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Are perfectionism dimensions risk factors for bulimic symptoms? A meta-analysis of longitudinal studies

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ABSTRACT

Background: Case histories, theoretical accounts, and empirical studies suggest an important relationship between perfectionism and bulimic symptoms. However, whether perfectionism confers vulnerability for bulimic symptoms is unclear.

Objective: To address this, we conducted a meta-analysis testing if socially prescribed perfectionism, concern over mistakes, doubts about actions, personal standards, self-oriented perfectionism and EDI-perfectionism predict increases in bulimic symptoms over time.

Method: Our literature search yielded 12 longitudinal studies for inclusion. Samples were composed of adolescents, undergraduates, and community adults.

Results: Meta-analysis using random effects models showed perfectionistic concerns and EDI-perfectionism, but not perfectionistic strivings, had positive relationships with follow-up bulimic symptoms, after controlling for baseline bulimic symptoms.

Conclusion: Results lend credence to theoretical accounts implicating perfectionism in the development of bulimic symptoms. Our review of this literature also underscored the need for additional longitudinal studies that use multisource designs and that assess perfectionism as a multidimensional construct.

1. Introduction

Bulimia nervosa is associated with widespread financial, medical and social burden (Crow et al., 2009; Mitchell & Crow, 2006). Affected individuals experience recurrent episodes of binge eating (i.e., uncontrollably eating a large amount of food in a short period) followed by compensatory methods (e.g., vomiting, misusing laxatives, restricting food intake, or excessive exercise) to prevent weight gain (American Psychiatric Association, 2013). Bulimic symptoms are also associated with physical (e.g., dental problems) and mental (e.g., depression) problems, as well as healthcare costs (e.g., hospital visits; Ágh et al., 2016; Agras, 2001). Individuals who do not meet diagnostic criteria for bulimia also suffer. Fairburn et al. (2007) reported both people suffering from subclinical bulimic symptoms and people suffering from diagnosable bulimic symptoms have comparable eating pathology and psychiatric comorbidity. Given bulimic symptoms' adverse consequences, researchers and clinicians are increasingly

interested in advancing understanding of the etiology of bulimia. One area of etiological importance is the personality traits associated with bulimic symptoms (Loxton & Dawe, 2009). We focused on one such trait—perfectionism.

2. Theoretical background and hypotheses

2.1. Perfectionism dimensions and bulimic symptoms

Two-higher order factors underlie several perfectionism dimensions: perfectionistic concerns and perfectionistic strivings (e.g., Stoeber & Otto, 2006). Perfectionistic concerns encompass socially prescribed perfectionism (i.e., perceiving others demand perfection; Hewitt & Flett, 1991), concern over mistakes (i.e., negative reactions to perceived failures; Frost, Marten, Lahart, & Rosenblate, 1990), doubts about actions (i.e., doubting one's performance abilities; Frost et al., 1990), self-criticism (i.e., the tendency to feel self-critical and to assume blame;

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Blatt, D’Afflitti, & Quinlan, 1976), and evaluative concerns perfectionism (i.e., a composite of concern over mistakes and doubts about actions). Perfectionistic strivings consists of self-oriented perfectionism (i.e., demanding perfection from the self; Hewitt & Flett, 1991) and personal standards (i.e., setting unrealistically lofty goals; Frost et al., 1990). Relative to controls groups, people with bulimic symptoms have elevated perfectionistic concerns (Boisseau, Thompson-Brenner, Pratt, Farchione, & Barlow, 2013; Farstad, McGeown, & von Ranson, 2016). Hewitt, Flett, and Ediger (1995) reported socially prescribed perfectionism correlated positively with bulimic symptoms. Likewise, Lilienfeld et al. (2000) found patients suffering from bulimia reported higher concern over mistakes and doubts about actions relative to healthy controls. Steiger, Goldstein, Mongrain, and Van der Feen (1990) found elevated levels of self-criticism in both anorexic and bulimic patients compared to psychiatric and normal controls. Further, Boone, Soenens, and Braet (2011) and Levinson and Rodebaugh (2016) reported evaluative concerns perfectionism predicted increased bulimic symptoms over a two-year and a six-month period, respectively. Taken together, these findings suggest perfectionistic concerns correlates positively with bulimic symptoms, that perfectionistic concerns are elevated in individuals with bulimic symptoms, and that perfectionistic concerns are a risk factor for bulimic symptoms.

In contrast, the relationship between perfectionistic strivings and bulimic symptoms is unclear. On the one hand, Lilienfeld et al. (2000) reported bulimic patients reported higher personal standards relative to healthy controls. Likewise, Bardone-Cone (2007) reported self-oriented and socially prescribed perfectionism were associated with bulimic symptoms in female undergraduates. Moreover, Bardone-Cone (2007) found self-oriented perfectionism, but not socially prescribed perfectionism, predicted unique variance in bulimic symptoms, after controlling for negative affect. Additionally, Pratt, Telch, Labouvie, Wilson, and Agras (2001) reported people with bulimic symptoms had higher scores on self-oriented perfectionism, relative to an overweight control group. Boone et al. (2011) and Mackinnon et al. (2011) reported perfectionistic strivings predicted longitudinal increases in bulimic symptoms. However, on the other hand, Pearson and Gleaves (2006) reported personal standards relationship with bulimic symptoms was non-significant. And Gustafsson, Edlund, Kjellin, and Norring (2009), as well as Levinson and Rodebaugh (2016), reported perfectionistic strivings were not significantly associated with longitudinal change in bulimic symptoms. Overall, findings regarding perfectionistic strivings relationship with bulimic symptoms are inconsistent and unclear.

Several theories have been put forward to explain the perfectionism-bulimic symptom link (e.g., Bardone, Vohs, Abramson, Heatherton, & Joiner, 2000; Sherry & Hall, 2009). Heatherton and Baumeister (1991) proposed self-awareness becomes aversive when people perceive they have fallen short of their lofty goals, which in turn erodes inhibitions around food and leads to binge eating (a key symptom of bulimia). Joiner, Heatherton, Rudd, and Schmidt’s (1997) model posits perfectionistic women experience bulimic symptoms when they perceive they have fallen short of their standards (e.g., seeing themselves as overweight). Similarly, Bardone et al.’s (2000) three-factor interactive model posits that people high in perfectionism and low in self-esteem are prone to bulimic symptoms when they see themselves as overweight. Alternatively, Woodside et al. (2002) theorized perfectionism is a genetically-transmitted personality trait that places people at risk for eating disorder symptoms. Quinton and Wagner (2005) suggest alexithymia (i.e., a personality construct characterized by the inability to recognize and to identify emotions in the self) predicts bulimic symptoms as both involve difficulties with modulating unpleasant emotional states. Marsero, Ruggiero, Scarone, Bertelli, and Sassaroli (2011) further suggest alexithymia is a predisposing factor for perfectionism, which may in turn lead to eating pathology. Lastly, Sherry and Hall (2009) assert perceived external pressures to be perfect (Hewitt & Flett, 1991) confer risk for binge eating via four triggers: interpersonal discrepancies, low interpersonal esteem, depressive affect, and dietary

restraint.

Consistent with these theories, perfectionism correlates positively with bulimic symptoms (Bardone-Cone et al., 2007; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; Lilienfeld et al., 2000; Stice, 2002). But our understanding of whether perfectionism predicts increases in bulimic symptoms is limited. In his meta-analytic review, Stice (2002) reported perfectionism predicted increases in bulimic symptoms over an average of 21.2 months ($SD = 15.8$; month range = 1.0–36.0). However, Stice (2002) used a unidimensional measure of perfectionism (i.e., EDI-perfectionism), despite ample evidence suggesting perfectionism is best understood as a multidimensional construct (Hewitt & Flett, 1991; Hewitt, Flett, Besser, Sherry, & McGee, 2003). Thus, Stice’s (2002) findings require updating given he did not investigate multidimensional perfectionism and published his findings over a decade ago. Finally, studies investigating perfectionism and bulimic symptoms are underpowered (Bardone-Cone et al., 2007) and are limited in their ability to draw strong conclusions. We addressed these challenges by conducting a rigorous meta-analytic review testing the extent to which perfectionism dimensions confer risk for bulimic symptoms.

2.2. Advancing research on perfectionism and bulimic symptoms using meta-analysis

In the eating disorder literature, perfectionism is often assessed using the Eating Disorder Inventory perfectionism subscale (EDI-perfectionism; Garner, Olmsted, & Polivy, 1983). EDI-perfectionism was developed to assess general perfectionism, yielding one unidimensional score. People with bulimic symptoms have significantly higher EDI-perfectionism scores relative to healthy controls (Lilienfeld et al., 2000; Moor, Vartanian, Touyz, & Beumont, 2004; Tachikawa et al., 2004). However, some researchers challenge EDI-perfectionism’s unidimensionality. Sherry, Hewitt, Besser, McGee, and Flett (2004) presented evidence that EDI-perfectionism contains a self-oriented perfectionism factor and a socially prescribed perfectionism factor (see also Joiner & Schmidt, 1995). Moreover, Sherry et al. (2004) argued EDI-perfectionism provides a partial, incomplete representation of self-oriented and socially prescribed perfectionism. Thus, there is a need to summarize research on bulimic symptoms and multidimensional perfectionism. Moreover, meta-analysis could help resolve inconsistencies regarding perfectionistic strivings relationship with bulimic symptoms and may allow for an overall conclusion to be reached.

2.3. Objectives and hypotheses

We tested which perfectionism dimensions, if any, are part of a premorbid personality that confers risk for bulimic symptoms by comprehensively meta-analyzing longitudinal research on this topic. Guided by theory and research, we hypothesized perfectionistic concerns (socially prescribed perfectionism, concern over mistakes, doubts about actions) would predict increased bulimic symptoms. Likewise, we hypothesized EDI-perfectionism would predict increased bulimic symptoms. However, given inconsistent findings, we considered our examination of the extent to which perfectionistic strivings predict change in bulimic symptoms to be exploratory.

3. Method

3.1. Selection of studies

We conducted a rigorous literature search using PsycINFO, PubMed, Educational Resource Information Center (ERIC), and ProQuest Dissertations and Theses to locate longitudinal studies on perfectionism and bulimic symptoms. The following keywords and Boolean search terms were utilized in all searches: ((self-critic*) OR (perfect*)) AND ((longitudinal*) OR (prospective*) OR (panel*) OR (over time) OR (repeated)) NOT (perfect). This search yielded 965 studies. After

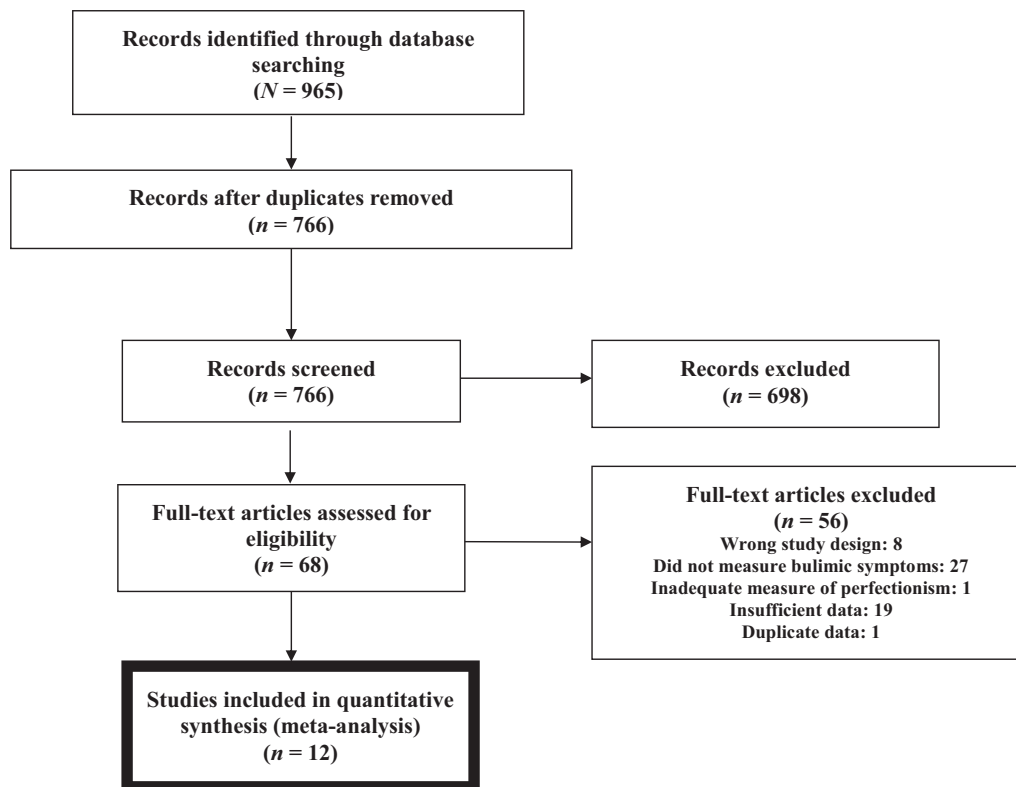


Fig. 1. Study selection procedure.

removing duplicates, 766 studies remained. The abstract and method of each study identified was then screened by the first and the fourth author to determine inclusion. A study was included if it (a) contained data on bulimic symptoms (bingeing, purging, vomiting, dieting, excessive exercising, excessive eating, bulimia nervosa) and perfectionism, (b) used a longitudinal design, (c) assessed bulimic symptoms on at least two occasions, (d) assessed perfectionism alongside bulimic symptoms in at least one measurement occasion preceding the final assessment of bulimic symptoms, (e) was in English, (f) reported an effect size, sufficient information for computing an effect size, or this information was obtained from a corresponding author, and (g) was a published journal article, book chapter, dissertation, or data provided directly from an author. Our search strategy and search results are depicted in Fig. 1. Studies were included regardless of the participants' age, gender, or ethnicity. Our search yielded 68 studies for inclusion. Interrater agreement on inclusion was 100%. Search strategies were ended on May 20, 2017 and data extraction and analysis was implemented. A backward citation search, in which the reference lists of all eligible studies were examined for new articles, was then conducted, but resulted in no additional studies for potential inclusion. A total of 56 studies were subsequently excluded from the meta-analysis for predetermined reasons (see Supplemental Material Table A1 for justification). The final sample of included studies was comprised of 12 studies with a pooled total of 4665 participants (see Table 1).

3.2. Coding of studies

Each study was coded by the first and the fourth author based on the following characteristics: sample size at baseline, percent female at baseline, mean age at baseline, percent ethnic minority (i.e., non-Caucasian) at baseline, sample type, time lag between assessments, percent attrition, publication status (i.e., published journal article vs. dissertation), measure used to assess perfectionism, and measure used to assess bulimic symptoms.

3.3. Meta-analytic procedure

We conducted random effects analysis using Comprehensive Meta-Analysis Version 3.3 (Borenstein, Hedges, Higgins, & Rothstein, 2005). Weighted mean effect sizes were calculated following Hunter and Schmidt's (1990) recommendations, allowing for estimation of mean effect sizes and variance in observed scores after considering sampling error (Card, 2012). All effect size estimates were weighted by sample size and aggregated. We weighted effects sizes by sample size given standard error decreases as sample size increases (Borenstein, Hedges, Higgins, & Rothstein, 2009). To test the extent to which perfectionism dimensions predict follow-up bulimic symptoms, after controlling for baseline bulimic symptoms, we calculated semi-partial correlations using Mplus 6 (Muthén & Muthén, 1998–2010) with maximum likelihood estimation. For each study, we calculated semi-partial correlations by imputing bivariate correlation matrices into Mplus and using path analysis with follow-up bulimic symptoms regressed on the perfectionism dimensions of interest and baseline bulimic symptoms.

When more than one measure was used to assess bulimic symptoms, effects were averaged so only one effect was included in the analysis (Card, 2012). This strategy guards against overrepresentation of studies that include multiple effects (Borenstein et al., 2009). For studies that included variables of interest across three or more waves of data collection, the time points that corresponded to the longest time lag between measurement occasions were selected to compute effect sizes. Selection of the longest possible time lag provided the most conservative test of the perfectionism-bulimic symptom link. Correlations were transformed into Fisher's Z before averaging (Card, 2012). Supplemental Table A2 contains correlations for each study. Overall weighted mean effect sizes between baseline perfectionism dimensions and follow-up bulimic symptoms, controlling for baseline bulimic symptoms, are in Table 2.

Each analysis included an assessment of the total heterogeneity of weighted mean effect sizes (Q_T ; see Table 2). A significant Q_T suggests

Table 1
Characteristics of longitudinal studies included in the meta-analysis.

	Sample							Measurement		
	N	Sample type	Mean age	Time lag	Attrition (%)	Female (%)	Ethnic minority (%)	Status	Perfectionism	Bulimic symptoms
Boone et al. (2011)	708	Community ^a	13.9	104.0	21.1	57.0	NR	Article	FMPS-COM FMPS-DAA FMPS-PS ^c	EDI-II-B
Boone, Soenens, and Luyten, 2014	455	Community ^a	13.3	52.0	40.4	100.0	100.0	Article	FMPS-COM FMPS-DAA FMPS-PS ^d	EDI-II-B
Boone, Vansteenkiste, Soenens, Van der Kaap-Deeder, and Verstuyf (2014)	566	Community ^a	13.3	52.0	NR	72.0	0.0	Article	FMPS-COM FMPS-DAA	EDI-II-BE ^e
Brosos and Levinson (2017)	300	University ^b	18.0	26.1	36.7	100.0	39.3	Article	FMPS-COM	EDI-II-BE ^f
Holm-Denoma et al. (2005)	150	Community ^a	45.2	130.4	NR	100.0	10.0	Article	EDI-P	EDI-B
Joiner et al. (1997)	459	University ^b	20.0	521.4	0.0	100.0	19.7	Article	EDI-P	EDI-B ED diagnoses ^g
Levinson and Rodebaugh, 2016	300	University ^b	NR	26.5	36.7	100.0	39.3	Article	FMPS-COM FMPS-DAA FMPS-PS FMPS-PC FMPS-PE	EDI-II-B
Mackinnon et al. (2011)	200	University ^b	19.9	3.0	5.5	100.0	12.0	Article	FMPS-SF-COM FMPS-SF-PS	EDDS-BE ^h
Mushquash and Sherry (2013)	218	University ^b	20.0	3.0	NR	100.0	8.3	Article	HMPS-SF-SPP ⁱ	EDI-B ^j
Sehm and Warschburger (2016) sample 1 (girls)	523	Community ^a	14.4	86.9	28.8	100.0	NR	Article	EDI-C-P	ChEDE-BE
Sehm and Warschburger, 2016 sample 2 (boys)	516	Community ^a	14.3	86.9	28.8	0.0	NR	Article	EDI-C-P	ChEDE-BE
Smith et al. (2017)	200	University ^b	19.9	4.0	4.5	100.0	12.0	Article	HMPS-SF-SPP FMPS-SF-COM FMPS-SF-DAA	EDI-B EDDS-BE BULIT-R-BE
Vohs et al. (2001)	70	University ^b	NR	6.5	NR	100.0	28.0	Article	EDI-P	EDI-B

Note. N = total number of participants; Time lag = number of weeks between time points; NR = not reported SF = short-form; FMPS = Frost et al.'s (1990) Multidimensional Perfectionism Scale; COM = concern over mistakes; DAA = doubts about action; PS = personal standards; PC = parental criticism; PE = parental expectations; EDI-II = Garner's (1991) Eating Disorder Inventory-II; B = bulimia; BE = binge eating; EDI = Garner et al.'s (1983) Eating Disorder Inventory; P = perfectionism; EDDS = Stice et al.'s (2000) Eating Disorder Diagnostic Scale; HMPS = Hewitt and Flett's (1991) Multidimensional Perfectionism Scale; SPP = socially prescribed perfectionism; EDI-C = Thiels et al.'s (2011) German version of the Child Eating Disorder Inventory; ChEDE = Hilbert et al.'s (2008) German Version of the Child Eating Disorder Examination Questionnaire; BULIT-R = Thelen et al.'s (1991) Bulimia Test-Revised.

^a Community members.

^b University undergraduates.

^c Two items removed due to cross-loading on other scales.

^d One item removed due to cross-loading on other scales.

^e Dutch version of this questionnaire used (van Strien and Ouwens, 2003); one item from EDI-II-B was dropped in order to only measure binge eating.

^f Five of the binge eating items were used to measure binge eating.

^g Lab-created survey based on DSM-III criteria for bulimia nervosa.

^h Modified for seven-day timeframe; two questions dropped.

ⁱ Modified to be mother-specific (e.g., "My mother expects nothing less than perfection from me").

^j Four items were used and items were dropped that focused on compensatory behaviours.

the variance in the weighted mean effect sizes is greater than would be expected by sampling error and examination of moderating variables is warranted. A non-significant Q_T suggests a weak basis for moderation (Card, 2012). For each analysis, inconsistency in observed relationships across studies (I^2) was also calculated. I^2 indicates the total variation across studies due to heterogeneity: values of 25%, 50%, and 75% correspond to low, medium, and high heterogeneity, respectively (Higgins & Thompson, 2002). Regarding publication bias, we calculated Egger's test of regression to the intercept (Egger, Smith, Schneider, & Minder, 1997; see Table 2). In the absence of publication bias, Egger's regression intercept does not differ significantly from zero (Egger et al., 1997).

3.4. Description of studies

We identified 12 studies and 13 samples containing relevant effect size data (Table 1). Samples were made available between 1997 and 2017, with a median year of 2013. Sample size ranged between 70 and 708, with an average sample size of 358.9 ($SD = 191.5$). Likewise, the total pooled sample size was 4665. There were five samples of

adolescents, seven samples of undergraduates, and one sample of community adults. Participants were on average 19.3 years of age ($SD = 9.1$; age range = 13.3–45.2 years). The average percentage of ethnic minority participants was 26.9%; the average percentage of female participants was 86.8%. The average time lag between measurement occasions was 84.8 weeks ($SD = 137.9$; median = 52.0; range in weeks = 3.0–521.4).

3.5. Measures

3.5.1. Perfectionism

Perfectionism was assessed using four measures (see Table 1). Concern over mistakes, doubts about actions, parental criticism, parental expectations and personal standards were assessed with Frost et al.'s (1990) Multidimensional Perfectionism Scale (FMPS). Socially prescribed perfectionism was assessed with Hewitt and Flett's (1991) Multidimensional Perfectionism Scale (HMPS). One study (Sehm & Warschburger, 2016) used the perfectionism subscale of Thiels, Salbach-Andrae, Bender, and Garner's (2011) Eating Disorder Inventory child version (EDI-C-P). Three studies (Holm-Denoma et al., 2005;

Table 2
Summary of effect sizes for the relationship between perfectionism dimensions and bulimic symptoms, controlling for baseline bulimic symptoms.

Variable	k	N	r ⁺	95% CI	Q _T	I ² (%)	Egger's intercept	95% CI	K ^{TF}	Trim and fill estimates r ⁺ [95% CI]
Perfectionistic concerns	8	2375	0.15***	[0.11, 0.19]	6.58	0.00	-2.23	[-5.24, 0.79]	0	0.15 [0.11, 0.19]
Evaluative concerns perfectionism ^a										
^t ECP ₁ ,BS ₁	4	2029	0.35***	[0.27, 0.43]	11.85**	74.68	0.30	[-34.05, 34.66]	0	0.35 [0.27, 0.43]
BS ₁ → BS ₂	4	1586	0.54***	[0.45, 0.62]	16.57***	81.89	7.26	[-9.60, 24.12]	0	0.54 [0.45, 0.62]
ECP ₁ → BS ₂	4	1586	0.16***	[0.10, 0.22]	4.40	31.86	-2.57	[-14.57, 9.42]	0	0.16 [0.10, 0.22]
Concern over mistakes										
^t COM ₁ ,BS ₁	3	500	0.32***	[0.25, 0.40]	2.42	17.43	8.82	[-16.55, 34.19]	0	0.32 [0.25, 0.40]
BS ₁ → BS ₂	3	571	0.66***	[0.57, 0.74]	6.19*	67.68	-716.03	[2021.12, 589.06]	0	0.66 [0.57, 0.74]
COM ₁ → BS ₂	3	571	0.14**	[0.06, 0.22]	0.12	0.00	78.68	[-1649.90, 1807.27]	0	0.14 [0.06, 0.22]
Doubts about action										
^t DAA ₁ ,BS ₁	1	200	0.35***	[0.22, 0.47]	-	-	-	-	-	-
BS ₁ → BS ₂	1	191	0.71***	[0.63, 0.77]	-	-	-	-	-	-
DAA ₁ → BS ₂	1	191	0.12	[-0.02, 0.26]	-	-	-	-	-	-
Socially prescribed perfectionism										
^t SPP ₁ ,BS ₁	2	418	0.18**	[0.06, 0.30]	1.59	36.93	-	-	-	-
BS ₁ → BS ₂	2	409	0.67***	[0.48, 0.80]	8.32**	87.98	-	-	-	-
SPP ₁ → BS ₂	2	409	0.06	[-0.04, 0.16]	0.04	0.00	-	-	-	-
Personal standards										
^t PS ₁ ,BS ₁	4	1663	0.14***	[0.06, 0.22]	7.78	61.44	1.27	[-16.75, 19.29]	0	0.14 [0.06, 0.22]
BS ₁ → BS ₂	4	1394	0.64***	[0.51, 0.74]	34.78***	91.37	12.09	[4.94, 19.25]	0	0.64 [0.51, 0.74]
PS ₁ → BS ₂	4	1394	0.04	[-0.06, 0.13]	8.95*	66.46	-2.78	[-19.81, 14.26]	1	0.01 [-0.08, 0.10]
Other forms of perfectionism										
EDI-perfectionism										
^t EDI-P ₁ ,BS ₁	5	1718	0.10	[-0.03, 0.22]	23.62***	83.06	0.16	[-11.95, 12.27]	0	0.10 [-0.03, 0.22]
BS ₁ → BS ₂	5	1418	0.48***	[0.37, 0.57]	22.37***	82.12	5.74	[-1.93, 13.42]	1	0.43 [0.31, 0.53]
EDI-P ₁ → BS ₂	5	1418	0.06*	[0.01, 0.11]	2.47	0.00	-0.70	[-4.85, 3.44]	0	0.06 [0.01, 0.11]

Note. k = number of studies; N = total number of participants in the k samples; r⁺ = weighted mean r; CI = confident interval; Q_T = measure of heterogeneity of effect sizes; I² = percentage of heterogeneity; Egger's intercept = Egger's test of regression to the intercept; K^{TF} = number of imputed studies as part of trim and fill method; ECP = evaluative concerns perfectionism; BS = bulimic symptoms; x₁ = baseline variable; x₂ = follow-up variable; ^tx₁,^ty₁ = bivariate correlation between baseline variable and follow-up variable; ^tBS₁ → BS₂ = standardized beta for baseline bulimic symptoms predicting follow-up bulimic symptoms (while controlling for evaluative concerns perfectionism); ECP₁ → BS₂ = standardized beta for baseline for evaluative concerns perfectionism predicting follow-up bulimic symptoms (while controlling baseline bulimic symptoms); COM = concern over mistakes; DAA = doubts about actions; SPP = socially prescribed perfectionism; PS = personal standards; EDI-P = Garner et al.'s (1983) Eating Disorder Inventory, perfectionism subscale.

^a Aggregate of FMPS-COM, FMPS-DAA, FMPS-PC, and FMPS-PE.

* p < .05.

** p < .01.

*** p < .001.

Joiner et al., 1997; Vohs et al., 2001) used the perfectionism subscale of Garner et al.'s (1983) Eating Disorder Inventory. Unexpectedly, no study measured self-oriented perfectionism.

3.5.2. Bulimic symptoms

Bulimic symptoms were assessed using nine measures (see Table 1). Binge eating was measured using the binge eating subscale of Garner et al.'s (1983) Eating Disorder Inventory (EDI-BE), Stice, Akutagawa, Gaggan, and Agras's (2000) Eating Disorder Diagnostic Scale (EDDS-BE), the German version of Hilbert, Hartmann, and Czaja's (2008) Child Eating Disorder Examination Questionnaire (ChEDE-BE), and Thelen, Farmer, Wonderlich, and Smith's (1991) Bulimia Test Revised Version (BULIT-R-BE). Bulimic symptoms were measured using the bulimia subscale of Garner et al.'s (1983) EDI (EDI-B), and Garner's (1991) Eating Disorder Inventory-II (EDI-II-B). Bulimia was also assessed using a survey based on criteria from the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (American Psychiatric Association, 1980).

4. Results

Weighted mean effect sizes between perfectionism at baseline and bulimic symptoms at follow-up, while controlling for baseline levels of bulimic symptoms, are in Table 2. We followed Gignac and Szodorai's (2016) guidelines for interpreting small, medium, and large effect sizes (r = 0.10, 0.30, 0.50, respectively). All longitudinal perfectionism-bulimic symptom effects were small to medium in magnitude. Congruent

with hypotheses, perfectionistic concerns and EDI-perfectionism predicted increases in bulimic symptoms, beyond baseline bulimic symptoms. At the facet level, evaluative concerns perfectionism and concern over mistakes relationships with follow-up bulimic symptoms, taking into account baseline bulimic symptoms, were significant. However, at the facet level, the relationships between socially prescribed perfectionism and doubts about actions with follow-up bulimic symptoms, controlling for baseline bulimic symptoms, were non-significant. Moreover, personal standards relationship with follow-up bulimic symptoms, controlling for baseline bulimic symptoms was non-significant.

The test of the total heterogeneity of weighted mean effect sizes corresponding to perfectionism dimensions' effects on follow-up bulimic symptoms were non-significant, with the exception of personal standards. This suggests the assumption of homogeneity should be retained and indicates common study effects, with the exception of personal standards (Card, 2012). Differences in relevant effect sizes were not greater than would be expected based on sample variation alone, with the exception of personal standards. Egger's test of regression to the intercept (see Table 2) was not significant for any observed longitudinal effect. As such, we found no evidence of publication bias.

5. Discussion

Many theoretical accounts and some empirical studies suggest perfectionism is a risk factor for bulimic symptoms (Stice, 2002). Nonetheless, given inconsistent findings and underpowered studies, it is

unclear which, if any, perfectionism dimensions confer risk for bulimic symptoms. We addressed this by conducting a rigorous meta-analytic review on the extent to which perfectionism dimensions confer risk for bulimic symptoms. Findings derived from 12 longitudinal studies showed perfectionistic concerns, and to a lesser extent EDI-perfectionism, predicted longitudinal increases in bulimic symptoms. Our results are consistent with, and provide support for, longstanding theoretical accounts suggesting perfectionistic concerns are part of the premorbid personality of individuals at risk for bulimic symptoms.

5.1. Multidimensional perfectionism and bulimic symptoms

Consistent with hypotheses, perfectionistic concerns predicted increased bulimic symptoms at follow-up, even after controlling for baseline bulimic symptoms. Given that bulimic symptoms are highly stable (e.g., Fichter & Quadflieg, 2007), this represents a rigorous test of the perfectionistic concerns-bulimic symptom link. Unfortunately, many studies of perfectionism and bulimia do not include baseline levels of bulimic symptoms in their research design, reflecting a serious limitation (e.g., Pearson & Gleaves, 2006). Nonetheless, our findings suggest individuals with high perfectionistic concerns are prone to bulimic symptoms, even when considering pre-existing levels of bulimic symptoms.

Perfectionistic concerns capture cognitive and interpersonal features of perfectionism (Sherry, Hewitt, Flett, & Harvey, 2003). People with high perfectionistic concerns often experience dysfunction in the social domain where they chronically perceive or encounter negative social interactions (Sherry & Hall, 2009). Likewise, people with high perfectionistic concerns experience others as disappointed and disconnected from them, resulting in poor interpersonal relationships and sadness (e.g., Mackinnon et al., 2011). As a result, individuals high in perfectionistic concerns may use bulimic symptoms (e.g., binge eating) to cope with or to escape from their lack of connection and negative self-awareness (Heatherton & Baumeister, 1991). Moreover, high perfectionistic concerns are linked with dysfunctional beliefs about self-worth (e.g., “If I can't complete this task perfectly, I am a useless person”; Frost et al., 1990). Thus, individuals high in perfectionistic concerns may judge themselves harshly when they perceive they have not lived up to others' expectations. Given that the body is a publicly visible aspect of the self, individuals high in perfectionistic concerns may then focus on presenting an idealized weight to others in order to attain highly prized social acceptance from others (Sherry & Hall, 2009). This may also be especially relevant to those with bulimic symptoms given that individuals with bulimic symptoms place an excessive emphasis on body shape or weight in their self-evaluation, and are more often in the normal to overweight weight range than those with symptoms of anorexia nervosa (American Psychiatric Association, 2013). Thus, our results buttress theoretical accounts and empirical studies implicating evaluative perfectionistic concerns in bulimic symptoms.

Given inconsistent prior findings (e.g., Bardone-Cone, 2007; Boone et al., 2011), we attempted to clarify whether personal standards and self-oriented perfectionism confer risk for bulimic symptoms. However, we were unable to identify any longitudinal studies that investigated the association between self-oriented perfectionism and bulimic symptoms. This speaks to the need for more studies investigating self-oriented perfectionism and bulimic symptoms with a rigorous, longitudinal design. Furthermore, our results include a non-significant relationship between personal standards and bulimic symptoms. The lack of a significant relationship between personal standards and bulimic symptoms in the current meta-analysis may be explained by past findings that suggest personal standards are more strongly associated with anorexic than bulimic symptoms (Bardone-Cone et al., 2007; Hewitt et al., 1995). Perhaps personal standards confer a specific risk to anorexic symptoms as opposed to other forms of disordered eating. It has also been suggested the link between perfectionism, perceived

weight status, and bulimic symptoms is moderated by self-esteem (Joiner et al., 1997; Vohs, Bardone, Joiner, Abramson, & Heatherton, 1999). Within these models, perfectionistic individuals with high self-esteem are able to view their feelings of being overweight as a temporary, changeable state whereas those with low self-esteem who have difficulty managing their weight may turn to more self-destructive ways to achieve their weight goal (e.g., bulimic symptoms; Vohs et al., 1999). This relationship may be specific to personal standards as well, since personal standards, but not perfectionistic concerns, significantly interacted with perceived weight status to predict bulimic symptoms over a 3-month period (Steele, Corsini, & Wade, 2007). Given our meta-analysis did not include moderating variables such as self-esteem, this could explain why we did not find a significant link between personal standards and bulimic symptoms.

Finally, consistent with hypotheses, EDI-perfectionism predicted increased bulimic symptoms, even after controlling for baseline bulimic symptoms. Even so, it is unfortunate that many studies in the eating disorder literature measure perfectionism in a unidimensional way, given that a large number of investigations have supported perfectionism's multidimensionality (e.g., Bieling, Israeli, & Antony, 2004; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993; Hill, McIntire, & Bacharach, 1997). Studying perfectionism as a unidimensional construct neglects the different social contexts in which perfectionism operates (e.g., perceiving others demand perfection of the self vs. demanding perfection of others; Hewitt & Flett, 1991). There is also substantial historical, theoretical, and empirical evidence supporting the value of conceptualizing perfectionism multidimensionally (Hewitt et al., 2003). Therefore, while these results provide further evidence of the longitudinal association between perfectionism and bulimic symptoms, they also highlight the need for additional longitudinal research in this area that is supported by more current conceptualizations of perfectionism.

5.2. Clinical implications

Results from our meta-analysis suggest clinicians should assess and treat perfectionism, as it appears to be a personality trait that underlies the development of bulimic symptoms over time. Researchers suggest perfectionism is an example of a dysfunctional system of self-evaluation that is much like the core psychopathology of eating disorders (Cooper & Fairburn, 2011; Shafran, Cooper, & Fairburn, 2002). Given that perfectionism has been shown to maintain eating disorders (Cooper & Fairburn, 2011), cognitive-behavioural therapies (CBT) have been developed to target perfectionism in the context of an eating disorder (Fairburn, Cooper, & Shafran, 2008). Such therapies add perfectionism to the patient's case formulation and highlight the consequences of striving for unattainable standards. Patients are then encouraged to enhance other, non-performance-related domains of their lives in order to counter their constant self-evaluation. Other treatments, such as schema therapy, place emphasis on modifying unrelenting standards and hypercriticalness and may also be utilized in efforts to prevent the development of eating disorder symptoms (Young, Klosko, & Weishaar, 2003). Theory suggests internalized high standards and strict rules create a demanding or critical parent schema mode that is often triggered in situations requiring performance, leading to perfectionistic tendencies. Therapists aim to help patients weaken their maladaptive coping modes and to break schema-driven life patterns (e.g., overstriving). Taking into consideration the results from our meta-analysis, perfectionism is an underlying vulnerability to bulimic symptoms and should be targeted with interventions that directly address perfectionistic tendencies.

5.3. Limitations of overall literature

Conducting a meta-analysis illuminates gaps in empirical findings and highlights areas for future research. One limitation identified in the perfectionism-bulimic symptom literature is a large dependence on

cross-sectional designs. Cross-sectional studies are problematic in that they do not provide information on temporal precedence. Research in this area would benefit from additional longitudinal studies which are able to provide information regarding risk over time. Existing longitudinal studies in this area are also insufficient in their design, as most study individuals at two points in time, during a period wherein stress or change in eating disorder symptoms is unlikely to occur. For instance, given the established stability of bulimic symptoms over time, future studies may benefit from examining bulimic symptoms during a time of transition or upheaval in participants' lives. Improved study designs would allow for stronger conclusions to be made regarding perfectionism and bulimic symptoms.

All studies in the present meta-analysis also utilized mono-source designs (i.e., self-report questionnaires). Self-report measures can be prone to social desirability effects, which may result from participants changing their responses in order to look more favourable (van de Mortel, 2008). Bias can be reduced by including multiple sources of information (e.g., self-reports and informant reports) of a given construct (Sherry et al., 2013). Further, research in this area would benefit from multiple methods of measurement, such as utilizing clinical interviews to assess bulimic symptoms. Finally, four of the longitudinal studies included in the present meta-analysis had sample sizes below 250, suggesting some of the investigations were underpowered (see Schönbrodt & Perugini, 2013). Future research should include sample sizes large enough to adequately detect longitudinal effects.

5.4. Limitations of the present study and future directions

Perfectionistic concerns were comprised of four facets (socially prescribed perfectionism, concern over mistakes, evaluative concerns perfectionism, and doubts about actions) and perfectionistic strivings were only comprised of one facet (personal standards). Because of this, it is possible perfectionistic concerns were more comprehensively measured than perfectionistic strivings. Likewise, we only identified one study that investigated doubts about actions and bulimic symptoms longitudinally (Smith et al., 2017) and we found no studies that investigated self-criticism and bulimic symptoms longitudinally. Therefore, while cross-sectional research has established links between doubts about actions and bulimic symptoms (e.g., Boisseau et al., 2013; Bulik et al., 2003), and self-criticism and bulimia (e.g., Steiger et al., 1990), we were unable to meta-analyze these links longitudinally. Future analyses may benefit from using equivalent numbers of perfectionism facets to reduce potential bias. We need strict tests of the extent to which perfectionism adds incrementally to our understanding of bulimic symptoms above and beyond other established predictors of bulimic symptoms (e.g., borderline personality traits). Further, we investigated the link between perfectionism and bulimic symptoms unidirectionally where we only tested whether perfectionism is an antecedent to bulimic symptoms and not whether it is a consequence of bulimic symptoms (Smith et al., 2017). We also did not investigate whether both constructs reciprocally influence each other. Future studies may wish to test this relationship bidirectionally in order to better establish directionality. It is important to acknowledge that four of the studies included in our analyses only measured binge eating and not compensatory behaviours. Finally, given the demographics and the sample types in our meta-analysis, our findings may not be generalizable to specific populations (e.g., ethnic minorities).

5.5. Conclusions

Our meta-analysis represents the most comprehensive investigation of the link between perfectionism and bulimic symptoms to date. Findings revealed perfectionistic concerns and EDI-perfectionism conferred risk for bulimic symptoms. Accordingly, our findings underscore the importance of addressing perfectionistic concerns early as possible in order to curtail the possible progression of bulimic symptoms.

Declarations of interest

None.

Author disclosures

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Contributors

Simon Sherry and Ivy-Lee Kehayes conceptualized the study. Simon Sherry, Donald Saklofske, and Martin Smith wrote the protocol. Ivy-Lee Kehayes conducted the literature search. Ivy-Lee Kehayes and Vanja Vidovic screened abstracts and methods and coded and extracted effect sizes from all studies. Martin Smith conducted statistical analyses. Ivy-Lee Kehayes wrote the first draft of the manuscript. Simon Sherry, Martin Smith, and Vanja Vidovic aided in all revisions of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

All contributing authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2018.09.022>.

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¹ References marked with an asterisk indicate studies included in the meta-analysis.

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