



## Disordered eating, perfectionism, and food rules

Amanda Joelle Brown<sup>\*</sup>, Kortney M. Parman, Deirdre A. Rudat, Linda W. Craighead

Emory University Psychological Center, 36 Eagle Row, Atlanta, GA 30322, USA

### ARTICLE INFO

#### Article history:

Received 17 September 2011  
Received in revised form 25 April 2012  
Accepted 31 May 2012  
Available online 9 June 2012

#### Keywords:

Perfectionism  
Food rules  
Disordered eating

### ABSTRACT

Clinically significant trait perfectionism is often characteristic of individuals exhibiting symptoms of eating disorders. The present study reports on a measure developed to assess the use of food rules and evaluates the hypothesis that adherence to food rules may be one mechanism through which trait perfectionism exacerbates risk for developing eating disorder symptoms. Forty-eight female college students completed a battery of questionnaires, and multiple regression analyses were used to test a mediational model. Results indicated that adherence to food rules mediated the relationship between self-oriented perfectionism and three indices of disordered eating in this sample. This relationship was specific to self-oriented perfectionism and did not hold for other-oriented or socially prescribed perfectionism. These findings may have implications for designing early interventions for disordered eating and may be useful in tailoring treatment for individuals with disordered eating who also report high levels of perfectionism.

© 2012 Elsevier Ltd. All rights reserved.

### 1. Introduction

The identification of factors that contribute to the development and maintenance of eating disorders has been the focus of significant research effort in recent years. The etiology of anorexia nervosa (AN), bulimia nervosa (BN), and eating disorder not otherwise specified (EDNOS) appears to involve a combination of genetic, familial, personality, developmental, and socio-cultural influences (Klein & Walsh, 2003). A strong relationship has been found between trait perfectionism and disordered eating, but potential mediating variables affecting this relationship remain largely unknown (Bardone-Cone et al., 2007). One hypothesized mechanism at play in this relationship is adherence to rules regarding what, when, and how one must eat or not eat. Perfectionistic traits may lead individuals to adhere rigidly to such “food rules,” which, in turn, may increase vulnerability to developing eating disorder symptoms. This study aims to explore the role of food rules in understanding the relationship between perfectionism and disordered eating attitudes and behaviors.

The construct of perfectionism involves placing excessive emphasis on organization and preciseness, holding idealistic personal expectations, critically self-evaluating when expectations are not met, and doubting the quality of personal accomplishments (Hewitt & Flett, 1991). Hewitt and colleagues (Hewitt, Flett, Turnbull-Donovan, & Mikail, 1991) propose that perfectionism has three dimensions: self-oriented, other-oriented, and socially prescribed. Self-oriented perfectionism involves critical self-scrutiny and holding to unrealistic,

self-imposed personal standards, whereas other-oriented and socially prescribed perfectionism are based on a need to achieve high standards imposed by other people or by society at large (Hewitt, Flett, Besser, Sherry, & McGee, 2003). While some degree of adherence to personal and socially constructed standards of behavior is adaptive and healthy, perfectionistic tendencies become clinically relevant when high standards are pursued despite significant adverse consequences (Shafran, Cooper, & Fairburn, 2002).

Perfectionism has been identified as both a risk factor and a maintaining variable for disordered eating symptoms. In a prospective study, individuals with severe anorexia nervosa who scored highly on perfectionism at pretest had poorer prognoses, as indicated by assessments 5–10 years later (Bizeul, Sadowsky, & Rigaud, 2001). In a correlational study designed to investigate the relationship between eating disorders and both adaptive and maladaptive dimensions of perfectionism, women in treatment for an eating disorder scored significantly higher than healthy controls on the maladaptive perfectionism factor (Ashby, Kottman, & Schoen, 1998). More recent findings suggest that this difference may be specific to self-oriented perfectionism (Castro-Fornieles et al., 2007); individuals with eating disorders appear to hold themselves to exceptionally high personal standards but may be less concerned about living up to socially prescribed ideals.

In Fairburn and colleagues' influential transdiagnostic cognitive-behavioral theory of the development and maintenance of eating disorders (Fairburn, Cooper, & Shafran, 2003), over-evaluation of eating, weight, and shape interacts with perfectionistic standards for achievement and self-control to drive the development and maintenance of eating disorder symptoms. Fairburn (Fairburn, 2008) recently introduced a “clinical perfectionism” module into standard cognitive-behavioral therapy for eating disorders, which specifically addresses this dysfunctional scheme for self-evaluation.

<sup>\*</sup> Corresponding author. Tel.: +1 908 507 7209; fax: +1 404 727 1284.  
E-mail address: ajbrow9@emory.edu (A.J. Brown).

While the relationship between perfectionism and disordered eating behaviors is well-supported by the existing literature, the specific mechanisms by which perfectionism exerts its influence on eating pathology have yet to be identified. The pursuit of unrealistic standards regarding eating, weight, and shape may encourage the development of overly rigid food rules. To date, little empirical research has been conducted on the development of and adherence to food rules among individuals with eating disorders. The following section briefly reviews research related to food rules and disordered eating and suggests that food rules may mediate the relationship between perfectionism and eating disorder symptoms.

### 1.1. Food rules

Many individuals with AN, BN, and subclinical forms of disordered eating subscribe to personal food rules that can be quite rigid and restrictive (Eiber, Mirabel-Sarron, & Urdapilleta, 2005). For some, it is a matter of taking generally sound recommendations for healthy eating to the extreme. Others have received unhealthy messages about food in the past and experience greater distortion in their thoughts about food as their disorder progresses. Many individuals with eating concerns avoid foods that either predispose them to binge eating or they consider unhealthy (Klein & Walsh, 2003). By denying themselves certain foods and only eating those foods considered to be safe, the food intake of individuals with eating concerns can be very restrictive and lacking in variety and nutrients, which may lead to a state of physiological deprivation and heightened risk for binge eating (Eiber et al., 2005; Mathes, Brownley, Mo, & Bulik, 2009). Food rules specifically, and rigid thought patterns about food more generally, are associated with heightened emotional responsiveness and cognitive disruption, including excessive focusing on food as well as eating in excess, which further compound eating concerns (Polivy, 1996).

Self-imposed food rules may increase preoccupation with “forbidden” foods, setting the stage for more rigid adherence to these rules in an effort to maintain self-control and increasing the likelihood of binge eating when the temptation to consume “off-limits” foods becomes too strong (Lingswiler, Crowther, & Stephens, 1989; Mann & Ward, 2001). Mann and Ward (2001) assigned participants to one of three groups; the first group was prohibited from eating a target food, the second group was encouraged to avoid it, and the third group was given no instruction related to the target food. The researchers found that in an absence of prohibition on eating, individuals' thoughts about a food decreased over time. However, when dietary restraint from an appealing food was enforced or chosen, individuals experienced increased preoccupation with the forbidden foods. Such preoccupation may strengthen commitment to food rules as the forbidden food becomes more tempting and salient for the individual, who may feel a need to exert more control over his or her behavior to resist consuming the off-limits food.

To date, little research has evaluated the degree to which adherence to food rules may contribute to disordered eating. Additionally, the current literature is limited by a lack of validated measures specifically assessing adherence to food rules. This study aims to fill both voids by testing the psychometric properties of a new Food Rules Measure (FRM) in a sample of healthy female undergraduates and exploring the relationship between perfectionism, adherence to food rules, and disordered eating in this sample. Adherence to food rules is hypothesized to mediate the relationship between perfectionism and disordered eating. Support for this hypothesis would suggest that specific interventions targeting distorted cognitions about and commitment to following rigid food rules might be particularly efficacious for treating eating pathology in highly perfectionistic individuals.

## 2. Methods

The current investigation was part of a larger study investigating the role of self- and other-compassion in body dissatisfaction (Rudat, 2010). The specific measures used for this study (described below) were included among the questionnaires that were completed as a part of the parent study.

### 2.1. Participants

Forty-eight female undergraduate students completed the study. All students were enrolled in the Psychology Research Pool at a private university. Only participants over age 18 were enrolled in the study. The ages of participants ranged from 18 to 35 ( $M = 19.2$ ,  $SD = 2.5$ ). The participants were racially diverse; 66.7% identified as Caucasian, 18.8% as Asian, 8.3% as Black or African-American, 4.2% as Mixed Race or Other. Further, 10.4% of the participants identified as Hispanic or Latino. One participant did not report her race or ethnicity. This study was approved by the Emory University Institutional Review Board.

### 2.2. Design

The measures used for this study were included within a larger set of questionnaires that were completed at a single time point. This cross-sectional correlational design was used to provide an initial investigation of potential relationships among concurrent levels of perfectionism, eating disorder symptoms, and adherence to food rules. Other measures assessing depression, self-esteem, and self- and other-compassion were used to investigate the construct validity of the new measure of adherence to food rules that had been developed specifically to evaluate hypotheses for this study. As adherence to food rules was hypothesized to reflect attitudes and judgments about one's own eating, it was expected that the new measure would be moderately correlated with depression, self-esteem, and self-compassion but not significantly correlated with compassion towards others.

### 2.3. Measures

#### 2.3.1. Food rules

Due to the lack of adequate measures to assess adherence to food rules, the authors developed a novel measure assessing the degree to which participants endorse the use of food rules. The Food Rules Measure (FRM) is a 14-item self-report measure designed to assess the content of food rules, the frequency of rule enforcement, and the predicted consequences of breaking the rule. A team of experts, including a registered dietician and two Masters-level psychologists, collaboratively generated the items for the FRM and pilot-tested the measure to ensure its clarity and coherence. FRM items are rated on a four-point scale ranging from “Always” to “Never.” Lower scores indicate greater adherence to food rules. An example item from this measure is, “I feel disappointed in myself when I ‘splurge’ on a food I typically do not eat or avoid.” Reliability and validity statistics related to the FRM are presented in the Results section.

#### 2.3.2. Perfectionism

The Multidimensional Perfectionism Scale is a 45-item self-report measure that assesses perfectionism using seven-point Likert scales (Hewitt et al., 1991). The measure captures three domains of perfectionism: self-oriented perfectionism, other-oriented perfectionism, and socially prescribed perfectionism. Hewitt et al. (1991) found this measure to have good internal consistency (Cronbach's  $\alpha = 0.87$ ), test-retest reliability (0.91 and 0.86 for self-oriented and socially prescribed perfectionism, respectively), and concurrent validity.

### 2.3.3. Eating pathology

Stice's Eating Screen (SES) was used to determine current eating disorder pathology. Stice, Telch, and Rizvi (2000) found this measure to be a reliable and valid brief screening measure for eating disorders. The measure is comprised of 26 questions related to the symptoms of anorexia, bulimia, and binge-eating disorder and can be used to indicate the likelihood of a current diagnosis according to DSM-IV criteria (Stice et al., 2000). Participants were not asked to report if they had ever been diagnosed with or received treatment for an eating disorder, and participants were not screened out on the basis of likely eating disorder diagnosis.

### 2.3.4. Eating-related cognitions

The Preoccupation with Eating, Weight, and Shape Scale (PEWS; Niemeier, Craighead, Pung, & Elder, 2002) is an eight-item self-report measure that was adapted from the Modifying Distressing Thoughts Questionnaire (Clark, Feldman, & Channon, 1989). It requires respondents to rate the percentage of the day (0–100%) they spend thinking about food/eating and about weight/shape, and also to indicate on a scale of one to six how distressing the thoughts were, how difficult they were to stop, and how much they interfered with concentration. Percentage is averaged across both domains, and the six Likert scores are averaged to provide an overall Distress score. Preliminary analyses have revealed adequate convergent and discriminant validity, sensitivity to change, and internal consistency (coefficient  $\alpha = .84$ ; Niemeier et al., 2002).

### 2.3.5. Intuitive eating

The Intuitive Eating Scale (IES; Tylka, 2006) is a 21-item questionnaire that assesses three aspects of eating: unconditional permission to eat when hungry, eating for physical instead of emotional reasons, and relying on internal hunger and satiety cues when determining when to eat and how much to eat. The measure has good internal consistency (coefficient  $\alpha = .89$ ) and good construct validity, correlating strongly in the negative direction with measures of body dissatisfaction, interoceptive awareness, pressure for thinness, and thin-ideal internalization (Tylka, 2006).

### 2.3.6. Body dissatisfaction

Participants' body dissatisfaction was measured by the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987), a 34-item, self-report questionnaire that assesses body shape concerns through six-point Likert scale forced-choice answers. Items include questions such as, "Have you felt ashamed of your body?" Higher scores indicate greater body dissatisfaction. Internal consistency (0.97), test-retest reliability (0.88) and concurrent validity (0.66) have been shown to be satisfactory (Rosen, Jones, Ramirez, & Waxman, 1996).

### 2.3.7. Depression

The Beck Depression Inventory, Second Edition (BDI-II), like its predecessor the Beck Depression Inventory (BDI), was constructed by selecting items that consistently discriminated between depressed and nondepressed psychiatric patients (Beck, Steer, Ball, & Ranieri, 1996; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; Steer, Ball, Ranieri, & Beck, 1999). The BDI-II is a 21-item multiple-choice self-report measure that assesses emotional, cognitive, motivational, and physical symptoms of depression. The coefficient  $\alpha$  for the BDI-II is approximately .91, and it correlates highly with mood disorder diagnosis (Beck, Ward et al., 1996).

### 2.3.8. Self-esteem

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) consists of 10 items related to feelings about oneself that are answered on a four-point Likert scale ranging from "Strongly agree" to "Strongly disagree." Total scores range from 0 to 30, with scores below 15

suggesting significantly low self-esteem. The RSES has been validated with many culturally diverse and international samples (Hatcher & Hall, 2009; Martin, Thompson, & Chan, 2006).

### 2.3.9. Self-compassion

The Self-Compassion Scale (SCS; Neff, 2003) was used to determine levels of compassion toward the self. The 26-item, self-report questionnaire includes three factors: self-kindness, common humanity, and mindful awareness. Items include statements such as, "I try to be understanding and patient towards those aspects of my personality I don't like," and the respondent's level of agreement is rated on a five-point Likert scale. Higher scores indicate a higher degree of self-compassion. Internal consistency (0.92), test-retest reliability (0.93), and discriminant validity are satisfactory (Neff, 2003).

### 2.3.10. Other-compassion

The Other-Compassion Scale (OCS) is a modified version of the Self-Compassion Scale, designed to assess compassion toward other people. The OCS was created for the parent study, which was designed in part to investigate the relationship between self- and other-compassion. The 26 items of the Self-Compassion Scale were modified to refer to others instead of the self; for example, "I try to be understanding and patient towards those aspects of other people's personality that I don't like." Like the Self-Compassion Scale, the Other-Compassion Scale is a self-report measure that uses a five-point Likert scale. Reliability and validity of this measure have not yet been determined.

## 2.4. Procedure

Participants were recruited through the Introductory Psychology subject pool. Participants were told that the study was about "attitudes towards self, appearance, and others." When participants arrived, they were given a brief verbal description of the study and signed a consent form explaining the nature of the study. Participants then completed the questionnaire packet. Prior to their departure, each participant received a debriefing form with additional information about the study and referral information for local counseling services.

## 2.5. Data analysis

Based on the Baron and Kenny model for testing mediational hypotheses, a four-step procedure for data analysis was followed (Baron & Kenny, 1986). A series of regression analyses were carried out to determine the extent to which the variance in a potential mediator variable accounts for the statistical relationship between an independent variable and dependent variable(s). Mediation is demonstrated when the effect of the independent variable on a given outcome variable is attenuated or non-existent when controlling for the mediating variable. The Sobel test (Sobel, 1982) was conducted to test the significance of the mediator's impact on the relationship between the independent and dependent variable. An alpha level of .05 was used to determine statistical significance for all analyses. SPSS was used for all statistical analyses.

## 3. Results

### 3.1. Descriptive statistics

All 48 participants completed the required questionnaires and were included in the analyses. Table 1 displays participants' mean scores on each of the measures.

### 3.2. Psychometric properties of the FRM

The FRM was found to have good internal consistency (Cronbach's  $\alpha = .85$ ) suggesting that the items create a coherent measure. In

order to test for construct validity, correlations were calculated between the FRM and other measures included in the parent study. Convergent validity was demonstrated by the large effect sizes of the correlations between the FRM and all other measures assessing eating pathology (Table 2). Moderately strong correlations were found between the FRM and four non-eating-specific measures (Table 3): the BDI-II, RSES, SCS, and the Self-Oriented subscale of the MPS. Other-oriented perfectionism, socially oriented perfectionism, and compassion towards others were not correlated with adherence to food rules.

### 3.3. Mediator analyses

A series of regression analyses (Baron & Kenny, 1986) was carried out to test whether adherence to food rules acted as a mediator of the relationship between perfectionism (three subscales) and the three primary indices of eating pathology, the SES, PEWS, and IES. Table 4 depicts the outcome of these statistical tests. To test the first criterion for mediation, that the independent variable affects the mediator, scores on the FRM were regressed on each of the three subscales of the MPS. The results indicated that adherence to food rules was significantly related to self-oriented perfectionism but not related to other-oriented or socially oriented perfectionism. Therefore, the subsequent steps in the mediator analyses were conducted only with self-oriented perfectionism.

To test the second criterion for mediation, that the independent variable affects the dependent variable, SES, PEWS and IES scores were regressed on MPS-Self scores. Self-oriented perfectionism was significantly related to global eating pathology (as measured by the SES), preoccupation with eating, weight, and shape (PEWS) and intuitive eating (IES).

The third criterion for mediation is that the mediator affects the dependent variable. To test this criterion, SES, PEWS, and IES scores were each regressed on FRM scores. Results of Step 3 analyses indicated that the adherence to food rules was significantly related to all three eating-related outcome measures.

In order to be considered a mediating variable according to Baron and Kenny's (1986) criteria, the effect of the independent variable on the dependent variable must be significantly less when controlling for the mediator than when the mediator is not controlled. To test this final criterion, SES, PEWS, and IES scores were regressed on self-oriented perfectionism, as in Step 2. In Step 4, FRM scores were entered into block 1 of the regression analysis to control for their influence on the relationship between perfectionism and eating disorder symptoms. The Sobel test was performed (<http://www.people.ku.edu/~preacher/sobel/sobel.htm>) to test the strength of the mediator.

The results indicated that adherence to food rules significantly mediated the relationship between self-oriented perfectionism and all three outcome variables: global eating disorder symptoms (Sobel test statistic = 2.41,  $p = .02$ ), preoccupation with food and weight (Sobel test statistic = 2.50,  $p = .01$ ) and intuitive eating (Sobel test

**Table 1**  
Descriptive statistics.

|  | Possible range | Observed range | Mean | Standard deviation |
|--|----------------|----------------|------|--------------------|
| Food Rules Measure                                 | 14–84          | 26–75          | 51.5 | 37–86              |
| Self-Oriented Perfectionism                        | 15–105         | 35–103         | 71.9 | 16.6               |
| Other-Oriented Perfectionism                       | 15–105         | 40–86          | 63.4 | 10.3               |
| Socially Prescribed Perfectionism                  | 15–105         | 25–80          | 52.2 | 13.1               |
| Stice's Eating Scale                               | 0–22           | 0–17           | 9.2  | 4.8                |
| Preoccupation with Eating, Weight, and Shape Scale | 0–6            | 0–5.3          | 2.2  | 1.5                |
| Intuitive Eating Scale                             | 1–5            | 1.9–4.4        | 3.0  | 0.54               |
| Body Shape Questionnaire                           | 34–204         | 34–174         | 92.1 | 33.7               |
| Beck Depression Inventory                          | 0–63           | 0–24           | 9.8  | 6.7                |
| Rosenberg Self-Esteem Scale                        | 10–40          | 15–40          | 32.3 | 5.1                |
| Self-Compassion Scale                              | 26–130         | 41–128         | 77.3 | 17.7               |
| Other-Compassion Scale                             | 26–130         | 62–104         | 90.9 | 9.1                |

**Table 2**  
Correlations between FRM and measures related to eating pathology.

| Measure       | Correlation with FRM |
|---------------|----------------------|
| SES           | -.54**               |
| IES           | .78**                |
| PEWS %        | -.59**               |
| PEWS Distress | -.59**               |
| BSQ           | -.69**               |

FRM = Food Rules Measure.

SES = Stice's Eating Scale.

IES = Intuitive Eating Scale.

PEWS = Preoccupation with Eating, Weight, and Shape Scale.

BSQ = Body Shape Questionnaire.

\*\*  $p < .01$ .

statistic = -3.80,  $p = .00$ ). Due to the strong statistical relationship between the MPS-self, FRM, and all three outcome variables, the achieved power for these regression analyses was consistently high (.96 and above). The two nonsignificant Step 1 regression analyses had lower power, which may have been related to the weaker correlations between the measures of other-oriented and socially prescribed perfectionism and the FRM, the small sample size, or both (achieved power: MPS-other = .22; MPS-social = .14).

## 4. Discussion

In this study, adherence to food rules mediated the relationship between self-oriented perfectionism and three indices of eating pathology: global eating disorder symptoms, preoccupation with eating and weight, and intuitive eating. Notably, mediation was specific to self-oriented perfectionism and was not demonstrated for other-oriented or socially oriented perfectionism. These data support the notion that disordered eating attitudes and behaviors may be largely driven by individuals' self-imposed high standards. High levels of self-oriented perfectionism may lead individuals to rigidly interpret guidelines for healthy eating and to adhere strictly to these guidelines. Once established, rigid food rules likely become more restrictive and prohibitive, leading to greater preoccupation with food and eating, less intuitive eating, and increased symptoms of disordered eating. While the current data do not address the developmental trajectory of perfectionism, food rules, and disordered eating, they support the hypothesis that adherence to food rules may be a key mechanism by which self-oriented perfectionism leads to eating pathology.

As the first measure to specifically assess adherence to food rules, the FRM provides a promising contribution to the field of eating disorders assessment. In this study, the FRM showed good internal

**Table 3**  
Correlations between FRM and non-eating-related measures.

| Measure    | Correlation with FRM |
|------------|----------------------|
| BDI-II     | -.34*                |
| RSES       | .40**                |
| SCS        | .34*                 |
| OCS        | .06                  |
| MPS-Self   | -.58**               |
| MPS-Other  | -.23                 |
| MPS-Social | -.17                 |

BDI-II = Beck Depression Inventory.

RSES = Rosenberg Self-Esteem Scale.

SCS = Self-Compassion Scale.

OCS = Other-Compassion Scale.

MPS-Self = Self-Oriented Perfectionism.

MPS-Other = Other-Oriented Perfectionism.

MPS-Social = Socially Prescribed Perfectionism.

\*  $p < .05$ .

\*\*  $p < .01$ .



**Table 4**  
Results of mediator analyses.

|  | R <sup>2</sup> change | F change | P value | β     | Meets criteria? |
|--|-----------------------|----------|---------|-------|-----------------|
| Step 1: Independent variable affects the mediator  |                       |          |         |       |                 |
| IV: MPS-self   |                       |          |         |       |                 |
| FRM  | .33                   | 22.7     | .00     | -.58  | Yes             |
| IV: MPS-other  |                       |          |         |       |                 |
| FRM  | .05                   | 2.5      | .12     | -.23  | No; stop here   |
| IV: MPS-social   |                       |          |         |       |                 |
| FRM  | .03                   | 1.4      | .25     | -.17  | No; stop here   |
| Step 2: Independent variable affects the dependent variable                                      |                       |          |         |       |                 |
| IV: MPS-self   |                       |          |         |       |                 |
| SES  | .19                   | 10.1     | .00     | .44   | Yes             |
| PEWS   | .31                   | 21.0     | .00     | .56   | Yes             |
| IES  | .16                   | 8.3      | .01     | -.40  | Yes             |
| Step 3: Mediator affects the dependent variable  |                       |          |         |       |                 |
| IV: FRM  |                       |          |         |       |                 |
| SES  | .29                   | 17.7     | .00     | -.54  | Yes             |
| PEWS   | .35                   | 24.4     | .00     | -.59  | Yes             |
| IES  | .57                   | 60.5     | .00     | .76   | Yes             |
| Step 4: IV affects the DV to a lesser degree when the mediator is controlled than when it is not |                       |          |         |       |                 |
| IV: MPS-self   |                       |          |         |       |                 |
| SES  | .03                   | 1.6      | .21     | .19*  | Yes             |
| PEWS   | .07                   | 5.7      | .02     | .33*  | Yes             |
| IES  | .00                   | .32      | .57     | -.07* | Yes             |

<sup>^</sup>p < .10 compared with Step 2 value (Sobel test).

\* p < .05 compared with Step 2 value (Sobel test).

consistency and construct validity. The strong correlations between the FRM and other measures assessing characteristics of eating disorders indicate that the measure has good convergent validity and may be useful as a more specific index of this aspect of disordered eating. The FRM may also be useful in a clinical setting for the purposes of screening or treatment planning. For example, the FRM may be useful for individualizing treatment by helping to identify the specific rules that individuals adhere to and the ways in which these rules may be exacerbating or causing disordered eating behaviors.

The medium effect sizes of the correlations between the FRM and the BDI-II, SCS, and Self-Oriented subscale of the MPS also offer evidence of convergent validity, as depression (Casper, 1998), low self-compassion (Adams & Leary, 2007), and self-oriented perfectionism (Castro-Fornieles et al., 2007) have all been found at higher levels among individuals showing symptoms of disordered eating. The lack of significant correlation between FRM and the other-oriented and socially prescribed subscales of the MPS suggests that adherence to food rules is associated with holding oneself to high self-standards, but not seeking to achieve goals set by others and by society at large. The FRM also proved to have adequate discriminant validity, as it was not significantly correlated with measures assessing constructs for which there is no empirical evidence or theoretical basis for a relationship with disordered eating (e.g., compassion for others).

#### 4.1. Relevance for treatment

The present findings suggest that an explicit focus on changing rule-bound cognitions and behaviors may increase the efficacy of treatments for eating disorders, at least for individuals with high levels of self-oriented perfectionism. It may be helpful for therapists and dietitians to identify clients' rigid food rules early in treatment and to work towards modifying those rules through such techniques as cognitive restructuring and exposure and response prevention. Cognitive restructuring strategies, already commonly used in cognitive-behavioral therapy for eating disorders (Fairburn et al., 2003) are easily applicable to rigid rules about food. For example, the "downward arrow" technique can be used to help clients understand what lies at the heart of their food rules, such as fear of weight gain or an aversion to appearing weak or self-indulgent. Those maladaptive cognitions can then be challenged and attenuated.

Behavioral interventions such as exposure and response prevention can also be used to challenge clients' rigid adherence to food rules. In vivo exposure to rule breaking (without the option of restricting or purging) may lessen the rigidity of clients' beliefs that rule breaking will have a negative outcome (e.g. weight gain). With repeated exposure, the rule is likely to lose its potency, allowing the client increased flexibility in both cognitions and behaviors.

#### 4.2. Study limitations

The main limitations of this questionnaire-based study include sample characteristics, aspects of study design, and the use of a newly developed measure to assess adherence to food rules. This study was conducted in a single geographic location in a developed nation at an elite, private university. Further research will be needed to determine if the findings are representative of the national college population, and beyond this, a clinical population with significant eating pathology. Further, the cross-sectional nature of the study design did not allow for analysis of the development of eating disorder pathology, perfectionism, or subscription to food rules. Specifically, this study did not investigate if there is an age or life stage at which these variables most often appear and interact. Further research will be necessary to determine if there are critical developmental periods in which food rules emerge or are more likely to exacerbate disordered eating.

As the FRM was developed by the authors for the purposes of this study, its reliability and validity can only be preliminarily suggested on the basis of the study results. Data analyses indicated that the measure had good internal consistency and correlated strongly with indicators of eating pathology and perfectionism. Further investigation is needed to determine the utility of the FRM as an assessment tool for determining the extent to which adherence to food rules is problematic or interferes with response to intervention. However, the mean FRM score reported in this study can serve as an initial normative value for female college undergraduates.

#### 5. Conclusions

Rigid adherence to food rules is characteristic of many individuals with eating concerns. Perfectionism is also common in this population, and the results of this investigation suggest that adherence to food rules may be one mechanism by which perfectionistic tendencies contribute to the development and maintenance of eating disorder symptoms. Adherence to food rules was found to be a mediator of the relationship between self-oriented perfectionism and three indicators of disordered eating in a nonclinical sample of female undergraduates. Thus, use of food rules may need to be targeted in prevention and early intervention programs designed to reduce risk factors for eating disorders. Further work is needed to confirm this finding within clinical populations. If confirmed, therapeutic interventions for eating disorders might be strengthened by individualized assessment of and attention to clients' levels of trait perfectionism and adherence to food rules.

#### Role of funding sources

No external funding was provided for this study.

#### Contributors

Authors 1, 2, 3, and 4 were involved in designing the study. Authors 1 and 2 conducted all statistical analyses and wrote the manuscript collaboratively. Authors 2 and 3 were directly involved in data collection. All authors contributed to and have approved the final manuscript.

#### Conflict of interest

All authors declare that they have no conflicts of interest.

## Appendix A.

### Food Rules Measure

*Directions for participants:* For each item, please check the answer that best characterizes your beliefs or behaviors. Do you have any dietary restrictions based on a medical condition or food allergy?

Yes  No Briefly describe: \_\_\_\_\_

1. **I choose to eat what I consider to be healthy foods when those foods are available.**  
 Always  Usually  Often  Sometimes  Rarely  Never
2. **I don't eat at certain times during the day because I believe those times are not helpful for my body's metabolism (e.g. after 7 p.m. or first thing in the morning).**  
 Always  Usually  Often  Sometimes  Rarely  Never
3. **I avoid certain foods or food groups for reasons other than an allergy or dislike of the taste or texture.**  
 Always  Usually  Often  Sometimes  Rarely  Never
4. **I tend to snack between meals.**  
 Always  Usually  Often  Sometimes  Rarely  Never
5. **I eat what I believe to be the right portion size, even when it's not satisfying.**  
 Always  Usually  Often  Sometimes  Rarely  Never
6. **I feel disappointed in myself when I "splurge" on a food I typically do not eat or avoid.**  
 Always  Usually  Often  Sometimes  Rarely  Never
7. **I feel the need to follow food rules or diet plans that dictate what, when, and/or how much to eat.**  
 Always  Usually  Often  Sometimes  Rarely  Never
8. **I avoid eating "junk food" and sweets because they are not good choices.**  
 Always  Usually  Often  Sometimes  Rarely  Never
9. **I feel comfortable eating any food in all locations with anyone, including at home, in a restaurant, and at social functions.**  
 Always  Usually  Often  Sometimes  Rarely  Never
10. **I feel I need to compensate, such as through exercise or eating less at another time, when I eat certain foods or a certain amount of food.**  
 Always  Usually  Often  Sometimes  Rarely  Never
11. **I find myself preoccupied with thoughts about food and what to eat or not eat.**  
 Always  Usually  Often  Sometimes  Rarely  Never
12. **I eat exactly what I want, regardless of what kind or quantity of food is available, or what time of day it is.**  
 Always  Usually  Often  Sometimes  Rarely  Never
13. **I avoid foods high in carbohydrates, fat, and/or calories.**  
 Always  Usually  Often  Sometimes  Rarely  Never
14. **I avoid thinking of foods as either "good" or "bad" based on their nutritional content.**  
 Always  Usually  Often  Sometimes  Rarely  Never

## References

- Adams, C. E., & Leary, M. R. (2007). Promoting self-compassionate attitudes toward eating among restrictive and guilty eaters. *Journal of Social and Clinical Psychology, 26*(10), 1120–1144.
- Ashby, J. S., Kottman, T., & Schoen, E. (1998). Perfectionism and eating disorders reconsidered. *Journal of Mental Health Counseling, 20*, 261–271.
- Bardone-Cone, A. M., Wonderlich, S. A., Frost, R. O., Bulik, C. M., Mitchell, J. E., Uppala, S., et al. (2007). Perfectionism and eating disorders: Current status and future directions. *Clinical Psychology Review, 27*(3), 384–405. <http://dx.doi.org/10.1016/j.cpr.2006.12.005> [pii] S0272-7358(06)00159-0.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.
- Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. (1996). Comparison of Beck Depression Inventories -IA and -II in psychiatric outpatients. *Journal of Personality Assessment, 67*(3), 588–597.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561–571.
- Bizeul, C., Sadowsky, N., & Rigaud, D. (2001). The prognostic value of initial EDI scores in anorexia nervosa patients: A prospective follow-up study of 5–10 years. *Eating Disorder Inventory. European Psychiatry, 16*(4), 232–238 doi: S0924933801005703 [pii].
- Casper, R. C. (1998). Depression and eating disorders. [Review]. *Depression and Anxiety, 8*(Suppl. 1), 96–104.
- Castro-Fornieles, J., Gual, P., Lahortiga, F., Gila, A., Casula, V., Fuhrmann, C., et al. (2007). Self-oriented perfectionism in eating disorders. *The International Journal of Eating Disorders, 40*(6), 562–568. <http://dx.doi.org/10.1002/eat.20393>.
- Clark, D. A., Feldman, J., & Channon, S. (1989). Dysfunctional thinking in anorexia and bulimia nervosa. *Cognitive Therapy and Research, 13*, 377–387.
- Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the body shape questionnaire. *The International Journal of Eating Disorders, 6*, 485–494.
- Eiber, R., Mirabel-Sarron, C., & Urdapilleta, I. (2005). Cognitions in eating disorders and their assessment. *L'Encéphale, 31*(6 Pt 1), 643–652 doi: MDOI-ENC-12-2005-31-6-C1-0013-7006-101019-200520379 [pii].
- Fairburn, C. G. (2008). *Cognitive Behavior Therapy and Eating Disorders*. New York, NY: The Guilford Press.
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy, 41*(5), 509–528 doi: S0005796702000888 [pii].
- Hatcher, J., & Hall, L. A. (2009). Psychometric properties of the Rosenberg self-esteem scale in African American single mothers. *Issues in Mental Health Nursing, 30*(2), 70–77. <http://dx.doi.org/10.1080/01612840802595113> [pii]908649643.
- Hewitt, P. L., & Flett, G. L. (1991). Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *Journal of Personality and Social Psychology, 60*(3), 456–470.
- Hewitt, P. L., Flett, G. L., Besser, A., Sherry, S. B., & McGee, B. (2003). Perfectionism is multidimensional: A reply to Shafran, Cooper and Fairburn. *Behaviour Research and Therapy, 41*(10), 1221–1236 doi: S0005796703000214 [pii].
- Hewitt, P. L., Flett, G. L., Turnbull-Donovan, W., & Mikail, S. F. (1991). The multidimensional perfectionism scale: Reliability, validity, and psychometric properties in psychiatric samples. *Psychological Assessment, 3*(3), 464–468.
- Klein, D. A., & Walsh, B. T. (2003). Eating disorders. *International Review of Psychiatry, 15*(3), 205–216 doi: 10.1080/0954026031000136839AT3JFTPNVB4RXW2K [pii].
- Lingswiler, V. M., Crowther, J. H., & Stephens, M. A. P. (1989). Affective and cognitive antecedents to eating episodes in bulimia and binge eating. *The International Journal of Eating Disorders, 8*, 533–539.

- Mann, T., & Ward, A. (2001). Forbidden fruit: Does thinking about a prohibited food lead to its consumption? *The International Journal of Eating Disorders*, 29(3), 319–327. <http://dx.doi.org/10.1002/eat.1025> [pii].
- Martin, C. R., Thompson, D. R., & Chan, D. S. (2006). An examination of the psychometric properties of the Rosenberg Self-Esteem Scale (RSES) in Chinese acute coronary syndrome (ACS) patients. *Psychology, Health & Medicine*, 11(4), 507–521. <http://dx.doi.org/10.1080/13548500500407367> [pii]Q4177N88048X2145.
- Mathes, W. F., Brownley, K. A., Mo, X., & Bulik, C. M. (2009). The biology of binge eating. *Appetite*, 52(3), 545–553. <http://dx.doi.org/10.1016/j.appet.2009.03.005> [pii]S0195-6663(09)00050-6.
- Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity*, 2, 223–250.
- Niemeier, H. M., Craighead, L. W., Pung, M. A., & Elder, K. A. (2002). *Reliability, validity, and sensitivity to change of the Preoccupation with Eating, Weight, and Shape scale*. Paper presented at the Annual meeting of the Association of the Advancement of Behavior Therapy, Reno, NV.
- Polivy, J. (1996). Psychological consequences of food restriction. *Journal of the American Dietetic Association*, 96(6), 589–592. [http://dx.doi.org/10.1016/S0002-8223\(96\)00161-7](http://dx.doi.org/10.1016/S0002-8223(96)00161-7) quiz 593–584, [pii]S0002-8223(96)00161-7.
- Rosen, J. C., Jones, A., Ramirez, E., & Waxman, S. (1996). Body Shape Questionnaire: Studies of validity and reliability. *The International Journal of Eating Disorders*, 20(3), 315–319 doi: 10.1002/(SICI)1098-108X(199611)20:3<315::AID-EAT11>3.0.CO;2-Z [pii].
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Rudat, D. A. (2010). *The relationship of self- and other-compassion with body dissatisfaction*. Unpublished Master's thesis. Emory University.
- Shafran, R., Cooper, Z., & Fairburn, C. G. (2002). Clinical perfectionism: A cognitive-behavioural analysis. *Behaviour Research and Therapy*, 40(7), 773–791.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological Methodology 1982* (pp. 290–312). Washington, D.C.: American Sociological Association.
- Steer, R. A., Ball, R., Ranieri, W. F., & Beck, A. T. (1999). Dimensions of the Beck Depression Inventory-II in clinically depressed outpatients. *Journal of Clinical Psychology*, 55(1), 117–128 doi: 10.1002/(SICI)1097-4679(199901)55:1<117::AID-JCLP12>3.0.CO;2-A [pii].
- Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the Eating Disorder Diagnostic Scale: A brief self-report measure of anorexia, bulimia, and binge-eating disorder. *Psychological Assessment*, 12(2), 123–131.
- Tylka, T. L. (2006). Development and psychometric evaluation of a measure of intuitive eating. *Journal of Counseling Psychology*, 53, 226–240.