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Self-Recognition of an Eating Disorder and Treatment-Seeking Behavior

Charlotte Lucienne Grillot



FLORIDA STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

SELF-RECOGNITION OF AN EATING DISORDER AND
TREATMENT-SEEKING BEHAVIOR

By

CHARLOTTE LUCIENNE GRILLOT

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The members of the supervisory committee were:

Pamela K. Keel

Professor Directing Thesis

Thomas Joiner

Committee Member

Colleen Ganley

Committee Member

The Graduate School has verified and approved the above-named committee members, and certifies that the thesis has been approved in accordance with university requirements.

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ABSTRACT

Many individuals with eating disorders do not self-identify as having an eating problem, and may therefore fail to seek or receive appropriate treatment. Factors that may influence eating disorder self-recognition and treatment-seeking behavior include demographic variables and symptom presentation. Previous research suggests that men and racial/ethnic minorities are less likely to seek treatment for an eating disorder than white women. The current study utilized a large community-based sample to examine predictors of self-recognition of an eating disorder and eating disorder treatment-seeking behavior, as well as differences in self-recognition and treatment-seeking behavior by gender and race/ethnicity. Results indicate that being female, greater current eating disorder symptom severity, current self-perception overweight, and having a higher current BMI were related to higher likelihood of current self-recognition of an eating disorder. Being female, greater lifetime eating disorder symptom severity, self-perception being underweight at adult lowest weight, and self-recognition of an eating disorder significantly increased the odds of having ever sought treatment for an ED. In symptom cluster models, binge eating and engaging in compensatory behaviors were both related to higher likelihood of self-recognition and treatment-seeking. Importantly, even when accounting for self-recognition, women were more likely than men to report ever seeking treatment for an eating disorder. Mediation models indicated that self-recognition partially mediated the relationship between gender and treatment-seeking, suggesting that help-seeking barriers extend beyond the problem of limited self-recognition. Results have implications for interventions designed to promote self-recognition of eating disturbances as serious problems, and the need to address barriers to treatment seeking both related and unrelated to self-recognition.

INTRODUCTION

Given the significant levels of distress, impairment, and medical comorbidity associated with eating disorders (EDs) (e.g. Crow, et al., 2009; Jenkins, Hoste, Meyer, & Blissett, 2011; Smink, Van Hoeken, & Hoek, 2012), understanding factors that influence self-recognition of an eating problem and treatment-seeking behavior is vital. Research addressing factors associated with self-recognition of an ED and treatment-seeking has focused on demographic variables, such as age, gender, and race/ethnicity, as well as ED-related variables including symptom presentation, and knowledge and beliefs concerning eating-disordered behavior (Cachelin, Striegel-Moore & Regan, 2006; Jorm, et al., 1997). Still, relatively little is known about the ability of individuals to recognize symptoms of disordered eating in themselves, i.e. self-recognition, or how this relates to treatment-seeking behavior. Therefore, the purpose of the current study was to examine predictors of self-recognition of and treatment seeking for an ED, as well as differences in self-recognition and treatment seeking by gender and race/ethnicity.

Self-Recognition

Although the prevalence of ED symptoms is quite high in the general population (Hay, Mond, Buttner, & Darby, 2008; Jenkins et al., 2011), relatively few individuals recognize they have a problem. Indeed, in a community-based study of young adult women who met screening criteria for a clinically significant ED, under half (48.1%) reported that they currently had an eating problem (Mond, Hay, Rodgers, & Owen, 2006). Similarly, in a subsample of college women who endorsed binge eating (with or without compensatory behaviors), only 52.1% recognized a problem with their eating (Gratwick-Sarll, Mond & Hay, 2013). In a population-based study of female adolescents who met criteria for an ED, only 42.3% recognized a problem (Gratwick-Sarll, Bentley, Harrison, & Mond, 2014).

Severity. Among factors that contribute to self-recognition of a problem, higher levels of ED psychopathology and general distress have been shown to predict increased self-recognition (Gratwick-Sarll, Bentley, Harrison, & Mond, 2014; Gratwick-Sarll, Mond & Hay, 2013; Hepworth, & Paxton, 2007; Mond, Hay, Rodgers, & Owen, 2006). EDs are composed of behavioral (e.g. fasting, binge eating, compensatory weight control methods) and cognitive symptoms (e.g. disturbance in experience of weight or shape, overvaluation of body weight and shape). They are also often associated with physical signs, including, for example, low and high weight. Behavioral ED symptoms and observable physical signs may be more likely to trigger self-recognition of an eating problem than cognitive symptoms alone. Indeed, severity of behavioral ED symptoms has been identified as a prompt to self-recognition of an eating problem (Hepworth, & Paxton, 2007; Schoen, et al., 2012).

Behavioral Symptoms. Specific behavioral ED symptoms may also prompt self-recognition of a problem. Self-induced vomiting as a means for controlling weight and shape has consistently been associated with increased self-recognition of an eating problem above and beyond other ED symptoms (Gratwick-Sarll, Bentley, Harrison, & Mond, 2014; Gratwick-Sarll, Mond & Hay, 2013; Hepworth, & Paxton, 2007; Mond, Hay, Rodgers, & Owen, 2006). Indeed, 75% of participants who reported self-induced vomiting recognized themselves as experiencing an eating problem, while under half of those without self-induced vomiting perceived a problem, despite presence of other ED symptoms (Mond, Hay, Rodgers, & Owen, 2006). Findings that self-induced vomiting is consistently associated with self-recognition of an ED indicates that individuals are less likely to recognize their behavior as pathological in the absence of this behavior, and that those engaging in binge eating and/or non-purging compensatory behaviors may view these behaviors as normative.

Physical Signs: Body Weight. Some have argued that anorexia nervosa (AN) might be more readily recognized than bulimic-type disorders, in part because it has been featured more prominently in popular media, and because symptoms of low body weight tend to be more readily observable and commented upon by others (Gratwick-Sarll, Bentley, Harrison, & Mond, 2014). Numerous studies have shown that AN is considered more severe and is more likely to be identified as an eating problem or as an ED, specifically, than BN, among lay people (Hunt & Rothman, 2007; Mond & Arrighi, 2011). Indeed, both men and women from the community are more likely to view symptom presentations in others resembling AN as an eating problem, and presentations resembling BN as primarily a problem of 'low self-esteem' (Chen, Mond & Kumar, 2010; Darby, Hay, Mond & Quirk, 2012; Mond & Arrighi, 2011; Mond, Hay, Rodgers, & Owen, 2008; Mond, Hay, Rodgers, Owen, & Beumont, 2004). These perceptions could potentially influence recognition by others, and in turn, hinder self-recognition of an ED. Matters may be less clear for partial-syndrome variants of AN that do not result in extreme low BMI. In the absence of observably low weight, ED behaviors like self-imposed dietary restriction may be less likely to be viewed as problematic, particularly among young women for whom this is relatively normative (Levitt, 1997; Meyer, 2001; Mond & Arrighi, 2011; Vander Wal & Thelen, 1997).

Given that more than two-thirds (68.8%) of adults are considered to be overweight or obese (Schiller, Lucas, Ward, & Peregoy, 2012), increased body weight may be less likely to elicit concern from others unless it reaches an extreme deviation from the normative weight range (i.e. BMI >35). Still, body weight does appear to play a role in recognition of an eating problem outside of AN. Indeed, having a higher body mass index (BMI) has been independently associated with self-recognition of an eating problem (Mond, Hay, Rodgers, & Owen, 2006).

One reason for this association may be that BMI and psychological distress are positively correlated, particularly among women (Istvan, Zavela, & Weidner, 1992; Larsson, Karlsson, & Sullivan, 2002; Young-Hyman et al., 2006). This pattern suggests that individuals may be more likely to view eating behaviors as problematic when those behaviors contribute to weight gain.

Cognitive Symptoms: Weight Perception. Features of AN that are ego-syntonic may be associated with denial that it is a problem (i.e. lack of self-recognition) (Holliday, Wall, Treasure, & Weinman, 2005; Higbed & Fox, 2010; Mond, Hay, Rodgers, Owen, & Beumont, 2005; Stockford, Turner, & Cooper, 2007; Treasure, & Schmidt, 2001; Vandereycken, 2006). As such, among individuals with full-syndrome AN, lack of insight, and relatedly, lower levels of distress, could contribute considerably to poor self-recognition of an ED. Still, it seems possible that accurate perception of underweight may actually increase self-recognition of an ED. Likewise, given findings indicating that accurate and inaccurate perception of overweight/obesity is related to increased distress (Atlantis, & Ball, 2008; Khambalia, Hardy, & Bauman, 2012; Young-Hyman et al., 2006), perceiving oneself as overweight may also prompt self-recognition of an ED. Thus, in addition to potential roles of actual body weight, perceptions of body weight may contribute to self-recognition of eating problems.

Treatment Seeking

Evidence from a systematic review suggests that among individuals with a diagnosable ED, 23.2% seek formal treatment specifically for an eating problem (Hart, Granillo, Jorm, & Paxton, 2011). Likewise, among women with EDs, lifetime history of having received treatment for an ED are comparably discouraging, ranging from 26% to 44% (Fairburn, Cooper, Doll, Norman, & O'Connor, 2000; Hudson, Hiripi, Pope, & Kessler, 2007; Mond, Hay, Rodgers, & Owen 2007). Despite heterogeneity in findings, the overall proportion of those seeking and

receiving treatment clearly indicates a large unmet need among individuals with EDs in the community (Striegel-Moore et al., 2008).

As was found for self-recognition of an ED, greater severity of ED symptoms and psychological distress is associated with increased treatment-seeking behavior (Cachelin et al., 2001; Hepworth, & Paxton, 2007; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002; Keel et al., 2002). Additionally, presence of personality disorders has also been associated with higher likelihood of having received treatment for an ED (Keel et al., 2002). Given high rates of comorbidity with anxiety, mood, impulse-control, and substance use disorders among those with an ED (Hudson, Hiripi, Pope, & Kessler, 2007), and that individuals with comorbid conditions are more likely to seek treatment (Berkson, 1946), individuals with an ED may end up receiving treatment for an ED secondary to having sought help for another disorder.

Symptom presentation also plays a role in who seeks treatment for an ED (Cachelin et al., 2001; Cachelin, Striegel-Moore, & Regan, 2006; Mond et al., 2009). Engaging in self-induced vomiting has consistently been associated with a greater likelihood of having sought or received treatment for an ED (Mond et al., 2009). For example, in a large-scale community-based study, only 17.3% of women meeting criteria for BED and 21.4% of those with non-purging BN had ever received treatment for an eating problem, while 45.8% of women with purging BN had received treatment for an ED (Striegel-Moore et al., 2001). Taken together, this suggests that symptom presentation, and particularly the presence of self-induced vomiting, at least among those who binge, may increase the likelihood of both self-recognition and treatment-seeking behavior.

Research suggests that both high BMI (Evans et al., 2011; Mond et al., 2009) and low BMI (Cachelin, Striegel-Moore, & Regan, 2006) are associated with treatment-seeking behavior

among women with EDs from the community. Individuals with AN are more likely to have received treatment for an ED than those with BN or BED, which may be due to a higher likelihood that low body weight is recognized by others as indicative of a problem (Striegel-Moore et al., 2003; Yager, Landsverk, & Edelstein, 1989).

Demographics. Eating disorders have historically been conceptualized as a young white female problem (e.g. Alegria, et al., 2007; Becker, Franko, Speck, & Herzog, 2003; Cachelin et al., 2000; Gordon, Perez, & Joiner, 2002; Hunt & Rothman, 2007; Räisänen, Hunt, 2014; Robinson, Mountford & Sperlinger, 2013; Smith, Pruitt, Mann, & Thelen, 1986). However, recent evidence suggests that men and minorities represent a significant proportion of individuals suffering from EDs and sub-threshold ED variants (Alegria, et al., 2007; Hay, Mond, Buttner, & Darby, 2008; Hilbert, DeZwaan, & Braehler, 2012; Hudson et al., 2007; Marques, et al., 2011; Nicdao, Hong, & Takeuchi, 2007; Striegel-Moore et al., 2009; Strother et al., 2012; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011; Woodside et al., 2001).

Estimates from epidemiological studies have found lifetime prevalence rates of DSM-IV AN, BN, and BED of 0.9%, 1.5%, and 3.5% among women, and 0.3%, 0.5%, and 2.0% among men, representing a female to male ratio of 3:1 for AN and BN, and 1.75:1 for BED (Hudson et al., 2007). Similarly, in a large representative sample of US adolescents, the female to male lifetime prevalence ratio of BN and BED was 2.6:1 and 2.9:1, respectively, while the prevalence of AN was equivalent between females and males (1:1) (Swanson, et al. 2011). While the prevalence of full-threshold EDs may be lower among men than women, the number of men engaging in ED symptoms, especially binge eating and excessive exercise, is comparable and may even exceed prevalence seen among women (Hay, Mond, Buttner, & Darby, 2008; Hilbert, DeZwaan, & Braehler, 2012; Striegel-Moore et al., 2009; Strother et al., 2012; Woodside et al.,

2001). For example, epidemiological evidence indicates that the prevalence of binge eating is equivalent between men and women, and that the prevalence of sub-threshold BED is greater among men than women (Hudson et al., 2007). In contrast, clinical samples suggest a female to male ratio of 10:1 for AN and BN, and 2:1 for BED (APA, 2013; Hay, Loukas, & Philpott, 2005; Hoek, 2006; Muise, Stein, & Arbess, 2003). Overall, clinical samples report that males represent a lower percentage of ED cases than population-based studies (10% versus 15%) (Hoek & Van Hoeken, 2003; Hudson et al., 2007). These patterns suggest underrepresentation of men in treatment settings for EDs.

Epidemiological data support that men with EDs are less likely to seek or receive treatment for an ED compared to women with EDs (Hudson et al., 2007). Among individuals with a lifetime history of BN, 47% of women versus 29% of men have ever received ED treatment (Hudson et al., 2007, Online Appendices). Similarly, among individuals with a lifetime history of BED, 49% of women and 29% of men have ever received treatment for an ED (Hudson et al., 2007, Online Appendices). Moreover, even with comparable levels of ED symptoms, one study found that women were significantly more likely to have sought treatment for an ED than men (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002).

Although research examining the prevalence of EDs in diverse populations is relatively limited, findings from pooled epidemiological data from the NIMH Collaborative Psychiatric Epidemiological Studies indicate that the prevalence of AN and BED was similar across ethnic groups, while BN was more prevalent among Hispanics and African Americans than non-Hispanic Whites (Marques, et al., 2011). Moreover, engaging in binge eating, regardless of ED diagnosis, was more prevalent among Hispanics, African Americans, and Asians than non-Hispanic Whites (Marques, et al., 2011).

Despite the comparable prevalence estimates observed across ethnic and racial groups in epidemiological and community-based studies, numerous studies have documented lower rates of treatment seeking and treatment receipt among minorities (Alegria, et al., 2007; Becker, Franko, Speck, & Herzog, 2003; Cachelin et al., 2000; Cachelin et al., 2001; Cachelin & Striegel-Moore, 2006; Cachelin, et al., 2006; Pike, et al., 2001). Evidence from pooled epidemiological data indicate that lifetime mental health service utilization among those with a history of an ED was significantly higher for non-Hispanic Whites than for Hispanics, Asians, or African Americans (75.80% versus 61.65%, 63.22%, and 62.21%, respectively) (Marques, et al., 2011).

One reason for the gap in treatment seeking may be lack of self-recognition of an ED among men and minorities, which may be exacerbated by lower likelihood of external recognition of a problem. Research indicates that even with identical symptoms, primary care doctors are less likely to diagnose men with an ED than women (Currin, Schmidt, & Waller, 2007). Clinicians are also less likely to ask non-Whites about ED symptoms, identify an ED, or refer that individual for treatment than Whites (Becker, Franko, Speck, & Herzog, 2003; Gordon, Brattole, Wingate, & Joiner, 2006). The influence of stereotypes is found not only among health care professionals, but also among peers. Despite being equally able to recognize the presence/absence of individual ED symptoms across race/ethnicity, university students were less likely to say someone had an ED if they were Hispanic or African American than if they were White, even when matched for ED symptoms (Gordon, Perez, & Joiner, 2002). In contrast, however, a more recent study found that college students were equally likely to recognize an ED and recommend someone seek treatment, irrespective of race/ethnicity (Sala, Reyes-Rodríguez, Bulik, & Bardone-Cone, 2013). The influence of stereotypes might be particularly problematic

among peers, given research indicating that peers are key in recognition and referral (Price, Desmond, Price, & Mossing, 1990). Though none of these studies have examined self-recognition of an ED, it seems possible that these same stereotypes would reduce the likelihood of self-recognition of an ED among men and minorities.

The Present Study: Hypotheses

Previous research has demonstrated that many individuals with ED symptoms do not perceive themselves as having an ED. Furthermore, although efficacious treatments are available, it is clear that only a minority of individuals with EDs seek appropriate treatment. Additionally, there is evidence that men may be less likely to seek treatment compared to women, and that minorities may also be less likely to seek treatment than non-Hispanic whites. However, the contributions of differences in self-recognition of having an ED, or barriers to treatment seeking that are specific to men or minorities have not been distinguished. Therefore, the purpose of the current study is to examine predictors of self-recognition of an ED and ED treatment-seeking behavior, as well as the impact of gender and race/ethnicity on self-identification and treatment-seeking behavior.

We hypothesize that greater current ED symptom severity, higher BMI, and self-perception of overweight and underweight will predict greater odds of current self-recognition of an ED. Additionally, in a model with individual symptoms, we hypothesize that current self-induced vomiting, higher BMI, and self-perception of overweight and underweight will be related to a higher likelihood of current self-recognition of having an ED. In parallel treatment-seeking models, we hypothesize that greater lifetime behavioral ED symptom severity and both perception of overweight at their adult highest weight, and perception of underweight at their adult lowest weight, as well as highest and lowest adult BMI will predict greater odds of having

ever sought treatment for an ED. Likewise, we expect self-recognition of having an ED to be associated with higher likelihood of having ever sought treatment for an ED. In a model with individual symptoms, we expect lifetime history of engaging in self-induced vomiting, perception of overweight at their highest adult weight, and perception of underweight at their lowest adult weight will be associated with greater odds of having ever sought ED treatment. Lastly, we hypothesize that while controlling for other variables in each model, being female and identifying as non-Hispanic White will predict higher likelihoods of self-recognition of an ED and of having ever sought treatment for an ED. We predict that the association between demographic variables and treatment seeking will remain significant even after controlling for ED severity and self-recognition of an ED, indicating that barriers to treatment seeking specific to men and ethnic/racial minorities will not be fully mediated by differences in prevalence and self-recognition.

METHODS

Participants

Participants (N=2,514) in this study come from four cohorts of college students in 1982, 1992, 2002, and 2012, who were followed prospectively at 10-year intervals. Data from the present study reflect cross-sectional data from the fourth wave of data collection in 2012, representing the baseline assessment of the 2012 cohort, 10-year follow-up of the 2002 cohort, 20-year follow-up of the 1992, and 30-year follow-up of the 1982 cohort with mean \pm SD ages of the subsamples being 20 ± 2 , 30 ± 2 , 40 ± 2 years, and 51 ± 2 respectively. The current sample comprises 1695 (67.4%) women, and 73.4% self-identified as Caucasian/White, 6.3% as African American, 17.8% Asian, 6.8% Hispanic, and 2.4% mixed race or other.

To examine differences in cohort composition and evidence of biased attrition, independent samples t-tests were used for analyses involving continuous variables, and chi-square tests for categorical variables. Among all those contacted in 2012, participation rates were 68% from the 1982 cohort, 66% from the 1992 cohort, 68% from the 2002 cohort, and 51% from the 2012 cohort. Among the 2012 cohort, freshman were more likely to participate than seniors, $\chi^2(1) = 13.70$, $p < 0.001$. Women were more likely than men to participate in 2012, regardless of cohort (1982: 72% vs. 66%; 1992: 71% vs. 61%; 2002: 72% vs. 63%; 2012: 58% vs. 43%; $\chi^2(3) = 57.79$, $p < 0.001$). Cross-sectionally, in 2012, cohorts differed in ethnic/racial diversity ($\chi^2(3) = 122.08$, $p < 0.001$), with increased representation of Hispanic/non-Caucasian participants across cohorts. This change reflects greater racial and ethnic diversity in the undergraduate population from which participants were randomly sampled, paralleling concurrent changes in the ethnic composition of the US population.

Follow-up participation rates did not differ between the 1982, 1992, and 2002 cohorts ($p > 0.05$). Overall, participants identifying as non-Hispanic White/Caucasian ($\chi^2(1) = 24.76, p < 0.001$) and women ($\chi^2(1) = 13.14, p < 0.001$) were significantly more likely to participate at follow-up in 2012. Additionally, participants with a lower BMI currently ($t(2450) = 3.83, p < 0.001$), when at their highest weight ($t(1889) = 2.65, p = 0.008$), and when at their lowest weight ($t(1799) = 2.60, p = 0.009$) at baseline were significantly more likely to participate at follow-up in 2012. However, baseline self-reported weight perception, symptom count, and individual symptom endorsements were not related to participation at follow-up (all $p > 0.05$). History of depression, anxiety, and substance abuse were unrelated to follow-up participation, based on endorsements from the 1992 wave of data collection for the 1982 cohort, and at baseline for the 1992 and 2002 cohort. Due to changes in the questionnaire over time, attrition analyses for perception of underweight at adult lowest weight, perception of overweight at adult highest weight, self-recognition, and treatment seeking are based on data from the 1982, 1992, and 2002 cohorts in 2002. These analyses indicated that participation in 2012 was not significantly associated with participant responses to these items in 2002.

Procedures

Self-report surveys of health and eating behaviors were sent to a sample of randomly selected men and women from the freshman and senior classes of a selective northeastern college in the springs of 1982, 1992, 2002, and 2012. Participants were then sent invitations to complete surveys at 10-year follow-up intervals. Surveys were mailed to participants up to three times to obtain as high a participation rate as possible. In addition, starting in 2002, a web-based version of the survey was offered for ease of accessibility and to maximize participation rates. Further details on procedures have been reported elsewhere (Heatherton, Nichols, Mahamedi, & Keel,

1995; Keel, Heatherton, Dorer, Joiner, & Zalta, 2006; Keel, Forney, Brown, & Heatherton, 2013). This study was approved by the Institutional Review Boards of the universities through which data were collected and analyzed, and all participants provided written informed consent before completing assessments.

Measures

Self-report surveys included questions about demographic variables, including sex, age, and race/ethnicity (coded as non-Hispanic White/Caucasian vs. ethnic/racial minority), as well as ED symptoms and other health-related behaviors. Lifetime histories of anxiety, depression, and substance abuse were assessed as part of a checklist of physical and mental health problems. Lifetime history of anxiety was measured using a single checklist item, “phobias/anxiety disorders,” coded as present or absent. Lifetime history of depression was measured by combining two checklist items, “mild depression” and “severe depression,” and was considered present if participants provided an affirmative response to either item or both. Similarly, lifetime history of substance abuse was measured by combining two checklist items, “alcohol abuse” and “drug abuse,” and was considered present if participants provided an affirmative response to either item or both.

Participants’ self-reported height and weight were used to calculate current BMI as weight in kilograms divided by the square of height in meters (kg/m^2). The same calculation was completed to ascertain lifetime highest and lowest BMI, based on participants’ self-reported lowest and highest weight, as well as their height at those respective times. Studies have demonstrated high correlations between self-reported and objectively measured height and weight, with only relatively small biases among certain population subgroups (Jeffery, 1996; Stunkard & Albaum, 1981; Villanueva, 2001). Overall, researchers have determined that self-

reported height and weight are largely reliable and valid in precision and accuracy and can be used in large studies when direct assessment is less feasible (Jeffery, 1996; Spencer, Appleby, Davey, & Key, 2002; Stunkard & Albaum, 1981).

Current self-perception of being either underweight or overweight was assessed by asking participants to “Describe your current weight,” with responses of “Very Underweight,” “Underweight,” “Average Weight,” “Overweight,” and “Very Overweight.” This single item has demonstrated predictive validity in examining prospective changes in ED questionnaire scores in both women and men at 10- and 20-year follow-up (Keel, Baxter, Heatherton & Joiner, 2007). Responses were then transformed as either “Underweight,” which included both underweight and very underweight, or “Overweight” which included both overweight and very overweight. This method of collapsing weight perception into more standardized body weight categories has been utilized elsewhere, and weight perception based on these categories corresponds with weight control behavior (Kim, 2007; Serdula, et al., 1993; Strauss, 1999). Likewise, lifetime self-perception of being either underweight or overweight was assessed by asking participants, in reference to their lifetime lowest adult weight, “Did you think you were underweight?” and in reference to their lifetime highest adult weight, “Did you think you were overweight?” with participant responses indicating “Yes” or “No.”

Our measure of symptom severity focused on behavioral ED symptoms as the most pathognomic features of eating pathology, in contrast to cognitive symptoms, which demonstrate higher prevalence and affect non-eating-disordered individuals. Behavioral ED symptoms were measured using a checklist and included: binge eating, fasting, intentional vomiting, compensatory exercise, consuming at least 25% of daily food intake after the evening meal, eating after waking during the night, and the use of diuretics, laxatives, and diet pills. Occurrence

was coded as “Current,” “Lifetime” (including those who currently or ever engaged in the behavior), or “Never.” Current and lifetime symptom counts were then derived from the sum of the number of behavioral symptoms endorsed from these two time frames, which aligned with the time frames for our two key outcomes – self-identification of a current ED and lifetime treatment seeking for an ED. Importantly, participants have been shown to accurately report the presence of ED symptoms through the use of ED symptom checklists, and we found evidence of concurrent validity between current ED diagnoses based on this self-reported checklist and a structured clinical interview in a prior assessment wave (Keel & Heatherton, 2010).

Self-perception of having an ED was assessed by the item, “Do you believe you have an eating disorder?” with response options of “Yes” or “No,” along with a place to indicate, via free-response, which ED they self-identified as having for those answering “Yes.” Treatment-seeking for an ED was assessed by the item, “Have you ever sought formal treatment for an eating disorder?” with response options of “Yes” or “No,” along with a place to indicate, via free-response, what treatment was sought for those answering “Yes.” The use of a single item to assess treatment-seeking behavior is in line with previous studies, the majority of which have defined treatment seekers as those who reported ever having received any type of treatment for a particular problem (Hart et al., 2011). Consistency of responses to lifetime treatment seeking from 2002 to 2012 was assessed and found to be acceptable, $r = 0.82$, $p < 0.001$.

Data Analyses

Analyses were conducted using SPSS statistical software package Version 23 (IBM Corp, Armonk, NY). *P*-values less than 0.05 were considered statistically significant. Given the binary dependent variables, binary logistic regression was the most appropriate and powerful tool to test the current hypotheses. Using binary logistic regression allowed us to predict probabilities that

individuals do or do not self-identify as having an ED, or that they have or have not ever sought treatment for an ED, as a function of our predictor variables (including a combination of binary and continuous predictors). In all models, simultaneous entry was employed to parse out the unique contribution of each predictor while accounting for other predictors in the model. Additionally, age was entered as a covariate in all models to control for cohort-based differences. Nagelkerke pseudo- R^2 was used to estimate how much variance was accounted for by each model.

Before running multivariable models, collinearity statistics were calculated to determine if any of our predictor variables were too highly correlated. Collinearity was assessed by examining variance inflation (VIF) indices and corresponding tolerance statistics.

Multicollinearity was observed between current BMI and adult highest BMI in both the symptom count and symptom feature models predicting self-recognition and treatment-seeking (current BMI VIF = 5.09-6.09, tolerance = 0.164-0.174; highest BMI VIF = 4.65-5.32, tolerance = 0.188-0.215). Adult highest BMI was then removed from the current self-recognition models, and current BMI was removed from the lifetime treatment-seeking models. With those variables removed, all VIF values ranged from 1.04 to 1.97, with corresponding tolerance values between 0.51-0.97, which were all within acceptable ranges. As such, only variables corresponding to the time frame of the model's outcome variable were utilized to avoid introducing multicollinearity.

Prior to conducting planned individual symptom models, expected cell frequencies for categorical variables from the symptom checklist were examined using Chi-Square statistics. These analyses indicated that current fasting, intentional vomiting, compensatory exercise, and the use of diuretics, laxatives, and diet pills each had expected cell counts less than five. As such, these variables were combined to form the composite variable of "current compensatory

behavior,” which was considered present if participants indicated they currently engaged in any of these behaviors. Similarly, consuming greater than 25% of total daily intake after the evening meal and nocturnal eating were aggregated into the composite variable “current night eating,” and was considered present if participants indicated they currently engaged either or both of these behaviors. Given efforts to maintain equivalence between current self-recognition and lifetime treatment-seeking models, corresponding combinations were used for lifetime symptoms even when lifetime expected less counts were not less than 5, resulting in “lifetime compensatory behavior” and “lifetime night eating” variables.

In order to test the mediating effect of self-recognition in the relation between other predictors and treatment-seeking, a joint significance test was utilized. The joint significance test is a variation of Baron and Kenny’s (1986) causal-steps test (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). It simultaneously tests whether the independent variable is related to the intervening/mediating variable and whether the intervening variable is related to the dependent variable. Mediation is supported when separate tests of each path in the mediational pathway are jointly statistically significant. Overall, this approach has been found to provide the best balance between maximizing power to detect mediation while minimizing Type I error rates (Hayes & Scharkow, 2013; MacKinnon, Fritz, Williams, & Lockwood, 2007; MacKinnon et al., 2002). In order to account for missing data, Mplus Montecarlo integration was utilized to calculate regression coefficients for mediation analysis (Mplus Version 7.0, Los Angeles, CA; Muthén & Muthén, 2015). Adjustments were then made to make these coefficients comparable according to the procedure recommended for mediation analyses with binary mediator and outcome variables (MacKinnon & Dwyer, 1993). Using this procedure, unstandardized logistic regression coefficients and standard errors were made comparable by multiplying each coefficient by the

standard deviation of the predictor variable and dividing this by the standard deviation of the outcome variable (MacKinnon & Dwyer, 1993). The RMediation (PRODCLIN) program was then used to calculate the joint significance test of mediation (Fritz & MacKinnon, 2007; Tofighi & MacKinnon, 2011). This program implements a general algorithm for calculating mediation effects and is appropriate for use with a variety of statistical models (Tofighi & MacKinnon, 2011). Specifically, this program determines the distribution and confidence limits for the mediated effect based on the distribution of the product of the coefficients, which entails entering the coefficient estimates of the two paths involved in the indirect effect and their standard errors, as well as the correlation between the two variables (Tofighi & MacKinnon, 2011; MacKinnon, Fritz, Williams, & Lockwood, 2007). Within this framework, the product of coefficients must be different from zero and the corresponding 95 % confidence interval (CI) must not contain zero for the indirect effect to be considered significant and support the presence of mediation. Finally, because the joint significance test does not distinguish between partial and complete mediation, Baron and Kenny's (1986) causal-steps test was utilized for this purpose. Complete mediation is evidenced when the independent variable no longer affects the dependent variable once the mediator has been controlled. Partial mediation is demonstrated when the path from the independent variable to the dependent variable is reduced in absolute size but is still different from zero when the mediator is introduced.

Power Analyses

The minimum detectable effect size was calculated for binary and continuous predictors given the current sample specifications (G*Power 3.1). Specifically, to estimate the minimum detectable effect size with power = 0.80 for a logistic regression, we entered the alpha level (.05), the percentage of participants endorsing self-recognition of an ED or treatment-seeking for an

ED (likelihood of each outcome), the total sample size ($N = 2514$), the amount of variance accounted for by other variables in each model, and the distribution of predictors (e.g., binary or continuous). In the symptom count model predicting self-recognition, we had 80% power to detect effect sizes (odds ratios) of 1.78 or larger for binary predictors (e.g. gender), and 1.33 or larger for continuous predictors (e.g. symptom count). In the symptom features model of self-recognition, we had 80% power to detect effect sizes of 1.98 or larger for binary and 1.45 or larger for continuous predictors. In the symptom count model of treatment seeking, we had 80% power to detect effect sizes of 1.77 or larger and 1.32 or larger for binary and continuous predictors, respectively. Lastly, in the symptom features model of treatment seeking, we had 80% power to detect effect sizes of 1.84 or larger for binary predictors, and 1.39 or larger for continuous predictors.

RESULTS

Table 1 presents comparisons between those who did and did not self-identify with an ED on predictors included in multivariable logistic regression for self-identification of an ED. Participants who self-identified as having a current ED (n=109; 4.3%) were more likely to be female, consider themselves overweight, and have a higher mean symptom count and BMI compared to those who did not (all $p < 0.001$). There were no significant differences between groups in age, race/ethnicity, or perception of being underweight (all $p > 0.05$).

Comparisons between those who did and did not ever seek ED treatment on variables included in multivariable logistic regression analyses to predict lifetime ED treatment seeking are presented in **Table 2**. Of the total sample, 111 (4.4%) participants indicated that they had sought formal treatment for an ED in their lifetime. These participants were more likely to be female, perceive themselves as underweight at their lowest adult BMI, perceive themselves as overweight at their highest adult BMI, have a higher lifetime symptom count, and lower BMI when they weighed the least (all $p < 0.001$). There were no significant differences in race/ethnicity, age, or highest adult BMI (all $p > 0.05$) between those with and without a history of treatment seeking for an ED.

The overall model for predicting current ED self-identification focusing on symptom count was statistically significant, $\chi^2(7, 2397) = 201.61, p < 0.001$, explaining 26.4% (Nagelkerke R^2) of the variance (**Table 3**). Being female, higher ED symptom count, self-perception of overweight, and higher current BMI were significant predictors of current self-recognition of an ED. Age, race/ethnicity, and current self-perception of underweight did not predict ED self-identification while controlling for other variables in the model.

Focusing on symptom features for predicting ED self-recognition produced a model that was statistically significant, $\chi^2(9, 1981) = 245.98, p < 0.001$, explaining 45.2% (Nagelkerke R^2) of the variance (**Table 4**). Being female, higher current BMI, binge eating, and use of inappropriate compensatory behaviors were significant predictors of self-recognition of an ED. Age, race/ethnicity, night eating, and current self-perception of overweight and underweight did not predict ED self-identification while controlling for other variables in the model.

For both the symptom count and symptom features models of treatment-seeking, analyses were run first without, and then with self-identification of having a current eating disorder as a predictor of lifetime treatment seeking. The symptom count model was statistically significant, $\chi^2(11, 1496) = 160.66, p < 0.001$, and explained 34.5% (Nagelkerke R^2) of the variance in treatment-seeking. In this model, being female and having a higher lifetime symptom count were the only variables uniquely associated with a higher likelihood of having ever sought ED treatment while controlling for all other variables in the model. **Table 5** presents results with the inclusion of current self-identification of having an ED for the prediction of lifetime treatment seeking. This model was significant, $\chi^2(12, 1496) = 205.33, p < 0.001$, explaining 43.5% (Nagelkerke R^2) of the variance. Again, being female and having a higher lifetime symptom count significantly increased the odds of having ever sought treatment for an ED. In addition, perception underweight at lowest adult weight and current self-identification of an ED emerged as significant predictors of treatment-seeking for an ED. Lifetime history of a substance use, anxiety, or depressive disorders were not related to increased odds of treatment-seeking for an ED. Similarly, no other variables were significant when accounting for other predictors of lifetime treatment seeking.

Finally, the first symptom features model, run without ED self-recognition, was statistically significant, $\chi^2(13, 1547) = 200.58, p < 0.001$, and explained 38.8% (Nagelkerke R^2) of the variance in treatment-seeking. Women were more likely than men to report having sought treatment for an ED, as were those who had lower adult lowest BMI, perceived themselves to be underweight at their lowest adult weight, and those who reported ever binge eating or using inappropriate compensatory behaviors. Results from the model including current ED self-identification are presented in **Table 6**. This model was significant, $\chi^2(14, 1547) = 248.14, p < 0.001$, explaining 47.2% (Nagelkerke R^2) of the variance. When accounting for all other variables in the model, the same predictors significantly increased the odds of having ever sought treatment for an ED, as did self-recognition of an ED. Lifetime histories of comorbid anxiety, depression, or substance use disorders were not related to increased odds of treatment-seeking for an ED, and no other variables emerged as unique predictors of treatment seeking for an ED.

In order to test the mediating effect of self-recognition of an ED between predictors and treatment-seeking for an ED, regression analyses were first run in Mplus, allowing for imputation of missing values. Results from adjusted regression coefficients indicated that the direct path (*a*) from lifetime symptom severity to current self-recognition was significant, while accounting for other variables in the model ($b = 0.390, S.E. = 0.041, p < 0.001$). Additionally, the direct path (*b*) from current self-recognition to lifetime treatment seeking was significant, while accounting for other variables in the model ($b = 0.209, S.E. = 0.030, p < 0.001$). Within the joint significance test framework, that both the direct paths were significant provides initial support for mediation. Next, RMediation was utilized to provide the estimate of the indirect effect, which was 0.082 (S.E. = 0.017), with a 95% confidence interval that did not contain zero (CI = 0.052 – 0.116), consistent with a statistically significant mediation effect. Additional

examination of results from regression analyses indicated that the total effect of lifetime symptom severity on treatment seeking was significant ($b = 0.542$, S.E. = 0.038, $p < 0.001$). When self-recognition was entered into the same model, the magnitude of this effect was reduced, but still significant ($b = 0.396$, S.E. = 0.041, $p < 0.001$). Taken together, these results suggest that self-recognition partially mediated the relationship between symptom severity and treatment seeking, while adjusting for all other variables in the model.

The same analytical approach was applied to evaluate the mediating effect of self-recognition in the relationship between sex and treatment seeking. Results from adjusted Mplus regressions indicated that while accounting for other variables in the model, the direct path (a) from sex to current self-recognition was significant ($b = 0.281$, S.E. = 0.070, $p < 0.001$), as was the direct path (b) from current self-recognition to lifetime treatment seeking ($b = 0.209$, S.E. = 0.030, $p < 0.001$), providing initial support for mediation. The estimate of the indirect effect was 0.058 (S.E. = 0.018, 95% CI = 0.027 – 0.096), consistent with a statistically significant mediation effect. The total effect of sex on treatment seeking was significant ($b = 0.600$, S.E. = 0.121, $p < 0.001$). When self-recognition was entered into the same model, the magnitude of this effect was reduced, but still significant ($b = 0.486$, S.E. = 0.107, $p < 0.001$). Taken together, these results suggest that self-recognition partially mediated the relationship between sex and treatment seeking, while adjusting for all other variables in the model.

DISCUSSION

The purpose of the current study was to examine predictors of self-recognition of and treatment seeking for an ED, including the influence of gender and race/ethnicity on these outcomes. Results from multivariable analyses show that greater severity of behavioral ED symptoms increases the likelihood of both self-recognition and treatment seeking for an ED. Higher current BMI and perception of overweight were related to higher odds of self-recognition of an ED, while lower lifetime adult lowest BMI and perceiving oneself to be underweight at that weight were associated with greater likelihood of having sought treatment for an ED. Participants who reported binge eating and engaging in inappropriate compensatory behaviors were also more likely to identify as having an ED and to have sought treatment for one. Importantly, lifetime history of a substance use, anxiety, or depressive disorders were not related to increased odds of treatment-seeking for an ED. This increases confidence that individuals sought treatment for an ED, specifically, rather than receiving ED treatment while seeking help for another problem. In accordance with study hypotheses, findings from the current study also indicate that men are less likely to recognize themselves as having an ED, even when controlling for symptom severity and features. Moreover, even when accounting for symptom severity, weight disruption, *and* self-recognition of an ED, men were less likely to report having ever sought treatment for an ED. Furthermore, mediation analyses indicated that although self-recognition partially mediated the relationship between sex and treatment-seeking, it did not fully account for this relationship, suggesting that barriers to help seeking among men extend beyond differences in severity and self-recognition. Contrary to study hypotheses, race/ethnicity did not significantly impact the odds of either self-recognition or treatment-seeking for an ED.

The current findings are the first to examine self-recognition of an ED among both women and men, and suggest that even with comparable severity, men are less likely to identify themselves as having an ED. One reason for this discrepancy may be that men may subscribe to the common misconception of EDs as an exclusively female problem, despite the fact that knowledge about the core features of EDs are comparable between sexes (Hunt & Rothman, 2007; Murray, Touyz, & Beumont, 1990; Räisänen, Hunt, 2014; Robinson, Mountford & Sperlinger, 2013; Smith, Pruitt, Mann, & Thelen, 1986). This stereotype is perpetuated by popular media representations of EDs, which continue to portray EDs as a uniquely female problem (Levitt, 1997; O'Hara & Smith, 2007; Shepherd & Seale, 2010). Moreover, when the media has portrayed cases of EDs in males, it has generally presented them as anomalous (MacLean et al., 2015). This lack of awareness about EDs in men may result in misinterpretation of ED symptoms in men, both by men themselves, and by their families, friends, and health professionals. Indeed, emergent research suggests that men with ED symptoms are more likely to interpret their ED symptoms as idiosyncratic, dismiss the seriousness of their symptoms, and are less likely to consider that their symptoms could be indicative of an ED (Räisänen & Hunt, 2014). These cultural expectations may result in increased feelings of shame for acknowledging, even to themselves, that they suffer from a disorder that is perceived to be a female problem, as well as stigma for admitting that they are suffering from an ED to others. Consequently, poor self-recognition of an eating problem may delay or even prevent appropriate treatment-seeking. Indeed, models indicated that self-recognition of a current ED was a significant predictor of treatment seeking and partially mediated the relationship between sex and treatment-seeking. Findings indicate that self-recognition is an important barrier to help-seeking, though it is not the only barrier.

Regarding treatment-seeking, current findings replicated previous epidemiological findings that women are more likely than men to seek treatment for a mental disorder (Möller-Leimkühler, 2002), and specifically for an ED (Hudson et al., 2007). These results extend previous findings by indicating that this relationship remains even when accounting for severity of symptoms and current self-recognition of an ED. Compared to findings from the National Comorbidity Survey Replication (NCS-R), a significantly larger number of participants in the current study sought treatment overall (current sample 4.5% vs. NCS-R 1.9%, $Z = 5.548$, $p < 0.001$). This was driven by differences in the proportion of women seeking treatment, with 6.5% of women in the current sample seeking treatment for an ED, compared to 2.7% of women in the NCS-R ($Z = 5.350$, $p < 0.001$) (Hudson et al., 2007, Online Appendices). However, the proportion of men seeking treatment was comparable (current sample 0.4% vs. NCS-R 0.7%, $Z = 1.128$, $p = 0.130$). Prior studies from the parent study from which these data came indicate that the sample is representative of national epidemiological data for eating disorder prevalence (Keel et al., 2006). Thus, differences in treatment seeking may reflect other differences between the current sample and those in nationally representative epidemiological studies. Indeed, the current sample is not nationally representative in several ways, with higher educational attainment due to being recruited from college, and higher economic resources at follow-up related to the prestigious nature of the college from which they were recruited. Both may help explain higher likelihood of treatment-seeking among women in the current sample compared to those observed in the NCS-R data. However, these sample differences did not appear to facilitate a higher likelihood of treatment seeking among men. Thus, these findings highlight that women are more likely to seek treatment than men, even after accounting for self-recognition in a group with higher education and resources, which might otherwise pose as barriers to treatment-seeking.

Barriers to treatment seeking in men may stem from beliefs about EDs and their treatment. Men are more likely than women to view symptom presentations like BN as a problem of lack of willpower (Mond & Arrighi, 2011; Vander Wal & Thelen, 1997). Men are also more likely to believe that is easy to recover from an ED (Wingfield, Kelly, Serdar, Shivy, & Mazzeo, 2011). The perception that symptoms are within personal control may increase stigma associated with seeking help for an ED among men, for whom lack of self-control may be seen as a weakness and as a challenge to their masculinity (Griffiths, Mond, Murray & Touyz, 2014; Mond & Arrighi, 2011; Robinson, Mountford & Sperlinger, 2013; Vander Wal & Thelen, 1997). Admitting vulnerability and the need for help among men with EDs is not only associated with the stigma of being considered weak or feminine, but also to concern about being labeled as gay (Thapliyal & Hay, 2014). Finally, given that current ED treatments were designed predominantly for women, another barrier to help-seeking may be the perception that treatments do not acknowledge or address the unique needs of men with EDs. Overall, beliefs about the nature of and severity of EDs among men, and perceptions of ED treatments may hinder self-recognition and, beyond their effects on self-recognition, also hinder seeking treatment for an ED.

Results from symptom feature models suggest that individuals engaging binge eating and/or compensatory behavior(s) are more likely to recognize they have an ED. This finding likely reflects the perception that these behaviors do not fall within the normal range of eating behavior and that they are associated with increased distress and impairment (Levitt, 1997; Stice, Marti, Shaw, & Jaconis, 2009; Vander Wal & Thelen, 1997). That binge eating emerged as a unique predictor of both self-recognition and treatment-seeking for an ED differs somewhat from previous findings that suggest that binge eating in the absence of self-induced vomiting is not as

readily associated with self-recognition or treatment-seeking (Gratwick-Sarll, Bentley, Harrison, & Mond, 2014; Gratwick-Sarll, Mond & Hay, 2013; Hepworth, & Paxton, 2007; Mond, Hay, Rodgers, & Owen, 2006; Mond et al., 2009; Striegel-Moore et al., 2001). Given their higher educational status, participants in the current study may have had a better understanding of what was meant by “binge eating” and less likely to endorse nonclinical overeating as a “binge.” Similar to prior findings that vomiting was linked to self-recognition and treatment-seeking (Cachelin et al., 2001; Cachelin, Striegel-Moore, & Regan, 2006; Gratwick-Sarll, Bentley, Harrison, & Mond, 2014; Gratwick-Sarll, Mond & Hay, 2013; Hepworth, & Paxton, 2007; Mond, Hay, Rodgers, & Owen, 2006; Mond et al., 2009; Striegel-Moore et al., 2001), we found that the broader variables of compensatory behaviors was linked to these outcomes. Due to the relative infrequency of specific compensatory behaviors, we were unable to determine whether this was driven by self-induced vomiting or was equally true across various methods used to control weight.

That higher BMI was related to greater self-recognition of an ED may reflect increased distress associated with higher weight status (Istvan, Zavela, & Weidner, 1992; Larsson, Karlsson, & Sullivan, 2002; Young-Hyman et al., 2006), as well as confusion regarding whether obesity, in and of itself, represents an ED (Devlin, 2007). Distress over higher weight may reflect internalization of societal ideals of beauty and stigma associated with overweight/obesity (e.g. Keel & Klump, 2003; Miller & Pumariega, 2001; Puhl & Brownell, 2001; Puhl, Andreyeva, & Brownell, 2008) and may be attributed to a problem in eating, even when the behaviors themselves are not considered disordered. In contrast, higher adult BMI was not a significant predictor of lifetime treatment seeking whereas lower adult BMI, when it was at its lowest, and perception of underweight were linked to treatment-seeking in symptom feature models. Low

weight may prompt treatment-seeking through external-recognition of a problem by friends, family, or medical professionals.

In contrast to the influence of BN-like symptoms, features linked to Night Eating Syndrome (NES) did not emerge as significant predictors in models for self-recognition or treatment seeking. This may reflect their more recent recognition in the literature (Allison et al., 2010; O'reardon, Peshek, & Allison, 2005; Striegel-Moore et al., 2006; Vander Wal, 2012) and less frequent coverage in popular media depictions of EDs. Given that NES was included among Other Specified Feeding and Eating Disorders in the DSM-5, future work is needed to assess the validity of this as a diagnostic entity and its indicators. Indeed, for college students who represented nearly a fourth of the sample, consuming more than 25% of their daily food intake at night may not represent a disorder of eating as much as an adaption to schedules that permit staying up later. Pending findings, future efforts may be needed to both assess for and increase awareness of this less typical form of eating pathology.

The present study had several notable strengths. Data came from a randomly selected college-based sample of men and women that demonstrated high retention over follow-up. The sample included individuals from late adolescence to mid-life, enhancing the period of time over which participants may have experienced and sought treatment for eating problems. Multivariable statistical models tested gender differences in self-recognition of an ED while accounting for symptom severity, symptom presentation, and associated features. Models explicitly examined variables that influence treatment seeking for an ED over and above severity and self-recognition of an ED, and demonstrated, for the first time, that self-recognition of an ED partially mediated the effect of gender on treatment seeking but did not fully account for the effect of gender. This means that even when men had EDs that they recognized as EDs and that

did not differ in severity or features from those in women, they were still less likely to seek treatment than were woman. This gap has clinically significant implications given that men are not accessing evidence-based treatment shown to work to produce lasting remission (e.g. Brownley et al., 2007; Hay, 2013; Shapiro et al., 2007; Watson & Bulik, 2013; Wilson, Grilo, & Vitousek, 2007). Lastly, because of the large sample size, there was adequate power to detect moderate effect sizes.

While the present study had several strengths, there were also weaknesses that merit consideration. Most notably, all data were cross-section and self-identification of an ED was assessed as current while treatment seeking for an ED was assessed for lifetime, creating different reference times for our two key outcomes. For example, the fact that current self-recognition did not fully mediate the association between gender and treatment seeking may be due to the fact that some individuals who previously sought treatment had recovered and no longer had a current eating disorder. Despite this discrepancy, we were able to test near-parallel self-recognition and treatment-seeking models. Still, these features prohibit temporal or causal inferences that could be made in other designs (for example, through mediation analyses of a longitudinal or experimental design, respectively). In addition to being unable to link self-recognition and treatment seeking temporally, we did not probe whether participants felt that they needed or wanted treatment or whether they had actually received treatment and, if so, how much treatment. Thus, this study provides a first step in understanding the presence of barriers to treatment seeking for men. In future research, it would be beneficial to ask participants about perception of an eating disorder, whether they needed or wanted treatment, whether they sought treatment, and how much treatment they actually received to obtain a full picture of gender discrepancies that may exist.

Additionally, because participants for the present study were drawn from a selective Northeastern university, our sample is not representative of the broader population. Given the highly educated nature of our sample, there may have been fewer barriers to treatment than in a general community sample. Relatedly, the majority of participants (73.4%) were non-Hispanic Caucasian, with few participants falling within certain racial and ethnic groups. As a result, our binary categorization of race/ethnicity (non-Hispanic White/Caucasian vs. ethnic/racial minority) did not allow for examination of comparisons between individual racial/ethnic minority groups. Both the smaller number of minority participants and the creation of a heterogeneous variable may have impeded our ability to detect differences in self-recognition or treatment seeking related to race and ethnicity. Indeed, compared to rates of treatment seeking among racial and ethnic groups from pooled epidemiological data (Marques, et al., 2011), a similar proportion of African American participants (current sample 3.8% vs. 1.8%, $Z = 1.784$, $p = 0.079$) in the current study sought treatment. Likewise, in comparison to epidemiological samples, a similar proportion of Hispanic/Latino participants in the current study (current sample 2.9% vs. 2.2%, $Z = 0.609$, $p = 0.542$) reported seeking treatment for an ED, specifically (Alegria, et al., 2007). However, significantly more Asian (current sample 3.8% vs. 1.7%, $Z = 2.674$, $p = 0.008$) and non-Hispanic white (current sample 4.7% vs. 1.9%, $Z = 5.868$, $p < 0.001$) participants from the current sample sought treatment for an ED than from nationally representative samples (Hudson et al., 2007; Nicdao, Hong, & Takeuchi, 2007). Relatively higher rates of treatment seeking among racial/ethnic minority participants, particularly among those who identified as Asian, may reflect the higher socioeconomic status (SES) of our sample and could account for the nonsignificant effect of race/ethnicity on treatment seeking in the current study. This suggests that differences in treatment seeking by race/ethnicity found in epidemiological studies may be

due to disparities in SES, rather than stereotypes of EDs as a white problem. Future studies would benefit from replicating the results of the present study in other geographic regions and demographic samples. Given the relative rarity of particular symptoms, the sample was not large enough to permit examination of specific symptoms, thereby necessitating the use of heterogeneous composite variables in symptom feature models. Finally, several variables were measured using single-items, which are associated with reduced reliability.

Results from the present study have important implications for designing public health and community programs to promote self-recognition of ED's, and for interventions to increase appropriate treatment seeking. Interventions to promote both self-recognition and help-seeking are particularly important given that delays in treatment seeking result in increased duration of ED symptoms (Räsänen & Hunt, 2014), making them less tractable to intervention. For one, programs to raise awareness of EDs may benefit by depicting a range of ED presentations in both men and women. It will be important to raise awareness of ED behaviors as serious, regardless of weight, and to portray less commonly recognized symptom features. For example, inclusion of representations of individuals with symptoms that comprise the core features of NES (i.e. consuming greater than 25% of total daily intake after the evening meal and nocturnal eating episodes), which were unassociated with self-recognition in the current study, would support broader recognition of what constitutes an ED in accordance with current conceptualizations. These programs have the potential to increase self-recognition as well as recognition by others, and, in turn, increase treatment-seeking behavior.

Efforts to increase awareness of EDs in men will be particularly important for self-recognition and may ultimately help to reduce stigma associated with acknowledging an eating problem among males with EDs. Reductions in the stigma associated with admitting that one has

an ED would result in increased willingness to disclose to others and to seek treatment. Future studies should explore barriers that men perceive in identifying and getting help for an eating disorder. Although there is a lack of consensus regarding the importance of gendered issues in treatment, in part due to the relative scarcity of ED treatment studies among men (Andersen, 1999; Greenberg & Schoen, 2008; Strother, et al. 2012), qualitative studies have reported an expressed desire among men with EDs for services tailored to their needs (Räisänen & Hunt, 2014; Thapliyal & Hay, 2014). At this level, men may prefer the option of all-male therapeutic groups as a component of treatment (Andersen, 1999; Greenberg & Schoen, 2008; Strother, et al. 2012). In conjunction with general services that highlight the commonalities of experiences of men and women with EDs, specific groups for males could allow for tailoring of discussions to issues that are particular to men with EDs, and create an environment in which men feel safe disclosing their issues around food and body image. Future research expanding on and examining the interplay among factors impacting self-recognition of EDs and barriers to treatment seeking among men will be useful for guiding health promotion efforts to enhance timely identification of EDs and appropriate treatment seeking.

APPENDIX A

TABLES

Table 1. Characteristics of Those Self-Identifying as Having a Current Eating Disorder vs. Those Who Do Not
Do You Think You Have an Eating Disorder?

Current	Full Sample (N=2514)	Do You Think You Have an Eating Disorder?		X^2/t (df)
		Yes (N=109)	No (N=2328)	
Sex (Female)	1695 (67.42%)	94 (86.24%)	1556 (66.84%)	17.92 (1)***
Race (White)	1675 (66.87%)	71 (65.74%)	1561 (67.28%)	0.11 (1)
Age	34.14 (12.02)	35.24 (12.57)	34.32 (11.99)	-0.78 (2430)
Symptom Count	0.29 (0.69)	1.40 (1.33)	0.25 (0.61)	-17.81 (2435)***
Underweight	148 (6.04%)	3 (2.78%)	145 (6.26%)	2.18 (1)
Overweight	651 (26.55%)	62 (57.41%)	581 (25.08%)	55.36 (1)***
Current BMI	23.37 (3.87)	25.85 (6.09)	23.26 (3.71)	-6.86 (2420)***

Note: Statistical analysis using t-tests for continuous variables presented as mean \pm standard deviation and chi-square for categorical variables presented as *n* and percentage (%) of group. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Underweight and Overweight variables refer to perception underweight and overweight at adult lowest and highest BMI, respectively. Coding: men = 0, women = 1; white/Caucasian = 1, other = 0; no = 0, yes = 1

Table 2. Characteristics of Those Ever Seeking Treatment for an Eating Disorder vs. Those Who Have Not

Lifetime	Full Sample (N=2514)	Have You Ever Sought Treatment for an Eating Disorder?		X^2/t (df)
		Yes (N=111)	No (N=2328)	
Sex (Female)	1695 (67.42%)	108 (97.30%)	1546 (66.41%)	46.31 (1)***
Race (White)	1675 (66.87%)	79 (71.82%)	1556 (67.07%)	1.08 (1)
Age	34.14 (12.02)	35.38 (11.10)	34.32 (12.07)	-0.91 (2432)
Symptom Count	1.12 (1.60)	3.96 (1.94)	0.99 (1.46)	-19.26 (2305)***
Underweight	453 (19.71%)	37 (34.26%)	413 (19.01%)	15.09 (1)***
Overweight	1435 (59.72%)	87 (81.31%)	1333 (58.62%)	21.86 (1)***
Highest BMI	25.49 (4.59)	26.35 (5.73)	25.45 (4.54)	-1.88 (2160)
Lowest BMI	20.39 (2.85)	18.79 (2.81)	20.46 (2.84)	5.69 (2051)***
Substance Use	55 (2.38%)	8 (7.62%)	45 (2.10%)	13.25 (1)***
Anxiety	221 (10.35%)	20 (22.99%)	194 (9.78%)	15.68 (1)***
Depression	637 (27.70%)	55 (53.39%)	566 (26.60%)	35.13 (1)***

Note: Statistical analysis using t-tests for continuous variables presented as mean \pm standard deviation and chi-square for categorical variables presented as *n* and percentage (%) of group. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Underweight and Overweight variables refer to perception underweight and overweight at adult lowest and highest BMI, respectively. Coding: men = 0, women = 1; white/Caucasian = 1, other = 0; no = 0, yes = 1

Table 3. Multivariable Symptom Count Model of Current Predictors of Self-Identifying as Having a Current Eating Disorder

	β	S.E.	Wald	<i>P</i>	OR (95% CI)
Age	0.002	0.01	0.05	0.83	1.00 (0.98-1.02)
Sex	1.14	0.31	13.72	<0.001	3.14 (1.71-5.75)
Race	0.09	0.24	0.16	0.69	1.10 (0.69-1.75)
Symptom Count	1.05	0.10	123.21	<0.001	2.86 (2.37-3.44)
Overweight	0.61	0.28	4.59	0.03	1.84 (1.05-3.20)
Underweight	-0.13	0.69	0.04	0.85	0.88 (0.23-3.38)
Current BMI	0.08	0.03	7.78	0.01	1.08 (1.02-1.14)

Abbreviation: BMI, body mass index.

Table 4. Multivariable Symptom Cluster Models of Current Predictors of Self-Identifying as Having a Current Eating Disorder

	β	S.E.	Wald	<i>P</i>	OR (95% CI)
Age	-0.01	0.01	0.56	0.46	0.99 (0.97-1.02)
Sex	0.80	0.39	4.16	0.04	2.23 (1.03-4.80)
Race	-0.36	0.32	1.27	0.26	0.70 (0.37-1.30)
Overweight	0.66	0.39	2.95	0.09	1.94 (0.91-4.13)
Underweight	0.17	0.85	0.04	0.84	1.18 (0.22-6.26)
Current BMI	0.09	0.04	5.64	0.02	1.09 (1.02-1.17)
Binge Eating	3.37	0.36	87.30	<0.001	29.08 (14.34-58.96)
Compensatory Behaviors	1.10	0.35	10.08	0.001	3.00 (1.52-5.91)
Night Eating	-0.01	0.34	0.00	0.99	1.00 (0.51-1.94)

Abbreviation: BMI, body mass index.

Table 5. Multivariable Symptom Count Model of Lifetime Predictors of Ever Seeking Treatment for an Eating Disorder

	β	S.E.	Wald	<i>P</i>	OR (95% CI)
Step 1.					
Age	-0.01	0.02	0.19	0.66	0.99 (0.97-1.02)
Sex	2.11	0.81	6.89	0.01	8.28 (1.71-40.13)
Race	0.11	0.36	0.10	0.75	1.12 (0.60-2.25)
Symptom Count	0.57	0.08	53.64	<0.001	1.76 (1.52-2.05)
Overweight	0.11	0.40	0.08	0.78	1.12 (0.51-2.47)
Underweight	0.80	0.35	5.28	0.02	2.22 (1.13-4.40)
Highest BMI	-0.01	0.04	0.08	0.78	0.99 (0.92-1.06)
Lowest BMI	-0.12	0.06	3.65	0.06	0.89 (0.79-1.00)
Substance Use	0.25	0.72	0.12	0.73	1.29 (0.31-5.32)
Anxiety	0.60	0.43	1.96	0.16	1.82 (0.79-4.20)
Depression	0.11	0.37	0.09	0.76	1.12 (0.54-2.32)
Step 2.					
Currently Think Have ED	2.60	0.38	46.39	<0.001	13.49 (6.38-28.52)

Abbreviation: BMI, body mass index; ED, eating disorder.

Table 6. Multivariable Symptom Cluster Models of Lifetime Predictors of Ever Seeking Treatment for an Eating Disorder

	β	S.E.	Wald	<i>P</i>	OR (95% CI)
Step 1.					
Age	-0.01	0.01	1.05	0.31	0.99 (0.96-1.01)
Sex	2.04	0.81	6.35	0.01	7.67 (1.57-37.39)
Race	0.23	0.35	0.44	0.51	1.26 (0.64-2.48)
Overweight	-0.16	0.37	0.18	0.67	0.85 (0.41-1.77)
Underweight	0.73	0.34	4.66	0.03	2.07 (1.07-4.02)
Highest BMI	0.03	0.03	0.67	0.41	1.03 (0.96-1.10)
Lowest BMI	-0.22	0.07	10.11	0.001	0.80 (0.70-0.92)
Binge Eating	1.31	0.37	12.43	<0.001	3.72 (1.79-7.71)
Compensatory Behaviors	2.23	0.56	16.12	<0.001	9.31 (3.13-27.65)
Night Eating	0.22	0.31	0.47	0.49	1.24 (0.67-2.30)
Substance Use	0.27	0.66	0.16	0.69	1.31 (0.36-4.78)
Anxiety	0.47	0.41	1.36	0.24	1.61 (0.73-3.56)
Depression	0.09	0.36	0.06	0.80	1.09 (0.54-2.22)
Step 2.					
Currently Think Have ED	2.44	0.36	45.49	<0.001	11.52 (5.66-23.45)

Abbreviation: BMI, body mass index; ED, eating disorder.

APPENDIX B

IRB APPROVAL NOTICE



Office of the Vice President for Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 01/11/2017

To: Charlotte Grillot

Address:

Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Gender, self-recognition of an eating disorder, and treatment-seeking behavior.

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 01/10/2017 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Pamela Keel
HSC No. 2015.16677

APPENDIX C

IRB RENEWAL NOTICE



Office of the Vice President For Research
Human Subjects Committee
P. O. Box 3062742
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

RE-APPROVAL MEMORANDUM

Date: 01/23/2017

To: Charlotte Grillot

Address:

Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Re-approval of Use of Human subjects in Research:

Gender, self-recognition of an eating disorder, and treatment-seeking behavior.

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 01/22/2018, you are must request renewed approval by the Committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chairman of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc:
HSC No. 2017.20105

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BIOGRAPHICAL SKETCH

Charlotte L. Grillot graduated *cum laude* from Goucher College in May 2007 with a Bachelor of Arts degree in psychology and sociology. In May 2011, she went on to receive a Master of Arts degree in psychology in education from Teachers College, Columbia University. She worked as a research coordinator and bariatric surgery counselor at the New York Obesity and Nutrition Research Center from 2010 to 2014. In August 2014, she enrolled in the clinical psychology program at Florida State University, where she currently studies eating behaviors/disorders under the mentorship of Dr. Pamela K. Keel.