THE ROLE OF SELF-RELATED AND SELF-DISCREPANT COGNITIONS IN ANOREXIA NERVOSA AND RELATED PSYCHOPATHOLOGY

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Abstract

This literature review explores clinical research and theory concerning the role of self in anorexia nervosa. Within this topic, a special focus is given to cognitive theories and the cognitive behavioral treatment model. Self-discrepancy theory, a social-cognitive framework that links self-related cognitions with affect, will be introduced and reviewed in detail. Research that has utilized self-discrepancy theory to study eating disorders, body image, and related phenomena will also be summarized. A specific focus on the limitations of existing research (e.g., non-clinical samples, inconsistent findings) that has linked these phenomena, as well as new utilizations of the theory in clinical interventions will be given. Finally, and a rationale for the continued use of self-discrepancy theory in eating disorder research is offered.
CHAPTER 1: REVIEW OF THE LITERATURE

The following literature review focuses on the role of self-related cognitions in anorexia nervosa (AN), specifically examining how general, rather than shape and weight-related thoughts exclusively, may relate to eating disorder pathology. To begin, information regarding diagnosis, prevalence, mortality, and outcome of AN will be presented. Subsequently, cognitive theories and the cognitive behavioral treatment model will be reviewed with the intention of examining how sense of self has been conceptualized in this population. Next, self-discrepancy theory will be introduced and offered as a potentially valuable approach to understanding self-related cognitions and their relation to affect. Studies that have employed self-discrepancy theory as a framework to understand body image as well as eating disorder thoughts and behavior will be reviewed. Gaps in the self-discrepancy literature will be highlighted in order to present a rationale for continued use of the theory in the study of eating disorders. Finally, implications for self-discrepancy theory in AN-specific treatment and research will be noted.

Anorexia Nervosa – Introduction and Background

Anorexia nervosa is a serious mental disorder which has been recognized by the American Psychiatric Association since 1980, when it was included in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM). According to the DSM-V, AN is characterized by significantly low body weight considering age and height, an intense fear of fatness/weight gain or the persistence of behavior that interferes with weight gain, and either a significant disturbance in the way body image is perceived, a denial of the seriousness of being underweight, or an undue influence of body weight/shape on self-evaluation (American Psychiatric Association, 2013). DSM taxonomy also outlines two subgroups based on the
presence of bingeing and purging: anorexia nervosa, restricting subtype (AN-R) and anorexia nervosa, binge-purge subtype (AN-BP).

Estimates of the rates of AN in the population fluctuate depending on research sample and the methodology employed to assess prevalence. It is likely that studies employing clinical samples tend to underestimate the total number of individuals suffering from AN in the community (Favaro, Ferrara, & Santonastaso, 2003). Hoek and van Hoeken (2003) conducted a literature review of the point prevalence of eating disorders and found that, in the United States and Western Europe, approximately 0.3% of young women in the general population are diagnosed with AN. A more recent investigation by Hudson, Hiripi, Pope, and Kessler (2007) used a nationally representative sample of adults in the United States and reported the lifetime prevalence of AN to be 0.9% in females and 0.3% in males. In this sample, the mean age of onset for the disorder was 18.9 years and the average duration of illness was 1.7 years. Long-term follow-up studies have shown that while one-third of patients with AN tend to recover or only have residual features of the disorder, less than half will experience a full recovery and 20% will remain chronically ill (Steinhausen, 2002).

Eating disorders have been categorized as one of the most debilitating conditions young women can face (Mathers, Vos, Stevenson, & Begg, 2000). Anorexia nervosa in particular has been found to have the highest mortality rate of all psychiatric disorders and individuals with AN tend to have a higher annual mortality rate than those diagnosed with other eating disorders (Arcelus, Mitchell, Wales, & Nielsen, 2011). A recent meta analysis that examined the course of the disorder across patient outcome studies found mortality rates ranging from zero to eight percent, with the average being 2.8% (Keel & Brown, 2010). A host of grave medical complications are associated with AN and can severely complicate the course of the disorder.
Sufferers of AN may face dental, cardiorespiratory, gastrointestinal, endocrine, and dermatologic issues. Additionally, suicide is elevated in this population; one out of every five patient deaths is the result of a completed suicide (Arcelus et al., 2011). Taken together, these findings suggest that AN can have serious and often dire consequences for individual sufferers.

**Assessment and Treatment**

While clinically low weight is a fairly unambiguous diagnostic criterion, assessment of the cognitive components of AN (i.e., intense fear of gaining weight, body image disturbance, influence of body weight/shape on self-evaluation, and/or denial of the seriousness of low body weight) can be more difficult. In a review of the cognitive symptoms of eating disorders, Becker, Eddy, and Perloe (2009) noted that clients may not endorse cognitive criteria because:

(1) the individual does not recognize or acknowledge symptoms due to limited insight, minimization, or denial of the symptoms and (2) the individual recognizes symptoms but either does not disclose them or conceals them. This denial, non-disclosure, and/or concealment may relate to perceived stigma, concerns about social desirability, or investment in maintaining the symptoms. (p. 612)

In addition, social norms and the broader cultural context may influence a patient’s self-report or the clinician’s evaluation of symptoms such as weight/shape concerns or clinical distress (Becker et al., 2009). Amidst these concerns, there have been efforts among eating disorder researchers to reformulate the diagnostic criteria for AN in preparation for the fifth edition of the DSM to be published in 2013. The word “refusal” in criterion A (i.e., refusal to maintain body weight at or above a minimally normal weight for age and height) will likely be changed to reflect behavioral indicators of restriction due to concerns that “refusal” may be pejorative and is difficult to assess (Workgroup for Classification of Eating Disorders in Children and Adolescents, 2007; Becker et al., 2009). Similarly, criterion B (i.e., intense fear of gaining weight or becoming fat, even though underweight) will be amended to include behavior that persistently interferes with weight
gain as many individuals may not endorse a “fear of weight gain.” The most substantial change recommended is the removal of the amenorrhea criterion. Following an analysis of the research on amenorrhea, Attia and Roberto (2009) concluded that menstrual status may have some clinical value in providing insight into patient nutrition but does not represent a meaningful threshold for differential diagnosis or illness severity. Similarly, the criterion excludes individuals for whom the existence of menstrual cycles is irrelevant such as men and pre-menarchal girls (Attia & Roberto, 2009).

The shift from cognitive to behavioral indicators of AN is designed to make the diagnostic process simpler, and the changes generally appear to be agreed upon within the eating disorder research community. Significantly less consensus exists with regard to how the disorder should be treated, as consistently effective evidence-based treatments for adults with AN remain elusive (Hay, Bacaltchuk, Claudino, Ben-Tovim, & Young, 2003). There have been relatively few randomized clinical trials for AN; many studies have struggled to recruit participants or have suffered from high rates of attrition (Mahon, 2000). The lack of empirical evidence for effective treatments for AN has correspondingly resulted in vague therapeutic recommendations. For example, the National Institute for Health and Clinical Excellence (NICE), an organization that bases their clinical recommendations on treatment outcome research, was not able to recommend specific interventions for treatment of anorexia nervosa (NICE, 2004). Instead, NICE broadly offered that psychological treatment of AN focus on eating disorder behaviors, attitudes about weight and shape, and general psychosocial issues (NICE, 2004).

Cognitive therapeutic approaches, such as Enhanced Cognitive Behavioral Treatment (CBT-E; Fairburn, 2008), have demonstrated some success in treating eating disorders (Fairburn et al., 2009). However, cognitive therapies like CBT-E have shown better results with bulimia
nervosa (BN) compared to low-weight AN patients (Byrne, Fursland, Allen, & Watson, 2011).

CBT-E rests on the transdiagnostic theory (Fairburn, Cooper, & Shafran, 2003), a proposition that all eating disorders are part of a single diagnostic category and that certain core mechanisms maintain psychopathology as symptoms and presentations shift (e.g., between AN, BN and subclinical variants of both). Specifically, the transdiagnostic theory focuses on the importance of weight and shape in self-evaluation as the key maintenance factors of eating pathology. Whereas most people stake their self-worth in work performance, relationships, or hobbies, individuals with eating disorders define themselves by body shape, weight, and/or their ability to control these factors (Fairburn, 2008). According to CBT-E, this pathological approach to self-evaluation provides the motivation for dietary restriction, frequent weight and shape monitoring, and a host of other behaviors commonly seen in patients with eating disorders (Fairburn, 2008). High rates of diagnostic migration within individuals and the preponderance of eating disorder not otherwise specified diagnoses are often cited as evidence in support of a focus on the similarities in eating disorder diagnoses (e.g., Fairburn & Cooper, 2007).

While the transdiagnostic view provides a compelling cognitive theory and a well-developed corresponding treatment, some scholars (e.g., Anderson & Maloney, 2001; Cooper, 2005) have noted that a focus on shape and weight-related cognitions may overlook other important cognitive factors. For example, the transdiagnostic view does not provide much insight into core cognitions, automatic thoughts, the role of emotions, or a broader self-evaluative scheme that may underlie shape and weight concerns. Incorporating these elements may be especially useful for complex eating disorder presentations that are resistant to traditional CBT (Waller, Kennerley, & Ohanian, 2007).

Cognitive Theories of Eating Disorders
Early cognitive theories of eating disorders have emphasized weight and shape concerns but have also offered hypotheses regarding more general thought processes and their developmental origins. In addition to weight and shape distortions, it has been suggested that individuals with AN suffer from a global sense of ineffectiveness and failure (Bruch, 1973; Guidano & Liotti, 1983). In fact, Guidano and Liotti (1983) stipulated that weight and shape-related distortions and the misperception of hunger cues were a manifestation of a core cognition of the self as inept. This model also proposed that individuals with AN acquired a belief early in life that relationships and the emotional validation that stem from them cannot occur until perfection is achieved. It was also thought that individuals with eating disorders may develop a belief that any attempt to share thoughts or feelings with others will result in rejection or criticism. As such, the development of autonomy and self-expression in patients with AN was believed to be severely impaired. It is important to note that Guidano and Liotti’s (1983) theory was based largely on clinical observations; however, several researchers have investigated cognitions in AN to uncover broader patterns of thinking in this population.

Taking a cognitive approach, scholars have argued that schemas, or unconditional core beliefs, may have a role to play in the etiology and maintenance of eating disorders. While not limited to beliefs about the self, studies of schemas in eating disorders have suggested commonalities in the schema content (e.g., core beliefs) and processes (e.g. methods of affective control) in these populations (for review see Waller et al., 2007). In two comprehensive reviews of the literature pertaining to cognitive theory and research in eating disorders, Cooper (1997, 2005) hypothesized that the core self-beliefs of individuals with AN center on global negative self-evaluation, as differentiated from self-evaluation based solely on weight and shape. Such cognitions can be difficult to assess outside of psychotherapy because many eating disorder
assessment instruments focus exclusively on the core symptoms of the disorder. As such, researchers have used semi-structured interviewing to uncover underlying beliefs about the self in AN. Turner and Cooper (2002) used this method to compare the cognitions and affect of eighteen women receiving outpatient treatment for AN, with those of eighteen female dieters, and eighteen female controls. The authors asked participants to identify a situation in which they experienced eating, weight, and shape-related concerns. Participants were then queried about the nature, duration, and severity of the affect they experienced and a downward arrow technique was employed to explore the nature and origin of automatic thoughts, assumptions, and self-beliefs. Once negative self-beliefs were identified, the authors asked participants how such cognitions might impact eating behavior. Their results suggested that the AN participants had more general negative self-beliefs (e.g., I’m bad, I’m lazy) in addition to the expected elevations in negative weight and shape-related appraisals. The patients with AN in this sample also reported that dieting was a means to overcome distress caused by negative self-beliefs and to gain the acceptance of themselves and others. The origins of negative self-beliefs were investigated by asking questions such as, “what is your first memory of these beliefs?”, “how old were you?” and “what was happening in your life at the time?” Interestingly, all of the AN participants were able to identify the origin of their negative self-beliefs in early experience (Turner & Cooper, 2002). The authors did not elaborate about the nature of these experiences and note that causality between early experiences, negative self-beliefs, and eating disorder symptoms cannot be assumed. However, the evidence from this study suggests that negative self-beliefs play an important role in eating pathology. In a similar vein, Woolrich, Cooper, and Turner (2006) uncovered six themes that distinguished the negative self-beliefs of women with AN from non-clinical participants based on semi-structured interviews. The self-beliefs of the
AN participants were organized around themes of powerlessness, failure, defectiveness, unattractiveness, worthlessness, and emptiness. In this sample, dietary restriction and “placating others” were both found to be prominent means for reducing the cognitive and emotional distress caused by negative self-beliefs. This line of research lends merit to the supposition that negative cognitions outside the realm of shape and weight may be present and clinically relevant in women with AN. However, given that the aforementioned studies’ conclusions are based on self-report interviews with women already diagnosed with AN and were studied by one group of investigators, there are still unanswered questions with regard to self-beliefs and their relation to eating pathology. Theories that include self-beliefs would be useful as evidence has suggested that negative cognitions beyond those focused on weight and shape are important in this population.

**Self-Discrepancy Theory**

Recently, eating disorder researchers have utilized self-discrepancy theory (Higgins, 1987) to investigate pathology maintenance models of AN because it is thought that incongruities within one’s self-concept can induce negative affect and motivate eating disorder behavior (Engel et al., 2005). Self-discrepancy theory is a cognitive model that assumes negative emotions, such as sadness or frustration, may be the result of discrepant beliefs individuals hold about themselves. In this context, a discrepancy refers to an incompatibility between self-beliefs, for example, believing oneself to be shy while ideally desiring to be extroverted. Within the self-discrepancy literature, self-beliefs are often referred to as “traits” or “attributes” and these terms are used interchangeably. According to Higgins (1987), self-discrepancy theory was developed with the following goals:

1. to distinguish among different kinds of discomfort that people holding incompatible beliefs may experience,
2. to relate different kinds of emotional vulnerabilities
systematically to different types of discrepancies that people may possess among their self-beliefs, and (c) to consider the role of both the availability and the accessibility of different discrepancies people may possess in determining the kind of discomfort they are most likely to suffer. (p. 319)

Self-discrepancy theory organizes beliefs about the self into three primary domains: the actual self, the ideal self, and the ought self. The actual self refers to attributes that an individual believes they truly possess. The ideal self consists of attributes the individual aspires to or would ideally like to possess. Lastly, the ought self is made up of attributes that an individual believes it is their duty or obligation to possess. The type and degree of self-discrepancy is said to cue a particular affective response. Actual-ought discrepancies, which may represent the violation of prescribed duties or expectations of punishment, are thought to be distinctly associated with agitation-related emotions such as, fear, worry, and guilt (Higgins, Bond, Klein, & Strauman, 1986). Alternatively, actual-ideal discrepancies may be predictive of dejection-related emotions, such as sadness, disappointment, shame, and frustration because the individual senses she cannot obtain desired positive outcomes.

Self-discrepancy theory also includes distinctions between the sources of self-related cognitions, which Higgins (1987) termed “standpoints on the self” (p. 321). Standpoints on the self refer to whose perception is being considered—either the individual’s perception or those of significant others. When notions about the self are defined primarily by the individual’s own standpoint, they are referred to as actual/own, ideal/own, and ought/own. The actual, ideal, and ought domains can also be defined from an individual’s perception of significant others’ judgment of them. For instance, the attributes in the actual domain from the standpoint of a significant other could be assessed by asking, “What are the attributes your parents think you actually possess?” Domains that are determined by significant others’ standpoints are referred to as actual/other, ideal/other, and ought/other. Self-discrepancy theory assumes that self-beliefs
may differ depending on their source; an individual may believe she is lazy (actual/own) but also believe her mother thinks she is hard-working (actual/other). Researchers have commonly used the standpoint of mothers, fathers, and romantic partners as unique but important perspectives in self-discrepancy studies because they represent perspectives that can be influential to an individual’s sense of self. Standpoints on the self allow for a flexible means of assessing and comparing self-beliefs and social cognitions.

An individual’s self-concept is thought to be composed of both their actual/own and actual/other beliefs since these domains are composed of the characteristics that the person believes they possess. In contrast, an individual’s self-evaluative standards are composed of their own and others’ ideal and ought beliefs. Hence, self-discrepancy is the mismatch between self-concept (actual domains) and self-evaluative standards (ideal and ought domains). According to self-discrepancy theory, individuals are motivated to bring their self-concept in line with valued self-evaluative standards.

Higgins (1987) theorized that availability, or the amount of distress that self-discrepancies can produce, will depend on the degree of mismatch between beliefs. A mismatch is determined by comparing the beliefs in the domains of the self. For instance, if traits in the actual domain are synonymous or largely similar to traits in the ideal domain, self-discrepancy and its associated distress would be minimal or not available. If traits are antithetical to one another, such that an individual might identify an ideal trait as “thin” while believing oneself to be “fat” on the actual domain, the self-discrepancy would be available and could cue distressing emotions.

An additional facet of self-discrepancies is their accessibility:

“the likelihood that an available self-discrepancy will be activated in turn depends on its accessibility. The accessibility of an available self-discrepancy is assumed
With regard to AN, an accessible self-discrepancy might be one in which an individual strives for control over the type and amount of food consumed and thinks about this ideal whenever experiencing hunger pangs or being presented with food.

Investigations of the central tenets and predictions of self-discrepancy theory have produced mixed outcomes. While early efforts supported the theory’s predictions regarding the link between discrepancies’ distinct relation to affect (e.g., Higgins, 1987; Higgins, Klein, & Strauman, 1985), other researchers have reported varying levels of support. Tangney, Niedenthal, Covert, and Barlow (1998) found that while self-discrepancies in general were associated with the emotions of guilt and shame, distinct discrepancies could not differentially predict unique affective states. Similarly, research has in some cases shown that self-discrepancies relate to negative affect and pathology but fail to consistently predict distinct affect in the manner that the theory would expect (e.g., Bruch, Rivet, & Laurenti, 2000; McDaniel & Grice, 2008; Ozgul, Heubeck, Ward, & Wilkinson, 2003). For example, Bruch and colleagues (2000) found evidence for the link between actual-ideal discrepancies and depressive affect but did not find support for actual-ought discrepancies and their hypothesized relation to agitation-related affect in a sample of undergraduates. Contrary to what Higgins’ (1987) theory would have predicted, actual-ought discrepancies in this study were found to relate to anhedonia, a symptom of depression. Methodological differences within instruments, population, and procedure have been offered as possible explanations for the inconsistent results across the literature (Boldero, Moretti, Bell, & Francis, 2005). Scott and O’Hara (1993) noted that there has been variability in the way that researchers have asked participants to define the other standpoint...
and this may account for conflicting results across studies. In their investigation of anxious, depressed, and euthymic individuals, the authors asked participants to list traits from the other standpoint using the perspective of their parents as a unit, rather than asking about their mother or father as separate perspectives. Although a seemingly minor difference, treating mother and father as exclusive standpoints has produced different outcomes for each parental unit (e.g., Forston & Stanton, 1992). Considerable debate regarding the impact of idiographic versus nomothetic measures has also been a focus of self-discrepancy research (Halliwell & Dittmar, 2006; McDaniel & Grice, 2008; Watson, Bryan, & Thrash, 2010). While some measures allow participants to create their own list of traits in each domain, others instruct participants to select from a list of pre-selected characteristics. Additionally, Tangney and colleagues (1998) expressed concern regarding the ability of participants to understand the difference between the ideal and ought domains. Despite these limitations, self-discrepancy theory still demonstrates some utility in its ability to link cognitions about the self to affect and pathology, especially when used in clinical samples (e.g., Scott & O’Hara, 1993; Weilage & Hope, 1999).

**Self-Discrepancies, Eating Disorders, and Body Image**

Self-discrepancy theory has been investigated in relation to eating disorders and body image disturbance because of its relationship to affect, biased cognitive processing, and ability to motivate behavior aimed at reducing discrepancies. An additional appeal lies in self-discrepancy theory’s ability to capture idiosyncratic cognitive content. A self-discrepancy measure allows for quantitative and qualitative examinations of self-discrepant themes, the relative weight of these themes within an individual’s sense of self, and a comparison of standpoints of the self (e.g. how the individual views themselves in their own eyes and via the eyes of others). Given the evidence
of core cognitive content across eating disorders, self-discrepancy assessment could confer a direct comparison of the relative influence of general versus appearance-related cognitions.

Research examining the link between self-discrepancy theory and eating disorders has generally been sparse and studies have largely utilized non-clinical samples. As such, studies that have examined eating and body disturbance using self-discrepancy theory will be examined in detail. Strauman, Vookles, Berenstein, Chaiken, and Higgins (1991) made one of the earliest efforts in this vein, conducting two correlational investigations to examine how types of self-discrepancies related to particular eating disorder symptoms and body image. The authors predicted that a discrepancy between actual/own and ideal/own standards would produce body dissatisfaction and further postulated that discrepancies between actual/own and ought/other would be associated with attitudes and behavior related to anorexia (e.g., body image disturbance, restriction). The latter hypothesis was based on research linking actual-ought discrepancies with weight-loss (Higgins, Klein, & Strauman, 1985) and the work of Bruch (1973; 1982) who characterized AN patients as obedient, conscientious, anxious, and eager to please others. In the first experiment, female undergraduates were given the Selves Questionnaire (SQ; Higgins, Bond, Klein, & Strauman, 1986) to appraise self-discrepancies, the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) to assess the frequency of body shape and appearance concerns, and the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), a checklist of eating attitudes and behaviors. For the SQ, participants were asked to list traits for the three self domains (i.e., actual, ideal, ought) from their own standpoint and the standpoint of their mother, father, and closest friend. Participants then rated the degree of each trait using a four-point scale ranging from slightly to extremely. For example, assessing the extent of the trait ‘honest’ would result in the following answer choices on the scale: slightly
honest, moderately honest, very honest, extremely honest. Appearance or body shape-related traits on the SQ (as distinct from general traits such as being honest) and participants’ body mass index (BMI) were controlled for as these variables have been shown to be predictive of body dissatisfaction and eating disorder pathology. The results confirmed the investigators’ hypotheses; actual-ideal discrepancies were discriminantly related to body dissatisfaction on the BSQ and actual-ought discrepancies were discriminantly related to anorexia-related symptoms on the EAT (Strauman et al., 1991). In the second study presented in this article, Strauman and colleagues (1991) included both male and female undergraduates to examine whether gender would impact their findings and again tested whether they could differentiate between attitudes and behaviors associated with bulimia nervosa versus anorexia nervosa. Based on research that had linked BN and depression, the authors included an additional construct on the SQ, the “can self,” which is a representation of an individual’s beliefs about their own potential (Higgins, Tykocinski, & Vookles, 1990). Controlling for appearance-related content again, the results confirmed the authors’ predictions and demonstrated that actual-ideal discrepancies were discriminantly related to bulimia-related symptoms and that actual-ought discrepancies were associated with anorexia-related symptoms. The authors commented, “the psychological roots of dissatisfaction with one’s appearance and maladaptive eating behavior are likely to include both specific standards for one’s appearance and more generalized structural inconsistencies among self-beliefs” (Strauman et al., 1991, p. 954). They took their results as evidence that self-discrepancy theory provides a useful model for understanding eating and body image pathology because it includes self-perception, self-evaluation, motivation, and self-regulation. Subsequent research concurred that patterns of actual-ought and actual-ideal self-discrepancies could delineate symptoms of AN and BN, respectively (Higgins, Vookles, & Tykocinski, 1992).
However, other researchers have noted that similar investigations have produced inconsistent results (e.g., Halliwell & Dittmar, 2006; Snyder, 1997).

One of the appeals of self-discrepancy theory as a cognitive framework for understanding eating disorder thoughts and behaviors may lie in its emphasis on affect. Citing research that has linked BN with affective and anxiety disorders, Forston and Stanton (1992) explored the relationship between symptoms of these disorders and differing types of self-discrepancies in a female undergraduate population. Participants were given a modified version of the SQ (Higgins et al., 1986) that assessed general and appearance-related self-discrepancies from the participant’s own standpoint and the standpoint of their mother and father as significant others. Unlike earlier work (e.g., Strauman et al., 1991), self-discrepancies only partially accounted for eating disorder symptomatology as measured by the Bulimia Test (Smith & Thelen, 1984). In this study, appearance-related, rather than general, actual-ideal discrepancies from the mother standpoint showed a significant relationship with symptoms of bulimia nervosa. However, the authors also confirmed the affective predictions of self-discrepancy theory by demonstrating that actual-ideal discrepancies were predictive of depression as measured by the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and actual-ought discrepancies predictive of anxiety as measured by the State-Trait Anxiety Inventory-Trait Form (Spielberger, Gorsuch, & Lushene, 1970). Interestingly, the relationship between discrepant cognitions and emotional distress tended to be stronger for the participants who had higher levels of symptoms on the Bulimia Test. Forston and Stanton (1992) stated that compared to normal eaters, women who struggle with BN may experience more frequent activation of self-discrepancies, which in turn produces emotional distress. These results lend some support for the
potential utility of self-discrepancies to capture eating disorder symptoms for individuals with higher levels of pathology.

Applications of self-discrepancy theory have generally found that actual-ideal discrepancies tend to be more strongly associated with body image disturbance, negative affect, and eating disorder symptoms compared to actual-ought discrepancies (e.g., Forston & Stanton, 1992; Halliwell & Dittmar, 2006). Halliwell and Dittmar (2006) investigated the relationship between appearance-related actual-ideal discrepancies and negative affect, body image, and emotional eating. The study compared male and female undergraduates and prompted participants to use the own standpoint as well as the standpoint of a romantic partner, as this was thought to be a perspective that would be important for this age group. In addition, the authors evaluated the effectiveness of participant-generated versus fixed-item self-discrepancy measures in their ability to differentially predict outcomes. The idiographic measure prompted participants to list appearance-related traits that they actually possessed and would ideally like to change. For the fixed-item comparison, the authors used the Body Image Ideals Questionnaire—Expanded (Szymanski & Cash, 1995), which asks participants to rate 11 appearance-related discrepancies (e.g., body proportions, skin complexion). Not surprisingly, the idiographic measure that allowed participants to generate unique appearance-related traits was better able to capture and predict general affect, body-specific affect, and body dissatisfaction from the own standpoint. The authors took this result as evidence that nomothetic measures may capture discrepancies that are available but may not be accessible to an individual. However, results from the nomothetic measure showed that compared to men, women’s negative affect about their body and emotional eating were more impacted by discrepancies from the romantic partner standpoint. Similarly, on both idiographic and nomothetic measures, the female participants had larger appearance-related
discrepancies than their male counterparts. Considering these findings together, the authors theorized that relative to men, women may experience more chronically accessible appearance-related self-discrepancies that can have a significant impact on their affect and eating behaviors.

More recently, Sawdon, Cooper, and Seabrook (2007) examined how general and appearance-related discrepancies related to depressive and eating disorder symptoms. Noting the high prevalence of comorbidity between depression and eating disorders, the authors were interested in whether general self-discrepancies would still account for symptoms of eating disorders when depressive symptoms were controlled. Their sample of community and university-recruited female volunteers were given the EAT (Garner & Garfinkel, 1979), the Beck Depression Inventory-second edition (BDI-II; Beck, 1996), and a modified version of the SQ (Higgins et al., 1986). The authors expanded upon the traditional self-discrepancy categories (e.g., actual, ideal, ought) by including actual-potential and actual-future discrepancies in the SQ. They defined actual-potential as discrepancies between the actual self and the self that person has the potential to become. Actual-future was defined as a discrepancy between the actual self and who the person will become in the future. They justified the inclusion of these domains by citing clinical characterizations of patients with eating disorders as unable to fulfill their potential in important areas of life, such as meeting social or professional goals. Possible overlap between these newer discrepancy categories and actual-ideal discrepancies are not explicitly addressed. However, the authors noted that actual-potential discrepancies may be salient for individuals with eating disorders because they highlight the ways in which pathology has impaired functioning (e.g., not achieving academic or social potential due to eating disorder symptoms). The results indicated that actual-potential and actual-future discrepancies were associated with eating disorder symptoms but only actual-potential discrepancies remained significant when
appearance-related words were removed from the analyses. Neither actual-ideal or actual-ought discrepancies were significantly correlated with EAT scores. Additionally, partial correlations revealed that general actual-potential self-discrepancies were still significantly related to eating disorder symptoms when depression was controlled. In their conclusion, Sawdon and colleagues (2007) highlighted how actual-potential discrepancies may be important to understanding how general, rather than appearance-related negative beliefs influence the development and maintenance of eating disorders.

In a unique approach comparing standpoints of the self, Snyder (1997) compared individual versus societal standards for body image using self-discrepancy theory. To this end, a modified version of the SQ that asked participants to list physical attributes for actual, ideal/own, and ought/society was employed. For undergraduate women in the study, there were unique ways in which actual-ideal discrepancies from the own standpoint and actual-ought discrepancies from the societal standpoint accounted for subscale scores on the Eating Disorder Inventory (EDI; Garner, Olmstead, & Polivy, 1983). Moreover, actual-ideal discrepancies were related to BN symptoms and body dissatisfaction when the effects of actual-ought discrepancies and weight concerns were controlled. Although the correlations were relatively small, Snyder (1997) noted that her results concerning the relationship between actual-ideal discrepancies and BN symptoms correspond to those of Cash and Szymanski (1995) and Forston and Stanton (1992), suggesting a consistent conceptual link between these factors across studies.

Self-discrepancy theory has been shown to be well-suited to body image research as idiographic measures can capture distinctive body image discrepancies that are especially salient to individuals. In a study of female undergraduates, Strauman and Glenberg (1994) utilized self-discrepancy theory to investigate the link between body image disturbance and self-concept.
Body image disturbance was defined by earlier models (e.g., Cooper, Taylor, Cooper, & Fairburn, 1987) as both body dissatisfaction and body size overestimation. Because self-discrepancies are associated with chronic negative emotional states (Strauman & Higgins, 1988) and can bias an individual’s cognitive processing to interpret ambiguous stimuli as relevant to discrepancies (Higgins, Uleman, & Bargh, 1989), the authors argued that there may be a conceptual link to the cognitive and affective phenomena observed in body image disturbance (Strauman & Glenberg, 1994). That is, a general self-discrepancy (as opposed to an appearance-related self-discrepancy) could induce feelings of frustration and sadness as well as the kind of biased self-perception that are also thought to be features of body image disturbance. Participants were selected if they fell within the top or bottom quarters of a large pool of female undergraduates based on their scores on the BSQ (Cooper et al., 1987). In order to compare the predictive power of general versus appearance-related discrepancies in body image disturbance, participants completed the SQ (Higgins et al., 1986) and answered three appearance-related questions that assessed actual, ideal, and ought domains. On the SQ, the discrepancy scores from the two ideal standpoints (ideal/own, ideal/other) and ought standpoints (ought/own, ought/other) were combined to form a total actual-ideal score and total actual-ought score. The appearance-related questions were: “what attributes or traits describe how you believe you actually look” for actual-appearance, “what attributes or traits describe how you ideally would like to look” for ideal-appearance, and “what attributes or traits describe how you believe you ought to look” for ought-appearance. In addition to the BSQ (Cooper et al., 1987), participants completed the EDI (Garner, Olmstead, & Polivy, 1983), and the depression scale of the Symptom-Checklist-90-R (Derogatis, 1983). One month later and under the pretense of another study, participants completed the Body Image Assessment (Williamson, Davis, Goreczny, & Blouin, 1989), a
silhouette-based test used to gauge judgment of body size. Compared with actual-ought, BMI, and appearance-specific discrepancies, actual-ideal discrepancies emerged as the best predictor of an individual’s biased perception of body-silhouettes in relation to their own body size. Participants who had higher actual-ideal discrepancies had a higher threshold for determining whether a body-silhouette was larger than their own but they did not show this judgment bias for smaller body-silhouettes. Strauman and Glenberg (1994) concluded that general actual-ideal discrepancies may play a role in both body dissatisfaction and body size overestimation. Taking a broader view, the authors further noted:

High AI [actual-ideal] women are likely to possess chronic negative attitudes toward themselves, including salient aspects of the self (e.g., body shape or appearance). Thus, women with substantial AI discrepancy would tend to be vulnerable to negative self-evaluation, dejected or dissatisfied emotional states, and a tendency to evaluate their bodies and appearance negatively. (p. 122)

Following the line of research that explores the perceptual impact of discrepancies, Altabe and Thompson (1996) conducted a series of experiments designed to understand the ways in which body image might act like a cognitive schema. That is, they hoped to glean whether body image could be thought of as a mental representation of information that has ramifications for information processing. The investigators drew upon self-discrepancy theory because the affective consequences predicted by discrepancies in Higgins’ (1987) model appeared similar to the distressed reactions observed when individuals note the difference between their own bodies and cultural ideals (Garner & Garfinkel, 1981). Over the course of three separate studies conducted with female undergraduates, participants were given questionnaires assessing self-discrepancies, mood, and body image. Participants were also prompted to respond to visual stimuli (e.g., body silhouettes, pictures of bodies from magazines) and undergo word-recall tasks to test the information processing of body image content. Altabe and Thompson (1996) showed
that body image representations can influence memory recall and carry affective consequences, much like cognitive schemas. The authors proposed that body image schemas are activated when events in the environment (e.g., reading a magazine, engaging in social comparison) interact with pre-existing discrepancies to produce negative emotions like depression or anxiety. Moreover, this study demonstrated that body image schemas are likely well-delineated mental representations that remain stable over time. For individuals high in body image concern, the authors suggest that body image schemas may be more frequently activated (i.e., activated by neutral stimuli) or persistently accessible.

In sum, the literature linking self-discrepancy theory with eating disorder symptoms and body image disturbance has generally been encouraging. While self-discrepancy theory has shown potential as a framework for understanding symptoms of eating disorders, variations in methodology and some inconsistent findings between studies may limit the ability to draw firm conclusions. Actual-ideal discrepancies, relative to actual-ought discrepancies, appear to be more reliably predictive of pathology and related phenomena. Consistent findings regarding standpoints of the self have been elusive because, as some researchers have noted (e.g., Halliwell & Dittmar, 2006; Forston & Stanton, 1992), the developmental stage of participants across studies may alter the importance assigned to different sources (e.g., own, romantic partner, parents) of evaluative standards. Investigations of body image (e.g., body size overestimation, social comparison) have reliably demonstrated an association between an individual’s self-discrepancies and biased cognitive processing.

Much of the existing research linking self-discrepancy theory and eating disorders have utilized convenience samples of undergraduates or community members. There is some evidence to suggest that self-discrepancies would show stronger links to clinical symptoms in individuals
with diagnosable levels of eating disturbance (Forston & Stanton, 1992). Studies of self-discrepancy theory in individuals who meet criteria for other types of pathology, such as depression, have shown encouraging results (Scott & O’Hara, 1993; Weilage & Hope, 1999). In a form of psychopathology closely related to eating disorders, Veale and colleagues (2003) demonstrated that individuals diagnosed with body dysmorphic disorder had higher actual-ideal and actual-ought discrepancies than non-clinical controls. With the exception the work of Strauman and colleagues (1991), self-discrepancy theory’s relationship to BN, as opposed to AN, has been the focus of much of the literature. Considering that overlap in the symptoms of BN and AN may occur (e.g., undue influence of body shape or weight on self-evaluation, purging behaviors), results from studies of self-discrepancies and BN may support the value of Higgins’ (1987) theory in understanding how self-evaluative standards relate to symptoms of anorexia nervosa.

**Implications for Research and Practice**

Large-scale investigations of self-discrepancy theory in clinical populations with AN have not been conducted but could provide fruitful clinical data given the development of treatment models that target self-discrepant beliefs (e.g., Integrative Cognitive Affective Therapy; Wonderlich et al., 2010). Preliminary research endeavors testing a maintenance model of AN that include self-discrepant beliefs as a key cognitive variable have shown promising results (Engel et al., 2005). In a small sample of women with AN, Engel and colleagues (2005) hypothesized that affective lability might mediate the relationship between self-discrepant beliefs and restrictive eating behavior and rituals. The authors also suggested that stressful environmental events may increase affective lability and provide a further pathway to eating disorder behavior. Additional research is needed to test the merit of self-discrepancy theory as a
means to understand the cognitions, emotions, and behavior associated with anorexia nervosa. Based on the research that has suggested that women with AN tend to place a high value on their ability to placate others to reduce emotional distress (Turner & Cooper, 2002; Woolrich, Cooper, & Turner, 2006), the cognitions associated with actual-ought discrepancies might be particularly important within this population. Moreover, the lack of agentic beliefs found in women with eating disorders (e.g., Berrs, Blatt, & Dolinsky, 2004; Guidano & Liotti, 1983) could also be captured within the framework of self-discrepancy theory by measuring the relative distance between actual and ideal beliefs.
CHAPTER 2: EMPIRICAL RESEARCH

Abstract

**Objective:** Self-discrepancy theory, a social-cognitive framework that links self-related cognitions with affect and behavior, provides a viable framework for studying eating disorders. This study presents a rationale for the use of self-discrepancy theory in eating disorder research and evaluates how self-discrepancies relate to affect and eating disorder symptoms in a sample of women with anorexia nervosa (AN). **Method:** Adult women (N= 118) with full or sub-threshold AN completed baselines measures of self-discrepancies, eating disorder symptoms, depression, and anxiety. Participants then logged two weeks of ecological momentary assessment (EMA) data to capture self-discrepancies and eating disorder symptoms. **Results:** Correlation analyses did not support for the link between unique self-discrepancies and affect. Results from group comparisons of individuals with high and low self-discrepancies partially supported the hypothesis that higher discrepancies would relate to more eating disorder symptoms but this relationship disappeared when appearance-related discrepancies were controlled for in the analyses. Lastly, results from hierarchical linear regression analyses of EMA data did not support the hypothesized link between self-discrepancies and eating disorder symptoms. **Conclusion:** Findings provided only limited support for the usefulness of self-discrepancy theory to predict distinct affective states or eating disorder symptoms.
The role of self-related and self-discrepant cognitions in anorexia nervosa and related psychopathology

Introduction

Anorexia nervosa is a mental disorder characterized by the DSM-V significantly low body weight considering age and height, an intense fear of fatness/weight gain or the persistence of behavior that interferes with weight gain, and either a significant disturbance in the way body image is perceived, a denial of the seriousness of being underweight, or an undue influence of body weight/shape on self-evaluation (American Psychiatric Association, 2013). DSM taxonomy also outlines two subgroups based on the presence of bingeing and purging behaviors: anorexia nervosa, restricting subtype (AN-R) and anorexia nervosa, binge-purge subtype (AN-BP). Anorexia nervosa has been found to have the highest mortality rate of all psychiatric disorders and individuals with AN tend to have a higher annual mortality rate than those diagnosed with other eating disorders (Arcelus, Mitchell, Wales, & Nielsen, 2011). Long-term follow-up studies have shown that while one-third of patients with AN tend to recover or only have residual features of the disorder, less than half will experience a full recovery and 20% will remain chronically ill (Steinhausen, 2002).

Effective evidence-based treatments for adults with AN remain elusive. Cognitive therapeutic approaches, such as Enhanced Cognitive Behavioral Treatment (CBT-E; Fairburn, 2008), have demonstrated some success in treating eating disorders (Fairburn et al., 2009). However, cognitive therapies like CBT-E have shown better results with individuals suffering with bulimia nervosa (BN) compared to low-weight AN patients (Byrne, Fursland, Allen, & Watson, 2011). CBT-E rests on the transdiagnostic theory (Fairburn, Cooper, & Shafran, 2003), a proposition that all eating disorders are part of a single diagnostic category and that certain core
mechanisms maintain psychopathology as symptoms and presentations shift (e.g., between AN, BN and sub-clinical variants of both). Specifically, the transdiagnostic theory focuses on the importance of weight and shape in self-evaluation as the key maintenance factors of eating pathology. Some scholars (e.g., Anderson & Maloney, 2001; Cooper, 2005) have noted that a focus on shape and weight-related cognitions, a focal point of traditional cognitive approaches, may overlook other dysfunctional cognitions in individuals with eating disorders. When compared to normal controls, women with AN and BN have been shown to have significantly higher levels of maladaptive core beliefs, which are defined as unconditional and non-situation specific cognitions (Leung, Waller, & Thomas, 1999). Accordingly, restructured versions of CBT-E (Fairburn, Cooper, Shafran, Bohn, & Hawker, 2008) and other cognitive-behavioral approaches (e.g. schema-focused cognitive behavioral therapy; Waller, Kennerley, & Ohanian, 2007) have incorporated interventions that directly address issues such as low self-esteem, perfectionism, emotional dysregulation, and attachment to others.

**Self-related cognitions in anorexia nervosa**

Despite the continuous research focus on weight and shape cognitions as key factors germane to the etiology and maintenance of eating pathology, many scholars have tested hypotheses regarding patterns of cognition outside appearance-related realms. Of particular interest to the current study are the role of self-related cognitions as potential risk and maintenance factors for eating pathology. Self-beliefs are thought to function alongside other cognitive processes (e.g., thoughts regarding other people or the world at large); however, the sense of self in AN appears to be an important component of etiological models regardless of theoretical orientation (Bers, Blatt, & Dolinsky, 2004; Waller, Kennerley, & Ohanian, 2007). In two comprehensive reviews of the literature pertaining to cognitive theory and research in eating
disorders, Cooper (1997, 2005) hypothesized that the core beliefs of individuals with AN center on global negative self-evaluation, as differentiated from self-evaluation based solely on weight and shape. Such negative self-beliefs may function like cognitive schemas (i.e., mental frameworks which can impact cognitive processing, emotions, and behavior) that place individuals at risk for developing eating issues (Pringle, Harmer, & Cooper, 2010; Waller, Kennerley, & Ohanian, 2007).

The means for assessing self-related cognitions and their link to eating pathology have varied. Using semi-structured interviews, Woolrich, Cooper, and Turner (2006) uncovered six themes that distinguished the negative self-beliefs of women with AN from non-clinical participants: powerlessness, failure, defectiveness, unattractiveness, worthlessness, and emptiness. In this sample, dietary restriction and “placating others” were both found to be prominent means for reducing the cognitive and emotional distress caused by negative self-beliefs. Again by means of semi-structured interviews, Turner & Cooper (2002) compared the cognitive and affective profiles of women in outpatient eating disorder treatment with female dieters and female controls. The patients with AN in this sample reported that dieting was a means to overcome distress caused by negative self-beliefs and to gain the acceptance of themselves and others. There is evidence to suggest that schema content has a meaningful relation to eating disorder behaviors (Unoka, Tölgyes, Czobor, & Simon, 2010; Waller, Meyer, & Osman, 2000). Using Young’s (1999) concept of early maladaptive schemas, which are patterns of cognition about the self and relationships to others, Unoka, Tölgyes, and Czobor (2007) found that individuals diagnosed with AN-R and AN-BP shared the traits of self-sacrifice, unrelenting standards, and punitiveness. Leung and colleagues (1999) demonstrated that for women with AN-BP, the frequency of vomiting was positively correlated with scores on the
“failure to achieve” scale of the Young Schema Questionnaire. This line of research lends merit to the supposition that negative cognitions outside the realm of shape and weight may be present and clinically relevant in women with eating disorders. Moreover, the resolution of negative self-beliefs may be a necessary step toward recovery (Cooper, 2005).

**Self-discrepancy theory**

Recently, several eating disorder researchers have utilized self-discrepancy theory (Higgins, 1987) because it is thought that incongruities within one’s self-concept can motivate eating disorder behavior (e.g., Engel et al., 2005). Self-discrepancy theory is a cognitive model that assumes negative emotions, such as sadness or agitation, may be the result of discrepant beliefs individuals hold about themselves. Self-discrepancy theory organizes beliefs about the self into three primary domains: the actual self, the ideal self, and the ought self. The actual self refers to attributes that an individual believes they truly possess. The ideal self consists of attributes the individual aspires to or would ideally like to possess. Lastly, the ought self is made up of attributes that an individual believes it is their duty or obligation to possess. The type and degree of self-discrepancy is said to cue a particular affective response. Actual-ought discrepancies, which may represent the violation of prescribed duties or expectations of punishment, are thought to be distinctly associated with agitation-related emotions such as, fear, worry, and guilt (Higgins, Bond, Klein, & Strauman, 1986). Alternatively, actual-ideal discrepancies may be predictive of dejection-related emotions, such as sadness, disappointment, shame, and frustration because the individual senses she cannot obtain desired positive outcomes.

Self-discrepancy theory also includes distinctions between the sources of self-related cognitions which Higgins (1987) termed “standpoints on the self” (p. 321). Standpoints on the
self refer to whose perception is being considered, which can be either the individual’s own
perception or the perception of significant others. When notions about the self are defined
primarily by the individual’s own standpoint, they are referred to as actual-own, ideal-own, and
ought-own. The actual, ideal, and ought domains can also be defined from an individual’s
perception of significant others’ judgment of them. Domains that are determined by significant
others’ standpoints are referred to as actual-other, ideal-other, and ought-other. An individual’s
self-concept is thought to be composed of both their actual-own and actual-other beliefs because
these domains are composed of the characteristics that the person believes they possess. In
contrast, an individual’s self-evaluative standards are composed of their own and others’ ideal
and ought beliefs. Hence, self-discrepancy is the mismatch between self-concept (actual
domains) and self-evaluative standards (ideal and ought domains). According to self-discrepancy
theory, individuals are motivated to bring their self-concept in line with valued self-evaluative
standards.

Higgins (1987) theorized that availability, or the amount of distress that self-
discrepancies can produce, will depend on the degree of mismatch between beliefs. A mismatch
is determined by comparing the beliefs in the domains of the self. For instance, if traits in the
actual domain are synonymous or largely similar to traits in the ideal domain, self-discrepancy
and its associated distress would be minimal or not available. If traits are antithetical to one
another, such that an individual might identify an ideal trait as “thin” while believing oneself to
be “fat” on the actual domain, the self-discrepancy would be available and could cue distressing
emotions.

An additional facet of self-discrepancies is their accessibility:

“the likelihood that an available self-discrepancy will be activated in turn depends on its
accessibility. The accessibility of an available self-discrepancy is assumed
to depend on the same factors that determine the accessibility of any stored construct …its recency of activation, its frequency of activation, and its applicability to the stimulus event.” (Higgins, 1987, p. 323-324)

Self-discrepancies, Higgins (1987) notes, can operate outside of an individual’s awareness but will be more likely to be accessed when the meaning of the discrepancy relates to a stimulus event. With regard to AN, an accessible self-discrepancy might be one in which an individual strives for control over the type and amount of food consumed and activates this ideal whenever experiencing hunger pangs or being presented with food. In depressed and anxious individuals, self-discrepancies have been shown to be predictive of affective state both acutely and chronically when discrepancies are explicitly primed or covertly activated outside of an individual’s awareness (Strauman, 1989; Strauman & Higgins, 1987, 1988). When activated, greater magnitude of self-discrepancies has been shown to be associated with greater magnitude of emotional distress (Higgins, Bond, Klein, & Strauman, 1986; Higgins, Klein, & Strauman, 1985).

Theoretical models linking emotion and self-beliefs are not new within the psychological literature. Self-discrepancy theory is novel in that it attempts to predict how specific affective states will correspond to differing forms of self-belief. Investigations of the central tenets and predictions of self-discrepancy theory have produced mixed outcomes. While early efforts supported the theory’s predictions regarding the link between discrepancies’ distinct relation to affect (e.g., Higgins, 1987; Higgins, Klein, & Strauman, 1985; Strauman, 1989; Strauman & Higgins, 1987, 1988), other researchers have reported varying levels of support. Tangney, Niedenthal, Covert, and Barlow (1998) found that while self-discrepancies in general were associated with the emotions of guilt and shame, distinct discrepancies could not differentially predict unique affective states. Still other research has shown that self-discrepancies relate to
negative affect and pathology but fail to consistently predict depressive affect from actual-ideal discrepancies and anxious affect from actual-ought discrepancies (e.g., Bruch, Rivet, & Laurenti, 2000; McDaniel & Grice, 2008; Ozgul, Heubeck, Ward, & Wilkinson, 2003). Methodological differences across instruments, population, and procedure have been offered as possible explanations for the inconsistent results across the literature (Boldero, Moretti, Bell, & Francis, 2005). Despite these limitations, self-discrepancy theory has demonstrated utility in its ability to link cognitions about the self to affect and pathology, especially when used in clinical samples (e.g., Scott & O’Hara, 1993; Weilage & Hope, 1999). Self-discrepancy theory also continues to be a useful model as it confers significant flexibility in its ability to capture brief, person-specific cognitions about the self and the self in relation to significant others.

**Self-discrepancy theory and eating disorders**

Self-discrepancy theory has been investigated in relation to eating disorders and body image disturbance because of its relationship to affect, biased cognitive processing, and ability to motivate behavior aimed at reducing discrepancies. However, research in this area has generally been sparse and studies have largely utilized non-clinical samples. Strauman and colleagues (1991) made one of the earliest efforts in this domain, conducting two correlational analyses using a series of questionnaires to investigate how types of self-discrepancies related to particular eating disorder symptoms and body image. The authors controlled for appearance-related traits (as distinct from general traits such as being honest) on the self-discrepancy assessment, the Selves Questionnaire (SQ; Higgins, Bond, Klein, & Strauman, 1986) and participants’ BMI, as these variables have been shown to be predictive of body dissatisfaction and eating disorder pathology. The Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) was utilized to assess the frequency of body shape and appearance concerns while the Eating
Attitudes Test (EAT; Garner & Garfinkel, 1979), a checklist of eating attitudes and behaviors, was used to measure anorexia-related symptoms. The results of the first study confirmed Strauman and colleagues’ (1991) hypotheses; actual-ideal discrepancies were discriminantly related to body dissatisfaction and actual-ought discrepancies were discriminantly related to anorexia-related symptoms. In the second study, Strauman and colleagues (1991) included both male and female undergraduates to examine whether gender would impact their findings and again tested whether they could use types of self-discrepancies to distinguish attitudes and behaviors associated with bulimia versus anorexia. Controlling for appearance-related content again, the results demonstrated that actual-ideal discrepancies were discriminantly related to symptoms of bulimia and that actual-ought discrepancies were associated with symptoms of anorexia nervosa. Subsequent research also found that patterns of actual-ought and actual-ideal self-discrepancies could delineate symptoms of AN and BN, respectively (Higgins, Vookles, & Tykocinski, 1992). These early findings lend credence to the idea that self-beliefs outside of the realms of shape, weight, or appearance can be relevant to eating disorder etiology and that such cognitions can be reliably measured with a self-discrepancy assessment.

However, other researchers (e.g., Halliwell & Dittmar, 2006; Snyder, 1997) have noted that similar investigations have struggled to consistently replicate these early results linking types of self-discrepancies to eating disorder symptoms. For example, Forston and Stanton (1992) explored the relationship between symptoms of eating disorders and both general and appearance-related self-discrepancies. Participants were given a modified version of the SQ (Higgins et al., 1986) that assessed general and appearance-related self-discrepancies from the participant’s own standpoint and the standpoint of their mother and father as significant others. Unlike the earlier work of Strauman and colleagues (1991), self-discrepancies only partly
accounted for eating disorder symptoms as measured by the Bulimia Test (Smith & Thelan, 1984); appearance-related, rather than general, actual-ideal discrepancies from the mother standpoint showed a significant relationship with symptoms of bulimia. Moreover, the relationship between self-discrepancies and emotional distress (depressive and anxious affect) tended to be stronger for the participants who had higher levels of eating disorder symptoms. Forston and Stanton (1992) stated that compared to normal eaters, women who struggle with BN may experience more frequent activation of self-discrepancies, which in turn produces emotional distress. These findings correspond with investigations in other diagnostic categories that found self-discrepancies tend to be more relevant for individuals with higher levels of psychopathology. There is also accumulating evidence that suggests individuals with eating disorders may rely on bingeing, purging, or excessive exercise as palliative behaviors when negative emotion arises (Peñas-Lledó, Vaz Leal, & Waller, 2002; Smyth et al., 2007; Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012).

More recently, Sawdon, Cooper, and Seabrook (2007) examined how general and appearance-related discrepancies correlated to depressive and eating disorder symptoms. Noting the high prevalence of comorbidity between depression and eating disorders, the authors were interested in whether general self-discrepancies would still account for symptoms of eating disorders when depressive symptoms were controlled. Their sample of community and university-recruited female volunteers were given the EAT (Garner & Garfinkel, 1979), the Beck Depression Inventory-second edition (BDI-II; Beck, 1996), and a modified version of the SQ (Higgins et al., 1986) that included actual-potential and actual-future discrepancies. The authors defined actual-potential as discrepancies between the actual self and the self that person has the potential to become. Actual-future was defined as a discrepancy between the actual self and who
the person will become in the future. They justified the inclusion of these domains by citing clinical characterizations of patients with eating disorders as unable to fulfill their potential in important areas of life, such as meeting social or professional goals. The results indicated that actual-potential and actual-future discrepancies were associated with eating disorder symptoms but only actual-potential discrepancies remained significant when appearance-related words were removed from the analyses. The study gives additional merit to the suggestion that general, rather than appearance-related negative beliefs, can influence the development and maintenance of eating disorders. Sawdon and colleagues (2007) also note their findings suggest clinical work could focus on addressing how eating disorder symptoms have impaired individuals’ potential in work, school, social or other important areas of life in order to optimize the recovery process.

In a study of female undergraduates, Strauman and Glenberg (1994) utilized self-discrepancy theory to investigate the link between body image disturbance and self-concept. Because self-discrepancies are associated with chronic negative emotional states (Strauman & Higgins, 1988) and can bias an individual’s cognitive processing to interpret ambiguous stimuli as relevant to discrepancies (Higgins, Uleman, & Bargh, 1989), the authors argued that there may be a conceptual link to the cognitive and affective phenomena observed in body image disturbance (Strauman & Glenberg, 1994). That is, a general self-discrepancy (as opposed to an appearance-related self-discrepancy) could induce feelings of frustration and sadness as well as the kind of biased self-perception that are also thought to be features of body image disturbance. Participants were given a series of eating disorder and body image questionnaires along with a measure of depression. One month later and under the pretense of another study, participants completed the Body Image Assessment (Williamson, Davis, Goreczny, & Blouin, 1989), a silhouette-based test used to gauge judgment of body size. Compared with actual-ought, BMI,
and appearance-specific discrepancies, general actual-ideal discrepancies emerged as the best predictor of an individual’s biased perception of body-silhouettes in relation to their own body size. Thus, individuals who experience chronic negative self-beliefs may experience distortions in body image perception even when those negative self-beliefs are not explicitly related to appearance.

**Self-discrepancy theory and body image**

A number of studies have limited their investigation to appearance-related discrepancies’ relation to body image and disordered eating. Self-discrepancy theory has been shown to be well-suited to body image research as idiographic measures can capture distinctive appearance-related discrepancies that are especially relevant to individuals. Along these lines, Snyder (1997) compared individual versus societal standards for body image using self-discrepancy theory. Undergraduate women were given a series of questionnaires, and correlational analyses revealed unique ways in which actual-ideal discrepancies from the own standpoint and actual-ought discrepancies from the societal standpoint accounted for subscale scores on the Eating Disorder Inventory (EDI; Garner, Olmstead, & Polivy, 1983). Moreover, actual-ideal discrepancies were related to symptoms of BN and body dissatisfaction when the effects of actual-ought discrepancies and weight concerns were controlled. Halliwell and Dittmar (2006) investigated the relationship between appearance-related actual-ideal discrepancies and negative affect, body image, and emotional eating in men and women. The authors also evaluated the effectiveness of participant-generated (idiographic) versus fixed-item (nomothetic) self-discrepancy measures. Relative to men, women were found to experience more chronically accessible appearance-related self-discrepancies that may have a significant impact on their affect and eating behaviors. The idiographic measure employed by Halliwell and Dittmar (2006) was also found to be
superior to its nomothetic counterpart because it allowed participants to generate unique appearance-related traits and was better able to capture and predict general affect, body-specific affect, and body dissatisfaction.

In sum, the literature linking self-discrepancy theory with eating disorder symptoms and body image disturbance has generally been encouraging. While self-discrepancy theory has shown potential as a framework for relating cognitions, affect, and eating disorder symptoms, variations in methodology and some inconsistent findings between studies may limit the ability to draw firm conclusions. Therefore, research is needed that tests the fundamental tenets of self-discrepancy theory (e.g., affective predictions, link to symptoms, and variability over time) to better understand its utility as an assessment technique and potential treatment component.

Much of the existing research linking self-discrepancy theory and eating disorders has utilized convenience samples of undergraduates or community members. There is some evidence to suggest that self-discrepancies would show stronger links to symptoms in individuals with diagnosable levels of eating disturbance (Forston & Stanton, 1992). Studies of self-discrepancy theory in other types of pathology, such as depression and anxiety, have shown that individuals struggling with clinically significant symptoms also evidence heightened self-discrepancy scores (Scott & O’Hara, 1993; Strauman, 1989; Weilage & Hope, 1999). Investigating a form of pathology closely related to eating disorders, Veale and colleagues (2003) demonstrated that individuals diagnosed with body dysmorphic disorder had higher actual-ideal and actual-ought discrepancies than non-clinical controls. With the exception the work of Strauman and colleagues (1991), self-discrepancy theory has been tested with BN more so than with AN. Considering that overlap in the symptoms of BN and AN may occur (e.g., undue influence of body shape or weight on self-evaluation, purging behaviors), results from studies of self-
discrepancies and BN may support the value of utilizing Higgins’ (1987) theory to better understand how self-evaluative standards relate to symptoms of AN.

Based on the research that has suggested that women with AN tend to place a high value on their ability to placate others to reduce emotional distress (Turner & Cooper, 2002; Woolrich, Cooper, & Turner, 2006), the cognitions associated with actual-ought discrepancies might be particularly important within this population. Moreover, the lack of agentic beliefs found in women with eating disorders (e.g., Berrs, Blatt, & Dolinsky, 2004; Guidano & Liotti, 1983) could also be captured within the framework of self-discrepancy theory by measuring the relative distance between actual and ideal beliefs. Further, Higgins’ (1987) proposal that self-discrepancies are activated when relevant stimuli are experienced could be especially applicable to understanding how sufferers of eating disorders react as they face events like meals or reflections in windows in their daily environments. Therefore, examining the chronicity and variability of self-discrepancies over time would be useful to investigate how self-discrepancies might relate to eating disorder behaviors as individuals function in their daily routine.

**Ecological Momentary Assessment**

In recent years, Ecological Momentary Assessment (EMA) has emerged as a reliable means to assess research participants’ experiences and behaviors in their natural environment. Ecological momentary assessment techniques collect data repeatedly (e.g., several times over the course of a day) and in real-time (Shiffman, Stone, & Hufford, 2008) by providing participants with a means to log data during their normal, daily routine. Data collection can take multiple forms, such as digital or analog diaries, and usually occurs on a schedule or in response to events of interest. This method of data collection is thought to be especially valid because it reduces the recall bias associated with retrospective assessments. In their review of EMA in clinical
psychology research, Shiffman and colleagues (2008) note that multiple momentary assessment points allow investigators to examine how variables of interest change over time and in reaction to varying contexts. With the increasing availability of portable electronic devices, many contemporary EMA studies have used smart phones or palm-top computers to collect data.

**Ecological Momentary Assessment in the Study of Eating Pathology**

Eating disorder researchers have utilized EMA methods to examine the temporal relationship among cognitions, emotions, behaviors and other phenomena of interest. Anorexia nervosa, binge eating disorder, and bulimia nervosa have been studied using EMA (Burd et al., 2009; Munsch, Meyer, Quartier, & Wilhelm, 2012; Zunker et al., 2011). Results indicate that EMA is a reliable and valid approach to measuring eating disorder thoughts and behavior and that behaviors are not reactive to this methodology (Engel et al., 2005; Smyth et al., 2001; Stein & Corte, 2003; Tasca et al., 2009). Within this branch of literature, the role of affect has been of particular interest because it is thought to play a role in maintaining certain symptoms of eating pathology. For example, Anestis and colleagues (2010) found that EMA assessments of affective lability, defined as shifts in emotional valence and intensity, predicted the frequency of binge eating in a sample of women diagnosed with bulimia nervosa. Similarly, evidence from EMA studies has suggested that negative mood may be a precursor to bingeing and purging behaviors (Crosby et al., 2009; Engel et al., 2007; Smyth et al., 2007). Relatively less attention has been paid to the role of cognitions in EMA eating disorder research. A recent examination of social comparisons in a non-clinical sample of women demonstrated that appearance-related upward comparisons (i.e., an individual comparing herself with someone believed to be better-off with regard to a particular trait in order to gather information about herself in relation to the trait) led to increases in negative affect, guilt, body dissatisfaction, and thoughts of dieting (Leahey,
Moreover, the subset of participants in this study who had evidenced eating pathology and higher body dissatisfaction experienced more negative affect and eating disorder thoughts and behavior in response to upward comparisons. In one of the few EMA studies focused on AN, Engel and colleagues (2005) tested a theoretical model of eating pathology that included self-discrepancies, affective lability, stressful events, as well as restrictive and other eating disorder behaviors in a small female clinical sample (n=10). The authors propose “self-discrepant beliefs lead to affective lability and that affective lability mediates the relationship between self-discrepancy and restrictive behavior and rituals. Finally, the model suggests that stressful events exacerbate both affective lability and restrictive behavior and rituals” (Engel et al., 2005, p. 335). Results supported the hypothesized paradigm: self-discrepancies correlated with affective lability, which in turn, was correlated with restrictive behavior and rituals. Although the authors do not specify which type of self-discrepancies were used (e.g., actual-ideal, actual-ought), this research provides provisional support for the utility of self-discrepancy theory in EMA research and in accounting for symptoms of AN.

In sum, research has generally supported the link between self-beliefs and eating disorder pathology. Large-scale investigations of self-discrepancy theory in sufferers of AN have not been conducted but could provide fruitful clinical data given the development of treatment models that target self-discrepant beliefs (e.g., Integrative Cognitive Affective Therapy; Wonderlich et al., 2010). Moreover, a detailed understanding of the relationship between different types of self-discrepancies and eating disorder behaviors would contribute to the broader cognitive-behavioral literature that has suggested that beliefs outside the shape and weight concerns are important to maintenance and etiology. Self-discrepancy assessments may be particularly well-suited to EMA research because they allow brief, idiographic measurements.
of cognitions to be taken. Using EMA, data are collected frequently enough to capture how self-discrepancies vary over time and relate to other behaviors of interest. Lastly, given the evidence that eating disorder behavior may serve to regulate negative emotion, self-discrepancy theory provides hypotheses centering on specific self cognitions and their related affective consequences that can be tested.

**Hypotheses**

The current study will examine how different types of self-discrepancies relate to eating disorder symptoms and depressive and anxious affect in a sample of adult women with full and sub-threshold AN. The following hypotheses will be tested via a secondary data analysis; hypotheses 1 and 2 will utilize baseline data while hypothesis 3 will employ EMA data:

1. It is expected that actual-ideal discrepancies from the own standpoint will be positively correlated with depressive affect, and actual-ought discrepancies from the own standpoint will be positively correlated with anxious affect.

2. It is expected that individuals in the current study with high actual-ideal and actual-ought discrepancies (“high” defined those individuals with scores above the study population median, see data analysis section below) from the own standpoint will evidence more eating disorder symptoms than individuals with low discrepancies in both categories. As a further step, it is expected that individuals with high actual-ideal and actual-ought discrepancies from the own standpoint will evidence more eating disorder symptoms than individuals with low discrepancies in both categories even when the number of appearance-related discrepancies are controlled for in the analysis. This step will test the aforementioned notion that general, rather than appearance-related beliefs
alone, can influence the maintenance of eating disorder symptoms (see Baseline Assessments section below for appearance-related discrepancy coding).

3. It is expected that individuals who experience higher levels of self-discrepancies in their daily lives (i.e., defined as person-level averages of self-discrepancy scores across the EMA data collection period) and higher inconsistency in their self-discrepancies from one moment to the next (i.e., person-level standard deviations of self-discrepancy scores) will also experience more eating disorder symptoms. Since this hypothesis will be tested using EMA data, eating disorder symptoms will be computed by summing the total number of eating disorder behaviors that were recorded on the EMA device (see data analysis section below for further description of how this variable will be operationalized and examined).

Method

Participants

Hypotheses were tested using a dataset that was gathered across three eating disorder treatment facilities: the University of North Dakota/Neuropsychiatric Research Institute, the University of Minnesota, and the University of Chicago. Adult female participants were recruited via mailings to eating disorder treatment professionals, on-line postings, advertisements in community and campus newspapers, and flyers posted in clinical, community, and campus settings. Individuals who expressed interest in the study (N= 601) were screened via phone and 166 women were evaluated during an in-person assessment. Participants underwent informed consent and attended two individual baseline assessment appointments to determine study eligibility. A total of 121 participants met inclusion criteria, agreed to participate, and completed the full study protocol. Three participants were excluded from analyses as they had EMA
compliance rates below fifty percent. The final sample was composed of 118 women with a mean age of 25.3 years (SD = 8.4; Range = 18-58) who met full DSM-IV (American Psychiatric Association, 2000) criteria for AN (n=59) or sub-clinical AN (n=59). The latter group was operationally defined as having a BMI at or below 18.5 and either amenorrhea or the cognitive pattern of AN (i.e., body image disturbance and intense fear of fat). The mean BMI of the final sample was 17.2 kg/m² (SD = 1.0; Range = 13.4-18.5). Seventy-three participants (61.9%) were diagnosed with AN-R and 45 participants (38.1%) were diagnosed with AN-BP. Study exclusion criteria were: (a) the presence of active psychosis; (b) inability to read English; (c) a history of bariatric surgery or other relevant gastrointestinal surgery which might influence eating behavior; (d) medical instability; (e) being pregnant or actively breastfeeding; (f) inpatient or partial hospitalization within past six weeks; (g) initiation of psychotherapy or drug therapy within the past six weeks; or (h) drug or alcohol dependence within the past six weeks.

**Procedure**

For the initial in-person assessments, semi-structured interviews and self-report questionnaires were used to confirm study eligibility. The baseline assessment took approximately four hours and eligible participants were then asked to complete several questionnaires (approximately 90 minutes to complete). Participants also underwent a 30-minute baseline physical evaluation to establish medical stability. Height, weight, and vital signs were obtained by medical staff. All potential participants underwent a complete blood count with differentials, and a basic metabolic panel including magnesium and phosphorus levels. Lastly, participants were asked to take a urine pregnancy test.

Following the first assessment meeting, participants were trained to operate the palmtop computer for EMA data collection. They were then instructed to practice recording EMA
information for two days before returning for their second assessment appointment. These data were not included in final analyses; however, they were inspected by a research assistant to review compliance and usability issues. Participants were then given the palmtop computers to take home for the two-week data collection period. Research assistants endeavored to schedule two to three follow-up appointments during the two-week period to download palmtop computer data, provide feedback, and encourage compliance to complete the semi-random and end-of-day ratings (see description of EMA schedule below). Participants returned at the end of the two weeks so remaining data could be downloaded and they were paid $100 for each week of EMA data collection they successfully completed. In addition, they received a bonus of $50 for responding to at least 80% of the data collection prompts within 45-minutes on the palmtop computer ($250 total possible compensation).

The EMA schedule relied upon three types of daily self-report as described by Wheeler and Reis (1991): signal-contingent, event-contingent, and interval-contingent recordings. A signal-contingent schedule requires participants respond to signals at various points across the day to record their experience. In the original study’s (i.e., the full dataset which the current secondary data analysis study will use) design, a signal-contingent schedule was used to capture emotional state, stressful events, self-discrepancies, and to report any recent eating episodes or eating disorder behaviors that occurred after the last signal but had not yet been recorded. Only self-discrepancy ratings and eating disorder behavior ratings will be used for the secondary data analysis in the current study; see Table 1 for an overview of the variables included in the EMA assessment schedule. Participants were prompted by the palmtop computer (Handspring Visor model) at six semi-random but evenly distributed points throughout the day (8am – 11pm) to complete these ratings, thus, 84 total signal-contingent ratings occurred across the two-week
EMA data collection period. In the final sample, the rate of compliance to the semi-random signals was 87% (range = 58-100%). Compliance for the semi-random signals was calculated as the number of responses to signals divided by the total number of signals. Additionally, using an event-contingent schedule, participants were asked to self-initiate a report following the occurrence of an eating episode or an eating disorder behavior of interest (e.g., bingeing, vomiting, weighing, meal skipping). The eating disorder behaviors that participants were asked to log were listed on a card attached to the palmtop computer. Using an interval-contingent schedule, defined as completing a report when a predefined event has occurred, participants were asked to complete ratings at the end of each day. The end of day recordings included items assessing emotion, restriction, and an estimate of caloric intake for that day. The current study will only utilize the restriction and caloric intake data from the end-of-day ratings. The average compliance rate for end-of-day ratings was 89% (range = 24-100%) across the two-week period. For compliance to end-of-day recordings, compliance was calculated as the number of end-of-day ratings divided by the total number of days in the study, not counting the last partial day when the palmtop was returned. Descriptions of the EMA measures that will be included in the current study are provided in the Ecological Momentary Assessments section below.

Measures

Baseline Assessments

Self-Discrepancy Measurement. The Selves Interview (SI; Higgins et al., 1986) was administered during the baseline assessment phase. The SI has demonstrated good inter-rater reliability in studies measuring both general and appearance-related self-discrepancies, ranging from .80 to .97 (Bruch et al., 2000; Scott & O’Hara, 1992; Strauman et al., 1991; Tangney et al.,
1998) and has been successfully adapted for use in prior EMA investigations (Engel et al., 2005; Smyth et al., 2007).

Participants were asked to state between six and ten one-word traits or attributes to describe their actual self, their ideal self, and their ought self. The participants were allowed to generate any type of trait and were not told to focus on appearance or general discrepancies. Therefore, the number of appearance-related and general self-beliefs naturally varied by individual. Participants generated each list from their own standpoint (e.g., “What are the attributes that you believe you actually possess?”). Both actual-ideal discrepancies and actual-ought discrepancies were assessed (see Appendix A) and scored using the procedure described by Strauman and Higgins (1988). The SI was scored by taking a series of steps. First, for each category (e.g., actual/own, ideal/own, ought/own,) any synonyms or antonyms that followed the original word in that particular list were crossed off to eliminate within-self redundancy or contradiction. Next, each attribute in the actual/own list is compared with each attribute on the self-guides (ideal/own and ought/own). The number of pairs per comparison between any two lists will differ according to the number of attributes listed. Using Roget’s Thesaurus, the rater coded each attribute pair as having one of the following four relationships: a match, a mismatch of extent, a mismatch, and a non-match. A match occurred when the attribute from the actual/own list is the same as or synonymous with the attribute from the ideal/own or ought/own list; each match is given a score of -1. If the two attributes are antonyms (e.g., actual/own = sad; ideal/own = happy), this is coded as a mismatch and are given a score of +2. If the word pair were synonymous but negated by the presence of a qualifier that indicates a desire for more or less of the attribute (e.g., actual/own = happy; ideal/own = very happy), a mismatch of extent is obtained and is coded +1. Lastly, a non-match is given when the two attributes are neither
synonyms or antonyms and this results in a score of 0 and is ultimately not included when calculating self-discrepancy scores. Discrepancy scores are obtained by summing: a) total number of attributes generated for each list not including the synonyms/antonyms eliminated in step one; b) total number of mismatches for each guide; c) total number of non-matches for each guide; d) total number of mismatches of extent for each guide; e) total number of matches for each guide. Scores can range from -10 indicating complete match between self-guides, to +20 indicating complete discrepancy.

In order to identify highly self-discrepant traits that could be used for EMA data collection in the original study (see EMA section below), participants were asked to rank order their ideal and ought lists by indicating which traits were “most/least” like them currently (e.g., 1 = most like me; 10 = least like me). The four most discrepant traits on the ideal list and the four most discrepant traits from the ought list that were identified during this ranking process were used for assessing self-discrepancies via EMA. Thus, eight traits in total were entered into the EMA palmtop computer and included as part of the signal-contingent assessment schedule.

For the current study, hard-copies of the SI will be examined to identify appearance-related traits in the ideal and ought lists. Appearance-related words will be defined as any terms that relate to aesthetics (e.g., beautiful, slim, attractive, toned). In order to identify appearance-related discrepancies, at least two independent coders (current writer and one other research assistant) will examine the words participants provided on the SI at the baseline assessment. If there is a disagreement between the two coders as to whether a word is appearance-related, a third coder will be asked to categorize the term. Sawdon and colleagues (2007) employed this procedure and reported complete agreement between coders identifying appearance-related traits. The number of appearance-related traits on the ideal and ought lists will be recorded as new
continuous variables and used for analyses in hypothesis 2 (see below). The number of appearance-related traits will represent the degree to which appearance, rather than general cognitions about the self, dominate an individual’s self-guide. The choice to examine appearance-related cognitions about the self in this manner was made because re-coding the SI to compare appearance and general discrepancy scores is not feasible given the time and training required for the SI. It should also be noted that the appearance-related traits will not be examined in the third hypothesis which utilizes EMA data.

**Eating Disorder Measurement.** The Eating Disorder Examination (EDE; Fairburn & Cooper, 1993) was administered to participants at baseline to establish study eligibility. The EDE is a semi-structured interview that assesses psychological and behavioral facets of eating pathology; it produces a global score which is composed of four subscale scores: restraint, eating concern, shape concern, and weight concern. It also assesses the frequency of bingeing and compensatory behaviors designed to control shape or weight such as fasting, self-induced vomiting, driven exercise, laxative misuse, and diuretic misuse. Items are rated on a six-point scale; a score of four is considered the threshold for clinical significance, higher scores indicating more pathology. The EDE has consistently demonstrated good psychometric properties and is considered the “gold standard” for diagnosing eating disorders (Berg, Peterson, Frazier, & Crow, 2012; Fairburn & Cooper, 1993; Guest, 2000). Inter-rater reliability values for the four subscales of the EDE have been found to be between .65 and .99 (Grilo, Masheb, Lozano-Blanco, & Barry, 2004; Rizvi, Peterson, Crow, & Agras, 2000; Rosen, Vara, Wendt, & Leitenberg, 1990). EDE interviews were audio recorded and 25% (n = 31) were rated by a second independent assessor. Intraclass correlations coefficients representing agreement between raters on the EDE scales ranged from .894 (Shape Concern) to .997 (Restraint).
**Depressive Affect Measurement.** The Beck Depression Inventory (BDI; Beck et al., 1961) is a widely used 21-item questionnaire that measures the severity of depressive symptoms. Each item on the BDI is scored on a scale from zero to three; a total score of 0 – 13 is categorized as minimal, 14 – 19 mild, 20 – 28 moderate, and 29 – 63 severe depression. The psychometric properties of the BDI have been extensively reported upon; internal consistency ranges from .73 to .92 (Beck, Steer, & Garbin, 1988).

**Anxious Affect Measurement.** The State-Trait Anxiety Inventory (STAI; Spielberger, 1983) measures both transitory state anxiety and lasting trait anxiety. It is a self-report questionnaire consisting of 40 items that are answered on a four-point scale ranging from 1 (not at all) to 4 (very much so). State anxiety on the STAI has been described as transitory unpleasant feelings of tension, apprehension, and nervousness. These anxious states are thought to be conscious and can vary in intensity and change over time in reaction to circumstances deemed to be threatening. Trait anxiety is comparatively stable and unaffected by situational stressors. The STAI has demonstrated sound psychometric properties with internal consistency values ranging from .86 to .95 and test-retest coefficients ranging from .65 to .75 (Spielberger, 1983).

**Ecological Momentary Assessments**

**Self-Discrepancy Measurement.** As noted earlier, the eight most discrepant traits (four from the ideal list, four from the ought list) each participant generated during the baseline SI were programmed into the EMA devices as part of the semi-random signal assessment schedule. Participants rated the four words from the ideal list and the four words from the ought list six times per day by rating the degree to which each trait described them at that moment on a 5-point scale ranging from 1 (not at all) to 5 (extremely); higher scores indicate lower self-discrepancy. For example, if one of the four traits from the ideal list was *intelligent*, the participant would...
answer the prompt, “At this moment, to what extent are you intelligent?” It should be noted that while the baseline discrepancy scores from the SI were generated using the scoring method (e.g., match, mismatch of extent, mismatch, and non-match) outlined by Strauman and Higgins (1988), the EMA discrepancy scores are calculated from participants’ responses to the eight most discrepant traits using the 5-point scale. Thus, each participant will have baseline scores for actual-ideal and actual-ought discrepancies and EMA scores for actual-ideal and actual-ought discrepancies. The alpha coefficients for the momentary self-discrepancy scores were .860 for actual-ideal and .829 for actual-ought.

**Eating Disorder-Related Behaviors Assessment.** Eating disorder behaviors were assessed through semi-random signal schedule (i.e., six points throughout the day), if a participant self-initiated a report following the occurrence of an eating disorder behavior of interest, or during the end of day ratings. For example, a participant could self-initiate a report about her last episode of eating to indicate she had binge eaten or she could log this information when the palmtop computer prompted her to complete one of the six semi-random ratings by asking if she had logged her most recent eating disorder behavior. End of day ratings were unique in that they only assessed restriction and the participant’s estimate of caloric intake for that day.

Items took the form of a checklist in which participants could respond in a “yes/no” format to prompts such as, “I vomited.” Participants were instructed to record the following information on the palmtop computer: binge eating, vomiting or laxative use for weight control, weighing self on scale, exercising, skipping a meal, drinking fluids to curb appetite, making sure thighs do not touch, and checking joints and bones for fat (see table 1 for definitions of these behaviors). Binge eating was defined as a participant checking a “binge” option regarding an episode of eating that had occurred. Purging was defined as the participant endorsing either “I
vomited” or “I used laxatives for weight control.” Caloric restriction was recorded during the end of day rating because this is when participant would know if they had restricted their eating throughout the course of the day; participants could endorse either “I went for eight waking hours without eating” or “I limited daily intake to less than 1200 calories.”

**Data Analysis**

All data underwent appropriate tests of statistical assumptions before analyses were conducted (specific assumptions for each analysis technique are noted below). Hypotheses 1 and 2 relied on baseline data and while hypothesis 3 utilized EMA data. The hypotheses and data analysis plan were:

**Hypothesis 1:** It was predicted that actual-ideal discrepancies (A/I) from the own standpoint would be positively correlated with depressive affect, and actual-ought discrepancies (A/O) from the own standpoint would be positively correlated with anxious affect. To test this hypothesis, baseline data from the SI (total A/I score, total A/O score), BDI (total score), and the state anxiety subscale of the STAI was utilized to assess Pearson correlations between discrepancies, depressive affect, and anxious affect, respectively. Preliminary tests of normality, linearity, and homoscedasticity were conducted to ensure the assumptions of correlational analyses were not violated. As a first step, bivariate correlations between A/I discrepancies with A/O discrepancies and depression with anxiety were examined to assess the relationship between these variables. Previous research has found these pairs of variables to be positively correlated with one another (e.g., Boldero & Francis, 2000; Higgins et al., 1985) but discriminant relationships can still be examined by removing the shared variance between them. Following the recommendations of Boldero and colleagues (2005), partial correlations were employed to test the discriminant relationship of A/I discrepancies with depression and A/O discrepancies.
with anxiety as predicted by Higgins’ (1987) theory. Again, because these variables are correlated, the effect of the extra variable was partialed out before testing the target variable (e.g., examine the correlation of A/I to depression and anxiety with A/O partialed out; test the correlation of A/O to depression and anxiety with A/I partialed out).

**Hypothesis 2:** Individuals with high A/I and high A/O discrepancies would report more eating disorder symptoms than individuals with low discrepancies in both categories. Baseline data were used to test this hypothesis, specifically, the total A/I score and the total A/O score from the SI, and the subscales scores of the EDE. Two new dichotomous variables denoting high or low A/I and A/O discrepancy status were created by using a median split (as done by Harrison, 2001; Higgins et al., 1986) on participants’ discrepancy scores from the baseline SI. The two new variables for A/I and A/O were categorical independent variables with two levels each denoting whether a participant had high or low discrepancy status (e.g., one variable denoting A/I was coded as “high” or “low” one variable denoting A/O was coded as “high” or “low”). Subscale scores of the EDE were used as dependent variables. Two separate multivariate analysis of variance (MANOVA) tests were utilized: one with high/low A/I status as the independent variable and one with high/low A/O status as the independent variable. Prior to the analyses, the following assumptions were evaluated: normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity of the dependent variables.

It was expected that individuals with high actual-ideal and actual-ought discrepancies from the own standpoint would evidence more eating disorder symptoms than individuals with low discrepancies in both categories even when the number of appearance-related discrepancies were controlled for in the analysis. Again, the inclusion of appearance-related discrepancies as a
control variable was designed to examine the notion that general, rather than appearance-related beliefs alone, could influence the maintenance of eating disorder symptoms. Similar to the analyses used in the first step of hypothesis 2, high/low discrepancy status was used as the independent variable and subscale scores of the EDE were dependent variables. The number of appearance-related traits was used as a control variable in two separate multivariate analyses of covariance (MANCOVA)—one with A/I status as the independent variable and one with A/O status as the independent variable. Preliminary assumption testing was conducted to test for normality, independence of observations, and homogeneity of variance covariance-matrices.

Two research assistants independently tallied and coded these words. When there was a disagreement between the two coders, the primary investigator determined if the word should be counted as appearance-related or not. Appearance-related words were those that pertained primarily to physical characteristics, body shape, or body weight such as *pretty, skinny, beautiful,* and *attractive.* Words that were excluded were those that may have had a more general meaning such as *healthy* or *athletic.*

**Hypothesis 3:** It was predicted that individuals who experience higher mean levels of self-discrepancies in their daily lives and higher inconsistency (defined as standard deviations) in their self-discrepancies from one moment to the next would also experience more eating disorder symptoms. This hypothesis was examined with aggregated EMA data. The levels of actual-ideal and actual-ought self-discrepancies were defined by constructing person-level averages of self-discrepancy scores separately for ideal and ought constructs. Specifically, for each of the ought words (total of four that were included in EMA), mean scores were computed by averaging all momentary assessments (with the maximum being 6 semi-random signal points x 14 days = 84 assessments), such that \( \bar{x}_{O_i} = (\sum_{i}^{n_i} O_i) / n_i \) where \( n_i \) was the total number of momentary
assessments for a person $I$, and $O_1$ were responses to the 1st word on the list of ought traits on the palmtop computer. Person-level means were computed to represent the average level of ought and ideal discrepancies. For individuals who did not have perfect adherence to the EMA schedule, the means were constructed from fewer than 84 momentary assessments. The impact of EMA adherence on the mean scores was formally assessed. Adherence was computed by dividing the total number of provided assessment points by the total number of scheduled assessments: 6 semi-random signals per day over 14 days = 84 EMA data points. Further, two summary scores for ought and ideal discrepancies were computed by averaging the person-level means for the four ought words and four ideal words. The person-level summary scores will represent the average level of A/O and A/I discrepancies based on the day-to-day experiences of the participants.

The overall variability in A/I and A/O self-discrepancies were computed by constructing person-level standard deviations of self-discrepancy scores separately for ideal and ought constructs using the data reduction procedure described above for mean scores. Specifically, for each of the ought words (total of four), standard deviation scores were computed such that

$$
\sigma_i = \sqrt{\frac{\sum_i (x_{ij} - \bar{x}_i)^2}{n_i - 1}}
$$

where $x$ is a single EMA rating of a particular self-discrepancy trait for person $I$, and $\bar{x}_i$ is the mean of all EMA ratings for that trait over the EMA data collection period. The person-level standard deviation summary scores (one for ideal, one for ought) represented the degree of inconsistency an individual experienced in their self-discrepancies from moment-to-moment across the EMA data collection period. The impact of EMA adherence on person-level standard deviations was also formally assessed.
Tables 2 and 3 provide a snapshot of the two data files. Table 2 is a summary of raw EMA data in a long format that demonstrates records of momentary responses logged while an individual carried the palmtop computer. Each participant, denoted by the same ID, has multiple assessments of their self-discrepancy state. Each response for the same individual is time stamped, representing the six semi-random signal points. Missed responses did not have a corresponding data entry. The original EMA dataset (Table 2) was reduced in the data processing step and yielded a new data file, with a format described in Table 3. In this dataset, each individual, denoted by a unique ID, had one entry for each of the following variables: mean actual-ideal discrepancy, mean actual-ought discrepancy, standard deviation of actual-ideal discrepancy, standard deviation of actual-ought discrepancy, total number of eating disorder behaviors recorded during EMA, and percent adherence to the semi-random signals. Eating disorder behaviors were computed by summing the total number of eating disorder behaviors that were recorded during semi-random signal points, self-initiated reports, and end-of-day reports. The frequency and distribution of each of the following eating disorder behaviors was examined and summarized: binge eating, vomiting or laxative use for weight control, weighing self on scale, exercising, skipping a meal, drinking fluids to curb appetite, and caloric restriction. The aggregated self-discrepancy and eating disorder behavior data represented each participant’s experience over the two-week EMA data collection period.

Finally, to examine if eating disorder behaviors were related to the average level of self-discrepancies and inconsistency in self-discrepancies over time, multiple linear regression analysis were carried out. Four models were fit to the data, where the means and standard deviations of the A/I and A/O were used as outcomes and symptom frequency as predictors, while controlling for adherence to the EMA schedule (% of assessments completed).
Discrepancies were used as outcomes rather than predictors because the distribution of eating disorder behaviors had a non-normal distribution (see results for more detailed information). In the process of regression analyses, the following assumptions were evaluated: multicollinearity, singularity, normality, linearity, homoscedasticity, and independence of residuals. Data were also screened for outliers.

**Results**

**Hypothesis 1:** Pearson product-moment correlation coefficients were used to examine the relationship between A/I discrepancies from the own standpoint (as measured by the SI) and depressive affect (as measured by the BDI) as well as to examine the relationship between A/O discrepancies from the own standpoint (as measured by the SI) and anxious affect (as measured by the state anxiety subscale of the STAI). Preliminary analyses were conducted to ensure there was no violation of the assumptions of normality, linearity, and homoscedasticity before the correlational analyses were carried out. Results from correlational analyses are presented in Table 4 and descriptive statistics for variables of interest in the baseline data are presented in Table 5. There was a non-significant correlation between A/I discrepancies and depressive affect, \( r = .098, n = 112, p = .302 \). There was a trend toward significance between A/O discrepancies and anxious affect, \( r = .177, n = 112, p = .062 \).

Partial correlation was used to explore the relationship between A/I discrepancies from the own standpoint and depression (as measured by the BDI total score), while controlling for A/O discrepancies from the own standpoint. There was a non-significant correlation between A/I discrepancies and depression, controlling for A/O discrepancies, \( r = .01, n = 112, p = .913 \). An inspection of the previously calculated zero order correlation (\( r = .098, p = .302 \)) showed that
controlling for A/O discrepancies resulted in an almost complete loss of the correlational relationship between depression and A/I discrepancies.

Partial correlation was also used to explore the relationship between A/O discrepancies from the own standpoint and anxiety (as measured by the state subscale of the STAI), while controlling for A/I discrepancies from the own standpoint. There was a negligible correlation between A/O discrepancies and anxiety, $r = .122$, $n = 112$, $p = .201$. Controlling for A/I discrepancies removed the trend between these two variables (as a reminder, the bivariate correlation: $r = .177$, $p = .062$).

**Hypothesis 2:** A median split of participants’ A/I and A/O discrepancy scores was conducted to create two categorical independent variables with two levels each to designate high or low discrepancy status. Thirty-seven individuals were categorized as having a high A/O discrepancy status, with scores above the median ($\bar{x} = -1.0$) and $n = 75$ individuals were categorized as low A/O discrepancy status with scores below the median. Similarly, $n = 75$ individuals scored below the A/I median ($\bar{x} = 0.0$) and were categorized as low A/I discrepancy status and $n = 37$ scored above the median and were categorized as having high A/I discrepancy status. Six participants had missing data and were not included here.

These variables were utilized as the independent variables for two separate multivariate analyses of variance with subscale scores of the EDE as dependent variables. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity.

A one-way MANOVA was conducted to investigate whether individuals with high A/I discrepancy status evidenced more eating disorder symptoms than individuals with low A/I discrepancy status. Results from multivariate tests revealed there were no statistically significant
differences between the high and low A/I discrepancy status groups on a linear combination of the dependent variables, $F = (4, 107) = 1.75, p = .144$; Wilks’ Lambda = .94; partial eta squared = .06.

A second MANOVA was conducted to investigate whether individuals with high A/O discrepancy scores would have higher EDE subscale scores. Preliminary assumption testing revealed a violation of Levene’s test for homogeneity of variances for the restraint subscale of the EDE, therefore, a stricter alpha level of .025 was set for this variable. There was a statistically significant difference between high and low A/O status groups on a linear combination of the dependent variables, $F = (4, 107) = 3.43, p = .011$; Wilks’ Lambda = .89; partial eta squared = .114. Results from dependent variables were considered separately with a Bonferroni adjusted alpha level of .0125 (.05 critical $p$ value divided by four comparisons in this analysis). Two subscale scores reached statistical significance: restraint, $F = (1, 110) = 8.3, p = .005$, partial eta squared = .07, and eating concern, $F = (1, 110), 11.4, p = .001$, partial eta squared = .094. An inspection of the mean scores revealed that the high A/O group had slightly higher restraint scores ($M = 3.42, SD = 1.30$) compared to the low A/O group ($M = 2.51, SD = 1.70$). Similarly, the high A/O group had slightly higher eating concern scores ($M = 2.69, SD = 1.19$) compared to the low A/O group ($M = 1.80, SD = 1.37$).

Hard copies of the SI were examined to identify appearance-related words in the ideal and ought lists. The two independent coders had an agreement rate of 96% on the words in the ideal list and 95% on words in the ought list. Participants generated an average of 7.36 words/traits (range = 4 – 12; $SD = 1.54$) for the ideal list and an average of 7.18 words/traits (range 4 -11, $SD = 1.36$) for the ought list. Looking only at appearance-related words in each list, participants generated an average of .36 words on the ideal list (range = 0 – 3; $SD = .68$) and an
average of .20 words (range = 0 – 2; SD = .50) on the ought list, with many participants generating no appearance-related words. The number of appearance-related words was then compared to the overall number of words generated in each list to create an ideal and an ought percentage score for each individual which represented the degree to which appearance-related traits dominated an individual’s overall self-guide. Appearance-related words ranged from 0-33% for both ideal and ought lists and these scores were used as the control variables in two separate MANCOVAs to investigate whether individuals with high A/I and A/O discrepancy status would evidence more eating disorder symptoms than individuals with low A/I and A/O discrepancy status.

Preliminary assumption testing was carried out as noted above for MANOVA analyses with an additional test of homogeneity of regression slopes. Results from the Kolmogorov-Smirnov tests of normality revealed a violation of the assumption of normality for the variables representing the percentages of appearance-related trait scores for both A/I and A/O lists. An inspection of the histograms also indicated a skewed distribution for both A/I and A/O lists with most participants’ scores at zero percent. The analysis was still conducted as a violation of normality was not thought to seriously affect the results from the analyses and results would be interpreted with caution. There was a significant correlation between the control variable (percentage of appearance-related words for A/I) and all of the dependent variables (EDE subscales) with the exception of the eating concern subscale. Similarly, there was a significant correlation between the percentage of appearance-related words for A/O and all of the dependent variables. Results from multivariate tests showed a trend toward significance between high and low A/O discrepancy status groups on a linear combination of the dependent variables when appearance-related traits were controlled, $F = (4, 95) = 2.25, p = .069$; Wilks’ Lambda = .913;
partial eta squared = .09. There were no significant differences between high and low A/I discrepancy groups on a linear combination of the dependent variables when appearance-related traits were controlled, $F = (4, 95) = 1.13, p = .346$; Wilks’ Lambda = .954; partial eta squared = .046.

Because of the limited variability (i.e., maximum 33% of total words in each list were appearance-related) in the number of appearance-related words participants provided on the SI, this variable was dichotomized to split the sample into individuals with one or more appearance-related words on the SI and those without any appearance-related words. Using this definition, sixteen participants (15%) were categorized as having appearance-related content on the A/O list while ninety-one (85%) had no appearance-related words. Similarly, a minority ($n = 28$) of individuals had one or more appearance-related words on their A/I list while seventy-nine did not. Two separate one-way between-groups MANOVAs for A/O and A/I (independent variables) were then conducted to explore differences between participants with appearance-related content and those without on subscale scores of EDE (dependent variable). Preliminary assumption testing was conducted as noted above. For A/O, the number of participants with appearance-related content was quite low and results should be interpreted cautiously. However, there was a statistically significant difference on a linear combination of the dependent variables between participants with appearance-related content on the A/O list of the SI and those without appearance-related content, $F (4, 102) = 3.15, p = .017$; Wilks’ Lambda = .89; partial eta squared = .11. Considering results on the dependent variables separately with a Bonferroni adjusted alpha level of .0125 (.05 critical $p$ value divided by four comparisons in this analysis), the eating concern [$F (1, 105) = 7.23, p = .008$, partial eta squared = .06], weight concern [$F (1, 105) = 11.6, p = .001$, partial eta squared = .1], and shape concern [$F (1, 105) = 10.43, p = .002$, partial
eta squared = .09], subscales of the EDE reached statistical significance. An inspection of the mean scores revealed that participants with appearance-related content on the A/O list consistently had higher mean scores on the eating \((M = 2.89, SD = 1.43)\), weight \((M = 4.34, SD = 1.51)\), and shape \((M = 4.23, SD = 1.77)\) concern subscales than those without (eating concern \(M = 1.91, SD = 1.33\); weight concern \(M = 2.96, SD = 1.53\); shape concern \(M = 2.87, SD = 1.51\)).

Similarly, results from a linear combination of the variables in the second MANOVA revealed a significant difference between participants with appearance-related content on the A/I list of the SI and those without \([F(4, 102) = 5.09, p = .001; \text{Wilks’ Lambda} = .83; \text{partial eta squared} = .17]\). When results for the dependent variables were examined individually, the shape concern \([F(1, 105) = 10.74, p = .001, \text{partial eta squared} = .093]\) and weight concern \([F(1, 105) = 9.44, p = .003, \text{partial eta squared} = .083]\) subscales of the EDE reached statistical significance such that participants with appearance-related content on the A/I list had higher mean scores for shape concern \((M = 3.9, SD = 1.57)\) and weight concern \((M = 3.91, SD = 1.73)\) than participants who did not provide appearance-related content (shape concern \(M = 2.78, SD = 1.53\); weight concern \(M = 2.86, SD = 1.47\)).

**Hypothesis 3:** Participants in this portion of the study (N= 118) provided 15,017 individual EMA recordings over the course of the data collection period (range = 11 – 20 days, average = 14.97 days). In total, there were 9,088 responses to the semi-random signals and recording compliance to these assessments ranged from 58 to 100% (average = 87%). With regard to end-of-day recordings, 1,478 separate recordings were collected with participant compliance ranging from 24–100% (average = 89%). The total individual recordings also included 3,445 event-contingent reports of eating episodes and 1006 event-contingent reports of eating disorder behaviors. Eating disorder behaviors were aggregated by computing the total
number of behaviors recorded by each participant via semi-random signals and self-initiated reports (vomiting, laxative use, weighing self, exercise, skipping a meal, drinking fluids to curb appetite, bingeing) and end-of-day recordings (went 8 hours without eating, went 24 hours without eating, limited caloric intake to less than 1200). The total number of eating disorder behaviors ranged from 0 to 64 per person, with an average of 9.72 behaviors recorded during the EMA data collection period ($SD = 10.72$, median = 6). Inspection of the eating disorder behavior variable showed a Poisson distribution with 12.7% of participants reporting no eating disorder behaviors (skewness = 2.1, kurtosis = 5.8). Splitting the sample into quartiles, approximately 25% of all participants logged fewer than two ED behaviors, 50% logged at least six ED behaviors, and 75% of the sample logged 12 or fewer ED behaviors. Because the eating disorder behaviors captured by the EMA data were found to be severely skewed, data were aggregated into categorical groups and dichotomized into binary variables (e.g., behavior was reported or not reported) to better ensure compliance with the assumptions of the regression analyses. The categories were set as follows: aggregated restriction behaviors (24 hours without eating, 8 hours without eating, drank fluid to curb appetite, skipped meal), aggregated compensatory behaviors (self-induced vomiting, laxative use, exercise), weighing self, and bingeing. These four variables were then dichotomized such that participants who reported any instance of the behavior during the EMA data collection period were coded as “1” while those who did not report the behavior were coded as “0.”

EMA data were aggregated before analyses were carried out. Person-level averages and standard deviations of EMA Selves recordings were calculated such that each participant had a mean and standard deviation score for A/I and A/O across the two week EMA data collection period. The mean of the averaged A/I scores was 8.97 (range = 4 – 18.22, $SD = 3.17$) while the
mean of the averaged A/O scores was 10.31 (range = 4.14 – 18.39, SD = 3.22). For the aggregated standard deviation scores, which represented the degree of inconsistency an individual experiences in their self-discrepancies from moment-to-moment across the EMA data collection period, the mean A/I standard deviation score was 1.95 (range = 0 – 4.64, SD = .83) while the mean A/O standard deviation score was 1.94 (range = .54 – 3.87, SD = .72).

The demographic data of participants were utilized to examine whether these variables affected adherence to the EMA schedule. A series of one-way between-groups analyses of variance were utilized to compare education, income, and primary role (e.g., student, full-time employee, part-time employee, caretaker) for compliance with the semi-random EMA signals and end-of-day ratings. Participants were divided into three education groups (Group 1: high school or less; Group 2: some undergraduate or undergraduate education complete; Group 3: some graduate school or graduate school complete). There was no statistically significant difference at the p < .05 level between the groups on the percentage of answered semi-random EMA signals, $F(2, 113) = 1.7, p = .18$, or on the percentage of end-of-day ratings $F(2, 113) = .42, p = .66$. Based on reported annual household income data, participants were divided into three groups (Group 1: under $19,000; Group 2: $20-39,000; Group 3: $40,000 and above). There was no statistically difference at the p < .05 level between the groups on the percentage of answered semi-random EMA signals, $F = (2, 114) = .34, p = .71$, or on the percentage of end-of-day ratings, $F = (2, 114) = .73, p = .48$. Three groups were created to compare participants based on their primary role (Group 1: full or part-time wage earner; Group 2: full or part-time student; Group 3: homemaker, unemployed, and other). There was a statistically significant difference at the p < .05 level on the percentage of answered semi-random EMA signals, $F(2, 115) = 3.6, p = .03$; however, post-hoc comparisons using the Tukey HSD test indicated that there was no
statistically significant difference comparing the three groups’ mean scores (Group 1: \( M = .90, SD = .08 \); Group 2: \( M = .85, SD = .10 \); Group 3: \( M = .91, SD = .07 \)). There was no statistically difference at the \( p < .05 \) level between the groups on the percentage of end-of-day ratings, \( F = (2, 115) = .82, p = .44 \). The relationship between age, percentage of answered semi-random EMA signals, and percentage of end-of-day ratings was investigated using a Pearson product-moment correlation coefficient. There was a positive, medium correlation between age and percentage of answered semi-random EMA signals, \( r = .30, n = 118, p = .001 \); however there was no statistically significant correlation between age and percentage of end-of-day ratings, \( r = .05, n = 118, p = .60 \). Two groups were created to compare participants based on relationship status, (Group 1: married or living with partner; Group 2: single, separated, divorced, or widowed). Independent-samples t-tests were conducted to compare the groups on adherence to the EMA schedule. There was a significant difference in adherence to the semi-random signals between Group 1 \([M = .91, SD = .07]\) and Group 2 \([M = .86, SD = .10]; t (116) = 1.99, p = .049, \) two-tailed. The magnitude of the difference of the means was small (eta squared = .033). There was no significant difference, however, on adherence to end-of-day rating for between Group 1 \([M = .94, SD = .09]\) and Group 2 \([M = .88, SD = .18]; t (116) = 1.48\).

Regression analyses were used to examine the relationship between disordered eating behaviors and self-discrepancies with results for each of the analyses presented in Tables 6 through 9. Four hierarchical multiple regression analyses were used to assess the ability of eating disorder behaviors to predict the person-level mean and standard deviation scores for both ideal and ought self-discrepancies. Preliminary analyses were conducted to ensure there were no violations of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Six participants were identified as outliers, with Mahalanobis distance scores on the dependent
variables above the critical chi-square value and were therefore removed from the analyses. For all models, the following control variables were entered into Step 1: primary role, marital status, age, percentage of semi-random signals answered, and percentage of end-of-day recordings logged. Aggregated restriction behaviors, aggregated compensatory behaviors, weighing, and bingeing were entered into Step 2. With ideal discrepancy mean scores as the outcome, Step 1 explained 9% of the variance in scores. After entering the Step 2 variables, the model as a whole showed a trend toward significance, predicting 14.6% of the variance in ideal discrepancy mean scores, $F(9, 102) = 1.939, p = .054$. The eating disorder behaviors in Step 2 explained an additional 6% of the variance in ideal discrepancy mean scores after controlling for Step 1 variables [$R^2$ change = .059, $F$ change $(4, 102) = 1.772, p = .140$]. In the final model, only age and restriction were statistically significant, with age generating a slightly higher standardized beta value (beta = -.26, $p = .017$) than restriction (beta = -.239, $p = .016$) suggesting that fewer restrictive behaviors and younger age predict increased ideal discrepancies.

In the model using ought mean scores as the outcome, Step 1 explained 5% of the variance in scores. The Step 2 model explained 6.7% of the variance and was not statistically significant, $F(9, 102) = .816, p = .602$, with an $R^2$ change = .015, $F$ change $(4, 102) = .408, p = .802$. There were no independent variables that showed a significant unique contribution to the model. Using ideal standard deviations as the outcome, Step 1 explained 8% of the variance in scores while Step 2 explained 10% of the variance but was not statistically significant, $F(9, 102) = 1.271, p = .262$, $R^2$ change = .023, $F$ change $(4, 102) = .659, p = .622$. Age was the only variable that showed a significant unique contribution to the final model, standardized beta = -.280, $p = .013$. Lastly, when using ought standard deviation scores as the outcome, Step 1 explained 9% of the variance; the Step 2 model explained 10% of the variance.
in scores but was not statistically significant, $F(9, 102) = 1.276, p = .259$. Eating disorder behaviors in Step 2 only explained an additional 1.6% of the variance in scores after controlling for Step 1 variables [$R^2$ change $= .016, F$ change $(4, 102), = .462, p = .764$]. Age, again, was the only variable to show a significant contribution to the final model, beta $= -.262, p = .019$.

**Discussion**

The current study investigated the link between self-discrepancies, negative affect, and eating disorder symptoms in a sample of women with full and sub-threshold AN. A summary of the results for each of the three hypotheses are outlined below, followed by interpretations for the findings, potential future directions, and a note on study limitations.

A major distinguishing feature of self-discrepancy theory is its attempt to link categories of self-belief with corresponding affective states. As per Higgins’ (1987) theory, our first hypothesis predicted that A/I discrepancies from the own standpoint would be positively correlated with depressive affect and A/O discrepancies from the own standpoint would be positively correlated with anxious affect. Results from correlation and partial correlation analyses did not show strong support for either of these hypotheses. Only A/O discrepancies demonstrated a trend toward a significant correlation with anxiety, thus, the hypothesis was not confirmed.

The second hypothesis was that individuals with self-discrepancy scores above the study population median, labeled here as high A/I and A/O discrepancies, would demonstrate more eating disorder symptoms compared to individuals with low discrepancies. Results only partially supported this assertion: while high A/I discrepancies did not reveal a statistically significant relationship with eating disorder symptoms, high A/O discrepancies were significantly related to sub-scales representing restraint and eating concern.
However, when appearance-related content was used as a control variable in follow-up analyses, the relationship between A/O self-discrepancies and eating disorder symptoms was no longer significant. Controlling for idiographic appearance-related content was included in the analyses as other researchers (e.g., Forston & Stanton, 1992; Sawdon, Cooper, & Seabrook, 2007; Strauman et al., 1991) have tested whether general self-discrepancies might influence the maintenance of eating disorder symptoms beyond the expected body image disturbance that appearance-related discrepancies capture. To investigate whether there were meaningful differences between individuals who generated any appearance-related content and those who did not, a post-hoc analysis was conducted. However, for both ideal and ought aspects, individuals categorized as having high appearance-related discrepancies also evidenced higher EDE sub-scale scores. The number of individuals categorized into the group with high appearance-related discrepancies was quite low which limits the conclusions that can be drawn and the generalizability of findings.

Our third hypothesis utilized EMA data and posited that participants who experienced higher levels of self-discrepancies (aggregated person-level mean score across EMA data collection period) and more inconsistency in self-discrepancies (aggregated person-level standard deviation scores across EMA data collection period) in their daily lives would also experience more ED symptoms. Testing the relationship between mean discrepancy scores and ED symptoms is similar to the approach in hypothesis two, however, hypothesis three relied on EMA data (which limited the number of self-discrepant traits assessed and was scored differently) as opposed to the baseline data and thus results will be discussed separately. Hypothesis three was tested via hierarchical regression analyses that controlled for compliance to the EMA schedule and demographic variables. Four models were fit to the data with categories
of eating disorder behaviors as dichotomous predictor variables and ideal and ought means and standard deviations as outcomes. Results did not support the hypothesis. Specifically, only ideal self-discrepancy mean scores showed a trend toward significance, with age and restriction behaviors making unique and statistically significant contributions to the final model.

The current study does not provide strong empirical support for the ability of self-discrepancy theory to predict unique affective states as per the first hypothesis. These findings are notable given that other investigators (e.g., Scott & O’Hara, 1993; Weilage & Hope, 1999) have argued that the theorized relationship between self-discrepancies and their corresponding affective states should be more robust in clinical samples such as ours which included participants who met study criteria for full or sub-threshold AN. There are several possible reasons for the null findings. For one, researchers have observed that individuals with AN may also be prone to alexithymia or poor emotional awareness and therefore struggle to recognize negative emotions (Beadle, Paradiso, Salerno, & McCormick, 2013; Kessler, Schwarze, Filipic, Traue, & Wietersheim, 2006). However, it is unlikely that the inability to link discrepancies with negative affect in the current study was due to participants’ difficulty distinguishing emotional states as the measures utilized to assess anxiety and depression included cognitive and behavioral markers of these emotions. The current study did not include an assessment of alexithymia but if participants had difficulty identifying negative emotions, let alone distinguishing different affective states from one another, it is possible that depression and anxiety could have been underreported and therefore explain some of the null findings here. However, while it may be true that individuals suffering from eating disorders may struggle to recognize all aspects of emotion, other investigators have noted high correlations between anxiety, depression, and alexithymia in individuals with eating disorders, suggesting a conceptual overlap between the
constructs of alexithymia and negative affect suggesting that the alexithymia reported among eating disorder patients may be confounded with negative affect (Montebarocci et al., 2006).

A second potential explanation for the null findings could be methodological in nature. Bruch, Rivet, & Laurenti (2000) noted that one of the challenges in the investigation of self-discrepancies and negative affect is the degree of conceptual overlap between the states of anxiety and depression. The current study design sought to address this issue by following the recommendations of Boldero and colleagues (2005), who suggested partialing out the effects of A/I and A/O self-discrepancies when examining the relationship between each type of discrepancies and affect. However, when this was carried out in the analyses, there were still no significant relationships. As such, it is unlikely that the current study failed to produce significant results because outcome variables were too closely correlated to capture a relationship between discrepancies and distinct affective states. Boldero and colleagues’ (2005) recommendation may need to be reconsidered as an explanation for the null findings in prior self-discrepancy studies. Additionally, the lack of findings may relate to the sensitivity of the SI as a measurement tool. The SI, as it was administered at baseline, relies on an independent coder to examine the words produced and then rate the degree of discrepancy between actual and ideal/ought traits. Having participants rate the degree of discrepancy they experience, for example on a numeric scale as was done in the EMA data collection, might produce stronger associations between discrepancies and distinct affective states.

Alternative methodological considerations may need to be taken into account when assessing the relationship between self-discrepancies and negative affect in future research. For example, a group comparison of participants with high magnitude discrepancies versus those with low magnitude discrepancies may have provided support for the application of self-
discrepancy theory to certain individuals or provided more context to interpret null findings.

However, the current study did not take this approach because Boldero and colleagues’ (2005) recommendation was made in reaction to prior research which had utilized convenience samples with lower levels of psychopathology and less variability in self-discrepancy scores, while our study population was selected based on the existence of significant eating pathology. Based on the clinical severity of the current study population, it was assumed that self-discrepancy scores would be sufficiently elevated and would not require a comparison of sub-groups with differing levels of self-discrepancies; however, this was not the case. Future analyses using the current data set could take up the aforementioned group comparison to investigate whether self-discrepancy theory was able to selectively predict affect for individuals with high levels of self-discrepancies in the A/I and A/O realms compared to individuals with relatively lower levels of discrepancies. Utilizing the same dataset as the current study, Lavender and colleagues (2013) compared personality-based subgroups of individuals with AN and found significant differences in the self-discrepancy scores and levels of positive and negative affect between underregulated, overregulated, and low psychopathology subtypes. These findings suggest that, among those with AN, there may be substantial heterogeneity within cognitive, emotional, and behavioral domains and could explain the existence of null findings when participants with AN are examined en masse rather than in empirically-validated subgroups. The lack of a significant relationship between discrepancies and affect presents a challenge to self-discrepancy theory; if reliable predictions can only be made with a specific population or under certain methodological considerations, self-discrepancy theory may have limited utility in predicting affective states. In sum, our null findings are consistent with those of others (e.g., McDaniel & Grice, 2008; Ozgul,
Heubeck, Ward, & Wilkinson, 2003) who have encountered challenges when attempting to predict affective states in the distinct manner proposed by Higgins (1987).

While limited in scope, previous research has shown some consistency in establishing a relationship between high levels of self-discrepancies and eating disorder attitudes and behaviors (Forston & Stanton, 1992; Higgins, Vookles, & Tykocinski, 1992; Sawdon, Cooper, & Seabrook, 2007; Strauman & Glenberg, 1994; Strauman et al., 1991). Hypotheses two and three were tested using baseline and EMA data, respectively, to examine the relationship between self-discrepancies and eating pathology, but results did not suggest a strong, direct relationship between these variables. In a test of the second hypothesis, A/O discrepancies showed a more consistent ability (relative to A/I discrepancies) to predict eating pathology in the baseline data. Our finding that A/O discrepancies were related to EDE restraint and eating concern subscales aligns with earlier research that theorized A/O discrepancies would be more closely related to attitudes and behaviors associated with AN compared to A/I discrepancies (Higgins, Klein, & Strauman, 1985; Vookles, Berenstein, Chaiken, and Higgins, 1991); individuals who experienced a larger discrepancy between their actual self and the self they feel obligated to attain (i.e., ought self) may attempt to alleviate the distress of A/O discrepancies by restricting their food intake, being preoccupied with food, or worrying/experiencing guilt about social eating. Strauman and colleagues (1991) further explain how concerns about self-presentation can interact with the social environment to create a cycle of frequently accessible discrepancies that can manifest eating disorder behavior:

Thinness or attractiveness, as chronically accessible self-guides, will be activated by the social environment and will participate in determining perceptions of that environment. This mutual influence of self-evaluation and social and interpersonal factors would serve to increase the likelihood that the individual would encounter cues activating accessible self-standards for appearance, in turn increasing efforts at self-regulation. Over time, maladaptive eating behaviors could emerge from such a sequence of events. (p.954)
Findings from hypothesis two are similar to those of Sawdon and colleagues (2007) and Forston and Stanton (1992) who found that appearance-related content accounted for much of the variability in the relationship between discrepancies and ED symptoms.

There are several potential reasons our second hypothesis was largely not confirmed. The relationship between A/O discrepancies and EDE subscales was no longer significant once appearance-related content was taken into account, as such, the current findings may underscore the importance of appearance-related cognitions as key motivators for disordered eating behavior; this could be interpreted as support for Fairburn and colleagues’ (2003) theory that the importance of shape and weight in individuals’ self-evaluative schemes underlies the cycle of eating disorder thoughts and behaviors (Fairburn, Cooper, & Shafran, 2003). Our post-hoc comparisons showed that individuals who generated appearance-related A/I and A/O discrepancies had higher EDE subscale scores than those who did not produce any appearance-related discrepancies. General discrepancies may still have a role to play, for example, influencing the initial development of eating pathology. However, considering the current sample had active ED symptoms, our data may suggest that appearance-related discrepancies may be more central to the maintenance of the disorder as they are more frequently and easily activated (e.g., by events such as looking in the mirror, putting on clothes, or eating with others). Higgins (1987) noted that discrepancies accessible to an individual will be those that are recently and frequently activated by relevant stimuli. As the importance of weight/shape in self-evaluation and body image distortion are defining symptoms of AN, it can be assumed that appearance-related discrepancies would be accessible to individuals suffering from the disorder. Similarly, more general self-discrepancies, such as an individual’s sense of their intelligence, may not be activated often enough to prompt negative emotion or ED symptoms.
A second potential reason for the null findings may be that the relationship between self-discrepancies and ED symptoms is influenced by additional variables such as stressful life events that could activate self-discrepant cognitions. Our analysis examined the relationship between self-discrepancies, affect, and ED symptoms in separate statistical analyses (hypotheses 1 and 2) but did not examine the potential mediating role of stressful life events. Future research could include affect, ED symptoms, and additional variables in the same analysis to uncover more nuanced relationships. Engel and colleagues (2005) utilized EMA data within a small sample of individuals with AN symptoms to test a multifactorial model of AN behavior and found positive correlations between self-discrepancies and affective lability. Affective lability, in turn, correlated with stressful life events and restrictive behaviors or rituals. Thus, by examining self-discrepancies at baseline or as aggregated data across the two-week EMA data collection period, the current study may have attenuated the relationship between self-discrepancies, eating disorder symptoms, and affect as they were not consistently activated by stressful life events or other relevant stimuli. In sum, including additional variables and utilizing a more comprehensive methodology to test relationships between them may uncover more significant findings.

A third potential explanation for the null findings is that the current study only used the participants’ own self standpoint as data were not available for other standpoints of the self. Past research has demonstrated significant differences between standpoints when examining the relationship between self-discrepancies and eating disorder behaviors (Forston & Stanton, 1992; Halliwell & Dittmar, 2006; Snyder, 1997). Considering that A/O discrepancies appeared to show a stronger relationship to restraint and eating concerns, such as eating in secret, self-presentation to others may be especially salient in motivating eating disorder behavior. For example, if a parent or significant other is a particularly potent source of self-evaluation (e.g., because that
individual makes shape or weight-related comments), asking the participant to consider the significant other’s ideal and ought standards could result in stronger relationships between discrepancies, affect, and behavior. Thus, assessing alternative standpoints of the self in future research may allow for discrepancies to be more available or accessible to an individual, as this could explicitly prime the individual to consider other viewpoints. Indeed, Higgins (1987) notes that self-concept and self-evaluative standards include beliefs from the perspective of significant others in addition to an individual’s own standpoint.

Hypothesis three proposed that higher mean levels of self-discrepancies and more variability in self-discrepancies would be associated with ED behavior recorded via ecological momentary assessment; however, this hypothesis was largely unsupported. Of the four models tested via regression analysis, the model that used mean ideal discrepancy scores as the outcome variable was the only to show a trend toward significance. Within the model, age and restriction behaviors made significant contributions. These results should be interpreted with caution given that they represent a trend rather than a significant finding, however, they suggest that fewer restrictive behaviors predict increased discrepancies in the ideal realm. In other words, if individuals did not engage in restrictive behaviors designed to influence shape or weight, they may have experienced more negative self-evaluative cognitions when considering how they conformed to their ideal self on a moment-to-moment basis. Given that many of the traits produced on the SI and entered into the PalmPilot devices were not exclusively appearance-related but more general in nature (e.g., happy, successful, diligent), these findings may suggest that engaging in eating disorder behaviors can influence self-evaluative cognitions that may not directly relate to weight or shape. Such a finding could be clinically important as therapists who seek to regulate eating and limit restrictive behaviors could anticipate an increase in negative
self-evaluations from patients as treatment progresses. Clinicians might illustrate how the process of extinguishing restrictive behaviors may trigger negative self-evaluative cognitions outside the realms of shape and weight. With regard to age, the findings may signify that younger individuals are subject to more discrepancies in the ideal realm. This may be due to the fact that with less life experience, younger individuals experience a larger gulf between their current status and their identified ideals. There are a number of potential explanations for the null findings. One, the EMA data used to test hypothesis three were aggregated to simplify statistical procedures, which may have limited the ability to uncover more complex relationships amongst the variables of interest. Two, the self-discrepancies selected for inclusion on the Palmpilot devices were selected as the top four most discrepant traits produced on the SI. While this approach assumes that the four traits are highly relevant to the individual and therefore should produce distress when activated, it may have limited the variability in self-discrepancy scores, as each individual’s A/I and A/O Palmpilot lists had to exclude other traits that might have been triggered by stimuli during the EMA data collection period. Examining self-discrepancies using EMA in future research can address such concerns by adjusting study design and statistical analyses, which may result in findings that support this theoretical notion; however, the lack of support for our hypotheses raises the question as to whether revisions to the theory or its application to affect and ED symptoms should be considered at all.

There are several limitations of the current study that deserve note. Many past self-discrepancy studies have utilized a self-report questionnaire (SQ; Higgins, Bond, Klein, & Strauman, 1986) rather than the SI, an interview-based tool. Participants in the current study may have felt less comfortable divulging discrepancies to an interviewer than they might have if they were given a questionnaire, and thus self-discrepancy scores could have been affected by this
procedure and influenced results. Another consideration is that the measures of anxiety and depression in our study were given at baseline and not in repeated measures fashion; the latter would have allowed comparisons between temporal levels of distress within participants when discrepancies were activated. For example, discrepancies might show a clearer relationship to distinct negative affective states if an assessment of emotional distress was given following the activation of the discrepancy. As noted earlier, examining this relationship via EMA data would allow for inclusion of stressful events that activated discrepancies in the participant’s daily experience. Similarly, much of the EMA data utilized were aggregated to allow for fairly straightforward statistical analyses. As a result of this, our null findings could be the result of our choice of analyses and could be resolved via more sophisticated analyses of the relationship between self-discrepancies, ED behaviors, and negative affect. For instance, an examination of EMA data might reveal that discrepancies become activated shortly after a participant weighs herself, which in turn cues anxiety and motivates compensatory behaviors. Lastly, the current study participants were female volunteers from the community with full or sub-threshold AN, thus, the inability to link discrepancies with emotional states is surprising given the clinical severity of the study population. However, the lack of support in this study does not necessarily signify that self-discrepancy theory would not be relevant for other populations such as individuals with more severe AN. Future research could compare full versus sub-threshold AN or compare subgroups of individuals with AN, for example, using the personality-based subtypes of AN described by Lavender and colleagues (2013).

Although our hypotheses were generally not supported, our results suggest self-discrepancy theory may have limited applicability when making predictions about affect and ED symptoms in individuals with anorexia nervosa. However, methodological considerations
regarding how self-discrepancies are assessed and how data are analyzed should be addressed in future research with this population. The strength of the SI, and a self-discrepancy assessment in general, is its ability to collect distinctive cognitive content and thus may have more value at the individual level than it does when data are aggregated across many participants in a study. The multiple domains (e.g., ideal, ought, potential, future) as well the different standpoints of the self (e.g., self, significant other, parents) may also confer significant insight in parsing an individual’s uniquely distressing cognitive landscape. As a clinical tool then, self-discrepancy theory may have beneficial utility in providing a framework by which clinicians and clients might better understand conceptual links between these variables. For one, it could help clinicians and clients discuss how self-evaluative standards relate to negative affect and eating disorder behaviors. This information, in turn, could help build a client’s awareness of when such cognitions become activated in their daily lives (e.g., when interacting with significant others, after stressful life events) and provide an opportunity to challenge and interrupt the cycle pathological cognitions, affect, and behavior.
References


relationships to components of the tripartite model of emotional distress. *Personality and Individual Differences, 29,* 37-44.


discrepancies and young women’s and men’s affect, body satisfaction, and emotional eating: A comparison of fixed-item and participant-generated self-discrepancies.


are the issues? *European Eating Disorders Review, 8*, 198-216.


SELF-DISCREPANCIES AND ANOREXIA


deficits in eating disorders: A marker of eating pathology or general psychopathology?

*Psychiatry Research, 197*, 103-111.


Table 1

*Overview of EMA Assessments Used in Current Study*

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Definition</th>
<th>Signal-contingent</th>
<th>Event-contingent</th>
<th>Interval-contingent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Six semi-random signals per day</td>
<td>Self-initiated reports</td>
<td>End-of-day ratings</td>
</tr>
<tr>
<td>Weighed self</td>
<td>Weighed self on mechanical or electronic scale</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Exercised</td>
<td>Completed anaerobic or aerobic exercise for at least 10 minutes</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Skipped meal</td>
<td>Failed to eat breakfast, lunch, or dinner</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Purging</td>
<td>Intentionally vomited or used laxatives for weight control</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Binge eating</td>
<td>Episode of eating that was unusually large, lost control over eating</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Drinking fluids to curb appetite</td>
<td>Intentional effort to reduce hunger by drinking fluids</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Checked bones and joints for fat</td>
<td>Physically measure or examine bone-joint size</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>Eight hours without eating or Limited daily intake to less than 1200 calories</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-discrepancies</td>
<td>At this moment, to what extent are you &lt;self-discrepant trait&gt;?</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

*Participants would receive this prompt for each of the four ideal traits and four ought traits that were entered into the EMA devices.*
Table 2

*Example of Raw EMA Data in Long Format Before Aggregation*

<table>
<thead>
<tr>
<th>ID</th>
<th>Day</th>
<th>Occurrence</th>
<th>A/O pair 1</th>
<th>A/O pair 2</th>
<th>A/O pair 3</th>
<th>A/O pair 4</th>
<th>A/I pair 1</th>
<th>A/I pair 2</th>
<th>A/I pair 3</th>
<th>A/I pair 4</th>
<th>Sx</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* A/O = actual-ought discrepancy; A/I = actual-ideal discrepancy; Sx = eating disorder behavior
Table 3

*Example of Aggregated EMA Data File with Means and Standard Deviations for each Discrepancy Pair*

<table>
<thead>
<tr>
<th>ID</th>
<th>A/O pair 1 mean</th>
<th>A/O pair 1 SD</th>
<th>A/O pair 2 mean</th>
<th>A/O pair 2 SD</th>
<th>A/I pair 1 mean</th>
<th>A/I pair 1 SD</th>
<th>Adherence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. A/O = actual-ought discrepancy; A/I = actual-ideal discrepancy.*
Table 4

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total A/I</td>
<td>-</td>
<td>.461**</td>
<td>.098</td>
<td>.151</td>
</tr>
<tr>
<td>2. Total A/O</td>
<td>-</td>
<td></td>
<td>.194*</td>
<td>.177</td>
</tr>
<tr>
<td>3. Total depressive affect</td>
<td>-</td>
<td></td>
<td></td>
<td>.564**</td>
</tr>
<tr>
<td>4. Total anxious affect</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** p < 0.01 (2-tailed).
* p < 0.05 (2-tailed).
Table 5

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A/I discrepancy</td>
<td>-.30</td>
<td>1.81</td>
<td>.00</td>
<td>-6 – 4</td>
</tr>
<tr>
<td>2. A/O discrepancy</td>
<td>-1.12</td>
<td>1.44</td>
<td>-1</td>
<td>-6 – 3</td>
</tr>
<tr>
<td>3. BDI total score</td>
<td>22.09</td>
<td>13.63</td>
<td>20</td>
<td>0 – 53</td>
</tr>
<tr>
<td>4. STAI state score</td>
<td>49.07</td>
<td>13.60</td>
<td>50.50</td>
<td>22 – 79</td>
</tr>
<tr>
<td>5. EDE Restraint</td>
<td>2.79</td>
<td>1.61</td>
<td>3</td>
<td>0 – 6</td>
</tr>
<tr>
<td>6. EDE Eating Concern</td>
<td>2.08</td>
<td>1.35</td>
<td>2.2</td>
<td>0 – 4.8</td>
</tr>
<tr>
<td>7. EDE Shape Concern</td>
<td>3.05</td>
<td>1.59</td>
<td>3</td>
<td>0 – 5.88</td>
</tr>
<tr>
<td>8. EDE Weight Concern</td>
<td>3.08</td>
<td>1.61</td>
<td>3.2</td>
<td>.2 – 6.2</td>
</tr>
</tbody>
</table>
Table 6

Summary of Hierarchical Multiple Regression Analyses for Variables Predicting Ideal Mean Scores in EMA Data (N = 112)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>-.26</td>
<td>.50</td>
<td>-.05</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.24</td>
<td>.80</td>
<td>-.03</td>
</tr>
<tr>
<td>Age</td>
<td>-.13</td>
<td>.05</td>
<td>-.31*</td>
</tr>
<tr>
<td>Semi-random signal compliance</td>
<td>8.5</td>
<td>4.2</td>
<td>.24*</td>
</tr>
<tr>
<td>End-of-day compliance</td>
<td>-3.8</td>
<td>2.7</td>
<td>-.16</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>-.24</td>
<td>.50</td>
<td>-.05</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.04</td>
<td>.82</td>
<td>-.01</td>
</tr>
<tr>
<td>Age</td>
<td>-.11</td>
<td>.05</td>
<td>-.26*</td>
</tr>
<tr>
<td>Semi-random signal compliance</td>
<td>5.8</td>
<td>4.6</td>
<td>.17</td>
</tr>
<tr>
<td>End-of-day compliance</td>
<td>-3.1</td>
<td>2.7</td>
<td>-.13</td>
</tr>
<tr>
<td>Restriction behaviors</td>
<td>-1.8</td>
<td>.75</td>
<td>-.24*</td>
</tr>
<tr>
<td>Compensatory behaviors</td>
<td>.55</td>
<td>.67</td>
<td>.09</td>
</tr>
<tr>
<td>Weighing</td>
<td>-.60</td>
<td>.75</td>
<td>-.08</td>
</tr>
<tr>
<td>Bingeing</td>
<td>.14</td>
<td>.86</td>
<td>.02</td>
</tr>
</tbody>
</table>

Note. $R^2 = .087$ for Step 1; $\Delta R^2 = .059$ for Step 2 ($p = .140$).
Table 7

Summary of Hierarchical Multiple Regression Analyses for Variables Predicting Ought Mean Scores in EMA Data (N = 112)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>.02</td>
<td>.51</td>
<td>.004</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.23</td>
<td>.81</td>
<td>-.03</td>
</tr>
<tr>
<td>Age</td>
<td>-.06</td>
<td>.05</td>
<td>-.13</td>
</tr>
<tr>
<td>Semi-random signal compliance</td>
<td>9.9</td>
<td>4.3</td>
<td>.28*</td>
</tr>
<tr>
<td>End-of-day compliance</td>
<td>-4.7</td>
<td>2.8</td>
<td>-.19</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>.05</td>
<td>.53</td>
<td>.01</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.01</td>
<td>.86</td>
<td>-.00</td>
</tr>
<tr>
<td>Age</td>
<td>-.04</td>
<td>.05</td>
<td>-.10</td>
</tr>
<tr>
<td>Semi-random signal compliance</td>
<td>7.6</td>
<td>4.9</td>
<td>.22</td>
</tr>
<tr>
<td>End-of-day compliance</td>
<td>-4.2</td>
<td>2.9</td>
<td>-.18</td>
</tr>
<tr>
<td>Restriction behaviors</td>
<td>-.95</td>
<td>.79</td>
<td>-.12</td>
</tr>
<tr>
<td>Compensatory behaviors</td>
<td>.28</td>
<td>.71</td>
<td>.04</td>
</tr>
<tr>
<td>Weighing</td>
<td>.08</td>
<td>.79</td>
<td>.01</td>
</tr>
<tr>
<td>Bingeing</td>
<td>.42</td>
<td>.90</td>
<td>.05</td>
</tr>
</tbody>
</table>

Note. $R^2 = .052$ for Step 1; $\Delta R^2 = .015$ for Step 2 ($p = .80$).
Table 8

Summary of Hierarchical Multiple Regression Analyses for Variables Predicting Ideal Standard Deviation Scores in EMA Data (N = 112)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>-.06</td>
<td>.13</td>
<td>-.04</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.33</td>
<td>.21</td>
<td>-.15</td>
</tr>
<tr>
<td>Age</td>
<td>-.03</td>
<td>.01</td>
<td>-.29*</td>
</tr>
<tr>
<td>Semi-random signal compliance</td>
<td>1.2</td>
<td>1.1</td>
<td>.13</td>
</tr>
<tr>
<td>End-of-day compliance</td>
<td>-.85</td>
<td>.72</td>
<td>-.13</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>-.01</td>
<td>.14</td>
<td>-.01</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.29</td>
<td>.22</td>
<td>-.14</td>
</tr>
<tr>
<td>Age</td>
<td>-.03</td>
<td>.01</td>
<td>-.28*</td>
</tr>
<tr>
<td>Semi-random signal compliance</td>
<td>1.2</td>
<td>1.3</td>
<td>.13</td>
</tr>
<tr>
<td>End-of-day compliance</td>
<td>-.76</td>
<td>.73</td>
<td>-.12</td>
</tr>
<tr>
<td>Restriction behaviors</td>
<td>.10</td>
<td>.20</td>
<td>.05</td>
</tr>
<tr>
<td>Compensatory behaviors</td>
<td>-.05</td>
<td>.18</td>
<td>-.03</td>
</tr>
<tr>
<td>Weighing</td>
<td>-.15</td>
<td>.20</td>
<td>-.07</td>
</tr>
<tr>
<td>Bingeing</td>
<td>.27</td>
<td>.23</td>
<td>.13</td>
</tr>
</tbody>
</table>

Note. \( R^2 = .078 \) for Step 1; \( \Delta R^2 = .023 \) for Step 2 (\( p = .622 \)).
Table 9

Summary of Hierarchical Multiple Regression Analyses for Variables Predicting Ought Standard Deviation Scores in EMA Data (N = 112)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Role</td>
<td>.07</td>
<td>.11</td>
<td>.06</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-.21</td>
<td>.18</td>
<td>-.11</td>
</tr>
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<td>-.27*</td>
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Note. $R^2 = .085$ for Step 1; $\Delta R^2 = .016$ for Step 2 ($p = .764$).
Appendix A

SELF-INTERVIEW PROTOCOL

Introduction: I'd like to ask you some questions concerning how you describe yourself and how other people in your life would describe you. I will be asking several different but related questions, about the type of person that you actually are, ideally would like to be, believe you ought to be, and do not want to be. As I ask the questions I'll be writing down your responses, and I may ask you to elaborate on them from time to time. Please do your best to limit your responses to one word attributes. These attributes may be positive or negative. If you're not sure of anything I ask you, just let me know and I'll try to clarify the question.

Please take your time and consider each question thoughtfully. There are no right or wrong answers. In general, the first things that come to mind are the best answers. We will maintain the confidentiality of your answers.

**ACTUAL/OWN:** What are the attributes that you believe you actually possess?

( Clarification: What kind of person do you believe you are?)

If only positive attributes are given, ask "Are there any attributes that you possess that might not be as positive as the ones you've mentioned already?".

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?" Only write down the first ten if more than ten are given.

**ACTUAL/OTHER:** What are the attributes that your parents or other important people in your life believe you actually possess?

( Clarification: What kind of person do important people in your life believe you are?)

If only positive attributes are given, ask "Are there any attributes that others believe you possess that might not be as positive as the ones you've mentioned already?".

If one or both parents are not currently a significant part of the subject's life, say "What kind of person did (he/she/they) believe you were back when they were a significant part of your life?"

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?" Only write down the first ten if more than ten are given.

**IDEAL/OWN:** Now I'd like to ask a slightly different question. What are the attributes of the kind of person that you would ideally like to be?

( Clarification: What kind of person is it your ultimate wish or aspiration to be?)

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?"
If the participant generates an inadequate number of trait like words for entry into the palm pilot say “Could you give me some more words describing how you would like to be as a person in terms of personality traits/values/physical characteristics.”

Only write down the first ten if more than ten are given.

**IDEAL/OTHER:** What are the attributes of the kind of person that your parents or other important people in your life would ideally like you to be?

(Clarification: What kind of person would important people in your life wish for you to be?)

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?" Only write down the first ten if more than ten are given.

**OUGHT/OWN:** Now here's another slightly different question: What are the attributes of the kind of person you believe you ought to be?

(Clarification: What kind of person is it your duty or responsibility to be?)

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?"

If the participant generates an inadequate number of trait like words for entry into the palm pilot say “Could you give me some more words describing how you ought to be as a person in terms of personality traits/values/physical characteristics.”

Only write down the first ten if more than ten are given.

**OUGHT OTHER:** What are the attributes of the kind of person that other important people in your life believe you ought to be?

(Clarification: What kind of person do important people in your life believe it is your duty or responsibility to be?)

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?" Only write down the first ten if more than ten are given.

**UNDESIRABLE/OWN:** Here is the final question. What are the attributes that you do not want to possess?

(Clarification: What kind of person do you believe it would be extremely undesirable to be?)

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?" Only write down the first ten if more than ten are given.
**UNDESIRED/OTHER:** What are the attributes that your parents or other important people in your life do not want you to possess?

(Clarification: What kind of person do important people in your life believe it would be extremely undesirable for you to be?)

Be sure to get at least SIX attributes. If less than six are produced spontaneously, ask "Are there any others you can think of?" Only write down the first ten if more than ten are given.

**CONCLUSION:** Are there any other attributes or traits that you forgot to mention for any of these questions?