



Short Communication

Perfectionism, rumination, and gender are related to symptoms of eating disorders: A moderated mediation model



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ABSTRACT

Introduction: Perfectionism and rumination both seem to be involved in the development and maintenance of eating disorders (ED), but the underlying studies have been performed almost exclusively in females. The aims of this study were to examine whether rumination is a potential mediator of the link between perfectionism and ED symptoms, and whether gender is a moderator of the link between perfectionism and ED symptoms and/or between perfectionism and brooding rumination.

Method: 390 participants (269 women, 121 men), aged between 18 and 25, completed three questionnaires: the Ruminative Response Scale for Eating Disorders, the Eating Attitudes Test, and the Frost Multidimensional Perfectionism Scale.

Results: Results showed that maladaptive evaluative-concerns perfectionism and positive strivings perfectionism both had indirect effects on ED symptoms via brooding rumination. Gender moderated only the direct effect between maladaptive evaluative-concerns perfectionism and ED symptoms.

Conclusions: These results highlighted gender differences, and support the literature on the importance of including rumination and perfectionism in the treatment and the prevention of eating disorders.

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1. Introduction

Recently, the prevalence of anorexia nervosa has been estimated to range from 0.3 to 0.9%; for bulimia nervosa, 0.9 to 1.5%; for binge eating disorder, 1.9 to 3.5%; and for eating disorders not otherwise specified, 2.0 to 5% (Smink, Van Hoeken, & Hoek, 2012). An increasing number of studies have focused on psychological factors involved in the development and maintenance of eating disorders (ED) symptoms in order to better prevent and treat them. Several studies suggest that perfectionism and rumination are two major processes involved in ED symptoms.

1.1. The role of perfectionism in eating disorders

Fairburn, Cooper, and Shafran's (2003) model postulated that perfectionism is a maintaining mechanism for eating disorders, with perfectionism predicting an over-evaluation of eating, shape and weight and their control in the evaluation of the self, which in turn leads to

strict dieting and other weight-control behaviors. Perfectionism can be defined as the tendency to establish and pursue very high personal goals, along with other features such a strong tendency to self-criticism (Burns, 1980). A large body of literature portrays perfectionism as a multidimensional construct with two higher-order dimensions (Cox, Enns, & Clara, 2002; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993). These two dimensions, Maladaptive Evaluation Concerns (MEC) and positive strivings (PS), have been highlighted as predictors of eating disorder symptoms in several studies (e.g., Bardone-Cone et al., 2007; Boone, Claes, & Luyten, 2014; Boone, Soenens, & Braet, 2011). Two lower-order dimensions contributing to MEC (doubt about actions, and concerns over mistakes) come from the Frost Multidimensional Perfectionism Scale (FMPS; Frost, Marten, Lahart, & Rosenblate, 1990) and have been highlighted as the strongest predictors of ED symptoms (Bardone-Cone et al., 2007; Bulik et al., 2003).

Relationships between perfectionism and eating disorders have customarily be studied exclusively with females; however, some few studies have shown a gender difference in the relationship between perfectionism and eating disorders: This relationship was stronger for women than for men (Forbush, Heatherton, & Keel, 2007; Haase, Prapavessis, & Owens, 1999), or even non-existent for men (Downey, Reinking, Gibson, Cloud, & Chang, 2014; Shanmugam & Davies, 2015). However, given the paucity of research that includes both genders, it seems crucial to pursue the moderating role of gender on relationships between aspects of perfectionism and ED symptoms.

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1.2. The role of rumination in eating disorders

Rumination can be defined as an inadequate style of coping, corresponding to an involuntary process of repetitive and passive thoughts about negative emotions, as well as focusing on depressive symptoms and their implications (Lyubomirsky & Nolen-Hoeksema, 1995). While rumination was originally studied for its role in depression, recent research suggests that rumination can also be involved in disorders such as addictions, anxiety disorders, post-traumatic stress disorder, obsessive-compulsive disorder, and eating disorders (Watkins, 2008). Although rumination has been highlighted as a predictor of ED symptoms in many studies (Etu & Gray, 2010; Holm-Denoma & Hankin, 2010; Gordon, Holm-Denoma, Troop-Gordon, & Sand, 2012; Keel, Mitchell, Davis, & Crow, 2001; Naumann, Tuschen-Caffier, Voderholzer, Caffier, & Svaldi, 2015; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007; Rawal, Park, & Williams, 2010), a general limitation of these works is that only depressive rumination was measured, even though it has been suggested that people with eating disorders are concerned about their eating, weight and shape and could ruminate on these topics (Fairburn & Harrison, 2003). Cowdrey and Park (2011) showed that rumination that is focused on concerns related to the body—measured by the Ruminative Response Scale for Eating-Disorders (RRS-ED)—is a better predictor of ED symptoms than depressive rumination. In addition, although small gender differences had been evidenced in depressive rumination (Johnson & Whisman, 2013), only one recent study examined gender differences in rumination related to ED symptoms (Opwis, Schmidt, Martin, & Salewski, 2017).

1.3. The link between rumination and perfectionism

Previous research has suggested that people with high concerns over mistakes are prone to ruminate following perceived failures (Harris, Pepper, & Maack, 2008). In addition, it is clear that depressive rumination is a mediator of the relationship between perfectionism and distress (Flett, Madorsky, Hewitt, & Heisel, 2002) and depressive symptoms (Harris et al., 2008). Based on those results, we anticipated that ED-related rumination could also play a hitherto untested role in the relationship between perfectionism and ED symptoms.

1.4. Objectives and hypotheses

The primary goal of this study was to examine whether ED-related rumination mediates relationships between ED symptoms and either PS or MEC perfectionism in a non-clinical sample, which has evidently never been investigated. As stated previously, there are gender differences in rumination and perfectionism processes and in ED symptoms. However, little is known about how gender moderates the relationships among those variables. Therefore, a secondary goal was to examine

whether gender moderates the prediction of ED symptoms by PS or MEC perfectionism, and possible links between rumination and PS and/or MEC perfectionism. As displayed in Fig. 1, we hypothesized a moderated mediation model (by ED-related rumination) of the relation between perfectionism and ED symptoms, with gender moderating both direct and indirect effects. More specifically, we hypothesized that both direct and indirect effects would be stronger for women than for men.

2. Method

2.1. Participants

The sample consisted of 390 participants (269 women, 121 men) between 18 and 25 years of age ($M = 22.00$, $SD = 3.16$), mostly students. Based on self-reported height and weight, the mean Body Mass Index (BMI) was 22.08 ($SD = 4.27$). Table 1 shows the gender breakdown for all variables.

2.2. Measures and procedure

Participants were recruited by e-mail or via a message posted on social websites, and received no compensation for their participation. Instructions lead them to the Survey-Monkey platform to complete the study questionnaires.

2.2.1. Rumination

The Ruminative Response Scale for Eating Disorders (RRS-ED; Cowdrey & Park, 2011; French validation: Douilliez, Rivière, & Rousseau, 2016) is a 9-item questionnaire that assesses ruminative concerns related to eating, shape and weight. Participants answer on a 4 point-scale from 1 (almost never) to 4 (almost always). The brooding subscale (6 items) reflects the passive comparison between the current state and the ideal state, whereas the reflection subscale (3 items) captures an intentional introspection focused on problem-solving. In the current study, we found satisfactory internal consistency for the “brooding” subscale (Cronbach's $\alpha = 0.84$). The “reflection” subscale was not used in the present study because it had poor internal consistency (Cronbach's $\alpha = 0.58$).

2.2.2. Eating disorder symptoms

The Eating Attitudes Test (EAT; Garner & Garfinkel, 1979; French version: Lechner, Steiger, Puentes-Neuman, Perreault, & Gottheil, 1994) is a 26-item questionnaire that measures symptoms and concerns characteristic of eating disorders. Items were answered on a 6-point scale from 1 (*never*) to 6 (*always*). In the present study internal consistency was satisfactory (Cronbach's $\alpha = 0.83$).

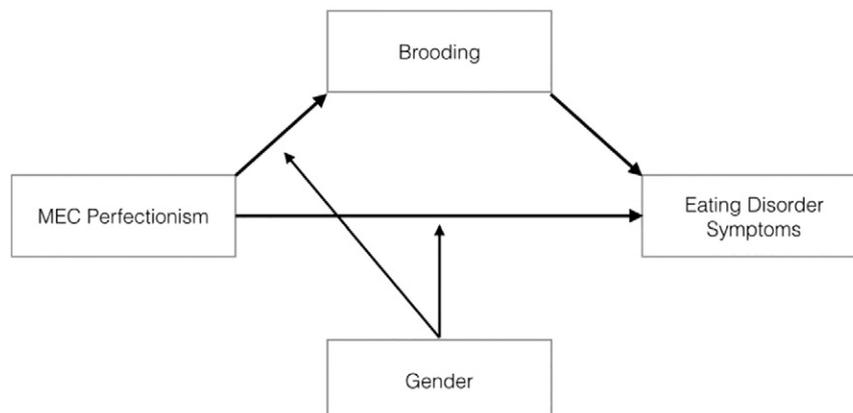


Fig. 1. Graphic representation of the moderated mediational model.

Table 1
Summary statistics and correlations among variables by gender ($n_{men} = 98$; $n_{women} = 253$).

	1	2	3	4	5	6	M_{men}	SD_{men}
1. Age	–	0.20*	–0.11	–0.13	0.04	0.08	21.98	3.70
2. BMI	0.03	–	0.36**	0.28**	–0.14	–0.10	22.31	2 0.57
3. Brooding rumination	–0.08	0.31**	–	0.71**	0.28**	0.11	8.52	2.95
4. Eating disorder symptoms	–0.06	0.15*	0.67**	–	0.09	0.10	4.92	4.23
5. MEC perfectionism	0.00	–0.02	0.42**	0.37**	–	0.47**	31.95	9.11
6. PS perfectionism	0.08	–0.01	0.19**	0.24**	0.58**	–	16.73	3.84
M_{women}	22.01	21.76	11.01	8.51	35.22	16.14	–	–
SD_{women}	3.11	4.59	4.21	8.20	10.70	4.27	–	–

Note. Statistics for men are above the diagonal; statistics for women are below the diagonal. BMI = Body Mass Index; MEC = Maladaptive Evaluative Concerns; PS = Personal Standards.
* $p < 0.05$.
** $p < 0.01$.

2.2.3. Perfectionism

The Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) was used in its French short form (Douilliez & Lefèvre, 2011). The 22 items are rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). There are five subscales: personal standards, concern over mistakes, doubts about actions, parental pressure, and organisation.

Following Dunkley, Blankstein, and Berg (2012), we computed a composite score for Maladaptive Evaluative Concerns (MEC) by summing the standardized scores of parental pressure, concern over mistakes and doubts about actions. Because organisation is not always considered to be a part of the construct of perfectionism (Stoeber & Otto, 2006), we only used the personal standards subscale (PS) in our analyses. In the present study, internal consistencies were uniformly satisfactory (for the MEC and PS subscales, respectively, Cronbach's $\alpha = 0.88$ and 0.85).

2.3. Statistical analyses

Data were analyzed using SPSS 20. To examine the set of mediations, moderations and moderated mediation, we used the PROCESS macro (developed by Hayes, 2013). PROCESS utilizes bootstrapping to assess direct and indirect effects of variables while maximizing power and minimizing concerns about non-normality. The indirect effect represents the impact of the mediator variable on the original relation (i.e., the relation of the independent variable to the outcome variable). 95% confidence intervals were used to judge the significance of the indirect effect, with confidence intervals resampled 5000 times for each analysis (Hayes, 2013). In moderation analyses, the predictors were centered (Cohen, Cohen, West, & Aiken, 2003). As recommended by Hayes (2013), only standardized coefficients were reported.

In this study, two mediation models were tested using Hayes's Model 4 (Hayes, 2013). In each of these models, we examined brooding rumination as the mediator and ED symptoms as the outcome. Then, four moderation models were tested applying Hayes's Model 1 (Hayes, 2013) with gender as the moderator (males coded as 1, females as 2). In the following analyses, we examined the interaction between gender and the independent variables (either PS perfectionism or MEC perfectionism). Then, using a pick-a-point approach, simple slopes were computed to estimate the conditional effect of each independent variable on each outcome variable (ED symptoms or brooding rumination) for the two values of the gender moderator (Cohen et al., 2003; Hayes, 2013).

3. Results

3.1. Preliminary analyses

Following Tabachnick and Fidell (2007), 27 univariate outliers (z -score > 3.29) and 12 multivariate outliers (Mahalanobis distance: $\chi^2(4) = 18.47$) were identified and removed leaving a final sample of

98 men and 253 women. By deleting the outliers the analysis reflects the bulk of the data without being affected by extreme data points or those with unusual multivariate influence (Stevens, 2002). In the current study outliers represented 10% of the sample, but there were no significant differences in the conclusions to be drawn from the analyses with or without including the outliers.

3.2. Descriptive statistics and bivariate correlations

Descriptive statistics and correlations are presented separately for women and men in Table 1. Mean comparisons revealed that women scored significantly higher than men on MEC perfectionism, $t(349) = 2.87$; $p < 0.01$, brooding, $t(349) = 6.26$; $p < 0.01$, and ED symptoms, $t(349) = 5.36$; $p < 0.01$. The effect size was small for MEC perfectionism ($d = 0.33$), and moderate for brooding ($d = 0.69$) and ED symptoms ($d = 0.55$). There were no reliable gender differences in age, BMI, or PS perfectionism (all $p > 0.20$).

Predictions of ED symptoms by MEC perfectionism and PS perfectionism were significant for women but not for men. Predictions of brooding by MEC perfectionism and ED symptoms were significant for women and for men, whereas the correlation between brooding and PS was significant only for women.

3.3. Mediation analyses

First, we tested the model with PS perfectionism as the independent variable. We found significant indirect ($B = 0.18$, $SE = 0.06$, 95% CI 0.06 to 0.30) and direct ($B = 0.17$, $SE = 0.07$, 95% CI 0.03 to 0.31) effects of PS on ED symptoms. Secondly, we tested this model with MEC perfectionism as the independent variable. We found a significant indirect effect of MEC perfectionism on ED symptoms through brooding rumination ($B = 0.19$, $SE = 0.03$, 95% CI 0.15 to 0.25), whereas the direct effect of MEC on ED symptoms was not significant ($B = 0.16$, $SE = 0.03$, 95% CI -0.01 to 0.12).

3.4. Moderation analyses

We first tested a moderation model with PS perfectionism as the independent variable, ED symptoms as the outcome variable, and gender as a moderator. The interaction between PS and gender was not significant, $t(348) = 1.59$; ns ($B = 0.34$, $SE = 0.22$, 95% CI -0.08 to 0.77). Next, we tested a moderation model with PS perfectionism as the independent variable, brooding as the outcome variable, and gender as a moderator. The interaction between PS and gender was not significant, $t(348) = 0.91$; ns ($B = 0.11$, $SE = 0.12$, 95% CI -0.12 to 0.34).

Using MEC perfectionism as the independent variable, ED symptoms as the outcome variable, and gender as a moderator, we found a significant interaction between MEC and gender, $t(348) = 2.82$; $p < 0.01$ ($B = 0.24$, $SE = 0.09$, 95% CI 0.07 to 0.41): MEC perfectionism predicted ED symptoms for women, $t(348) = 7.04$; $p < 0.001$ ($B = 0.28$, $SE = 0.04$, 95% CI 0.21 to 0.36), but not for men, $t(348) = 0.53$; ns ($B = 0.04$, $SE = 0.07$, 95% CI -0.11 to 0.19).

Finally, with MEC perfectionism as the independent variable, brooding as the outcome variable, and gender as a moderator, the interaction between MEC perfectionism and gender was not significant $t(348) = 1.58$; ns ($B = 0.07$, $SE = 0.05$, 95% CI -0.02 to 0.16), but MEC perfectionism significantly predicted brooding for women, $t(348) = 7.74$; $p < 0.001$ ($B = 0.16$, $SE = 0.02$, 95% CI 0.12 to 0.21) and for men, $t(348) = 2.29$; $p < 0.05$ ($B = 0.09$, $SE = 0.04$, 95% CI 0.01 to 0.17).

3.5. Mediation analyses with moderation of effect of gender

We found that gender did not moderate the relationships involving PS perfectionism. Therefore, we did not test the moderated mediation model (Model 8, Hayes, 2013) with PS perfectionism as the independent variable. Moreover, contrary to our hypothesis, gender moderated only the relationship between MEC Perfectionism and ED symptoms. Therefore, we did not test the moderated mediation, but rather a mediation model (i.e., the indirect effect of MEC perfectionism on ED symptoms through brooding rumination) with a moderation of the direct effect (i.e., the moderation of gender on the direct relationship between MEC perfectionism and ED symptoms). This model (Model 5, Hayes, 2013) is displayed in Fig. 2.

As expected, the relationship between MEC perfectionism and ED symptoms was mediated by brooding rumination. As Fig. 2 illustrates, the standardized regression coefficient between MEC perfectionism and brooding was statistically significant, as was that between brooding and ED symptoms. Moreover, the direct relationship between MEC perfectionism and ED symptoms was moderated by gender. Finally, in line with our hypotheses, the conditional direct effect of MEC perfectionism on ED symptoms was significant for women ($B = 0.09$, $SE = 0.03$, 95% CI 0.02 to 0.16) but not for men ($B = -0.07$, $SE = 0.06$, 95% CI -0.19 to 0.05).

4. Discussion

Our findings suggest overall that perfectionism and rumination are closely associated with ED symptoms. This is consistent with prior research, which found significant associations between perfectionism and ED symptoms (e.g., Bardone-Cone et al., 2007). In addition, several studies have also found rumination to be related to ED symptoms (e.g., Etu & Gray, 2010; Gordon et al., 2012). Our findings extend prior research by showing that MEC perfectionism is not only associated

with depressive brooding, as evidenced previously (O'Connor, O'Connor, & Marshall, 2007; Olson & Kwon, 2008; Van der Kaap-Deeder et al., 2016), but also with ED-related brooding.

Although the relationship between perfectionism and eating disorders is well-established, as well as the relationship between rumination and eating disorders, there has been little attention given to the role of rumination as a mediator of the relationship between perfectionism and ED symptoms. Moreover, there has been even less attention given to gender's potential moderation of these relations.

We observed that brooding significantly mediated the relationship between each dimension of perfectionism (MEC perfectionism and PS perfectionism) and ED symptoms, which is consistent with previous findings (Halmi et al., 2000; Lilenfeld et al., 2000), and these results are also in line with findings of several other studies showing the mediating role of rumination in the relationship between perfectionism and other psychopathologies (e.g., Flett et al., 2002; Harris et al., 2008). This suggests that rumination results from perfectionism and leads to various symptomatology, including ED symptoms. Although the cross-sectional nature of our data does not allow causal conclusions, some recent findings support the notion that perfectionism is an antecedent of ED symptoms rather than a consequence (Smith et al., 2017).

The present study highlights the role of gender as a moderator of the relationship between perfectionism and ED symptoms. This relationship was significant only for women, which suggests that men use different strategies, ones that reduce the effect of perfectionism on ED symptoms. An explanation might reside in a qualitative difference in the ways women and men are dissatisfied with their body. For example, for women, body dissatisfaction comes from the desire to lose weight, while for men it comes from the will to gain weight and muscle (Valls, Rousseau, & Chabrol, 2013), which may lead to dissimilarities in strategies developed to reduce the difference between their ideal body and their actual body (and their consequences). Further research is needed to isolate processes that give rise to this gender difference.

Although our results are promising, the present study is not without limitations. The first one is that the sample is mostly composed of students and the second one is that all questionnaires were self-reported. Future research should also focus on behavioral measures.

In conclusion, this study has implications for clinical practice and for future research. This study adds to the research literature regarding the link between perfectionism, rumination and ED symptoms, and it draws attention to gender differences in relationships between perfectionism,

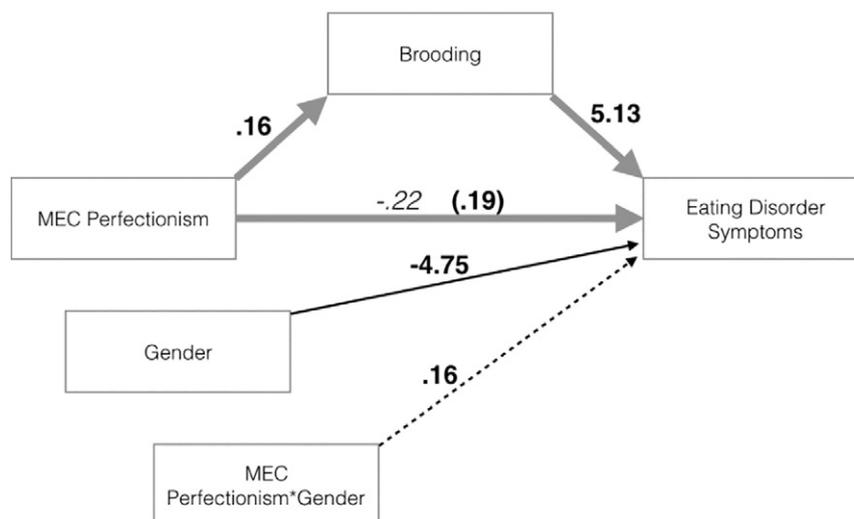


Fig. 2. Graphic representation of the model of mediation with moderation. ($n_{\text{men}} = 98$; $n_{\text{women}} = 253$). MEC = Maladaptive Evaluative Concerns. The unbroken thick gray arrows represent the mediated effect; the broken thin black arrow represents the moderated effect. Standardized regression coefficients appearing in bold are significant ($p < 0.05$), standardized regression coefficients appearing in italics are nonsignificant ($p > 0.05$). The standardized regression coefficient of the indirect effect of MEC perfectionism and eating disorder symptoms controlling for brooding is in parentheses.

rumination and ED symptoms, and the possibility that the processes involved in eating disorders might not be the same across genders.

With regard to clinical implications, this study highlights the importance of working on both rumination and perfectionism when treating or attempting to prevent eating disorders. Interventions targeting those specific processes could be added to customary treatments of ED disorders. Promising research results have suggested that perfectionism-focused interventions may improve eating disorders (Lloyd, Fleming, Schmidt, & Tchanturia, 2014; Steele & Wade, 2008; but see Goldstein, Peters, Thornton, & Touyz, 2014). Similarly, further research should ask whether interventions targeting rumination (e.g., rumination-focused cognitive behavioral therapy, Watkins et al., 2007) could enhance the treatment of ED. Finally, our results also suggest that interventions may best be focused on different processes for men and women based on further research on those gender-based process differences.

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