

RESEARCH ARTICLE

The effect of temperament and character on body dissatisfaction in women with bulimia nervosa: The role of low self-esteem and depression

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Abstract

Objective: Although personality traits have been found to be associated with body dissatisfaction for women in the general population, little research has explored these associations for people with eating disorders. Furthermore, it is unknown whether these associations are direct or are mediated by other factors. In this cross-sectional study, secondary analyses of data from two clinical trials were conducted to determine which personality dimensions contributed to body dissatisfaction in women with bulimia nervosa, and whether low self-esteem and depression mediate these associations independently or in serial.

Method: Participants were 193 women with bulimia nervosa. Participants completed self-report measures of temperament and character, body dissatisfaction, low self-esteem, and depression before receiving treatment for their eating disorder.

Results: The temperament dimension, harm avoidance, contributed significantly to body dissatisfaction. Serial mediation analyses showed this association was fully mediated, revealing two significant indirect effects. The first was through low self-esteem and the second through depression and low self-esteem in serial.

Conclusions: Findings suggest body dissatisfaction in women with bulimia nervosa may be indirectly targeted through addressing harm avoidance, depression and low self-esteem.

KEYWORDS

body dissatisfaction, depression low self-esteem, harm avoidance, temperament and character

Abbreviations: CBT, Cognitive behaviour therapy; CI, Confidence interval; DSM, Diagnostic and statistical manual; EDI-2, Eating Disorder Inventory-2; IBM, International Business Machines; *M*, Mean; *N*, Number; *p*, Probability; *r*, Correlation; SCID, Structured Clinical Interview for DSM; SCL-90-R, Symptom Checklist-90-Revised; SD, Standard Deviation; SE, Standard error; SPSS, Statistical Package for the Social Sciences; TCI, Temperament and character inventory; TCI-R, Temperament and Character Inventory-Revised; VIF, Variance inflation factor.

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Highlights

- Low self-esteem and depression were examined as mediators of associations between temperament and character dimensions and body dissatisfaction in women with bulimia nervosa.
- Harm avoidance contributed significantly to body dissatisfaction.
- The association between harm avoidance and body dissatisfaction was mediated by low self-esteem alone and depression and low self-esteem in serial.

1 | INTRODUCTION

Body dissatisfaction comprises the cognitive–affective component of the broader body image construct (Carey & Preston, 2019; Cornelissen et al., 2019). Defined as dislike of one's body or appearance (Fairburn, 2008), body dissatisfaction is common in women from Western cultures (Holmqvist & Frisén, 2010; Jaeger et al., 2002; Warren et al., 2005), and is a risk factor for low self-esteem, symptoms of depression, and eating disorders (Fairburn, 2008; Paxton et al., 2006). It is unsurprising therefore that researchers have sought to identify factors that contribute to body dissatisfaction. Interest has grown in the relationship between personality and body dissatisfaction, based on the theory that personality provides a lens through which people experience the world (Dionne & Davis, 2012), and thus may influence people's experiences of their bodies. While many studies have investigated this question for women from the general population, few have explored it for women with eating disorders such as bulimia nervosa. As body dissatisfaction is a key maintaining factor of bulimia nervosa (Fairburn, 2008; Stice, 2001), identifying personality traits that contribute to body dissatisfaction in this population has potential to provide new insight into how to intervene (Lantz et al., 2018).

1.1 | Personality and body dissatisfaction

Studies that investigated the contribution of personality to body dissatisfaction in eating disorders used measures reflecting the psychobiological model of temperament and character developed by Cloninger et al. (1993). Temperament refers to the moderately heritable, emotional aspects of personality, whereas character describes the cognitive features of personality that are thought to change throughout life (Cloninger et al., 1993; Conrad et al., 2014). This model includes the temperament dimensions of

novelty seeking, harm avoidance, reward dependence, and persistence, and the character dimensions of self-directedness, cooperativeness, and self-transcendence. Novelty seeking reflects the tendency to approach novel stimuli (Hansenne et al., 1999). Harm avoidance captures inhibition in response to aversive stimuli (Hansenne et al., 1999), also conceptualised as biologically informed trait anxiety (Markett et al., 2016). Reward dependence describes the tendency to respond positively to signals of reward (Hansenne et al., 1999), and persistence is perseverance in spite of frustration and fatigue (Cloninger et al., 1993). Self-directedness reflects the ability to modify behaviour to fit a situation and live according to individual goals and values (Cloninger et al., 1993). Cooperativeness reflects variation in the extent to which people identify with and accept others (Cloninger et al., 1993), and self-transcendence captures the extent to which individuals perceive themselves as integral parts of the universe (Cloninger et al., 1993).

Four studies assessed the contribution of personality to body dissatisfaction in women with eating disorders, all of which found harm avoidance to be significantly associated with body dissatisfaction (Abbate-Daga et al., 2010; Frank et al., 2018; Vervaet et al., 2003; Zanetti et al., 2013). The studies by Vervaet et al. and Abbate-Daga et al. investigated the influence of all seven TCI dimensions, also finding self-directedness (Abbate-Daga et al.; Vervaet et al.) and cooperativeness (Abbate-Daga et al.) to be associated with body dissatisfaction in women with eating disorders. Abbate-Daga et al. also reported an association between reward dependence and body dissatisfaction in women with bulimia nervosa.

1.2 | Mediators

Most research examining the association between personality and body dissatisfaction has focussed on direct associations; however, personality traits are associated

with other psychological factors that are in turn related to body dissatisfaction (Skorek et al., 2014), which has led to investigation of mediators of the association between personality and body dissatisfaction. Self-esteem has been found to fully mediate the associations between body esteem and neuroticism, extraversion, and conscientiousness in women from the general population (Skorek et al., 2014). Whether this mediating effect applies to the associations between temperament and character and body dissatisfaction has not been tested in women with bulimia nervosa.

1.3 | Personality, body dissatisfaction, depression and low self-esteem

Depression is associated with both personality traits and body dissatisfaction. Significant correlations between depression and the seven TCI dimensions have been reported (Richter et al., 2000; Trouillet & Gana, 2008). Depression, which often co-occurs with eating disorders (Bulik, 2002; Jordan et al., 2014), has been found to be a better predictor of body dissatisfaction in women with bulimia nervosa than eating disorder symptoms (Keel et al., 2001; Wiederman & Pryor, 2000). Because depression is associated with both personality and body dissatisfaction, it may be another important mediator. Although a meta-analysis has found depression to be bi-directionally associated with low self-esteem, the effect of low self-esteem on depression was stronger than in the reverse direction (Sowislo & Orth, 2013). This close association means the correlation between personality and body dissatisfaction may be explained by an indirect pathway via both low self-esteem and depression.

1.4 | Present study

The current study had three aims. First, to determine which temperament and character dimensions contribute significantly to body dissatisfaction in women with bulimia nervosa. Second, to examine whether low self-esteem and depression individually mediate these significant associations. Finally, to investigate whether low self-esteem and depression mediate the significant associations in serial, via an indirect path passing through both low self-esteem and depression. As low self-esteem and depression are bi-directionally correlated, it is plausible that this indirect path could pass through low self-esteem and then depression or the reverse. Both paths will be tested, with the indirect effect passing through low self-esteem and then depression examined first.

Data from two past clinical trials of treatments for bulimia nervosa were analysed. Before beginning treatment, women with bulimia nervosa completed measures of temperament and character, low self-esteem, depression, and body dissatisfaction. Based on previous research, it was hypothesised that harm avoidance would contribute significantly to body dissatisfaction in women with bulimia nervosa. It was also hypothesised that both low self-esteem and depression would individually mediate this association. Finally, it was hypothesised that the indirect pathways passing through both low self-esteem and depression and depression and low self-esteem would be significant.

2 | METHOD

2.1 | Participants

Participants were 193 women with a diagnosis of bulimia nervosa, 135 from a bulimia treatment study (Sample 1; Bulik et al., 1998), 58 from a second psychotherapy study (Sample 2; McIntosh et al., 2016). Inclusion criteria were female gender (both samples), age 17–45 and a DSM-III-R (American Psychiatric Association, 1987) diagnosis of bulimia nervosa (Sample 1), age 16–65 and a primary DSM-IV (American Psychiatric Association, 1994) diagnosis of bulimia nervosa (Sample 2). Exclusion criteria were severe current comorbid conditions that required immediate treatment (major depression, suicidal intent, physical illness, and medical complications of bulimia nervosa) and current use of psychoactive medications (both samples), current body mass index $>30 \text{ kg/m}^2$ and a supervised drug washout not being advisable (Sample 1), an adequate trial of cognitive behaviour therapy (CBT) or schema therapy in the past year (Sample 2). Participants were recruited by referral from general practitioners or other health professionals or by self-referral. Ethical approval was granted by the Southern Regional Health Authority (Canterbury) and the Human Ethics Committee of the University of Canterbury (Sample 1) and the Upper South A Regional Ethics Committee (Sample 2).

2.2 | Measures

2.2.1 | Eating disorder and co-occurring diagnoses

Eating disorders and co-occurring mental health conditions were diagnosed using the Structured Clinical Interview for DSM-III-R (Spitzer et al., 1988; Sample 1) and DSM-IV (First, 1997; Sample 2).

2.2.2 | Body dissatisfaction

The body dissatisfaction subscale of the Eating Disorder Inventory-2 (EDI-2; Garner, 1991) was administered in both samples. This subscale assesses displeasure with the shape and size of body parts typically of concern to those with eating disorders. Scores for the nine items range from 0 to 27, with higher scores indicating greater body dissatisfaction. Cronbach's alpha coefficient in the current study was 0.92.

2.2.3 | Temperament and character

The TCI (Cloninger et al., 1993) describes four temperament and three character dimensions. The original 238 true/false item version (Cloninger et al., 1994) was used in Sample 1, in which a score of 1 is given to true responses and a score of 0 to false responses. Participant data are unusable if a 'true' response is given to the validity item: 'I have lied a lot on this questionnaire'. Sample 2 used the Temperament and Character Inventory-Revised (TCI-R; Cloninger, 1999), consisting of 240 items rated on a Likert-type scale ranging from 1 (*definitely false*) to 5 (*definitely true*). The measure includes five validity items, with two to five incorrect items invalidating test results. Total scores for the temperament and character dimensions were standardised to range from 0 to 1. For the 238-item TCI each dimension's total score was divided by the highest possible score for that dimension. For the 240-item TCI, the lowest possible dimension score was subtracted and then divided by the range of possible dimension scores. Cronbach's alpha coefficients for TCI dimensions in Sample 1 ranged from 0.64 to 0.87. The lower Cronbach's alpha for the persistence dimension (0.64) is consistent with previous research (Cloninger et al., 1994) and has been attributed to the low number of items (Duijsens et al., 2000). Cronbach's alpha coefficients for TCI-R dimensions in Sample 2 ranged from 0.83 to 0.94.

2.2.4 | Low self-esteem

The ineffectiveness subscale of the EDI-2 (Garner, 1991), a measure of low self-esteem was administered in both samples (Karpowicz et al., 2009). Scores for the 10 items range from 0 to 30, with higher scores indicating lower self-esteem. Cronbach's alpha coefficient in the current study was 0.88.

2.2.5 | Depression

The depression subscale of Hopkins Symptom Checklist-Revised (SCL-90-R; Derogatis, 1994) was used as a measure of depression. Consisting of 13 items, scores range from 0 to 4, with higher scores indicating greater intensity of distress associated with symptoms of depression. In the current study, Cronbach's alpha coefficient was 0.90.

2.3 | Procedure

Potential participants in both samples engaged in telephone screening in which information about the study was given, and the possible presence of bulimia nervosa and likely absence of exclusion criteria were assessed. Participants then completed a clinical assessment with a clinical psychologist, in which eligibility was determined, informed consent obtained, and a history of the eating disorder gathered. During a subsequent research assessment, the SCID was used to assess eating disorder and co-occurring mental health disorders and to collect demographic information. Participants completed the EDI-2, SCL-90-R and either the TCI (Sample 1) or TCI-R (Sample 2), as part of a wider battery of measures.

2.4 | Data analysis

TCI data for four participants were omitted as responses to validity items invalidated test results. One participant indicated they had lied a lot on the TCI and three responded correctly to fewer than four validity items on the TCI-R.

As the eligible age range was wide (16–65), age was controlled for in all analyses. Pearson correlation coefficients were computed to assess the bivariate associations among body dissatisfaction, age, temperament and character dimensions, low self-esteem and depression. An effect was considered small at $r = 0.11$ to 0.18 , medium at $r = 0.19$ – 0.29 , and large at $r > 0.29$ (Funder & Ozer, 2019).

Linear multiple regression analysis using the 'enter' method was conducted to examine the contribution of temperament and character dimensions to body dissatisfaction after controlling for age. Within this analysis, the regression assumption of normally distributed errors was assessed using histograms and normal probability plots of the standardised residuals. Homoscedasticity and linearity were assessed using plots of standardised

residuals against standardised predicted values. A Durbin-Watson value between 1 and 3 was used as an indication that the assumption of independent errors had been met. To ensure no cases had an undue influence on regression models, Cook's distance values were expected to be < 1 . Correlations between independent variables of < 0.80 was used as a preliminary indication of the absence of multicollinearity. The assumption was further tested by ensuring tolerance statistics were > 0.20 and variance inflation factor (VIF) values were < 10 . Semi-partial correlations were used as effect sizes in the multiple regression analysis. Cut-offs for small ($r = 0.11$ – 0.18), medium ($r = 0.19$ – 0.29) and large ($r > 0.29$) effects were the same as the bivariate associations.

To examine whether low self-esteem and depression mediated the association between temperament and character and body dissatisfaction, serial mediation analyses were conducted. Age was included as a covariate in all models. Linear multiple regression was used to test the regression assumptions. To test indirect effects, analyses were then conducted using model six of the PROCESS macro for SPSS (version 4.0; Hayes, 2018). A heteroscedasticity-consistent standard error was used in these analyses. Statistical significance of the indirect effects was determined using bootstrapped confidence intervals, with the exclusion of zero indicating a significant result.

To correct for multiple comparisons, the Bonferroni correction was applied to all analyses in which multiple tests were conducted simultaneously. This included correlations, multiple regression analysis and serial mediation analyses. This involved dividing the acceptable p value of 0.05 by the number of tests conducted. IBM SPSS Statistics for Windows, Version 27.0 was used for all analyses.

3 | RESULTS

3.1 | Sample characteristics

Demographic and clinical characteristics of Sample 1 and Sample 2 are presented in Table 1. Higher mean age, years of education and percentage married or living together in Sample 2 may be the result of older maximum eligible age (65), compared to age 45 in Sample 1. Sample 2 was also more ethnically diverse, with 69.0% New Zealand European compared to 91.1% in Sample 1. Although women with severe current major depression were excluded, some participants had a current co-occurring diagnosis of major depressive disorder.

3.2 | Multiple regression analysis

Descriptive statistics for EDI-2 body dissatisfaction, age and TCI temperament and character dimensions for the combined sample are presented in Table 2, including means, standard deviations, and intercorrelations among variables. Mean values for the temperament and character dimensions revealed that participants scored highest on cooperativeness and lowest on self-transcendence. Associations among EDI-2 body dissatisfaction and TCI temperament and character dimensions showed that harm avoidance and self-directedness were significantly correlated with EDI-2 body dissatisfaction with large effect sizes ($r > 0.29$). As a preliminary assessment of the presence of possible multicollinearity, associations among age and temperament and character dimensions were examined for correlations above 0.80. No variables were associated to this degree, suggesting the absence of multicollinearity.

Multiple regression analysis was conducted to assess the contribution of temperament and character dimensions to body dissatisfaction after controlling for age. Besides the assumption of normality, inspection of relevant plots and statistics confirmed the assumptions of multiple regression were met. Histograms and normal probability plots of the standardised residuals revealed the errors deviated from normality. To reduce the impact of possible bias, the analysis was rerun using bootstrapping based on 5000 samples. This provided bootstrapped standard errors and significance values that did not rely on the assumption of normality.

Results of the multiple regression analysis are presented in Table 3. A significant regression equation was found, $F(8, 174) = 4.29$, $p < 0.001$, with the model accounting for 12.6% of the variance in body dissatisfaction. Harm avoidance contributed significantly to the model, with the semi-partial correlation ($r = 0.23$) equating to a medium effect size. The b -value indicated that body dissatisfaction increased by 12.90 units for every unit increase in harm avoidance.

3.3 | Serial mediation analyses

As harm avoidance contributed significantly to body dissatisfaction, serial mediation analyses were conducted to examine whether low self-esteem and depression explained the association between harm avoidance and body dissatisfaction after controlling for age. Mean (SD) scores for EDI-2 ineffectiveness (low self-esteem) and SCL-90-R (depression) were 8.65 (6.12) and 1.44 (0.80), respectively. Pearson correlation coefficients revealed that harm avoidance, low self-esteem, depression and body dissatisfaction were significantly correlated

TABLE 1 Demographic and clinical characteristics of women with bulimia nervosa

Characteristic	Sample 1 (N = 135)		Sample 2 (N = 58)	
	M (SD)	n (%)	M (SD)	n (%)
Age	26.09 (6.09)		32.21 (11.89)	
Education (years)	13.08 (2.65)		15.21 (2.31)	
Married or living together		39 (28.9)		26 (44.8)
Employed		80 (59.3)		31 (53.4)
Ethnicity				
New Zealand European		123 (91.1)		40 (69.0)
Māori		8 (5.9)		5 (8.6)
Pacifica		2 (1.5)		0 (0.0)
Asian		1 (0.7)		3 (5.1)
Other		1 (0.7)		10 (17.2)
Age of onset of bulimia nervosa	19.48 (4.61)		20.91 (8.39)	
Eating disorder behaviours past 2 weeks				
Binges	10.62 (10.91)		10.90 (13.51)	
Purges by vomiting	12.53 (18.55)		9.92 (10.24)	
Purges by other methods	1.70 (4.59)		1.51 (5.25)	
Current co-occurring diagnoses				
Major depressive disorder		30 (22.2)		17 (29.3)
Anxiety disorder		58 (43.0)		27 (46.6)
Obsessive compulsive disorder		2 (1.5)		4 (6.9)
Substance dependence		25 (18.5)		6 (10.3)
Personality disorder		77 (57.0)		28 (48.3)

($p \leq 0.005$). The effect size for the association between depression and body dissatisfaction ($r = 0.23$) was medium and all others were large ($r = 0.34$ – 0.69). Correlations <0.80 suggested likely absence of multicollinearity.

The serial mediation analysis was initially conducted with low self-esteem as the first mediator and depression as the second mediator. Inspection of relevant plots and statistics confirmed all the assumptions of multiple regression, besides normality, were met. Histograms and normal probability plots of the standardised residuals revealed the errors deviated from normality. Indirect effects using Hayes's PROCESS were interpreted using bootstrapped confidence intervals which do not rely on the assumption of normality. To further reduce the impact of possible bias, bootstrapped confidence intervals and significance tests were generated for the remaining effects. In this way, all confidence intervals reported were bootstrapped. As the models included 14 hypothesis tests, 99.7% confidence intervals were used to correct for multiple comparisons, equating to a p value of < 0.003 .

The indirect effect of harm avoidance on body dissatisfaction through low self-esteem was significant, $b = 8.18$, $CI = 1.80, 15.68$, shown by zero outside the 99.7% confidence interval. The indirect effects of harm avoidance on body dissatisfaction via depression, $b = -1.08$, $CI = -4.94, 1.29$, and low self-esteem and depression in serial, $b = -1.62$, $CI = -6.32, 2.39$, were not statistically significant, indicated by zero lying within the 99.7% confidence intervals. The direct effect of harm avoidance on body dissatisfaction was not statistically significant, $b = 8.94$, $CI = -1.76, 19.64$, $p = 0.027$, showing that low self-esteem fully mediated the association between harm avoidance and body dissatisfaction.

The analysis was also conducted with depression as the first mediator and low self-esteem as the second mediator, with results presented in Figure 1. Represented by path c, the effect of harm avoidance on body dissatisfaction in isolation was significant, $b = 14.42$, $CI = 5.40, 23.44$, $p < 0.001$. This aligned with results of the multiple regression analysis. As shown in path c', the b -value

TABLE 2 Descriptive statistics for body dissatisfaction, age and temperament and character dimensions for women with bulimia nervosa

Variable	EDI-2 body dissatisfaction	Age	TCI novelty seeking	TCI harm avoidance	TCI reward dependence	TCI persistence	TCI self-directedness	TCI cooperativeness	TCI self-transcendence
Mean	18.99	28.01	0.55	0.57	0.64	0.59	0.55	0.78	0.34
Standard deviation	7.65	8.39	0.15	0.18	0.16	0.22	0.17	0.13	0.17
EDI-2 body dissatisfaction	-								
Age	-0.04	-							
TCI novelty seeking	0.03	-0.27 ^a	-						
TCI harm avoidance	0.34 ^a	-0.05	-0.30 ^a	-					
TCI reward dependence	0.07	0.03	0.11	-0.03	-				
TCI persistence	-0.13	0.11	-0.26 ^a	-0.11	0.02	-			
TCI self-directedness	-0.30 ^a	0.09	-0.09	-0.54 ^a	0.05	0.22	-		
TCI cooperativeness	-0.08	0.03	-0.12	-0.19	0.41 ^a	0.19	0.34 ^a	-	
TCI self-transcendence	0.16	0.02	0.23	0.01	0.17	-0.01	-0.21	0.19	-

Note: N = 183.

Abbreviations: EDI-2, Eating Disorders Inventory-2; TCI, temperament and character inventory.

^aSignificant after Bonferroni correction: $p \leq 0.001$.

TABLE 3 Linear model predicting body dissatisfaction as a function of temperament and character dimensions after controlling for age

Variable	<i>b</i>	SE <i>B</i>	<i>p</i>	Semi-partial <i>r</i>
Constant	10.03	7.82	0.197	
Age	0.01	0.07	0.910	0.01
TCI novelty seeking	3.48	4.79	0.477	0.05
TCI harm avoidance	12.90	4.23	0.005 ^a	0.23
TCI reward dependence	3.51	3.50	0.320	0.07
TCI persistence	-2.00	2.54	0.440	-0.05
TCI self-directedness	-4.19	4.41	0.343	-0.07
TCI cooperativeness	-1.24	4.58	0.790	-0.02
TCI self-transcendence	4.90	3.07	0.112	0.10

Note: *N* = 183. Standard errors and *p* values based on 5000 bootstrap samples. Adjusted $R^2 = 0.126$.

Abbreviation: TCI, temperament and character inventory.

^aSignificant after Bonferroni correction: $p \leq 0.006$.

reduced with the addition of the mediators to the model, $b = 8.94$, $CI = -1.76, 19.64$, with the direct effect of harm avoidance on body dissatisfaction not statistically significant, $p = 0.024$, indicating the association was fully mediated. Harm avoidance also significantly contributed to depression, $b = 2.32$, $CI = 1.46, 3.18$, $p < 0.001$, and low self-esteem, $b = 8.50$, $CI = 2.27, 14.72$, $p < 0.001$. In addition, significant associations between depression and low self-esteem, $b = 4.28$, $CI = 2.88, 5.68$, $p < 0.001$, and low self-esteem and body dissatisfaction, $b = 0.44$, $CI = 0.07, 0.81$, $p < 0.001$ were found. Depression did not significantly contribute to body dissatisfaction, $b = -1.16$, $CI = -3.95, 1.63$, $p = 0.186$.

The indirect effects are presented in Table 4. The indirect effect of harm avoidance on body dissatisfaction via depression was not statistically significant, $b = -2.70$, $CI = -10.00, 2.76$. The indirect effect of harm avoidance on body dissatisfaction through low self-esteem, however, was significant, $b = 3.77$, $CI = 0.74, 8.44$. The indirect effect through depression and low self-esteem in serial was also significant, $b = 4.41$, $CI = 1.00, 9.49$, showing that depression mediated the association between harm avoidance and body dissatisfaction through its influence on low self-esteem.

4 | DISCUSSION

The current study tested the mediating effects of low self-esteem and depression on associations between temperament and character dimensions and body dissatisfaction in women with bulimia nervosa. As hypothesised, the

temperament dimension harm avoidance contributed significantly to body dissatisfaction. Further analyses revealed that this effect was not direct, but rather fully mediated. Two significant indirect effects were found. The first was through low self-esteem, the second through depression and low self-esteem in serial. Contrary to hypotheses, depression alone did not mediate the association between harm avoidance and body dissatisfaction. The indirect pathway through low self-esteem and depression in serial was also not significant.

4.1 | Harm avoidance and body dissatisfaction

The finding that harm avoidance contributed significantly to body dissatisfaction is consistent with previous studies investigating the associations of temperament and character dimensions with body dissatisfaction in eating disorders (Abbate-Daga et al., 2010; Frank et al., 2018; Vervaet et al., 2003; Zanetti et al., 2013). Harm avoidance is characterised by worry, insecurity and fear of failure (Cloninger et al., 1993, 1994), also conceptualised as biologically informed trait anxiety (Markett et al., 2016). In this way, it is not surprising that previous researchers have suggested that harm avoidance may be associated with body image disturbance through worry and anxiety (Frank et al., 2018). The current study, however, highlights other factors that clarify the relationship.

4.2 | Indirect effect of low self-esteem

The finding that the association between harm avoidance and body dissatisfaction was fully mediated by low self-esteem is also consistent with previous research. Skorek et al. (2014) found the associations of neuroticism, extraversion, and conscientiousness with body esteem to be fully mediated by self-esteem. Results of the current study suggest that high harm avoidance is a risk factor for low self-esteem, which is subsequently a risk factor for body dissatisfaction. Thus, harm avoidance, characterised by insecurity and fear of failure (Cloninger et al., 1994), places people at risk of a negative view of themselves, which in turn affects body dissatisfaction.

4.3 | Indirect effect of depression and low self-esteem

The association between harm avoidance and body dissatisfaction was also mediated by both depression and low self-esteem in serial. This result showed that high

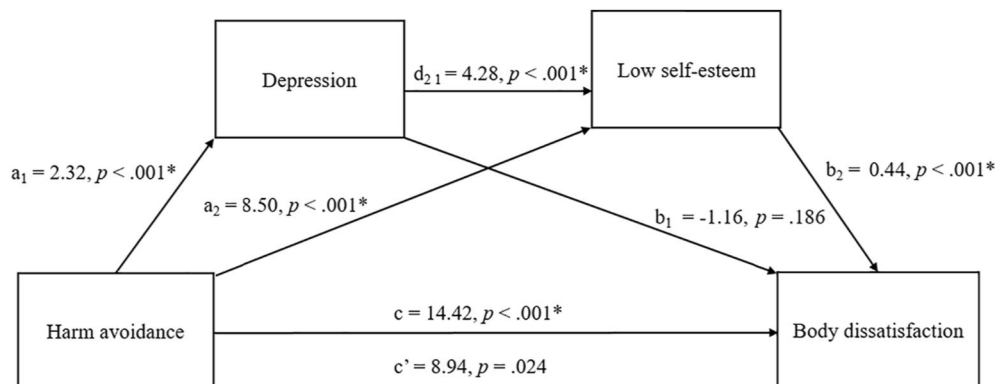


FIGURE 1 Mediating effects of depression and low self-esteem on association between harm avoidance and body dissatisfaction after controlling for age. $N = 182$; Age = covariate in all equations; Values shown are unstandardised b -values. *Significant result after Bonferonni correction: $p \leq 0.003$

TABLE 4 Indirect effects of harm avoidance on body dissatisfaction through depression and low self-esteem, with 99.7% bootstrapped confidence intervals

Path	b	99.7% CI
Harm avoidance → Depression → Body dissatisfaction	-2.70	-10.00, 2.76
Harm avoidance → Low self-esteem → Body dissatisfaction	3.77	0.74, 8.44
Harm avoidance → Depression → Low self-esteem → Body dissatisfaction	4.41	1.00, 9.49

Note: $N = 182$.

harm avoidance was associated with depression, depression was associated with low self-esteem, and low self-esteem was associated with body dissatisfaction. The correlation between harm avoidance and depression has been reported in multiple studies (Hansenne et al., 1999; Peirson & Heuchert, 2001; Rodríguez-Cano et al., 2014), with evidence that harm avoidance constitutes a genetic vulnerability to depression (Farmer et al., 2003). The effect of depression on low self-esteem is also supported by research (Sowislo & Orth, 2013). One study found depression to predict a reduction in self-esteem within 4 months in people with a mental illness (Shahar & Davidson, 2003). Finally, low self-esteem was found to contribute to body dissatisfaction in the current study. This is consistent with a study that found the body dissatisfaction of people with an eating disorder to be significantly higher in those in a negative compared to a positive self-esteem manipulation condition (Naumann et al., 2015). Therefore, results of the current study add to existing knowledge about the close association between self-esteem and body image (Puttevils et al., 2019).

4.4 | Non-significant indirect effects

The finding that depression did not independently mediate the association between harm avoidance and

body dissatisfaction was surprising given the strong association of depression with both variables (Farmer et al., 2003; Wiederman & Pryor, 2000). In the current study, harm avoidance significantly contributed to depression but depression did not significantly contribute to body dissatisfaction. This was unexpected given previous research that identified depression as a strong predictor of body dissatisfaction in women with bulimia nervosa (Keel et al., 2001). Bivariate associations in the current study also revealed depression was significantly correlated with body dissatisfaction with a medium effect size. The lack of mediation through depression may be an indication that low self-esteem was more important to body dissatisfaction than was depression. The bivariate correlation of low self-esteem with body dissatisfaction was larger than that of depression with body dissatisfaction, supporting this hypothesis. Low self-esteem but not depression has also been found to predict body dissatisfaction in a previous study (Kostanski & Gullone, 1998). The bivariate association between harm avoidance and body dissatisfaction was also stronger than that of depression with body dissatisfaction. This suggests that through its influence on depression and low self-esteem, harm avoidance may be a stronger risk factor for body dissatisfaction than depression alone. That depression did not contribute significantly to body dissatisfaction also explains why

the indirect effect through low self-esteem and depression in serial was not significant.

4.5 | Limitations and future research

Results of the current study should be viewed in the context of the following limitations. First, use of data from two clinical trials which involved exclusion criteria may have impacted the representativeness of the sample and thus generalisability of results. Future research could aim to confirm study findings in women with bulimia nervosa from the general population with fewer exclusion criteria. Second, due to the time the clinical trials were conducted, DSM-III-R and DSM-IV were used to make diagnoses of bulimia nervosa rather than DSM-5. For diagnosis of bulimia nervosa, excellent agreement has been reported between DSM-III-R and DSM-IV (Sunday et al., 2001) and between DSM-IV and DSM-5 (Thomas et al., 2015). Thus, although use of earlier diagnostic criteria is a limitation, existing research suggests the diagnosis of bulimia nervosa is very similar across the three versions of the DSM. In addition, reduced frequency of binge eating and inappropriate compensatory behaviours is required to make a diagnosis of bulimia nervosa in DSM-5. This increases the likelihood that study participants would meet DSM-5 criteria. Future research could confirm our observations by conducting analyses on samples with a DSM-5 diagnosis of bulimia nervosa. Third, although the ineffectiveness subscale of the EDI-2 has been validated as a measure of self-esteem (Karpowicz et al., 2009), other instruments such as the Rosenberg Self-Esteem Scale (Rosenberg, 1965) were designed to measure self-esteem directly, and may be the assessments of choice in future research. Fourth, results of the current study are relevant to women with bulimia nervosa, and without further research, cannot be generalised to community samples or to other eating disorder groups. Future research examining the associations between temperament and character and body dissatisfaction in women from the community and other eating disorders would be valuable. Fifth, the correlational nature of the study design meant questions about prediction and causation of body dissatisfaction could not be examined. Future research using prospective longitudinal and experimental designs could evaluate this further. Finally, the current study assessed the contribution of temperament and character dimensions to an attitudinal aspect of body image but not the perceptual aspect (Cornelissen et al., 2019).

Future research could examine whether personality is related to the accuracy in which a person judges the size of their body.

4.6 | Implications

Results of the current study have potential implications for eating disorder treatments. Change in body-related thoughts, such as body dissatisfaction, have been found to differentiate people who have partially recovered from an eating disorder (behavioural change only) and those who have fully recovered (behavioural and cognitive change; Bachner-Melman et al., 2006; Bardone-Cone et al., 2010). Those studies demonstrate the importance of achieving change in body dissatisfaction. Results of the current study highlight three important factors that could be targeted to indirectly impact body dissatisfaction, namely harm avoidance, depression and low self-esteem. Compared to those partially recovered from an eating disorder, harm avoidance was significantly lower and self-esteem significantly higher in those who had fully recovered (Bachner-Melman et al., 2006). Absence of depression has also been found to predict full recovery (Keshishian et al., 2019). Considered together, existing studies suggest that change in harm avoidance, depression and low self-esteem may also be important for full recovery, with results of the current study suggesting that this may be via their influence on body dissatisfaction.

4.7 | Conclusions

Results of the current study add to existing research about the association between personality and body dissatisfaction. By examining the associations of temperament and character with body dissatisfaction in women with bulimia nervosa, it was demonstrated that harm avoidance was the one TCI dimension important to body dissatisfaction in this group. The current study also extends previous work showing associations between personality and body dissatisfaction are mediated by other factors. Study findings confirm that the mediating effects of self-esteem apply to the association between harm avoidance and body dissatisfaction for women with bulimia nervosa. Furthermore, depression mediates the relationship insofar as it influences low self-esteem. Future research should explore depression as a possible mediator of other personality traits and body dissatisfaction.

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CONFLICTS OF INTEREST

CM Bulik reports: Shire (grant recipient, Scientific Advisory Board member); Idorsia (consultant); Lundbeckfonden (grant recipient); Pearson (author, royalty recipient); Equip Health Inc. (Clinical Advisory Board). The other authors have no conflicts to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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