University of Michigan
400 N. Ingalls
Ann Arbor, MI 48109
734-763-9716
kfarchau@umich.edu

Running Head: THE IDENTITY IMPAIRMENT MODEL

The Identity Impairment Model: A Longitudinal Study of Self-Schemas as Predictors of Disordered Eating Behaviors

Karen Farchaus Stein

Colleen Corte

The University of Michigan

Correspondence to:
Karen Farchaus Stein
University of Michigan School of Nursing
400 N. Ingalls
Ann Arbor, MI 48109
kfarchau@umich.edu

Colleen Corte is now at the College of Nursing, University of Illinois at Chicago.

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Abstract

Background: There is broad consensus that the eating disorders of anorexia nervosa (AN) and bulimia nervosa (BN) stem from fundamental disturbances in identity development, but theoretically based empirical support is lacking. **Objective:** This study extends work on the identity impairment model (Stein, 1996) by investigating the relationship between organizational properties of the self-concept and change in disordered eating behaviors in an at-risk sample of college women as they transition between their freshman and sophomore years. **Method:** The number, valence and organization of self-schemas, availability of a fat body weight self-schema, and disordered eating behaviors were measured at baseline in the freshman year, 6 and 12 months later in a community-based sample of college women engaged in sub-threshold disordered eating behaviors (DEB: n=77) and controls (*n*=41). **Results:** Women in the DEB group had more negative self-schemas at baseline and showed information processing evidence of a fat self-schema compared to the Controls. The Groups did not differ in the number of positive self-schemas or interrelatedness. The number of negative self-schemas predicted increases in the level of disordered eating behaviors at 6 and 12 month follow-up and these effects were mediated through the fat self-schema. The number of positive self-schemas predicted the fat self-schema score but was not predictive of increases in disordered eating behaviors. Interrelatedness of the self-concept was not a significant predictor in this model. **Discussion:** Impairments in overall collection of identities are predictive of the availability in memory of a fat self-schema which in turn is predictive of increases in disordered eating behaviors during the transition to college in a sample of women at risk for an eating disorder. Therefore, organizational properties of the self-concept may be an important focus for effective primary and secondary level prevention.

The Identity Impairment Model: A longitudinal Study of Self-Schemas as Predictors of Disordered Eating Behaviors

The proposition that the eating disorders of anorexia nervosa (AN) and bulimia nervosa (BN) stem from fundamental disturbances in identity development is a basic tenet in a diverse array of eating disorder theories ranging from early psychoanalytic, cultural, and feminist approaches (for a review see Stein & Corte, 2003). Yet related studies have generally failed to converge into a coherent and compelling set of findings necessary to explicate the link between the self-concept and eating disorder symptomatology. One key factor that has contributed to this lack of progress is that the core self-related constructs in the theories lack clear theoretical and operational definitions. Even the basic distinction as to whether the theory focuses on the *process of identity development*, characteristics of the actual *array of identities* (the products of identity development) or the *global attitude* toward the self often is unclearly specified making the focus of the theory difficult to discern.

In a recent study, Stein & Corte (2007) addressed the problem of unclear theoretical specification by using the schema model of the self-concept (Markus, 1977) to investigate the content and organization of self-cognitions that distinguished women with anorexia nervosa (AN) and bulimia nervosa (BN) from controls. In this model, self-schemas are defined as stable, highly elaborated and chronically accessible memory structures that reflect aspects of the self that are highly valued. Results of this cross-sectional study showed that women with AN and BN had fewer positive, more negative and a more highly interrelated collection of self-schemas compared to healthy controls. These three properties of the self-schemas were predictive of eating disordered attitudes and behaviors with their effects generally being mediated through availability of a fat self-schema. One key limitation of this study, however, was the cross-

sectional design that prevented drawing conclusions about the nature of the directional relationship between the self-schema characteristics and eating disorder symptoms.

In this study, we extend research on self-concept impairments in the etiology of eating disorders by investigating the relationship between the content and organization of self-schemas and the unfolding of disordered eating behaviors over time in women at risk for developing an eating disorder. More specifically, the effects of the number of valenced self-schemas and their level of interrelatedness on changes in eating disordered behavioral symptoms are examined in a sample of college freshman women as they transition from their freshman into their sophomore year. Furthermore, since eating disordered behaviors are believed to narrow the range of behavioral involvements including social engagement, and thereby hold the potential for undermining social and even personal identities, the effects of eating disordered behaviors on changes in the self-schemas across this developmental transition are also examined.

Self-Schemas and Eating Disorder Symptomatology

According to the cognitive model, identity formation is a developmental process that results in a stable but evolving set of memory structures about the self that collectively are referred as the self-concept (Westen & Heim, 2003). The self-concept is a complex, multidimensional cognitive structure that is comprised of multiple self-schemas defined as individual organizations of knowledge that focus on the self in specific domains of emotional and behavioral commitment (Markus & Wurf, 1987). Self-schemas then are cognitive products of the process of identity formation. Once established in memory, self-schemas serve as organizing templates that influence the processing of self-relevant information (Green & Sedikides, 2001; Kendzierski & Sheffield, 2000; Markus, 1977) and motivate and regulate behavior (Clemmey & Nicassio, 1997; Kendzierski & Whitaker, 1997; Sheeran & Orbell, 2000).

Studies have shown that the valence and organization of self-schemas influence emotional and behavioral self-regulation. Positively valenced self-schemas enhance behavioral performance in a domain (Cross & Markus, 1994 Froming, Nasby, & McManus, 1998; Kendzierski, Costello, & Cauley, 2004) while negatively valenced self-schemas are associated with negative affect and behavioral avoidance and inhibition (Cyranowski & Andersen, 1998; Lips, 1995). Furthermore, individual differences in the way self-schemas are organized influence their pattern of activation in memory. A highly interrelated collection of self-schemas function as a single unit and consequently reflect a less differentiated and complex experience of the self (Niedenthal & Beike, 1997; Nowak, Vallacher, Tesser, & Borkowski, 2000).

Based on the self-schema findings, Stein (1996) developed an identity impairment model that focuses on the number and organization of the total collection of self-schemas available in memory as a primary source of eating disorder symptomatology and tested it in a sample of 26 women with anorexia nervosa, 53 women with bulimia nervosa and 32 women with no history of a mental disorder including AN and BN (Stein & Corte, 2007). Outcome measures included the Eating Disorder Inventory (Garner, 1991) and a health behavior questionnaire designed to measure a full range of eating disordered behaviors over the last month. Results supported the model and showed that women with AN and BN had fewer positive and more negative self-schemas and higher interrelatedness compared to controls. Women in the BN group demonstrated a pattern information processing suggesting that they have a “fat” self-schema available in memory but women in the AN group did not. Finally, results of a series of path analyses showed that two of the self-concept variables (positive and negative self-schemas) indirectly influenced disordered eating attitudes and behaviors mediated through the availability

of a fat self-schema, while the third self-concept variable (interrelatedness) had a direct influence on eating disordered behaviors and on one of the eating disorder attitudes, drive for thinness.

Although the Stein & Corte (2007) results support the identity impairment model, the fact that women in the sample already had a diagnosable eating disorder raises questions about the direction of the relationship. One plausible competing hypothesis is that the eating disordered attitudes and behaviors caused the observed differences in the self-concept properties. Furthermore, since 84% of the clinical samples had a history of treatment for their eating disorder, it is possible that the observed self-concept properties are a product of treatment rather than a cause of the disorders. To address these competing hypotheses, a 12-month longitudinal study was designed to replicate our original study with a community based sample of college freshmen women who engaged in subthreshold levels of eating disordered behaviors and had no history of treatment for their behaviors.

Based on our earlier findings, we hypothesized that women engaging in subclinical levels of eating disorder behavior would have a fat body weight self-schema available in memory as evidenced by information processing indicators that include a higher rate of endorsement of fat relevant adjectives as self-descriptive, faster response latency times of positive endorsements of overweight adjectives and slower response latency times for negative endorsements. We also hypothesized that a self-concept comprised of few positive self-schemas, many negative self-schemas, and high interrelatedness would predict the availability of a fat self-schema in memory, which in turn, would prospectively predict increases in eating disorder behaviors. Self-concept properties were measured at two time points (baseline in freshman yr and 12 month follow-up at sophomore year) and eating disorder symptoms were measured at six-month intervals (baseline, 6 and 12 months). The college freshman to sophomore developmental transition was selected for

study because it is a peak period of onset of eating disorder symptoms and a period when symptoms consolidate into a stable disorder (Striegel-Moore, Dohm, Pike, Wilfley & Fairburn, 2006; Taylor et al., 2006).

Method

Participants

Participants included two groups of college freshmen women from a single large Midwestern university. The Disordered Eating Behaviors Group (DEB) was comprised of 77 college freshmen women with no history of eating disorder treatment who were currently engaging in at least one disordered eating behavior (food restricting/fasting, binge eating, vomiting, exercising for more than one hour/day, or using laxatives, diuretics or diet pills to control weight) and/or were amenorrheic for at least three consecutive months. The Control group was comprised of 41 college freshman women who had no history of disordered eating behaviors and no weight concerns.

Letters describing the study were sent to all incoming freshmen women and flyers were posted in dorms and across campus. Potential participants contacted the research office and were phone screened to determine eligibility. Women with any history of eating disorder treatment or taking any medication (except for birth control pills) were not eligible.

No differences were found between the DEB subjects and controls in age (18.2 vs 18.1 years) or race. Of the DEB group, 19.5% was minority (1.3% African-American, 13% Asian, 1.3% Hispanic, and 3.9% Mixed). In the Control group, 26.8 % was minority (7.3% African-American, 12.2% Asian, 0% Hispanic, and 7.3% Mixed). The Control group had a lower body mass index (BMI) than the DEB group (21.2 vs 22.1), $t(106)=2.02$, $p<.05$, but both groups were well within the normal range. Among women in the DEB group, eating disorder attitudes (EDI

scores) for Drive for Thinness and Body Dissatisfaction were in the clinical range (Garner, 1991) but the Bulimia scale score and the ED behaviors were at a subthreshold level (see Table1).

Of the 77 women in the DEB group at baseline, 56 (73%) completed data at the 6-month follow-up and 55 (72%) completed data at the 12-month follow-up. Of the 41 women in the Control group at baseline, 36 (88%) completed data at the 6-month follow-up and 39 (95%) completed data at the 12-month follow-up. Among women in the DEB group, no differences were found in age, race, or baseline BMI, EDI scores, self-concept variables or ED behaviors between those who were retained and those who dropped out. Similar comparisons for the control group were not completed due to the small size of the dropout group.

Measures

Self-Schemas. The number of valenced self-schemas was measured using an open-ended format questionnaire and employing a methodology developed by Markus (1977) to identify self-schemas. Participants were given a stack of 52 blank index cards labeled A through ZZ and were asked to write down all of the attributes that are "important to who you are." They were asked to write one self-defining attribute on each card and encouraged to use as many or as few cards as necessary to thoroughly describe themselves. Next, they were asked to rate the self-descriptiveness of each self-generated attribute on an 11-point scale and then to rate "the importance of the attribute to how you see yourself" also on an 11-point scale. Finally, they were asked to rate each attribute according to whether "you view the attribute as positive, negative or neutral." In keeping with previous work on self-schematicity (Kendzierski, 1988; Kendzierski & Sheffield, 2000, Kendzierski & Whitaker, 1997; Markus, 1977), attributes that were rated as highly self-descriptive *and* highly important (i.e., rated 8 – 11 on self-descriptiveness *and* importance scales) were classified as a self-schema. The number of positive (negative, neutral)

self-schemas was computed by totaling the number of self-descriptors that met the criteria for a self-schema and were rated as positive (negative, neutral). The validity of the self-descriptiveness and importance ratings as a means to identify self-schemas has been demonstrated (Kendzierski, et al., 1997; Markus, 1977) and test-retest reliability has been shown (Stein & Markus, 1990).

Information Processing Indicators of the Fat Self-Schema. The availability of a fat self-schema in memory was examined using trait adjective ratings (Rogers, Kuiper, & Kirker, 1977; Markus, 1977). Previous studies have shown that persons with a self-schema in a behavioral domain (schematics) process stimuli relevant to that domain differently than those with no self-schema (aschematics) in the domain. More specifically, schematics are more likely to endorse domain-specific adjectives as self-descriptive and their response latency times for these judgments are shorter than aschematics. Furthermore, when schematics make judgments that are contradictory to their self-knowledge (rating a schema-relevant stimulus as *not* self-descriptive), their response latency times for these judgments are *longer* than aschematics (Markus, Hammill, & Sentis, 1987).

For this study, stimuli were 63 appearance-related adjectives used previously by Markus et al. (1987) to measure body-weight self-schemas. The fat scale consisted of 10 adjectives (pleasantly-plump, chubby, strapping, roly-poly, overweight, dumpy, obese, stout, fat, pudgy). Internal consistency based on the self-endorsements was $\alpha = .87$. Ten adjectives (muscular, youthful, short, fair, freckled, blue-eyed, brown-eyed, blond, bow-legged, stooped) that were not correlated with the fat scale score were used to construct control scales for the endorsement rating and response latencies.

Participants who failed to respond to at least 7 of the 10 fat words *and* 7 of the 10 control words within the allotted word presentation time were deleted from the latency analyses. Separate fat and control word endorsement scores that reflect the proportion of the total number of fat and control items endorsed as "Me" were computed for each subject. Mean response latency time scores for the fat and control words were calculated for each subject separately for the "Me" and "Not Me" endorsements. A response latency time score (RLT) was computed as long as one RLT was obtained for the scale.

To minimize participant burden and simplify measurement of the availability of the fat self-schema at the 12-month follow-up, a closed-ended self-schema measure was administered at baseline and 12-months. The closed-ended self-schema scale consists of 14 bipolar sets of trait adjectives that are rated on an 11-point scale for self-descriptiveness and importance. One scale relevant to body-weight – thin-fat – is embedded in the 14-item scale. Extreme endorsements on the "fat" end of the scale (8-11 on self-descriptiveness and importance) were used to determine schematicity in the domain. Participants who endorsed points 8-11 on the fat end of the scale and concurrently rated fat as highly important (points 8-11) were considered fat schematic. To determine validity of the fat scale, those identified as fat schematic using the closed ended measure were compared to those fat aschematic on the fat-related adjective endorsement ratings and the response latency times (all measured at baseline). As expected, women identified as fat schematic endorsed a significantly greater proportion of fat-related adjective as self-descriptive (53% vs 12%, $p<.001$), response latency times for “me” endorsements were faster (1.17 sec vs 1.32 sec, $p<.01$), and not me endorsements were slower (1.26 sec vs 1.05 sec, $p<.001$) than those identified as fat aschematic. Together these results provide evidence to support the semantic differential scale as a valid measure of fat self-schema availability.

Eating Disorder Behaviors. A health behavior questionnaire was used to measure the frequency of engagement in the preceding month in a full range of eating disorder behaviors including fat/calorie restricting and fasting, excessive exercise (>1hr/day), bingeing, vomiting, laxative, diuretic, and diet pill use. The duration of amenorrhea was also measured. Each behavior was measured on a 5-point scale ranging from no involvement to daily involvement. For amenorrhea, the 5-point scale ranged from regular cycles to 12 or more consecutive months with no menstrual period. To avoid a scale score that unequally reflected binge-purging type behaviors (5 of 8 behaviors assessed), separate means for the binge-purging-type behaviors and restrictive-type behaviors were computed and averaged to form a disordered eating behaviors composite score. This measure correlated with behavioral frequencies measured with a diagnostic screening interview in a previous study of clinically diagnosed women with eating disorders (Stein & Corte, 2007).

Procedure

Baseline data were collected in 4 sessions over a one-month period of time. To minimize the effects of experimenter demand on self-concept and eating disorder measures, participants were informed that the study concerned how college women's thoughts and feelings about themselves affect their health behaviors. During Session 1, participants completed the closed-ended self-schema measure, EDI, health behavior questionnaire, and other measures not reported here. During Session 2, the open-ended self-schema measure was completed first to avoid priming effects, other measures not reported here were then completed, followed by height and weight. During Session 3, the information processing measures of the body-weight self-schema were completed. The adjectives were presented on a Power MacIntosh computer which recorded participants' Me/Not Me endorsements and RLT. Each adjective appeared individually at the

center of the monitor screen for a maximum of 2000 ms. A 2000 ms interval was interpolated between the subject's response and presentation of the next adjective. If the 2000 ms lapsed before an endorsement was made, both the endorsement and RLT variables for the item were considered missing. Participants responded by pushing one of two buttons on a computer mouse labeled 'Me' and "Not Me'. The 'Me' button was positioned in the subject's dominant hand. In session 4, after completing other measures not reported here, height and weight were measured.

Follow-up data were collected in one session at 6 months and again at 12 months. At the 6-month follow-up, the health behaviors questionnaire and other measures not reported here were completed, followed by height and weight. At the 12-month follow-up, the open-ended self-schema measure, closed-ended self-schema measure, health behaviors questionnaire, and other measures not reported here were completed, followed by height and weight. Participants were paid $132 for completing the 6 sessions ($7 after session 1, $25 after session 4, $25 after the 6-month follow-up, and $75 after the 12-month follow-up).

Data Analysis

Repeated measures analyses of variance and covariance were used to test the hypotheses that women engaging in subclinical levels of eating disorder behaviors would differ from Controls in the structural properties of the self-concept and in the availability of a fat self-schema in memory. Path analyses were used to test the hypothesis that the number of positive and negative self-schemas and interrelatedness predicts the availability of a fat body weight self-schema, which in turn predicts disordered eating attitudes and behaviors concurrently and prospectively. Additional regression analyses were also completed to examine the role of positive and negative self-schemas and interrelatedness on the fat self-schema over time.

Results

Pattern of ED Behaviors Across the Freshman to Sophomore Year

On average, there was remarkable stability in the pattern of ED behaviors across the first year of college for women in the DEB group (see Table 2). A repeated measures ANOVA showed no significant differences in the level of disordered eating across the year ($F<1$, p=ns) suggesting general persistence and stability of symptoms across the first college year.

Group Differences in the Organizational Properties of Self-Concept

Valenced Self-Schemas. The number of valenced self-schemas by group adjusted for differences in BMI is shown in Figure 1. To address the hypothesis that women engaging in subclinical levels of eating disorder behavior would have a self-concept characterized in part by fewer positive and more negative self-schemas compared to controls, an ANCOVA of the number of self-schemas classified by self-rated valence at baseline was completed. Because of group differences in BMI, this variable was used as a covariate. Results showed that the DEB group had significantly more negative self-schemas (Adj. $M = 3.91$) compared to controls (Adj. $M = 1.19$), $p < .001$, but contrary to predictions, the DEB group did not have fewer significantly fewer positive self-schemas (Adj. $M = 8.42$) than controls (Adj. $M = 9.37$), $p = .39$.

Interrelatedness. The hypothesis that women in the DEB group would have higher interrelatedness among their self-schemas compared to controls was also examined using an ANCOVA with BMI as a covariate. Contrary to predictions, the degree of interrelatedness did not differ significantly by group (Adj. Means: DEB=0.19, Control=0.18), p =.44.

Fat Self-Schema

To test the hypothesis that college women engaging in subclinical levels of ED behaviors (DEB group) would differ from controls in their susceptibility to cultural standards regarding body weight /shape, and therefore, would be more likely to define themselves as fat, analyses of

covariance on the adjective endorsements and response latency times were completed. Assessment of the fat self-schema was completed at baseline only. To control for possible group differences in general information processing, parallel responses to “other” words were used as a covariate in the analysis of each of the dependent variables. In addition, to control for objective differences in body weight between groups, BMI was also used as a covariate in these analyses.

Adjective Endorsements

In the analysis of the proportion of fat adjectives endorsed as self-descriptive (i.e., "me" ratings), both BMI (F=11.34, p=.001) and control endorsed as self-descriptive (F=6.67, p=.01) were significant covariates. As expected, the main effect for group was significant, $F(1,109)=52.50$, $p<.001$. Pairwise comparisons showed that the DEB group endorsed as self-descriptive a significantly greater proportion of the fat words (adj. M=37.2%) relative to Controls (adj. M=7.3%), $p<.001$.

Response Latencies for Adjective Endorsements

To determine whether the groups differed according to their efficiency in processing the body-weight adjectives, the idiographic mean response latencies to the fat adjectives were examined. Because 66% (n=27) of the women in the control group did not endorse even one fat word as self-descriptive, response latencies for ‘Not Me’ judgments were used in the analysis. Results of previous studies have shown that individuals with a self-schema in a given domain make ‘*Not Me*’ *judgments* of schema-consistent adjectives *more slowly* than those with no self-schema in the domain (Markus, 1977; Markus et al., 1987). RLT for the ‘Not Me’ judgments of the control words was a significant covariate, $F(1,107)=34.25$, $p<.001$, but BMI was not, $F<1$. A significant main effect for group was also found, $F(1,101)=40.96$, $p<.001$. Pairwise comparisons

showed that the DEB group was significantly slower to make 'Not Me' judgments for the fat adjectives (adj. *M*=1.21 sec.) compared to Controls (adj. *M*=0.96 sec.).

Self-Concept as a Concurrent and Prospective Predictor of Disordered Eating Behaviors

Path analyses were used to test our theoretical model that posits that organizational properties of the self-concept (few positive and many negative self-schemas and high interrelatedness) predict the fat self-schema score, which in turn predicts disordered eating behaviors concurrently and prospectively (6 and 12 months later). A composite measure of the two information-processing indicators of the fat self-schema (proportion of fat adjectives endorsed as "me" and RLT for "not me" judgments of fat adjectives) was computed to reduce multicollinearity between these two variables (r=.61). The Z scores for these two variables were summed to compute the composite measure of the fat self-schema that was used in the path analyses. Unadjusted group means and standard deviations, and correlations for all variables in the path analyses are in table 2.

Predicting Concurrent ED Behavior

In the first model to predict ED behaviors concurrently (at baseline), the number of positive and negative self-schemas and interrelatedness were used to predict the fat self-schema score. BMI was also entered in the initial step as a control variable because of group differences in BMI. In the second step, the four self-concept variables and BMI were used to predict ED behaviors at baseline. The model was significant, $F(5,101)=16.26$, $p<.001$, and accounted for 45% of the variance in ED behaviors. The number of positive self-schemas negatively predicted the fat self-schema score (ß=-.15, p=.06), and the number of negative self-schemas (ß.49, $p<.001$) and BMI (ß=.37, $p<.001$) positively predicted the fat self-schema score. Interrelatedness, however, was not a significant predictor (ß=.03, p=.71). The fat self-schema in turn predicted ED

behaviors (ß=.57, $p<.001$); Sobel tests showed that the fat self-schema partially mediated the effects of negative self-schemas ($Z=4.29$, $p<.001$) on ED behaviors, but did not mediate the effects of positive self-schemas on ED behaviors ($Z=1.79$, $p=.07$). In addition to its indirect effect through the fat self-schema, negative self-schemas also directly contributed to ED behaviors (ß=.17, $p=.06$). See top panel of figure 2 for graphic depiction of path analysis.

Predicting ED Behaviors 6 months later

The same model was used to predict ED behaviors 6 months later but baseline ED behaviors was also included as a predictor. The model was significant, $F(6,75)=28.57$, $p<.001$, and accounted for 70% of the variance in ED behaviors. Not surprisingly, baseline ED behaviors was a strong predictor (ß=.70, $p<.001$) of ED behaviors 6 months later. However, it is important to note that the fat self-schema remained a significant predictor (ß=.23, $p=.016$) even after controlling for baseline ED behaviors. Sobel tests showed that the fat self-schema significantly mediated the effects of negative (but not positive) self-schemas on ED behavior 6 months later ($Z=1.91$, $p=.05$). Also, BMI negatively predicted ED behaviors 6 months later (ß=-.16, $p=.026$) although it did not directly contribute to ED behaviors in the first (concurrent) model. This might suggest that as BMI decreases as a result of ED behaviors over time, it also begins to motivate these behaviors. See middle panel of figure 2 for graphic depiction of path analysis.

Predicting ED Behaviors 12 months later. Finally, the same model was used to predict ED behaviors 12 months later. Baseline ED behaviors was again included as a predictor in this model. The model was significant, $F(6,75)=16.54$, $p<.001$, and accounted for 57% of the variance in ED behaviors. Once again, baseline ED behaviors was a strong predictor (ß=.55, $p<.001$) of ED behaviors 12 months later. However, the fat self-schema continued to be a significant predictor of ED behaviors 12 months later (ß=.32, $p=.013$) even after controlling for

baseline ED behaviors. Sobel tests, however, showed that the fat self-schema did not significantly mediate the effects of positive or negative self-schemas on ED behavior 12 months later. BMI was no longer a significant predictor. See bottom panel of figure 2 for graphic depiction of path analysis.

Self-Concept Variables at Baseline Predict Increase in Fat Self-Schema 12 Months Later

To determine whether the underlying self-structure variables (positive and negative self-schemas and interrelatedness) strengthen the fat self-schema over time, regression analyses were completed using baseline self-structure variables to predict the fat self-schema (closed-ended measure) score 12 months later. We began by predicting each component of the fat-self schema--self-descriptiveness of 'fat' and the importance of 'fat'--separately. BMI and the corresponding baseline fat self-schema score component were also included as predictors. Regression analyses showed that the number of positive self-schemas predicted the *self-descriptiveness* of 'fat, whereas the number of negative self-schemas predicted the *importance* of 'fat' to the self-definition. More specifically, the number of positive self-schemas at baseline (ß = -.20, p = .05) negatively predicted the self-descriptiveness score for 'fat' one year later (controlling for baseline self-descriptiveness), whereas the number of negative self-schemas at baseline (ß = .18, p = .05) positively predicted the importance rating for 'fat' one year later (controlling for baseline importance rating). When we combined both components of the fat self-schema (mean of both the descriptiveness and importance ratings), results showed that the number of negative self-schemas at baseline (ß=.12, p = .037) significantly predicted the fat self-schema score 12 months later, controlling for the baseline fat self-schema score (ß=.80, p < .001), $F(5,87) = 55.4$, $p<.001$, $R^2 = 76$.

Do ED Behaviors Predict Self-Concept Disturbances?

To rule out the possibility that the ED behaviors themselves negatively influenced the organizational properties of the self-concept at the 12-month follow-up, regression models were completed using baseline ED behaviors to predict the number of positive self-schemas, number of negative self-schemas, and interrelatedness 12 months later. In each analysis, the related baseline self-concept variable was also used as a predictor. Results showed that ED behaviors at baseline did not predict any of the self-concept variables 12 months later (all *p*s $\geq$ 15).

Discussion

Results of this study provide new support for the identity impairment model and the theoretical proposition that disturbances in the overall array of self-cognitions contribute to the development of disordered eating behaviors and perhaps to the onset of diagnosable levels of the eating disorders. Consistent with the findings from our previous cross sectional study with a sample of women with clinically diagnosed AN and BN, the results of this study show that a self-concept comprised of few positive and many negative self-schemas predicts the availability of a fat self-schema, which in turns predicts increases of disordered eating behaviors in college women as they transition from their freshman to sophomore year. In addition, results showing a relationship between the number of valenced self-schemas and the strengthening of the fat self-schema suggest a plausible mechanism through which the cognitive vulnerabilities are structuralized into an enduring pattern of behavior.

Results of this study convincingly show that the fat self-schema plays an important role in the escalation of disordered eating behaviors over time. In this sample of women who have no history of treatment for an eating disorder, availability of a fat self-schema in the freshman year predicted increases in level of disordered eating behaviors 6 and 12 month later. This suggests

that defining oneself as fat is an important contributor to the development of eating disorder behavior, and is not related to treatment or treatment-seeking. These findings are consistent with our previous work that has shown that in a cross sectional study of women with diagnosed anorexia nervosa and bulimia nervosa the fat self-schema is highly predictive of disordered eating attitudes and behaviors (Stein & Corte, 2007; Stein & Hedger, 1997). In addition, the findings of our study are consistent with a large collection of other studies that have shown a link between body image disturbances and disordered eating behaviors (Taylor et al., 2006) and in fact raise a question about whether a fat self-definition may be better viewed as an early symptom of the eating disorder rather than an etiological factor. Contrary to the popular view that conceptions of the self as fat are normative, results of both of our studies suggest that only a subset of young adult women have an elaborated and stable cognitive structure of the self as fat and those who do consistently demonstrate patterns of disordered eating behavior.

A critical question that has surfaced in the eating disorder literature has to do with what causes some women to focus on body weight as an important source of self-definition. Results of this study show that the number of valenced self-schemas predict the availability of a fat self-schema at baseline and contribute to the strengthening of this self-cognition over time. The number of positive schemas influenced the availability and strengthening of the fat self-schema but showed no direct or indirect effects on the level of disordered eating behaviors. Fewer positive self-schemas predicted the availability of a fat self-schema at baseline and strengthened the self-descriptiveness of ‘fat’ over time. The number of negative self-schemas had an indirect effect on increases in disordered eating behaviors and this effect was mediated by the fat self-schema. Having many negative self-schemas predicted increases in the level of disordered eating behaviors at 6 and 12 months. In addition, the number of negative self-schemas positively

predicted increases in the importance of 'fat' to one's self-definition over the freshman to sophomore year. These findings suggest that although positive and negative self-schemas function somewhat differently, together they increase vulnerability to patterns of disordered eating not only at the clinical but also subclinical levels of severity.

The finding that the two groups did not differ in the level of interrelatedness among the self-schemas is contrary to our previous findings. Women with AN and BN had higher levels of self-schema interrelatedness and this organizational property of the self-concept was predictive of eating disordered behaviors and certain ED attitudes (Stein & Corte, 2007). One plausible explanation is that an eating disorder is a *cause* rather than an outcome of high self-schema interrelatedness. As the fat self-schema and disordered eating behaviors become a more dominant aspect of one's life, related conceptions of the self may increase their accessibility in working memory and intrude on other aspects of one's life. For example, as conceptions about the self as fat and thoughts about food increase, they may be active in working memory in diverse contexts such as the academic class, with thought about the self as the "fattest woman in this class." Since interconnectedness is likely the product of concurrent activation of self-cognitions (Nowak, Vallacher, Tesser, & Borkowski, 2000), the chronic accessibility of eating disordered self-cognitions may function to increase the formation of interconnections.

Although the longitudinal design of the study is an important step in teasing out the causal role of self-concept properties in the etiology of the eating disorders, longer follow-up is needed to determine whether self-concept properties predict formation of diagnosable eating disorders. As mentioned above, the subclinical sample addressed in this study is likely to be highly heterogeneous with only a small proportion progressing to a full anorexic or bulimic syndrome. Hence, additional longitudinal work is needed to further clarify the causal link

between the self-concept and consolidation of behaviors into severe levels of the disorders. In addition, more longitudinal research is needed to more fully investigate the causal relationship between the valenced number and organization of the total array of self-schemas and the formation of the schema of the self as fat. The identity impairment model suggests that the valenced content and organization of self-schemas are developmental vulnerabilities that lead to the formation of the body weight self schemas as maladaptive but culturally sanctioned means of attaining a clear and valued self-definition. In this study, indicators of the fat self-schema were measured simultaneously with properties of the self-schemas and hence, causality cannot be firmly established. A longitudinal study of school age children is necessary to fully establish the developmental trajectory of these components of the self-concept.

However, despite the limitations, the results of this study provide important new data supporting the long held clinical conviction that properties of the overall collection of self-cognitions are a fundamental vulnerability that contribute to formation of eating disordered behaviors. These findings are consistent with the view that while body image disturbances and cognitions of the self as fat play a proximal role, the array of positive and negative self-schemas are a basic and fundamental factor in escalating patterns of disordered eating behaviors over time. Together these findings suggest that interventions designed to prevent behavioral consolidation or promote long term recovery and cure must focus on the array of self-schemas available in memory, striving to increase the positive conceptions of the self while diminishing the accessibility and importance of the negative selves.

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Figure 1. *Organizational Properties of the Self-Concept by Group at Baseline (top) and 12-month Follow-up (bottom) Adjusting for Differences in BMI.*

Figure 2. *Graphic depiction of path analyses predicting ED behavior at baseline, 6 months, and 12 months.*

Table

Table 1. *Eating Disorder Inventory Means and (SD) and disordered eating behaviors at baseline.*

	DEB Group (*n*=77)	Control Group (*n*=41)
EDI Body Dissatisfaction		
Mean (SD)	18.7 (6.8)	2.4 (3.8)
Range	0-27	0-18
EDI Drive for Thinness		
Mean (SD)	13.4 (5.4)	0.2 (0.5)
Range	0-21	0-3
EDI Bulimia		
Mean (SD)	3.9 (4.3)	0.3 (0.9)
Range	0-20	0-4
% Restricting	83.1	--
% Fasting	57.7	--
% Amenorrheic X 3 mos	5.6	--
% Bingeing	49.4	--
*Mean # times/mo (SD)	5.4 (8.6)	
% Vomiting	32.5	--
*Mean # times/mo (SD)	8.56 (15.1)	
% taking Laxatives	10.4	--
*Mean # times/mo (SD)	3.6 (2.1)	
% taking Diet Pills	11.7	--
Mean # times/mo (SD)	24.3 (16.7)	
% taking Diuretics	2.6	--
*Mean # times/mo (SD)	3.5 (0.7)	
% Exercising > 1 hour/day	33.8	--
*Mean (SD) # times/mo	3.8 (7.4)	

Note. * Only those engaging in behavior included in analysis.

Table

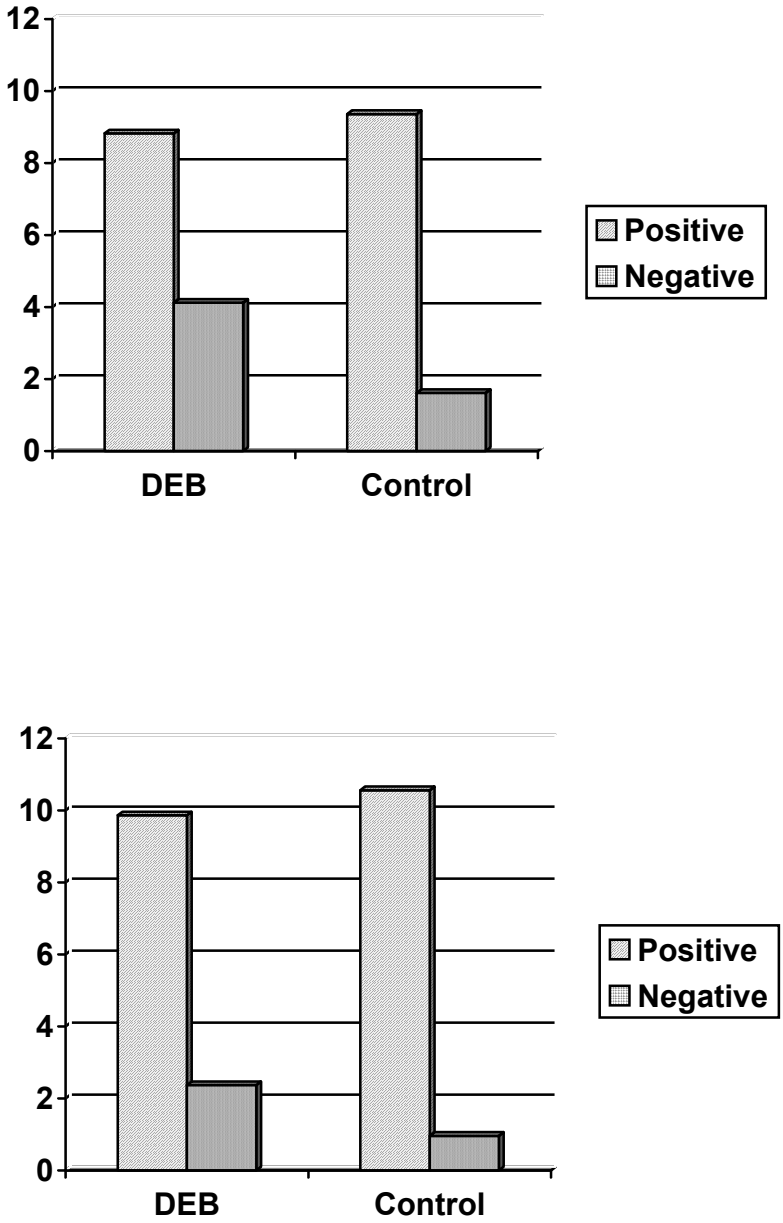
Table 2. *Correlations and group means and standard deviations for all variables used in path analyses*.

	Pos	Neg	Interrel.	BMI	Fat SS	ED Beh Baseline	ED Beh 6-mo	ED Beh 12-mo
Pos		-.04	.03	.05	-.14	-.08	-.05	-.13
Neg			.07	-.01	.49***	.44***	.36***	.33**
Interrel.				.07	.08	.12	.08	.08
BMI					.35***	.21*	.09	.07
Fat SS						.65***	.56***	.53***
ED Beh. Baseline							.78***	.67***
ED Beh 6-mo								.70***
ED Beh 12-mo								
Mean (SD)								
DEB	8.66 (5.78)	3.90 (3.57)	0.19 (0.10)	22.15 (2.39)	0.76 (1.73)	1.26 (0.50)	1.27 (0.46)	1.29 (0.49)
Control	9.27 (4.85)	1.27 (1.98)	0.18 (0.12)	21.25 (1.98)	-1.36 (0.62)	0.10 (0.15)	0.58 (0.15)	0.61 (0.24)

Note. Pos = # positive self-schemas; Neg = # of negative self-schemas; Interel. = interreatlatedness; Fat SS = fat self-schema (Z) score; ED Beh = ED Behaviors composite score. * $p \leq .05$; ** $p \leq .01$; *** $p < .001$

Figure

Figure 1. *Organizational Properties of the Self-Concept by Group at Baseline (top) and 12-month Follow-up (bottom) Adjusting for Differences in BMI.*



Figure

Figure 2. *Graphic depiction of path analyses predicting ED behavior at baseline, 6 months, and 12 months.*