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The Link Between Low Self-Esteem and Eating Disorders: A Meta-Analysis of Longitudinal Studies

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Abstract

In this meta-analysis, we synthesized the available longitudinal evidence on prospective effects between self-esteem and eating pathology (i.e., restrained eating, bulimic behavior, binge eating, eating concern, negative body image, and drive for thinness). The analyses were based on 48 independent samples, including 19,187 participants. Mean age was 19.3 years (range = 7–48). As effect-size measure, we used standardized regression coefficients, controlled for prior levels of the predicted variables. Results suggested reciprocal prospective effects between low self-esteem and eating pathology. Self-esteem negatively predicted total eating pathology over time (β = −.08), and total eating pathology negatively predicted self-esteem over time (β = −.09). Overall, results for specific categories of eating pathology were similar. Moderator analyses indicated that the effects did not differ across age, gender, sample type (clinical vs. nonclinical), and time lag between assessments. In sum, the results support a reciprocal relations model of low self-esteem and eating disorders.

Keywords

self-esteem, eating disorders, eating pathology, longitudinal, meta-analysis

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Approximately 8.4% of women and 2.2% of men suffer from eating disorders, such as anorexia nervosa, bulimia nervosa, and binge-eating disorder, and the point prevalence has been increasing over the past decades (Galmiche et al., 2019). Subclinical prevalence is even higher and has been estimated to be around 22% in adolescence (Hölling & Schlack, 2007). Besides genetic, biological, and sociological factors, self-esteem (i.e., individuals' subjective evaluation of their worth as a person; Donnellan et al., 2011) has been hypothesized to be an important psychological predictor for the development of an eating disorder (e.g., Fairburn et al., 2003; Serpell & Troop, 2003). However, the potential role of eating disorders in the development of self-esteem has been largely ignored in the literature. In this meta-analysis, we therefore synthesized the available longitudinal evidence to gain better insights into the prospective effects between self-esteem and eating pathology.

As noted above, research suggests that low self-esteem is a risk factor for the development of eating pathology, an effect to which we refer as the vulnerability effect of low self-esteem (see Klein et al., 2011; Sowislo & Orth, 2013). Theory on eating disorders supports the assumption that low self-esteem is an influential factor in the onset and maintenance of eating disorders. For example, the transdiagnostic model of eating disorders proposes that low self-esteem motivates individuals to achieve their desired goals in the domain of weight and shape to improve their appearance-related self-evaluations (Fairburn et al., 2003). According to this model, this disproportional overvaluation of weight and shape leads to strict dieting and other weight-control behavior, which, in turn, results in either low weight or binge eating. Another example is the model of psychological factors of eating disorders (Serpell & Troop, 2003), which identifies low self-esteem as one of the central psychological factors that

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increase the likelihood of developing an eating disorder. Moreover, both models consider low self-esteem a transdiagnostic predictor for eating pathology, which is also supported empirically (e.g., E. J. Jones et al., 2020; Lampard et al., 2013). Overall, empirical evidence suggests that low self-esteem is a risk factor for eating disorders. The results from a recent meta-analysis, based on data from 13 studies, suggested that self-esteem negatively predicted later eating-disorder symptoms ($\beta = -.09$; Colmsee et al., 2021).

On the other hand, it is possible that eating pathology leads to enduring damages in the individual's self-concept, resulting in reduced self-esteem, an effect to which we refer as the "scar" effect of eating pathology (see Klein et al., 2011; Sowislo & Orth, 2013). Two theoretical perspectives support the hypothesis that eating pathology negatively affects self-esteem. First, in his classic theory, James (1890) defined self-esteem as the degree to which individuals perceive that their goals are achieved (i.e., as the ratio of success to pretensions). For individuals with eating-disorder symptoms, a favorable ratio is often difficult to achieve. For example, individuals with anorexia may desire to be thin but perceive themselves as fat. In addition, individuals with binge-eating disorder may desire to have their eating behavior under control but repeatedly experience loss of control. A second theoretical perspective is sociometer theory, which assumes that self-esteem is part of an internal system that constantly monitors the individual's degree of social acceptance (Leary, 2012). When social acceptance is threatened, self-esteem declines. The problem is that most individuals with an eating disorder perceive themselves as disgusting and undesirable (e.g., Ille et al., 2014), which may contribute to declines in self-esteem. Although these theoretical perspectives suggest that eating pathology negatively affects self-esteem, only a few studies are available that focused on this possibility. Nevertheless, the available evidence suggests that restrained eating, binge eating, and body dissatisfaction predict decreases in self-esteem (Johnson & Wardle, 2005; D. C. Jones & Newman, 2009; Sehm & Warschburger, 2018).

The Present Research

The present meta-analysis synthesizes the available evidence on prospective effects between self-esteem and eating pathology. Note that the vulnerability effect and scar effect are not mutually exclusive but may operate simultaneously. Given the theoretical perspectives and empirical evidence reviewed above, we expected a pattern of reciprocal effects (i.e., supporting a reciprocal-relations model of low self-esteem and eating disorders).

We examined a comprehensive set of key constructs related to eating pathology, which can be clustered into behavioral symptoms (including restrained eating, bulimic behavior, and binge eating) and cognitive-affective symptoms (including eating concern, negative body image, and drive for thinness). Restrained eating covers aspects of restricted food intake, such as limiting the amount of consumed food or excluding certain types of food from the diet. Bulimic behavior describes the uncontrollable consumption of large amounts of food and subsequent compensatory measures, such as vomiting, excessively exercising, or using laxatives. Binge eating covers frequent episodes of consuming large amounts of food, in situations where the individual loses control (in contrast to bulimic behavior, no compensatory measures are taken). Eating concern comprises constant thoughts about food, eating, and calories. Negative body image covers weight and shape concerns (e.g., preoccupation with thoughts about weight and shape, importance of shape and weight) and body dissatisfaction (i.e., dissatisfaction with specific body parts, e.g., stomach, thighs, and hips). Drive for thinness describes the strong desire to be thin and the constant fear of gaining weight. Finally, we aggregated the evidence across all available measures by computing an index of total eating pathology.

To strengthen the validity of conclusions, we focused exclusively on effect sizes that were based on longitudinal data and that were controlled for prior levels of the predicted variables (e.g., Cole & Maxwell, 2003; Gollob & Reichardt, 1987). Figure 1 provides a generic illustration of the effect sizes analyzed in this meta-analysis. First, we examined the cross-lagged coefficients between self-esteem and eating-disorder variables for which the autoregressive effects of the predicted variables were controlled (e.g., the effect of self-esteem at Time 1 on restrained eating at Time 2 controlling for the effect of restrained eating at Time 1). Second, we examined the stability (i.e., autoregressive) coefficients of each construct (e.g., the effect of restrained eating at Time 1 on restrained eating at Time 2). Third, for reasons of completeness, we also examined the concurrent correlation between the constructs at Time 1 (e.g., the correlation between self-esteem at Time 1 and restrained eating at Time 1).

A general strength and central goal of meta-analyses is to assess the robustness of effects by conducting moderator analyses. To maximize the power of our moderator analyses, we focused exclusively on total eating pathology (for this variable, the number of effect sizes was much larger compared with the specific-eating-disorder variables). As potential moderators, we tested three important sample characteristics—mean age, proportion of gender in the sample, and sample type (i.e., clinical vs. nonclinical)—and one design characteristic, that is, length of time lag between assessments. These moderators were selected because they are useful to test whether the findings hold across variations in key

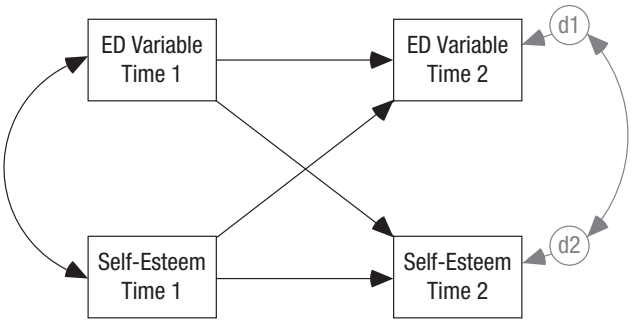

Fig. 1. Generic illustration of effect sizes analyzed in the present meta-analysis. We examined the cross-lagged effects between self-esteem and eating-disorder variables (e.g., the effect of self-esteem at Time 1 on restrained eating at Time 2) while controlling for the stability effects of the predicted variables (e.g., the effect of restrained eating at Time 1 on restrained eating at Time 2). In addition to cross-lagged and stability effects, we also examined the concurrent correlation between the constructs at Time 1 (e.g., correlation between self-esteem at Time 1 and restrained eating at Time 1). The correlation between the residuals of the constructs at Time 2 was not meta-analyzed (and is therefore grayed out in the figure). Residual variances (i.e., disturbances) are denoted as d1 and d2.

characteristics of the studies (for similar procedures, see Khazanov & Ruscio, 2016; Sowislo & Orth, 2013). Even if we did not expect significant moderator effects, some research is available that suggests that the moderator variables might explain variability in effect sizes. For example, the effects of low self-esteem on eating pathology could be stronger in childhood and adolescence compared with adulthood because adults have typically developed more adaptive strategies to cope with low self-esteem other than pathological eating behaviors (e.g., Diehl et al., 2014). Moreover, body weight and shape may affect girls' (vs. boys') self-esteem more strongly because girls place greater importance on their physical appearance than boys (Quittkat et al., 2019). Consequently, the effects of eating pathology on self-esteem could be larger for girls than for boys. In addition, sample type may play an important role because the link between self-esteem and eating pathology could be stronger in clinical samples than in nonclinical samples (Braun et al., 2016). Finally, we tested for moderating effects of time lag because effects between self-esteem and eating disorders might decrease with longer time lags (Dormann & Griffin, 2015).

The Need for the Present Meta-Analysis

The goal of the present meta-analysis was to better understand the link between low self-esteem and eating disorders. It is important to understand whether low self-esteem is a predictor for developing an eating disorder, and at the same time, it is also important to understand how eating disorders shape the development of self-esteem. Although the meta-analysis by Colmsee et al. (2021) summarized evidence regarding some of the questions in this field, the present meta-analysis is needed for several reasons. First, Colmsee et al. focused exclusively on the possible effects of low self-esteem on eating pathology. However, as reviewed above, theoretical and empirical arguments suggest that the relation between the constructs may be reciprocal. Consequently, without considering the possible effects in the reverse direction (i.e., effects of eating pathology on self-esteem), any conclusions about the nature of the relation between the constructs are incomplete and possibly false. Second, Colmsee et al. tested whether type of disorder (i.e., anorexia, bulimia, and binge eating) moderated the effect size (which was not the case). However, there is a need for more detailed information with regard to specific categories of eating pathology, which allows for a more refined theoretical account of the relation between self-esteem and eating pathology. In addition to an index of total eating pathology, we therefore examined a broad set of specific categories, including behavioral symptoms (i.e., restrained eating, bulimic behavior, and binge eating) and cognitive-affective symptoms (i.e., eating concern, negative body image, and drive for thinness). Theory suggests that low self-esteem is related to both behavioral and cognitive-affective symptoms (Fairburn et al., 2003; Rieger et al., 2010; Serpell & Troop, 2003), but little empirical information is available on this issue. Thus, it is possible that there are differential effects between self-esteem and specific categories of eating pathology, which would have important implications for potential interventions. Third, meta-analytic evidence on the possible effects of eating pathology on self-esteem will contribute important knowledge to the field of self-esteem development. Although some information on the factors that influence self-esteem is available (for a review, see Orth & Robins, 2019), overall, there is a need to better understand the factors that shape the development of self-esteem, and relatively little information is available about the effects of clinical conditions and symptoms (Zeigler-Hill, 2011).

Method

Given that we used anonymized data, the present research was exempt from approval by the Ethics Committee of the authors' institution (Faculty of Human Sciences, University of Bern), in accordance with national law. The present research was not registered. We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. Data, materials, and code are available at https://osf.io/t6nge. The present meta-analysis follows

the PRISMA guideline for reporting systematic reviews (Page et al., 2021).

Selection of studies

Figure S1, in the Supplemental Material available online, shows the flow diagram of the search and selection procedures. We searched the databases PsycINFO and MEDLINE for English-language journal articles, books, book chapters, and dissertations. The search was conducted on May 12, 2020, and covered articles from all years included in the databases (i.e., beginning in 1806 for PsycINFO and 1946 for MEDLINE). For self-esteem, we used the following search terms: *self-esteem*, *self-worth*, *self-liking*, *self-view**, *self-concept*, *self-respect*, *self-regard*, *self-acceptance*, and *self-image**. For constructs related to eating disorders, we used the following search terms: *eating**, *anore**, *bulimi**, and *bing**. The asterisk allowed for the inclusion of alternate word endings of the search term. To ensure that the search will likely yield longitudinal studies, we added the search terms *longitudinal**, *prospective**, and *cross-lag**. After removing duplicates, the search resulted in a total of 510 potentially relevant articles.

To make the meta-analysis as exhaustive as possible, we used three additional strategies. First, we sent a request for unpublished studies to authors with a research program in the area of eating disorders. We requested unpublished manuscripts, preprints, papers in press, theses, or any other form of gray literature or unpublished data. This strategy resulted in three additional articles. Second, we examined the reference sections of seven articles that focused on the topic of the present research (i.e., Bardone-Cone et al., 2020; Baumeister et al., 2003; Colmsee et al., 2021; Fairburn et al., 2003; Larsen et al., 2015; Linardon et al., 2019; Polivy & Herman, 2002). This strategy resulted in three additional studies. Third, we included one additional article that we knew of but was not found by the search procedures described above.

Studies were included in the meta-analysis if the following criteria were fulfilled: (a) The study was empirically quantitative, (b) the study used a longitudinal design (i.e., it included two or more assessments of the same sample), (c) the study included measures of both self-esteem and an eating-disorder variable, (d) enough information was given to compute the effect sizes, and (e) the sample did not undergo a psychological or psychopharmacological intervention (however, we used information from control groups that did not undergo any treatment). Nearly all studies were assessed in full text. Only studies that were difficult to obtain were first screened on the level of the abstract by S. Krauss. If the abstract did not meet any exclusion criteria, the study was acquired as full text for further assessment. All full texts were assessed by S. Krauss to decide on the eligibility of studies. In addition, a random sample of 60 studies was assessed independently by L. C. Dapp to obtain an estimate of interrater agreement. The interrater agreement on inclusion or exclusion in the meta-analysis was high ($\kappa = 1.00$).[1]

From the 517 potentially relevant studies, 14 could directly be included in the meta-analysis because all required information was available in the article. If studies fulfilled all inclusion criteria except for providing enough information to compute effect sizes, we contacted the authors by email with a request for providing the required information (if the article had been published in 2000 or later). On the basis of the authors' responses, we could include 30 additional articles. In sum, the search procedures yielded 44 sources (i.e., 41 journal articles and three dissertations), providing data on 48 independent samples for analysis.

Coding of studies

We coded the following data: sample size, mean age of participants at Time 1, percentage of female participants, sample type (i.e., nationally representative, college students, clinical, and community), country of data collection, race/ethnicity, information on socioeconomic status, year of Time 1 assessment, time lag between assessments, effect-size information, publication status of effect sizes (i.e., effect-size data published in article in form of correlation or regression coefficients vs. effect-size data not published in article but obtained from authors), and risk of bias. If an article did not report the mean age of participants, we used the most valid indicator of age that was available. For example, if an age range was given (e.g., 18–20 years), we used the midpoint of the interval as estimate of mean age (e.g., 19 years). If a study provided more than one effect size for the same category of eating pathology using the same sample (e.g., one effect size for weight/shape concern and one effect size for body dissatisfaction, which both belong to negative body image), we averaged the effect sizes using Fisher's z transformations. Risk of bias was assessed for each included study using the Joanna Briggs Institute's (JBI) Critical Appraisal Checklist for Analytical Cross-Sectional Studies (Moola et al., 2020). The checklist has been modified for longitudinal studies. The modified version included six dichotomous items (see Coding Manual), and a sum score of 6 indicates the lowest risk of bias (and the highest quality) of the included study.

As effect-size measure, we used standardized regression coefficients (denoted as β), where the effect of the predictor at Time 1 on the outcome at Time 2 is

controlled for the Time 1 level of the outcome (see Fig. 1). In most cases, these effect sizes were not directly reported in the article; instead, we coded all relevant zero-order correlations (i.e., correlations between Time 1 self-esteem, Time 2 self-esteem, Time 1 eating-disorder variable, and Time 2 eating-disorder variable). Using these correlations, we computed the standardized regression coefficients with the following equation (Cohen et al., 2003, p. 68), which is applicable when a criterion variable (Y) is influenced by two predictors (X_1, X_2):

$$\beta_{Y1.2} = \left(\frac{r_{Y1} - r_{Y2} r_{12}}{1 - r_{12}^2} \right).$$

Here, $\beta_{Y1.2}$ is the standardized regression coefficient of X_1 predicting Y controlling for the effect of X_2 (e.g., the effect of self-esteem at Time 1 on restrained eating at Time 2 controlling for restrained eating at Time 1), r_{Y1} and r_{Y2} are the zero-order correlations between each predictor (X_1, X_2; e.g., self-esteem at Time 1, restrained eating at Time 1) and the criterion (Y; e.g., restrained eating at Time 2), and r_{12} is the correlation between the two predictors (X_1 and X_2; e.g., the cross-sectional correlation of self-esteem at Time 1 and restrained eating at Time 1).

Studies from the PsycINFO and MEDLINE search that provided all required effect-size information were coded independently by two raters (i.e., S. Krauss, L. C. Dapp; the other studies were coded by S. Krauss). Estimates of interrater agreement were based on 12 samples and were calculated with the *psych* package (Revelle, 2021) in R (R Core Team, 2021). The interrater agreement was high for categorical variables ($\kappa = 1.00$) and continuous variables ($r > .99$). Diverging assessments were discussed until consensus was reached.

Meta-analytic procedure

For all meta-analytic computations, we used the *metafor* package in R (Viechtbauer, 2010). For the analyses, all coefficients were converted to Fisher's z values. The within-study variance of the transformed values is given by

$$v_i = \left(\frac{1}{n_i - 3} \right),$$

where n_i is the sample size in study i. In the effect-size analyses, we used random-effects models (for estimating weighted mean effect sizes) and mixed-effects metaregression models (for testing moderators), following recommendations by Borenstein et al. (2009). For both kind of models, study weights are given by

$$\omega_i = \left(\frac{1}{v_i + \tau^2} \right),$$

where ω_i is the study weight for study i, v_i is the within-study variance for study i, and τ^2 is the estimate of between-studies heterogeneity. Between-studies heterogeneity (i.e., τ^2) was estimated with the method of restricted maximum likelihood (Harville, 1977), as recommended by Langan et al. (2019). To account for the uncertainty in the estimate of τ^2, we used the Knapp and Hartung (2003) method, as recommended by Viechtbauer et al. (2015).

In the preliminary analyses, we examined statistical outliers on effect-size estimates and conducted sensitivity analyses. For each of the effect-size variables, we searched for influential outliers using the "influence" function of the *metafor* package (Viechtbauer, 2010). When an effect size was influential and qualified as a potential outlier (following the cutoff values implemented in the *metafor* package), we repeated the meta-analytic computation of the weighted mean effect size without this study for the purpose of sensitivity analyses.

In the effect-size analyses, we computed weighted mean effect sizes and tested for heterogeneity of effect-size distributions. In these analyses, we first focused on total eating pathology and then on specific categories of eating pathology (i.e., behavioral symptoms and cognitive-affective symptoms). The index of total eating pathology was based on all available measures (i.e., measures of specific symptoms and global measures of eating pathology). If a sample provided effect sizes for more than one measure, we averaged the effect sizes before the meta-analytic computations (using Fisher's z transformations) to ensure the statistical independence of effect sizes.

Moderator tests were conducted exclusively for total eating pathology because of the much larger number of samples for this variable compared with the more specific eating-disorder variables to maximize the power and robustness of the moderator analyses. The moderator variables mean age at Time 1, proportion of female participants, and time lag were continuous and were treated accordingly. The moderator-variable, sample type, was dichotomous, distinguishing between clinical (23%) and nonclinical samples (77%). For both directions of effects, the four moderators were tested simultaneously using mixed-effects metaregression models.

Finally, we determined whether there was evidence of publication bias in the meta-analytic data set using three methods. First, we examined funnel graphs, which display the relation between effect size and the standard error of the effect size. A symmetrical shape indicates a nonbiased meta-analytic data set. Second, we used Egger's regression test (Egger et al., 1997) to examine whether the funnel graphs significantly deviate from a symmetrical shape. Third, we compared effect sizes that were published in the articles (i.e., as correlation or regression coefficients) with effect sizes that were not published in the articles (but obtained from the study authors) using mixed-effects metaregression models. If the size and significance of an effect size influences whether it is published, then this comparison should yield a significant difference between effect sizes (i.e., this would be evidence of publication bias).

Results

Description of studies

The meta-analytic data set included information from 44 sources. Year of publication ranged from 2001 to 2018; the median is 2011. The 44 sources provided information on 48 independent samples. Basic sample characteristics are shown in Table 1, including references for all samples in the meta-analytic data set. Table 1 includes 49 lines because information for one sample was taken from two sources (i.e., the two sources reported on different eating-disorder variables for the same sample).[2] Sample sizes ranged from 20 to 2,601 (M = 399.7, SD = 549.0). In sum, the samples included 19,187 participants. Mean age at Time 1 ranged from 6.5 years to 47.6 years (M = 19.3 years, SD = 9.4 years). One sample was assessed in childhood (mean age = 6.5 years), 29 samples were assessed in adolescence (mean age range = 10.8–17.7 years), 13 samples were assessed in emerging adulthood (mean age range = 18.1–26.3 years), and five samples were assessed in middle adulthood (mean age range = 37.8–47.6 years). The mean proportion of female participants was 79% (range = 0%–100%, SD = 27%). Twenty-eight samples were community samples, 14 samples consisted of participants with a clinical disorder, five samples consisted of college and university students, and one sample was nationally representative. Twenty-six samples were from the United States, five were from Switzerland, four were from Australia, three were from Spain, two were from Germany, two were from Sweden, and one sample each was from Brazil, Canada, Finland, Italy, Norway, and the UK. With regard to race/ethnicity, 26 samples were predominantly White/European ("predominantly" was defined as 80% and more), one was predominantly Hispanic, 14 were mixed, and for seven samples, information about race/ethnicity was missing. More detailed information on race/ethnicity and socioeconomic status is reported in Table S1 in the Supplemental Material. Time lag between the assessments ranged from 4 weeks to 5 years (M = 1.1 years, SD = 1.2 years). Self-esteem was most frequently measured by the Rosenberg Self-Esteem Scale (Rosenberg, 1965; 72%), followed by Harter's Self-Perception Profile (e.g., Harter, 2012; 16%). Eating pathology was most frequently measured by the Eating Disorder Examination (e.g., Fairburn & Beglin, 1994; 35%), followed by the Eating Disorder Inventory (e.g., Garner et al., 1983; 33%) and the Eating Attitudes Test (e.g., Garner & Garfinkel, 1979; 7%). Risk of bias for the included samples, as assessed by the JBI checklist, ranged from 4 to 6 (M = 5.63, SD = 0.61), indicating a high quality of studies and a low risk of bias.

Preliminary analyses

When an effect size was influential and qualified as potential outlier, we conducted the meta-analytic computation of the weighted mean effect size without this study for the purpose of sensitivity analyses. The results suggested that excluding these studies did not change the pattern of findings and did not lead to any different conclusions (see Tables S2 and S3 in the Supplemental Material). We therefore used the complete data set in the remainder of the analyses, consistent with methodological literature advising against routine deletion of outliers (Viechtbauer & Cheung, 2010).

Effect-size analyses for total eating pathology

Table 2 reports the meta-analytic findings for total eating pathology. The two cross-lagged effects were statistically significant and of similar size. Specifically, total eating pathology negatively predicted later self-esteem (β = −.09), and self-esteem negatively predicted later eating pathology (β = −.08). No formal test of the difference between the effects is available because the samples on which these two effects were based overlapped partially. As an approximate means of comparing the effects, we used the 95% confidence intervals. The two confidence intervals overlapped strongly, suggesting that the effects did not differ significantly. Moreover, the results indicated that the cross-sectional correlation between self-esteem and total eating pathology at Time 1 was significant and of moderate size (r = −.35). The stability effects of self-esteem (β = .53) and total eating pathology (β = .55) were relatively large.

Table 1. Descriptive Information on the Studies Included in the Meta-Analysis

Study	Sample size	Mean age at Time 1	Female	Sample type	Country	Race/ ethnicity	Time lag	Effect-size data published
Allison and Park (2004)	205	18.5	100	Community	USA	White	1.00	No
Amaral and Ferreira (2017)	353	15.7	47	Community	Brazil	Hispanic	0.52	No
Andersén and Birgegård (2017)	551	26.3	98	Clinical	Sweden		1.00	No
Bain (2007)	143	13.3	100	Community	USA	Mixed	0.50	Yes
Bardone et al. (2003), Study 1	129	19.0	100	Students	USA	Mixed	0.10	Yes
Bardone et al. (2003), Study 2	406	18.6	100	Students	USA	White	0.21	Yes
Beato-Fernández et al. (2004)	1,021	12.5	54	Community	Spain	White	2.00	No
Birgegård et al. (2009)	143	25.5	100	Clinical	Sweden		3.00	No
Carrard, Crépin, Rouget, Lam, Golay, and Van der Linden (2011)	33	37.8	100	Clinical	Switzerland	White	0.50	No
Carrard, Crépin, Rouget, Lam, Van der Linden, and Golay (2011)	20	41.0	100	Clinical	Switzerland	White	0.50	No
Courtney et al. (2008)	197	16.3	79	Clinical	USA	Mixed	0.83	Yes
Davison et al. (2007)	178	11.3	100	Community	USA	White	2.00	Yes
De Caro and Di Blas (2016)	142	15.6	46	Community	Italy	White	0.58	No
Fay (2011)	1,050	14.9	68	Community	USA	Mixed	1.00	Yes
Ferreiro et al. (2012)	942	10.8	49	Community	Spain	White	2.00	No
Green et al. (2017)	23	23.8	100	Clinical	USA		0.08	No
Green et al. (2018)	36	26.1	100	Clinical	USA	White	0.08	No
Gumz et al. (2017)	728	14.7	57	Community	Germany	White	0.13	No
Helgeson et al. (2007), diabetic sample	132	12.1	53	Clinical	USA	White	1.00	No
Helgeson et al. (2007), healthy sample	131	12.1	51	Community	USA	White	1.00	No
Hinshaw et al. (2012)	206	14.6	100	Clinical	USA	Mixed	5.00	No
Holm-Denoma et al. (2005)	150	45.2	100	Community	USA	White	2.50	Yes
Holm-Denoma et al. (2008)	607	17.7	56	Community	USA	Mixed	0.75	No
Isomaa et al. (2011)	595	15.4	48	Community	Finland	White	3.00	No
D. C. Jones and Newman (2009), female sample	81	12.5	100	Community	USA	Mixed	1.00	Yes
D. C. Jones and Newman (2009), male sample	60	12.5	0	Community	USA	Mixed	1.00	Yes
Kipp (2012)	174	13.5	100	Community	USA	White	0.58	Yes
Kristeller et al. (2014)	31	46.6	88	Clinical	USA	White	0.33	No
McClure Brenchley and Quinn (2016)	265	18.1	79	Students	USA	Mixed	0.19	No
Munsch (2014), eating-disorder sample	111	22.9	100	Clinical	Switzerland	White	0.25	No
Munsch (2014), healthy sample	101	22.9	100	Students	Switzerland	White	0.25	No
Munsch (2014), other mental disorders	62	22.9	100	Clinical	Switzerland	White	0.25	No

(continued)

Table 1. *(continued)*

Study	Sample size	Mean age at Time 1	Female	Sample type	Country	Race/ ethnicity	Time lag	Effect-size data published
Murray et al. (2018)	298	15.4	54	Community	Australia	White	1.00	No
Neumark-Sztainer et al. (2006)	2,516	14.8	55	Community	USA	Mixed	5.00	No
Nichols et al. (2018)	235	6.5	55	Community	Australia		1.00	No
Nordin-Bates et al. (2016)	312	14.7	73	Community	UK	White	0.50	No
Nuzzi et al. (2017)	84	17.1	100	Community	USA		0.50	No
Nuzzi et al. (2018)	64	15.9	0	Community	USA		0.50	No
Peterson et al. (2009)	69	47.6	81	Clinical	USA	White	0.38	No
Rayner et al. (2013)	1,197	12.3	100	Community	Australia	White	1.00	Yes
Rodríguez-Cano et al. (2014)	151	23.0	100	Clinical	Spain	White	1.00	No
Sehm and Warschburger (2018)	1,039	14.4	50	Community	Germany	White	1.67	No
Shaw et al. (2004)	486	15.0	100	Community	USA	Mixed	1.00	Yes
Stice et al. (2002)	231	14.9	100	Community	USA	Mixed	0.83	No
Vohs et al. (2001)	70	19.0	100	Students	USA	Mixed	0.10	Yes
von Soest and Wichstrøm (2006)	2,601	16.3	56	National	Norway	White	5.00	No
von Soest and Wichstrøm (2009)	1,368	13.5	53	National	Norway	White	2.00	No
Wertheim et al. (2001)	435	14.1	100	Community	Australia		0.67	Yes
Wojtowicz and von Ranson (2012)	393	15.8	100	Community	Canada	Mixed	1.00	Yes

Note: Mean age at Time 1 is given in years. The column "Female" shows the proportion of female participants in percentages. The column "Time lag" indicates the interval between Time 1 and Time 2 in years. "Effect-size data published" is a dichotomous variable (yes = effect-size data were published in article in form of correlation or regression coefficients, no = effect-size data had not been published in article but were obtained from the authors).

Table 2. Summary of Effect Sizes for Relations Between Total Eating Pathology and Self-Esteem

Variable	*k*	*N*	Weighted mean effect size	95% CI	Heterogeneity		
					Q	τ^2	I^2
Total eating pathology							
$r_{ED,SE}$	48	19,187	−.35*	[−.40, −.30]	603.1*	.034	92.8
ED→SE[a]	39	15,878	−.09*	[−.13, −.06]	95.3*	.005	66.8
SE→ED[a]	44	16,265	−.08*	[−.11, −.06]	65.6*	.002	36.3
ED→ED[a]	44	16,265	.55*	[.50, .60]	976.0*	.055	95.1
SE→SE[a]	39	15,878	.53*	[.46, .59]	690.5*	.061	95.9

Note: Computations were made with random-effects models. ED = eating-disorder variable; SE = self-esteem; *k* = number of samples; *N* = total number of participants in the *k* samples; CI = confidence interval; *Q* = statistic used in heterogeneity test; τ^2 = estimated amount of total heterogeneity; I^2 = ratio of total heterogeneity by total variability (given in percent); $r_{ED,SE}$ = correlation between eating disorder variable at Time 1 and self-esteem at Time 1.
[a]Standardized regression coefficient.
*$p < .05$.

The analyses suggested that the cross-lagged effects were relatively heterogeneous across samples (Table 2), suggesting that moderating factors may account for systematic between-samples differences. Table S4 in the Supplemental Material provides information about the descriptive statistics and intercorrelations among moderators (i.e., mean age at Time 1, proportion of female participants, sample type, and time lag). The moderator

Table 3. Mixed-Effects Metaregression Models for Sample Characteristics Predicting Cross-Lagged Effects Between Total Eating Pathology and Self-Esteem

Moderator	*k*	*B*	Standard error	*p*
ED→SE	39			
Mean age at Time 1		0.0028	0.0026	.289
Female (proportion)		−0.0010	0.0008	.227
Sample type[a]		0.0293	0.0510	.569
Time lag		0.0105	0.0116	.372
SE→ED	44			
Mean age at Time 1		−0.0021	0.0021	.315
Female (proportion)		0.0012	0.0005	.038
Sample type[a]		0.0004	0.0357	.992
Time lag		−0.0001	0.0090	.990

Note: Regression coefficients are unstandardized. For each direction of effects, the four moderators were tested simultaneously. The significance level was adjusted to $p < .0125$ (Bonferroni correction for four moderators). *k* = number of samples; ED = eating-disorder variable; SE = self-esteem.
[a]1 = clinical, 0 = nonclinical.

analyses indicated that none of the moderators was significant (Table 3). Thus, the findings suggest that the cross-lagged effects between total eating pathology and self-esteem hold across samples varying with regard to age, gender, sample type, and time lag between assessments, which strengthens the generalizability of the findings.

Effect-size analyses for specific eating pathology

Table 4 reports the meta-analytic findings for the specific categories of eating pathology. For behavioral symptoms, significant cross-lagged effects emerged in both directions. Restrained eating (β = −.08), bulimic behavior (β = −.07), and binge eating (β = −.05) negatively predicted later self-esteem, and self-esteem negatively predicted restrained eating (β = −.07), bulimic behavior (β = −.09), and binge eating (β = −.11). For cognitive-affective symptoms, almost all cross-lagged effects were significant. Eating concern (β = −.13), negative body image (β = −.16), and drive for thinness (β = −.12) negatively predicted later self-esteem, and self-esteem negatively predicted negative body image (β = −.07) and drive for thinness (β = −.05). The only exception was that self-esteem did not significantly predict later eating concern (β = .00).

Assessment of publication bias

We assessed whether there was evidence of publication bias in the cross-lagged effects (i.e., the coefficients that were of key interest in this research). The three methods used for testing publication bias indicated little evidence of publication bias. First, the funnel graphs exhibited a relatively symmetrical shape typical of nonbiased meta-analytic data sets (see Fig. S2 in the Supplemental Material). Second, Egger's regression test (Egger et al., 1997) was nonsignificant in all cases (Table 5), suggesting that the funnel graphs did not deviate significantly from a symmetrical shape. Third, mixed-effects metaregression models indicated that all effect sizes did not differ significantly as a function of whether effect-size data had been reported in the article, except for the cross-lagged effect of total eating pathology on self-esteem (Table 5). When restricting the data to unpublished effect sizes (*k* = 33), we found the weighted mean effect size of this effect was β = −.07 [95% CI = −.10, −.04], which was only slightly smaller than the effect size based on the full data set (β = −.09, *k* = 39; see Table 2). Given that this was the only eating-disorder variable for which the publication bias tests yielded a significant result and given that the other methods of assessing publication bias were inconspicuous for all eating-disorder variables, we concluded that the possible influence of publication bias was, at most, very small.

Discussion

The aim of the present meta-analysis was to better understand the link between low self-esteem and eating disorders by synthesizing the available longitudinal evidence on prospective effects between low self-esteem and eating pathology (i.e., restrained eating, bulimic behavior, binge eating, eating concern, negative body image, drive for thinness, and total eating pathology).

Table 4. Summary of Effect Sizes for Relations Between Specific Eating Pathology Categories and Self-Esteem

Variable	*k*	*N*	Weighted mean effect size	95% CI	Heterogeneity		
					Q	τ^2	I^2
Restrained eating							
$r_{ED,SE}$	20	8,962	−.21*	[−.32, −.11]	193.8*	.040	94.2
ED→SE[a]	18	8,453	−.08*	[−.12, −.04]	37.1*	.003	53.8
SE→ED[a]	19	6,515	−.07*	[−.09, −.04]	13.7	.000	11.3
ED→ED[a]	19	6,515	.61*	[.52, .68]	262.1*	.050	93.9
SE→SE[a]	18	8,453	.59*	[.48, .69]	235.9*	.086	97.2
Bulimic behavior							
$r_{ED,SE}$	22	10,576	−.31*	[−.38, −.24]	325.4*	.027	92.3
ED→SE[a]	15	7,803	−.07*	[−.11, −.02]	34.4*	.004	62.7
SE→ED[a]	22	10,576	−.09*	[−.12, −.06]	32.3	.001	38.2
ED→ED[a]	22	10,576	.49*	[.41, .57]	463.1*	.054	96.0
SE→SE[a]	15	7,803	.52*	[.43, .60]	172.5*	.031	93.3
Binge eating							
$r_{ED,SE}$	6	6,240	−.13*	[−.23, −.03]	45.2*	.007	84.7
ED→SE[a]	6	6,240	−.05*	[−.08, −.03]	3.0	.000	12.1
SE→ED[a]	5	3,724	−.11*	[−.15, −.07]	3.7	.000	0.0
ED→ED[a]	5	3,724	.32*	[.30, .35]	1.7	.000	0.0
SE→SE[a]	6	6,240	.64*	[.36, .81]	47.2*	.109	98.9
Eating concern							
$r_{ED,SE}$	7	422	−.35*	[−.53, −.15]	14.3*	.026	58.2
ED→SE[a]	7	422	−.13*	[−.24, −.01]	5.7	.000	0.0
SE→ED[a]	7	422	.00	[−.10, .10]	3.9	.000	0.0
ED→ED[a]	7	422	.55*	[.52, .59]	1.2	.000	0.0
SE→SE[a]	7	422	.64*	[.42, .79]	21.0*	.074	79.9
Negative body image							
$r_{ED,SE}$	25	10,272	−.43*	[−.50, −.37]	228.3*	.031	92.1
ED→SE[a]	23	8,829	−.16*	[−.21, −.11]	70.8*	.007	70.9
SE→ED[a]	22	9,866	−.07*	[−.12, −.02]	72.1*	.009	78.2
ED→ED[a]	22	9,866	.62*	[.55, .68]	356.1*	.045	94.8
SE→SE[a]	23	8,829	.51*	[.42, .59]	246.4*	.060	95.3
Drive for thinness							
$r_{ED,SE}$	12	3,377	−.39*	[−.46, −.31]	50.8*	.013	76.3
ED→SE[a]	10	1,892	−.12*	[−.19, −.05]	14.1	.004	40.5
SE→ED[a]	12	3,377	−.05*	[−.10, −.01]	11.8	.001	18.3
ED→ED[a]	12	3,377	.68*	[.57, .77]	155.7*	.069	94.6
SE→SE[a]	10	1,892	.55*	[.42, .65]	57.8*	.038	86.7

Note: Computations were made with random-effects models. ED = eating-disorder variable; SE = self-esteem; *k* = number of samples; *N* = total number of participants in the *k* samples; CI = confidence interval; *Q* = statistic used in heterogeneity test; τ^2 = estimated amount of total heterogeneity; I^2 = ratio of total heterogeneity by total variability (given in percentage); $r_{ED,SE}$ = correlation between eating-disorder variable at Time 1 and self-esteem at Time 1.

[a]Standardized regression coefficient.

*$p < .05$.

The analyses were based on 48 samples, including data from more than 19,000 participants ranging from 7 to 48 years in age. Overall, the findings suggested a reciprocal pattern between low self-esteem and eating pathology. For behavioral symptoms, the point estimates were of similar size in both directions (i.e., behavioral symptoms predicted later self-esteem with about the same effect size as low self-esteem predicted later behavioral symptoms). In contrast, the point estimates of the effects of cognitive-affective symptoms on self-esteem were slightly larger than the reverse estimates, that is, effects of self-esteem on cognitive-affective

Table 5. Tests of Publication Bias in Cross-Lagged Effects

	Egger's regression test			Effect-size data published in article vs. unpublished				
Variable	*t*	*df*	*p*	k_p	k_u	*F*	*df1, df2*	*p*
Total eating pathology								
ED→SE	−1.37	37	.180	6	33	11.79	1, 37	.002
SE→ED	1.26	42	.215	13	31	2.43	1, 42	.127
Restrained eating								
ED→SE	0.23	16	.819	2	16	2.35	1, 16	.145
SE→ED	1.21	17	.243	4	15	2.76	1, 17	.115
Bulimic behavior								
ED→SE	0.66	13	.520	2	13	1.63	1, 13	.225
SE→ED	0.71	20	.489	9	13	0.10	1, 20	.753
Binge eating								
ED→SE	0.66	4	.545	0	6	—	—	—
SE→ED	−1.13	3	.340	0	5	—	—	—
Eating concern								
ED→SE	−0.08	5	.938	0	7	—	—	—
SE→ED	1.51	5	.191	0	7	—	—	—
Negative body image								
ED→SE	−0.42	21	.677	4	19	9.25	1, 21	.006
SE→ED	1.06	20	.302	4	18	2.37	1, 20	.140
Drive for thinness								
ED→SE	−0.20	8	.849	0	10	—	—	—
SE→ED	0.22	10	.829	2	10	1.65	1, 10	.228

Note: The differences between effect sizes from studies for which effect size data were published in the article versus unpublished were tested with mixed-effects metaregression models. Dash indicates that there were no published effect-size data for the eating-disorder variable. The significance level was adjusted to $p < .004$ for Egger's regression test and $p < .006$ for the difference between published and unpublished effect-size data (Bonferroni correction for 14 and nine tests, respectively). k_p = number of published effect sizes; k_u = number of unpublished effect sizes; ED = eating-disorder variable; SE = self-esteem.

symptoms. However, no formal test of the difference between the effects is available because the samples on which the effects were based overlapped partially. Moreover, note that by and large, the pattern of results was relatively similar across specific categories of eating pathology. Moderator analyses on the prospective effects between self-esteem and total eating pathology suggested that the effects did not differ across age, gender, sample type, and time lag. The pattern of effects is in line with both the vulnerability and the scar effect, supporting a reciprocal-relations model of low self-esteem and eating disorders. Thus, the findings suggest that low self-esteem makes people more vulnerable to developing an eating disorder and that suffering from an eating disorder scars the individual's self-esteem. Consequently, the present findings imply a positive feedback loop for people with high self-esteem and healthy eating behavior and, simultaneously, a vicious circle for people with low self-esteem and problematic eating behavior.

At first sight, the meta-analytic estimates of the effects might be considered as relatively small (i.e., the significant effects ranged from $\beta = -.05$ to $\beta = -.16$, with an average value of $\beta = .09$), especially when using Cohen's conventions for interpreting correlation coefficients (Cohen, 1992; e.g., with $r = .10$ indicating a small effect). However, conventions for correlations do not apply to cross-lagged effects, in particular because the stabilities of the outcomes are statistically controlled in the coefficients (Adachi & Willoughby, 2015). Often, constructs are relatively stable across time (which was also true in the present meta-analysis with regard to both self-esteem and eating pathology), which limits the theoretically possible range of effects of other constructs on the outcome. Recently, a meta-analytic project established empirical benchmarks for cross-lagged effects in several fields of psychology, including clinical and social-personality psychology (Orth et al., 2022). Given the distribution of effect sizes, results suggested

that an effect of .03 should be interpreted as small, .07 should be interpreted as medium, and .12 should be interpreted as large. Consequently, the effects found in the present meta-analysis can be considered of medium size. In addition, from a substantive perspective, very large effects were not to be expected given that many factors, besides low self-esteem, may influence eating pathology (for a review, see Polivy & Herman, 2002; Stice, 2002; Striegel-Moore & Bulik, 2007) and given that many factors, besides eating pathology, may influence self-esteem (for a review, see Orth & Robins, 2019). Moreover, the effects between self-esteem and eating pathology may accumulate over time (e.g., over adolescence and young adulthood; Abelson, 1985).

The largest effect size emerged for the effect of negative body image on self-esteem ($\beta = -.16$). This effect is consistent with the bottom-up model of self-esteem, which proposes that people's evaluations of specific aspects of their self (e.g., physical appearance) influence their global level of self-esteem (Rentzsch & Schröder-Abé, 2022). Given that measures of negative body image are more closely related to people's self than other categories of eating pathology (e.g., restrained eating or binge eating), this may provide an explanation of the larger effect of negative body image. However, as noted above, the pattern of findings generally held across specific categories of eating pathology.

The magnitude of the effect sizes between self-esteem and eating pathology was relatively similar to the effects between self-esteem and depression and between self-esteem and anxiety (Sowislo & Orth, 2013). Future research should examine the relations between self-esteem and other psychological disorders (e.g., personality disorders) because it is possible that low self-esteem is transdiagnostically related to psychopathology more generally (Nolen-Hoeksema & Watkins, 2011; Zeigler-Hill, 2011). If low self-esteem proves to be a transdiagnostic risk factor for psychological disorders, this would have important implications for clinical assessment, diagnosis, and treatment (Rodriguez-Seijas et al., 2015). Furthermore, improving low self-esteem may be useful for reducing the risk for psychological disorders in the first place.

The analyses suggested that the findings are unlikely to be influenced by publication bias. Moreover, we believe that there was generally little reason to expect publication bias in the present meta-analytic data set. The reason is that most of the effect sizes had not been reported in the articles but were obtained from the study authors. In addition, some studies included in the meta-analysis focused on other research questions (i.e., other than prospective effects between self-esteem and eating-disorder variables), and the relevant statistics (i.e., correlations between self-esteem and eating pathology) were simply reported along with other statistics on a larger set of variables.

As noted above, Colmsee et al. (2021) recently meta-analyzed the prospective effect of self-esteem on eating pathology. The meta-analytic estimate determined in the present research ($\beta = -.08$) was very similar in magnitude to the effect found in the earlier meta-analysis ($\beta = -.09$). However, several reasons suggest that the present meta-analysis significantly improves the knowledge about the link between self-esteem and eating pathology. First, the present meta-analysis examined a much larger evidentiary base. More precisely, whereas Colmsee et al. used data from 13 studies, the present meta-analysis included 44 studies. These numbers suggest not only that the present research provides for much larger power and precision but also that the present data set reflects the available evidence in a more comprehensive way. Second, whereas the data set by Colmsee et al. was based exclusively on published data, the present meta-analytic data set included a relatively large number of unpublished effect sizes, allowing for thorough tests of publication bias. Third, whereas in Colmsee et al. only nine effect sizes could be controlled for prior levels of the outcomes, this was possible for all effect sizes in the present research, which increases the validity of conclusions about prospective effects. Fourth, the present research significantly extends prior research in this area by investigating aspects that were not covered by Colmsee et al. Specifically, the present research also tested the reverse direction of effects (i.e., effects of eating pathology on self-esteem) and estimated the effects in both directions also for specific categories of eating pathology (e.g., restrained eating, binge eating) in addition to the index of total eating pathology.

When interpreting the findings, the following limitations should be noted. First, the present research does not allow for strong causal conclusions because the studies included in the meta-analysis used nonexperimental designs. As is true for all observational studies, it is possible that the effects are confounded by unmeasured third variables (e.g., Little et al., 2007). Nevertheless, longitudinal data are useful to test whether prospective effects are consistent with a causal model of the relation between constructs. Second, the samples were predominantly from Western cultures, of White/European race/ethnicity, and of medium to high socioeconomic status. In future research, it would therefore be highly desirable to more often collect data on self-esteem and eating pathology in samples from non-Western cultural contexts and in samples that are more diverse regarding race/ethnicity and socioeconomic

status to evaluate the degree to which the pattern of findings generalizes across cultures and different types of samples (Henrich et al., 2010). Third, in the meta-analysis, we could not test whether differences in socio-economic status (as indicated, e.g., by income, level of education, or occupational prestige) moderate the effects. The reason is that even if information is available in some reports, this information would not be comparable across samples because of the many differences between measures, between countries, and between birth cohorts. Fourth, we contacted authors with a research program in the area of eating disorders that we were aware of. However, because we received only three articles that were eligible for inclusion, it is unlikely that the effect sizes from these articles have biased the results. Fifth, it was not possible to divide bulimic behavior into two separate variables (i.e., binge eating and compensatory behaviors) because the measures rarely differentiated between the two components. Although some measures included binge eating as a separate scale, they did not provide information about whether binge eating was accompanied by compensatory behaviors. Finally, for some of the categories of eating pathology, only a small number of samples was available. Thus, future research would benefit from conducting more longitudinal studies examining the relation between low self-esteem and eating disorders.

The present research also has important strengths. A crucial advantage of meta-analyses in general lies in the aggregation of data across a set of heterogeneous studies, which increases the robustness of the findings. In the present research, 48 samples provided data from more than 19,000 individuals. Another major strength is the longitudinal nature of the data. Specifically, the fact that the meta-analysis synthesized prospective effects and systematically controlled for prior levels of the constructs significantly strengthens the validity of the findings. Finally, the thorough and diverse strategies used in the search for relevant studies (i.e., use of bibliographic databases, examination of references in key papers, contacting of authors with relevant research programs, and requests for unpublished effect-size data) increased the likelihood that the present meta-analysis comprehensively covers the available data.

Given that the present research suggests that low self-esteem and eating pathology reciprocally affect each other, future research should examine the mechanisms that may mediate the effects between the constructs. For example, a possible pathway is that individuals' level of self-esteem influences the perception of their own bodies, which, in turn, influences individuals' eating behavior (e.g., Woodward et al., 2019). A possible pathway of the reverse direction of effects is that eating pathology leads to social withdrawal and isolation (e.g., Robinson, 2014; Rørtveit et al., 2009), which is detrimental for social relationships. A lowered level of social support, in turn, might then lead to decreases in self-esteem (Harris & Orth, 2020). Finally, an interesting avenue for future research consists in using experience-sampling methods that focus on within-persons effects across shorter time periods (Csikszentmihalyi & Larson, 2014). For example, this approach would facilitate important insights into how eating-related thoughts and behaviors in everyday life may lead to immediate changes in self-esteem.

Moreover, future research should continue to test for moderators of the effects between low self-esteem and eating pathology. The moderator variables tested in the present meta-analysis (i.e., age, gender, sample type, and time lag) were not significant. However, other factors, such as the person's living situation, eating habits, and self-regulation abilities, may be important moderators. For example, living together with close others (e.g., one's parents or a partner) and sharing meals together may serve as a protective factor and thereby reduce the effect of low self-esteem on eating pathology. The person's level of self-regulation may also moderate the effects between low self-esteem and eating pathology. However, self-regulation may affect the relation between self-esteem and specific symptoms in different ways. For example, whereas better self-regulation abilities may buffer the effect of low self-esteem on binge eating, they might increase, rather than buffer, the effect of low self-esteem on restrained eating.

The findings of the present meta-analysis may also have practical implications. If future research supports the causality of the effects, then eating pathology could be improved by fostering self-esteem. In fact, research suggests that it is possible to increase self-esteem through interventions (Haney & Durlak, 1998; Niveau et al., 2021). We note that many factors influence complex phenomena such as eating pathology, and future research would benefit from combining information on a broad set of factors (e.g., by using procedures such as machine learning). Nevertheless, the present research suggests that self-esteem is one of the factors that contributes to the development of eating pathology. Another practical implication is related to the reverse direction of effects, that is, that it might be possible to improve self-esteem by treating eating pathology (e.g., Linardon et al., 2019). Given the findings from the present meta-analysis, the individual's self-esteem could benefit particularly from modifying the cognitive-affective symptoms of eating disorders, such as eating concern and negative body image.

Transparency

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Samantha Krauss: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Visualization; Writing – original draft.

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Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

Open Practices

This article has received the badges for Open Data and Open Materials. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

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Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/21677026221144255

Notes

1. At the time of coding, the qualifications of the coders were as follows: S. Krauss had a master's degree in psychology, and L. C. Dapp had a PhD in psychology.
2. Using data from the Young in Norway Study, von Soest and Wichstrøm (2006) provided effect sizes on a global measure, bulimic behavior, and binge eating, whereas von Soest and Wichstrøm (2009) provided effect sizes on restrained eating and negative body image.

References

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

Abelson, R. P. (1985). A variance explanation paradox: When a little is a lot. *Psychological Bulletin*, *97*(1), 129–133. https://doi.org/10.1037/0033-2909.97.1.129

Adachi, P., & Willoughby, T. (2015). Interpreting effect sizes when controlling for stability effects in longitudinal autoregressive models: Implications for psychological science. *European Journal of Developmental Psychology*, *12*(1), 116–128. https://doi.org/10.1080/17405629.2014.963549

*Allison, K. C., & Park, C. L. (2004). A prospective study of disordered eating among sorority and nonsorority women. *International Journal of Eating Disorders*, *35*(3), 354–358. https://doi.org/10.1002/eat.10255

*Amaral, A. C. S., & Ferreira, M. E. C. (2017). Body dissatisfaction and associated factors among Brazilian adolescents: A longitudinal study. *Body Image*, 22, 32–38. https://doi.org/10.1016/j.bodyim.2017.04.006

*Andersén, M., & Birgegård, A. (2017). Diagnosis-specific self-image predicts longitudinal suicidal ideation in adult eating disorders. *International Journal of Eating Disorders*, *50*(8), 970–978. https://doi.org/10.1002/eat.22730

*Bain, N. M. (2007). *A biopsychosocial model of dieting behaviors in adolescent females: A longitudinal study* (Publication No. 0818426) [Doctoral dissertation, University of Washington]. ProQuest Dissertations and Theses Global.

*Bardone, A. M., Perez, M., Abramson, L. Y., & Joiner, T. E. (2003). Self-competence and self-liking in the prediction of change in bulimic symptoms. *International Journal of Eating Disorders*, *34*(3), 361–369. https://doi.org/10.1002/eat.10197

Bardone-Cone, A. M., Thompson, K. A., & Miller, A. J. (2020). The self and eating disorders. *Journal of Personality*, *88*(1), 59–75. https://doi.org/10.1111/jopy.12448

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest*, *4*(1), 1–44. https://doi.org/10.1111/1529-1006.01431

*Beato-Fernández, L., Rodríguez-Cano, T., Belmonte-Llario, A., & Martínez-Delgado, C. (2004). Risk factors for eating disorders in adolescents. *European Child and Adolescent Psychiatry*, *13*(5), 287–294. https://doi.org/10.1007/s00787-004-0407-x

*Birgegård, A., Björck, C., Norring, C., Sohlberg, S., & Clinton, D. (2009). Anorexic self-control and bulimic self-hate: Differential outcome prediction from initial self-image. *International Journal of Eating Disorders*, *42*(6), 522–530. https://doi.org/10.1002/eat.20642

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. John Wiley & Sons.

Braun, T. D., Park, C. L., & Gorin, A. (2016). Self-compassion, body image, and disordered eating: A review of the literature. *Body Image*, *17*, 117–131. https://doi.org/10.1016/j.bodyim.2016.03.003

*Carrard, I., Crépin, C., Rouget, P., Lam, T., Golay, A., & Van der Linden, M. (2011). Randomised controlled trial of a guided self-help treatment on the Internet for binge eating disorder. *Behaviour Research and Therapy*, *49*(8), 482–491. https://doi.org/10.1016/j.brat.2011.05.004

*Carrard, I., Crépin, C., Rouget, P., Lam, T., Van der Linden, M., & Golay, A. (2011). Acceptance and efficacy of a guided internet self-help treatment program for obese

patients with binge eating disorder. *Clinical Practice and Epidemiology in Mental Health*, 7, 8–18. https://doi.org/10.2174/1745017901107010008

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159. https://doi.org/10.1037/0033-2909.112.1.155

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Erlbaum.

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology*, *112*(4), 558–577. https://doi.org/10.1037/0021-843X.112.4.558

Colmsee, I.-S. O., Hank, P., & Bošnjak, M. (2021). Low self-esteem as a risk factor for eating disorders. *Zeitschrift für Psychologie*, *229*(1), 48–69. https://doi.org/10.1027/2151-2604/a000433

*Courtney, E. A., Gamboz, J., & Johnson, J. G. (2008). Problematic eating behaviors in adolescents with low self-esteem and elevated depressive symptoms. *Eating Behaviors*, *9*(4), 408–414. https://doi.org/10.1016/j.eatbeh.2008.06.001

Csikszentmihalyi, M., & Larson, R. (2014). Validity and reliability of the experience-sampling method. In M. Csikszentmihalyi (Ed.), *Flow and the foundations of positive psychology* (pp. 35–54). Springer.

*Davison, K. K., Werder, J. L., Trost, S. G., Baker, B. L., & Birch, L. L. (2007). Why are early maturing girls less active? Links between pubertal development, psychological well-being, and physical activity among girls at ages 11 and 13. *Social Science and Medicine*, *64*(12), 2391–2404. https://doi.org/10.1016/j.socscimed.2007.02.033

*De Caro, E. F., & Di Blas, L. (2016). A prospective study on the reciprocal influence between personality and attitudes, behaviors, and psychological characteristics salient in eating disorders in a sample of non-clinical adolescents. *Eating Disorders*, *24*(5), 453–468. https://doi.org/10.1080/10640266.2016.1207454

Diehl, M., Chui, H., Hay, E. L., Lumley, M. A., Grühn, D., & Labouvie-Vief, G. (2014). Change in coping and defense mechanisms across adulthood: Longitudinal findings in a European American sample. *Developmental Psychology*, *50*(2), 634–648. https://doi.org/10.1037/a0033619

Donnellan, M. B., Trzesniewski, K. H., & Robins, R. W. (2011). Self-esteem: Enduring issues and controversies. In T. Chamorro-Premuzic, S. von Stumm, & A. Furnham (Eds.), *The Wiley-Blackwell handbook of individual differences* (pp. 718–746). Wiley-Blackwell.

Dormann, C., & Griffin, M. A. (2015). Optimal time lags in panel studies. *Psychological Methods*, *20*(4), 489–505. https://doi.org/10.1037/met0000041

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, *315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629

Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, *16*(4), 363–370.

Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy*, *41*(5), 509–528. https://doi.org/10.1016/S0005-7967(02)00088-8

*Fay, K. E. (2011). *Weighing in on the issue: A longitudinal analysis of the individual and contextual factors that influence the developmental trajectories of eating disorders among adolescents* (Publication No. 3460507) [Doctoral dissertation, Tufts University]. ProQuest Dissertations and Theses Global.

*Ferreiro, F., Seoane, G., & Senra, C. (2012). Gender-related risk and protective factors for depressive symptoms and disordered eating in adolescence: A 4-year longitudinal study. *Journal of Youth and Adolescence*, *41*(5), 607–622. https://doi.org/10.1007/s10964-011-9718-7

Galmiche, M., Déchelotte, P., Lambert, G., & Tavolacci, M. P. (2019). Prevalence of eating disorders over the 2000–2018 period: A systematic literature review. *The American Journal of Clinical Nutrition*, *109*(5), 1402–1413. https://doi.org/10.1093/ajcn/nqy342

Garner, D. M., & Garfinkel, P. E. (1979). The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. *Psychological Medicine*, *9*(2), 273–279. https://doi.org/10.1017/S0033291700030762

Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, *2*(2), 15–34.

Gollob, H. F., & Reichardt, C. S. (1987). Taking account of time lags in causal models. *Child Development*, *58*(1), 80–92. https://doi.org/10.2307/1130293

*Green, M., Kroska, A., Herrick, A., Bryant, B., Sage, E., Miles, L., Ravet, M., Powers, M., Whitegoat, W., Linkhart, R., & King, B. (2018). A preliminary trial of an online dissonance-based eating disorder intervention. *Eating Behaviors*, *31*, 88–98. https://doi.org/10.1016/j.eatbeh.2018.08.007

*Green, M., Willis, M., Fernandez-Kong, K., Reyes, S., Linkhart, R., Johnson, M., Thorne, T., Lindberg, J., Kroska, E., & Woodward, H. (2017). A controlled randomized preliminary trial of a modified dissonance-based eating disorder intervention program. *Journal of Clinical Psychology*, *73*(12), 1612–1628. https://doi.org/10.1002/jclp.22468

*Gumz, A., Weigel, A., Daubmann, A., Wegscheider, K., Romer, G., & Löwe, B. (2017). Efficacy of a prevention program for eating disorders in schools: A cluster-randomized controlled trial. *BMC Psychiatry*, *17*(1), Article 293. https://doi.org/10.1186/s12888-017-1454-4

Haney, P., & Durlak, J. A. (1998). Changing self-esteem in children and adolescents: A meta-analytical review. *Journal of Clinical Child Psychology*, *27*(4), 423–433. https://doi.org/10.1207/s15374424jccp2704_6

Harris, M. A., & Orth, U. (2020). The link between self-esteem and social relationships: A meta-analysis of longitudinal studies. *Journal of Personality and Social Psychology*, *119*(6), 1459–1477. https://doi.org/10.1037/pspp0000265

Harter, S. (2012). *Self-perception profile for children: Manual and questionnaires (Grades 3–8)*. University of Denver.

Harville, D. A. (1977). Maximum likelihood approaches to variance component estimation and to related problems. *Journal of the American Statistical Association*, *72*(358), 320–338. https://doi.org/10.1080/01621459.1977.10480998

*Helgeson, V. S., Escobar, O., Siminerio, L., & Becker, D. (2007). Unmitigated communion and health among adolescents with and without diabetes: The mediating role of eating disturbances. *Personality and Social Psychology Bulletin*, *33*(4), 519–536. https://doi.org/10.1177/0146167206296953

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, *33*(2–3), 61–83. https://doi.org/10.1017/S0140525X0999152X

*Hinshaw, S. P., Owens, E. B., Zalecki, C., Huggins, S. P., Montenegro-Nevado, A. J., Schrodek, E., & Swanson, E. N. (2012). Prospective follow-up of girls with attention-deficit/hyperactivity disorder into early adulthood: Continuing impairment includes elevated risk for suicide attempts and self-injury. *Journal of Consulting and Clinical Psychology*, *80*(6), 1041–1051. https://doi.org/10.1037/a0029451

Hölling, H., & Schlack, R. (2007). Essstörungen im Kindes-und Jugendalter [Eating disorders in childhood and adolescence]. *Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz*, *50*(5–6), 794–799. https://doi.org/10.1007/s00103-007-0242-6

*Holm-Denoma, J. M., Gordon, K. H., Bardone-Cone, A. M., Vohs, K. D., Abramson, L. Y., Heatherton, T. F., & Joiner, T. E. (2005). A test of an interactive model of bulimic symptomatology in adult women. *Behavior Therapy*, *36*(4), 311–321. https://doi.org/10.1016/S0005-7894(05)80113-3

*Holm-Denoma, J. M., Joiner, T. E., Vohs, K. D., & Heatherton, T. F. (2008). The "freshman fifteen" (the "freshman five" actually): Predictors and possible explanations. *Health Psychology*, *27*(1, Suppl.), S3–S9. https://doi.org/10.1037/0278-6133.27.1.S3

Ille, R., Schöggl, H., Kapfhammer, H.-P., Arendasy, M., Sommer, M., & Schienle, A. (2014). Self-disgust in mental disorders—Symptom-related or disorder-specific? *Comprehensive Psychiatry*, *55*(4), 938–943. https://doi.org/10.1016/j.comppsych.2013.12.020

*Isomaa, R., Isomaa, A.-L., Marttunen, M., Kaltiala-Heino, R., & Björkqvist, K. (2011). Longitudinal concomitants of incorrect weight perception in female and male adolescents. *Body Image*, *8*(1), 58–63. https://doi.org/10.1016/j.bodyim.2010.11.005

James, W. (1890). *The principles of psychology* (Vol. 1). Holt.

Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: A prospective analysis. *Journal of Abnormal Psychology*, *114*(1), 119–125. https://doi.org/10.1037/0021-843X.114.1.119

*Jones, D. C., & Newman, J. B. (2009). Early adolescent adjustment and critical evaluations by self and other: The prospective impact of body image dissatisfaction and peer appearance teasing on global self-esteem. *International Journal of Developmental Science*, *3*(1), 17–26. https://doi.org/10.3233/DEV-2009-3104

Jones, E. J., Egan, S. J., Howell, J. A., Hoiles, K. J., & Mazzucchelli, T. G. (2020). An examination of the transdiagnostic cognitive-behavioural model of eating disorders in adolescents. *Eating Behaviors*, *39*, Article 101445. https://doi.org/10.1016/j.eatbeh.2020.101445

Khazanov, G. K., & Ruscio, A. M. (2016). Is low positive emotionality a specific risk factor for depression? A meta-analysis of longitudinal studies. *Psychological Bulletin*, *142*(9), 991–1015. https://doi.org/10.1037/bul0000059

*Kipp, L. E. (2012). *Social influences and psychological and physical well-being among female adolescent gymnasts* (Publication No. 3588001) [Doctoral dissertation, University of Minnesota]. ProQuest Dissertations and Theses Global.

Klein, D. N., Kotov, R., & Bufferd, S. J. (2011). Personality and depression: Explanatory models and review of the evidence. *Annual Review of Clinical Psychology*, *7*, 269–295. https://doi.org/10.1146/annurev-clinpsy-032210-104540

Knapp, G., & Hartung, J. (2003). Improved tests for a random effects meta-regression with a single covariate. *Statistics in Medicine*, *22*(17), 2693–2710. https://doi.org/10.1002/sim.1482

*Kristeller, J., Wolever, R. Q., & Sheets, V. (2014). Mindfulness-based eating awareness training (MB-EAT) for binge eating: A randomized clinical trial. *Mindfulness*, *5*(3), 282–297. https://doi.org/10.1007/s12671-012-0179-1

Lampard, A. M., Tasca, G. A., Balfour, L., & Bissada, H. (2013). An evaluation of the transdiagnostic cognitive-behavioural model of eating disorders. *European Eating Disorders Review*, *21*(2), 99–107. https://doi.org/10.1002/erv.2214

Langan, D., Higgins, J. P., Jackson, D., Bowden, J., Veroniki, A. A., Kontopantelis, E., Viechtbauer, W., & Simmonds, M. (2019). A comparison of heterogeneity variance estimators in simulated random-effects meta-analyses. *Research Synthesis Methods*, *10*(1), 83–98. https://doi.org/10.1002/jrsm.1316

Larsen, P. S., Strandberg-Larsen, K., Micali, N., & Andersen, A.-M. N. (2015). Parental and child characteristics related to early-onset disordered eating: A systematic review. *Harvard Review of Psychiatry*, *23*(6), 395–412. https://doi.org/10.1097/HRP.0000000000000073

Leary, M. R. (2012). Sociometer theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (pp. 141–159). Sage.

Linardon, J., Kothe, E. J., & Fuller-Tyszkiewicz, M. (2019). Efficacy of psychotherapy for bulimia nervosa and binge-eating disorder on self-esteem improvement: Meta-analysis. *European Eating Disorders Review*, *27*(2), 109–123. https://doi.org/10.1002/erv.2662

Little, T. D., Preacher, K. J., Selig, J. P., & Card, N. A. (2007). New developments in latent variable panel analyses of longitudinal data. *International Journal of Behavioral Development*, *31*(4), 357–365. https://doi.org/10.1177/0165025407077757

*McClure Brenchley, K. J., & Quinn, D. M. (2016). Weight-based rejection sensitivity: Scale development and implications for well-being. *Body Image*, *16*, 79–92. https://doi.org/10.1016/j.bodyim.2015.11.005

Moola, S., Munn, Z., Tufanaru, C., Aromataris, E., Sears, K., Sfetcu, R., Currie, M., Qureshi, R., Mattis, P., Lisy, K., &

Mu, P.-F. (2020). Chapter 7: Systematic reviews of etiology and risk. In E. Aromataris & Z. Munn (Eds.), *JBI manual for evidence synthesis*. Joanna Briggs Institute. https://synthesismanual.jbi.global

*Munsch, S. (2014). Study protocol: Psychological and physiological consequences of exposure to mass media in young women - An experimental cross-sectional and longitudinal study and the role of moderators. *BMC Psychology*, *2*(1), Article 37. https://doi.org/10.1186/s40359-014-0037-0

*Murray, K., Rieger, E., & Byrne, D. (2018). Body image predictors of depressive symptoms in adolescence. *Journal of Adolescence*, *69*, 130–139. https://doi.org/10.1016/j.adolescence.2018.10.002

*Neumark-Sztainer, D., Paxton, S. J., Hannan, P. J., Haines, J., & Story, M. (2006). Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *Journal of Adolescent Health*, *39*(2), 244–251. https://doi.org/10.1016/j.jadohealth.2005.12.001

*Nichols, T. E., Damiano, S. R., Gregg, K., Wertheim, E. H., & Paxton, S. J. (2018). Psychological predictors of body image attitudes and concerns in young children. *Body Image*, *27*, 10–20. https://doi.org/10.1016/j.bodyim.2018.08.005

Niveau, N., New, B., & Beaudoin, M. (2021). Self-esteem interventions in adults – A systematic review and meta-analysis. *Journal of Research in Personality*, *94*, Article 104131. https://doi.org/10.1016/j.jrp.2021.104131

Nolen-Hoeksema, S., & Watkins, E. R. (2011). A heuristic for developing transdiagnostic models of psychopathology: Explaining multifinality and divergent trajectories. *Perspectives on Psychological Science*, *6*(6), 589–609. https://doi.org/10.1177/1745691611419672

*Nordin-Bates, S. M., Schwarz, J. F., Quested, E., Cumming, J., Aujla, I. J., & Redding, E. (2016). Within-and between-person predictors of disordered eating attitudes among male and female dancers: Findings from the UK Centres for Advanced Training. *Psychology of Sport and Exercise*, *27*, 101–111. https://doi.org/10.1016/j.psychsport.2016.07.004

*Nuzzi, L. C., Firriolo, J. M., Pike, C. M., Cerrato, F. E., DiVasta, A. D., & Labow, B. I. (2018). The effect of surgical treatment for gynecomastia on quality of life in adolescents. *Journal of Adolescent Health*, *63*(6), 759–765. https://doi.org/10.1016/j.jadohealth.2018.06.028

*Nuzzi, L. C., Firriolo, J. M., Pike, C. M., Cerrato, F. E., Webb, M. L., Faulkner, H. R., DiVasta, A. D., & Labow, B. I. (2017). The effect of reduction mammaplasty on quality of life in adolescents with macromastia. *Pediatrics*, *140*(5), Article e20171103. https://doi.org/10.1542/peds.2017-1103

Orth, U., Meier, L. L., Bühler, J. L., Dapp, L. C., Krauss, S., Messerli, D., & Robins, R. W. (2022). Effect size guidelines for cross-lagged effects. *Psychological Methods*. Advance online publication. https://doi.org/10.1037/met0000499

Orth, U., & Robins, R. W. (2019). Development of self-esteem across the lifespan. In D. P. McAdams, R. L. Shiner, & J. L. Tackett (Eds.), *Handbook of personality development* (pp. 328–344). The Guilford Press.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *The BMJ*, *372*, Article n371. https://doi.org/10.1136/bmj.n71

*Peterson, C. B., Mitchell, J. E., Crow, S. J., Crosby, R. D., & Wonderlich, S. A. (2009). The efficacy of self-help group treatment and therapist-led group treatment for binge eating disorder. *American Journal of Psychiatry*, *166*(12), 1347–1354. https://doi.org/10.1176/appi.ajp.2009.09030345

Polivy, J., & Herman, C. P. (2002). Causes of eating disorders. *Annual Review of Psychology*, *53*, 187–213. https://doi.org/10.1146/annurev.psych.53.100901.135103

Quittkat, H. L., Hartmann, A. S., Düsing, R., Buhlmann, U., & Vocks, S. (2019). Body dissatisfaction, importance of appearance, and body appreciation in men and women over the lifespan. *Frontiers in Psychiatry*, *10*, Article 864. https://doi.org/10.3389/fpsyt.2019.00864

*Rayner, K. E., Schniering, C. A., Rapee, R. M., Taylor, A., & Hutchinson, D. M. (2013). Adolescent girls' friendship networks, body dissatisfaction, and disordered eating: Examining selection and socialization processes. *Journal of Abnormal Psychology*, *122*(1), 93–104. https://doi.org/10.1037/a0029304

R Core Team. (2021). *R: A language and environment for statistical computing* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Rentzsch, K., & Schröder-Abé, M. (2022). Top down or bottom up? Evidence from the longitudinal development of global and domain-specific self-esteem in adulthood. *Journal of Personality and Social Psychology*, *122*(4), 714–730. https://doi.org/10.1037/pspp0000393

Revelle, W. (2021). *psych: Procedures for personality and psychological research* (Version 2.1.9) [Computer software]. https://cran.r-project.org/package=psych

Rieger, E., Van Buren, D. J., Bishop, M., Tanofsky-Kraff, M., Welch, R., & Wilfley, D. E. (2010). An eating disorder-specific model of interpersonal psychotherapy (IPT-ED): Causal pathways and treatment implications. *Clinical Psychology Review*, *30*(4), 400–410. https://doi.org/10.1016/j.cpr.2010.02.001

Robinson, P. (2014). Severe and enduring eating disorders: Recognition and management. *Advances in Psychiatric Treatment*, *20*(6), 392–401. https://doi.org/10.1192/apt.bp.113.011841

*Rodríguez-Cano, T., Beato-Fernandez, L., Rojo-Moreno, L., & Vaz-Leal, F. J. (2014). The role of temperament and character in the outcome of depressive mood in eating disorders. *Comprehensive Psychiatry*, *55*(5), 1130–1136. https://doi.org/10.1016/j.comppsych.2014.02.009

Rodriguez-Seijas, C., Eaton, N. R., & Krueger, R. F. (2015). How transdiagnostic factors of personality and psychopathology can inform clinical assessment and intervention. *Journal of Personality Assessment*, *97*(5), 425–435. https://doi.org/10.1080/00223891.2015.1055752

Rørtveit, K., Åström, S., & Severinsson, E. (2009). The feeling of being trapped in and ashamed of one's own body: A qualitative study of women who suffer from eating difficulties. *International Journal of Mental Health Nursing*,

18(2), 91–99. https://doi.org/10.1111/j.1447-0349.2008.00588.x

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton University Press.

*Sehm, M., & Warschburger, P. (2018). Prospective associations between binge eating and psychological risk factors in adolescence. *Journal of Clinical Child and Adolescent Psychology*, *47*(5), 770–784. https://doi.org/10.1080/15374416.2016.1178124

Serpell, L., & Troop, N. (2003). Psychological factors. In J. Treasure, U. Schmidt, & E. van Furth (Eds.), *Handbook of eating disorders* (2nd ed., pp. 151–167). John Wiley & Sons.

*Shaw, H. E., Stice, E., & Springer, D. W. (2004). Perfectionism, body dissatisfaction, and self-esteem in predicting bulimic symptomatology: Lack of replication. *International Journal of Eating Disorders*, *36*(1), 41–47. https://doi.org/10.1002/eat.20016

Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychological Bulletin*, *139*(1), 213–240. https://doi.org/10.1037/a0028931

Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin*, *128*(5), 825–848. https://doi.org/10.1037//0033-2909.128.5.825

*Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology*, *21*(2), 131–138. https://doi.org/10.1037//0278-6133.21.2.131

Striegel-Moore, R. H., & Bulik, C. M. (2007). Risk factors for eating disorders. *American Psychologist*, *62*(3), 181–198. https://doi.org/10.1037/0003-066X.62.3.181

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*(3), 1–48. https://doi.org/10.18637/jss.v036.i03

Viechtbauer, W., & Cheung, M. W. L. (2010). Outlier and influence diagnostics for meta-analysis. *Research Synthesis Methods*, *1*(2), 112–125. https://doi.org/10.1002/jrsm.11

Viechtbauer, W., López-López, J. A., Sánchez-Meca, J., & Marín-Martínez, F. (2015). A comparison of procedures to test for moderators in mixed-effects meta-regression models. *Psychological Methods*, *20*(3), 360–374. https://doi.org/10.1037/met0000023

*Vohs, K. D., Voelz, Z. R., Pettit, J. W., Bardone, A. M., Katz, J., Abramson, L. Y., Heatherton, T. F., & Joiner, T. E. (2001). Perfectionism, body dissatisfaction, and self-esteem: An interactive model of bulimic symptom development. *Journal of Social and Clinical Psychology*, *20*(4), 476–497. https://doi.org/10.1521/jscp.20.4.476.22397

*von Soest, T., & Wichstrøm, L. (2006). Cohabitation reduces bulimic symptoms in young women. *International Journal of Eating Disorders*, *39*(6), 484–491. https://doi.org/10.1002/eat.20273

*von Soest, T., & Wichstrøm, L. (2009). Gender differences in the development of dieting from adolescence to early adulthood: A longitudinal study. *Journal of Research on Adolescence*, *19*(3), 509–529. https://doi.org/10.1111/j.1532-7795.2009.00605.x

*Wertheim, E. H., Koerner, J., & Paxton, S. J. (2001). Longitudinal predictors of restrictive eating and bulimic tendencies in three different age groups of adolescent girls. *Journal of Youth and Adolescence*, *30*(1), 69–81. https://doi.org/10.1023/A:1005224921891

*Wojtowicz, A. E., & von Ranson, K. M. (2012). Weighing in on risk factors for body dissatisfaction: A one-year prospective study of middle-adolescent girls. *Body Image*, *9*(1), 20–30. https://doi.org/10.1016/j.bodyim.2011.07.004

Woodward, K., McIlwain, D., & Mond, J. (2019). Feelings about the self and body in eating disturbances: The role of internalized shame, self-esteem, externalized self-perceptions, and body shame. *Self and Identity*, *18*(2), 159–182. https://doi.org/10.1080/15298868.2017.1403373

Zeigler-Hill, V. (2011). The connections between self-esteem and psychopathology. *Journal of Contemporary Psychotherapy*, *41*(3), 157–164. https://doi.org/10.1007/s10879-010-9167-8