

Smith, Martin M. ORCID logoORCID:

<https://orcid.org/0000-0002-4754-3032>, Sherry, Simon B., Vidovic, Vanja, Hewitt, Paul L. and Flett, Gordon L. (2020) Why does perfectionism confer risk for depressive symptoms? A meta-analytic test of the mediating role of stress and social disconnection. *Journal of Research in Personality*, 86. p. 103954.

Downloaded from: <https://ray.yorks.ac.uk/id/eprint/4546/>

The version presented here may differ from the published version or version of record. If you intend to cite from the work you are advised to consult the publisher's version:

<http://dx.doi.org/10.1016/j.jrp.2020.103954>

Research at York St John (RaY) is an institutional repository. It supports the principles of open access by making the research outputs of the University available in digital form.

Copyright of the items stored in RaY reside with the authors and/or other copyright owners. Users may access full text items free of charge, and may download a copy for private study or non-commercial research. For further reuse terms, see licence terms governing individual outputs. [Institutional Repository Policy Statement](#)

RaY

Research at the University of York St John

For more information please contact RaY at ray@yorks.ac.uk

Smith, M. M., Sherry, S. B., Vidovic, V., Hewitt, P. L., & Flett, G. L. (accepted, March 23, 2020). Why does perfectionism confer risk for depressive symptoms? A meta-analytic test of the mediating role of stress and social disconnection. *Journal of Research in Personality*.

Why does perfectionism confer risk for depressive symptoms?

A meta-analytic test of the mediating role of stress and social disconnection

Martin M. Smith^{a*}, Simon B. Sherry^b, Vanja Vidovic^c, Paul L. Hewitt^d, & Gordon L. Flett^e

—Journal of Research in Personality (11,399 Words)—

^aSchool of Science, Technology, and Health, York St John University, Lord Mayor's Walk,
York, UK Y031 7EX

^bDepartment of Psychology and Neuroscience, Dalhousie University, 1355 Oxford Street, PO
Box 15000, Halifax, Nova Scotia, Canada B3H 4R2

^cDepartment of Psychology, University of Waterloo, 200 University Avenue West, Waterloo,
Ontario, Canada, N2L 3G1

^dDepartment of Psychology, University of British Columbia, Vancouver, British Columbia,
Canada V6T 1Z4

^eDepartment of Psychology, York University, Toronto, Ontario, Canada M3J 1P3

*Corresponding author. Tel.: +44-01904-876761

E-mail address: m.smith3@yorksj.ac.uk (M. M. Smith)

Abstract

The stress generation model posits perfectionistic concerns and perfectionistic strivings generate stress and, in turn, depression. Alternatively, the Perfectionism Social Disconnection Model (PSDM) maintains perfectionistic concerns and perfectionistic strivings confer risk for depression through social disconnection. However, inconsistent findings, underpowered studies, and overreliance on cross-sectional designs have obscured understanding of the mediating role of stress and social disconnection in the perfectionism–depression link. We addressed this by conducting the first meta-analytic test of the stress generation model and PSDM. Our search yielded 18 longitudinal studies ($N = 5,568$) involving community adults, undergraduates, medical students, and psychiatric patients. Results revealed perfectionistic concerns predicted increased depression through social disconnection and stress, whereas perfectionistic strivings predicted increased depression through social disconnection, but not stress.

Keywords: perfectionism, depression, stress, social disconnection, longitudinal, meta-analysis

Highlights

- Tested if social disconnection and stress mediate the perfectionism–depression link.
- Findings were derived from 18 longitudinal studies with 20 samples ($N = 5,568$).
- Perfectionistic concerns predicted increased depression via stress and social disconnection.
- Perfectionistic strivings predicted increased depression via social disconnection.
- Stress and social disconnection are mechanisms linking perfectionism to depression.

1. Introduction

Depressive symptoms are a common mental health problem characterized by guilt, anxiety, anhedonia, amotivation, suicidal thinking, and sleep and appetite problems (American Psychiatric Association, 2013). Worldwide, 300 million people suffer from depressive symptoms, and the prevalence of depressive symptoms is increasing (Vos et al., 2017; World Health Organization, 2017). Depressive symptoms also lead to reduced quality of life, poorer work performance, and increased risk of mortality (Lépine & Briley, 2011; Lerner & Henke, 2008). Hence, testing explanatory models of depressive symptoms to pinpoint contributing factors is important as such models support prevention, assessment, and treatment efforts. Likewise, though depressive symptoms derive from a complex interplay of biological, psychological, and social factors (Slavich & Irwin, 2014), personality traits play a crucial role (Bolger & Zuckerman, 1995). One such trait is perfectionism.

Hewitt and Flett's (2002) stress generation model asserts perfectionism leads people to think, feel, and behave in ways that generate stress; and that this stress brings about depressive symptoms. Alternatively, Hewitt, Flett, Sherry, and Caelian's (2006) Perfectionism Social Disconnection Model (PSDM) asserts perfectionism makes it difficult for people to benefit from and participate in close relationships and that this social disconnection, in turn, engenders depressive symptoms. However, inconsistent findings, underpowered studies, and an overreliance on cross-sectional designs have limited understanding of these important models. We addressed this by conducting the first meta-analytic test of the mediating role of stress and social disconnection in the longitudinal relationship between perfectionism and depressive symptoms. Our rigorous and comprehensive review also allowed us to examine the moderating effect of time lag, gender, age, sample size, percentage attrition, perfectionism scale used,

depression scale used, social disconnection scale used, stress scale used, sample type, and the year of data collection on observed relationships.

1.1. Perfectionistic Concerns, Perfectionistic Strivings, and Depressive Symptoms

Two factors underlie several perfectionism dimensions: perfectionistic concerns and perfectionistic strivings (Dunkley, Zuroff, & Blankstein, 2003; Stoeber & Otto, 2006).

Perfectionistic concerns encompass *socially prescribed perfectionism* (perceptions of others as demanding perfection; Hewitt & Flett, 1991), *concern over mistakes* (extreme reactions to perceived errors; Frost, Marten, Lahart, & Rosenblate, 1990), *doubts about actions* (uncertainties about performance abilities; Frost et al., 1990), *discrepancy* (a gap between how one is and how one wants to be; Slaney, Rice, Mobley, Trippi, & Ashby, 2001), *perfectionistic attitudes* (cognitive distortions and social difficulties with perfectionistic themes; Imber et al., 1990), and *self-criticism* (harsh self-rebuke; Blatt, D’Afflitti, & Quinlan, 1976). Perfectionistic strivings encompass *self-oriented perfectionism* (demanding perfection of the self; Hewitt & Flett, 1991), *personal standards* (striving for perfection; Frost et al., 1990), and *high standards* (striving for excellence; Blasberg, Hewitt, Flett, Sherry, & Chen, 2016; Slaney et al., 2001).

Both perfectionistic concerns and perfectionistic strivings display small-to-moderate positive relationships with depressive symptoms across clinical and non-clinical samples (see Limburg, Watson, Hagger, & Egan, 2017 for review). Similarly, both perfectionistic concerns and perfectionistic strivings predict longitudinal increases in depressive symptoms—even after controlling for covariates such as neuroticism (Smith et al., 2016b). However, though perfectionistic concerns and strivings are tied to depressive symptoms, our understanding of *why* perfectionistic concerns and strivings predict depressive symptoms is comparatively limited.

1. 2. Mediating Role of Stress

Initially, researchers tested the relationship between stress and depressive symptoms through the lens of the stress exposure model. The stress exposure model views people as having little to no influence over the occurrence of stressful events leading to depressive symptoms (Liu & Alloy, 2010). However, investigators have increasingly moved away from the stress exposure model in favor of the stress generation model. The stress generation model asserts personality traits confer risk for depressive symptoms by predisposing people to elicit and to experience more stressful events (Bolger & Zuckerman, 1995). More recently, Hewitt and Flett (2002) expanded and adapted the stress generation model to perfectionism.

According to the stress generation model of perfectionism, people high in perfectionism are prone to interpreting minor setbacks as major stressors and tend to anticipate future events as stressful (Hewitt & Flett, 2002). Similarly, the stress generation model contends that people high in perfectionism set unrealistically lofty goals and encounter more stress by actively pursuing stress-inducing circumstances (e.g., trying to be the best at everything; Hewitt & Flett, 1991, 2002). And Hewitt and Flett (2002) maintain the stress generated by perfectionism contributes to depressive symptoms. Even so, supporting evidence is mixed.

Congruent with the stress generation model, Olson and Kwon (2008) reported socially prescribed perfectionism, a facet of perfectionistic concerns, and self-oriented perfectionism, a facet of perfectionistic strivings, predicted increased depressive symptoms one-month later, through stress, among undergraduates. In contrast, Cox, Clara, and Enns (2009) studied community members and found socially prescribed perfectionism predicted increased depressive symptoms one-year later through stress in women, but not men. And Mandel, Dunkley, and Moroz (2015) studied community members and reported stress was not a significant mediator of the effect of perfectionistic concerns and strivings on depressive symptoms four-years later.

1.3. Mediating Role of Social Disconnection

We spend roughly 80% of our waking life with other people, and close relationships are a fundamental human need (Baumeister & Leary, 1995; Cacioppo, Fowler, & Christakis, 2009). However, some people have personality traits that make participating in and benefiting from close relationships difficult. According to Hewitt et al.'s (2006) PSDM, perfectionism is one such trait. Indeed, people high in perfectionistic concerns see others as being perpetually disappointed with, and overly critical of, their performance which leads to maladaptive social cognitions, hostile interactions, and feelings of isolation and alienation—feelings that are depressogenic. Likewise, people high in perfectionistic strivings rigidly pursue agentic goals, typically at the expense of communal goals, and often adopt a win-at-all-cost interpersonal style, in which being the absolute best is paramount (Flett, Hewitt, Blankstein, & Gray, 1998; Sherry, Hewitt, Flett, Lee-Baggley, & Hall, 2007; Sherry, Mackinnon, & Gautreau, 2016). As such, people high in perfectionistic strivings regularly miss or ignore opportunities for close connections, which can contribute to depressive symptoms (Hewitt, Flett, & Mikail, 2017; Sherry et al., 2016).

Consistent with the PSDM, evidence supports the mediating role of social disconnection in the perfectionistic concerns–depressive symptom link (Rice, Brooke, Christopher, & Porter, 2006; Sherry et al., 2013; Smith et al., 2017). However, unlike perfectionistic concerns, perfectionistic strivings relevance to the PSDM is unclear. On the one hand, Rice et al. (2006) studied undergraduates over two months and found social disconnection did not mediate the relationship between high standards, a facet of perfectionistic strivings, and depressive symptoms. Similarly, Sherry et al. (2013) studied undergraduates over one month and reported interpersonal discrepancies, feelings that one has fallen short of other people's standards, did not

mediate the perfectionistic strivings-depressive symptoms link. And Stoeber, Noland, Mawenu, Henderson, and Kent (2017, p. 112) conducted a cross-sectional study of three undergraduate samples and concluded that people high in self-oriented perfectionism “may feel socially connected and show no higher hostility than non-perfectionists.” On the other hand, Blankstein, Dunkley, and Wilson (2008) and Sherry and Hall (2009) found female undergraduates with high perfectionistic strivings tended to report greater experiences of social disconnection. Moreover, Smith et al. (2017) studied female undergraduates and found social disconnection mediated the effect of perfectionistic strivings on follow-up depressive symptoms one month later.

1.4. Advancing Research on Why Perfectionism Confers Risk for Depressive Symptoms

Notable inconsistencies in findings (e.g., Olson & Kwon, 2008; Mandel, Dunkley, & Moroz, 2015; Sherry et al., 2013) have clouded our understanding of the role of stress and social disconnection in the effect of perfectionistic concerns and strivings on depressive symptoms. A meta-analysis would address these inconsistencies and allow an overall conclusion to be reached. Furthermore, Monte Carlo simulations indicate correlations stabilize only when sample sizes larger than 250 are used (Schönbrodt & Perugini, 2013). As such, a sizeable portion of the literature on perfectionism and depressive symptoms is underpowered (see Table 1). However, a meta-analysis would overcome distorting artifacts arising from small sample sizes (Borenstein, Hedges, Higgins, & Rothstein, 2011).

Lastly, meta-analyses involving perfectionism (e.g., Limburg et al., 2017; Sirois, Molnar, & Hirsch, 2017; Smith et al., 2016a; Smith et al., 2016b; Smith et al., 2018) used bivariate meta-analytic techniques. Though it is possible to create a pooled correlation matrix by meta-analyzing correlations one by one, the results are misleading unless all predictors are uncorrelated (Cheung & Hong, 2017). Moreover, bivariate meta-analytic techniques do not provide estimates of

indirect effects, and as such, are incapable of testing mediation (Shrout & Bolger, 2002). However, the use of two-stage meta-analytic structural equation modeling (TS-MASEM; Cheung, 2015a) would address these limitations (Cheung, 2015b; Cheung & Cheung, 2016; Landis, 2013) and represent a methodological advancement to not only research on perfectionism and depressive symptoms but the entire perfectionism literature.

1.5. Present Study

Against this background, we used TS-MASEM to test the stress generation model and the PSDM. Building on theory and evidence (Rice et al., 2006; Sherry et al., 2013; Smith et al., 2017), and congruent with the PSDM, we hypothesized perfectionistic concerns would predict depressive symptoms through social disconnection. In contrast, due to inconsistencies in findings, we considered the following questions to be exploratory: Does stress mediate the perfectionistic strivings–depressive symptoms link? Does stress mediate the perfectionistic concerns–depressive symptoms link? And does social disconnection mediate the perfectionistic strivings–depressive symptoms link?

Furthermore, to catalyze a search for moderators that may resolve heterogeneity, we used traditional bivariate meta-regressions to evaluate the moderating effect of time lag, age, gender, percentage attrition, sample size, and the year of data collection on observed relationships. Year of data collection was included as a covariate in meta-regressions given evidence that certain dimensions of perfectionistic concerns and strivings have increased linearly over the past three decades (Curran & Hill, 2019; Smith, Sherry, Vidovic, Saklofske, Stoeber, & Benoit, 2019). Additionally, we conducted categorical moderation to evaluate whether observed relationships differed depending on the perfectionism scale used, depression scale used, social disconnection scale used, stress scale used, and sample type.

2.1. Method

2.2. Selection of Studies

We searched eight databases (PsycINFO, PubMed, Scopus, SPORTDiscus, Web of Science, ERIC, Embase, and ProQuest Dissertations and Theses) using keywords and Boolean operators: *perfection** AND (*depress** OR *MDD* OR *dysthymia* OR *dysthymic disorder* OR *mood* OR *dysphor** OR *bipolar* OR *affective* OR *cyclothymic* OR *mania*) AND (*longitudinal* OR *repeated measure* OR *serial measure* OR *prospective* OR *multi-wave* OR *over time*). This search yielded 507 studies. The third author and a trained research assistant evaluated studies for inclusion using pre-determined inclusion criteria: (a) the study used a longitudinal design, (b) depressive symptoms were assessed on two or more measurement occasions, (c) perfectionism was assessed alongside depressive symptoms on one measurement occasion preceding the final assessment of depressive symptoms, and (d) stress and/or social disconnection were measured on at least one measurement occasion following the initial assessment of depressive symptoms and perfectionism. On July 6, 2017, we terminated search strategies and started data reduction and analysis. Interrater agreement on inclusion was 95%, with discrepancies being discussed by the authors until a consensus of 100% was reached. The final set of included studies comprised 18 studies with 20 samples (see Table 1 and Figure 1 for PRISMA diagram); 133 studies were excluded (see Supplemental Material A). Individual effects are in Supplemental Material B.

2.2. Coding of Studies

The third author and a trained research assistant coded studies on 11 variables: sample size at baseline, sample type, mean age, time lag between first and last measurement occasion, percentage attrition, percentage female participants, percentage ethnic minority, publication

status, measure used to assess perfectionism, measure used to assess depressive symptoms, measure used to assess stress, and measure used to assess social disconnection (see Table 1).

2.3. Bivariate Meta-Analysis

We used Comprehensive Meta-Analysis (Borenstein, Hedges, Higgins, & Rothstein, 2005) to calculate overall bivariate effects using random-effect models. To guard against overrepresentation of studies with multiple effects, when more than one correlation was reported for the same construct, correlations were converted to Z -scores, averaged, and then transformed back into a correlation (Card, 2012). For studies with two measurement occasions, we extracted baseline perfectionism and baseline depressive symptoms from the first measurement occasion and extracted follow-up depressive symptoms, stress, and/or social disconnection from the second measurement occasion. For studies with three or more time points, we used the common, albeit conservative, strategy of selecting the greatest possible time lag (e.g., Smith et al., 2016).

To estimate mean effect sizes and variance in observed scores after accounting for sampling error, Hunter and Schmidt's (1990) guidelines were followed. Effects were interpreted using Gignac and Szodorai's (2016) guidelines for small, moderate, and strong effect sizes ($r = .10, .20, \text{ and } .30$). To assess homogeneity, the total heterogeneity of weighted mean effects (Q_T) and the total variation across studies attributable to heterogeneity (I^2) was calculated. When Q_T was significant, random-effect meta-regressions with maximum likelihood estimation were used to test the moderating effect of time lag (mean number of months between baseline and follow-up), gender (mean percentage of females), age (mean age), attrition (mean percentage of participants not completing follow-up), sample size, and the year of data collection (the year of publication minus two) on observed relationships. Seven models were tested for each relationship: a model with time lag as a predictor, a model with gender as a predictor, a model

with age as a predictor, a model with the year of data collection as a predictor, a model with attrition as a predictor, a model with sample size as a predictor, and a model with time lag, gender, age, the year of data collection, attrition, and sample size entered simultaneously as predictors (see Supplemental Material C). When moderators were significant, corresponding scatter plots were provided in Supplemental Material D.

When Q_T was significant, we also stipulated a categorical structure to the data and calculated the heterogeneity explained by the categorization (Q_B). A significant Q_B indicates differences in effect sizes between categories (Borenstein et al., 2011) and provides a firm basis for moderation. Thus, in the presence of a significant Q_B , as well as adequate content coverage (i.e., three or more studies per subgroup; Card, 2012), we investigated differences in the magnitude of effects between studies grouped by perfectionism measure, depression measure, social disconnection measure, stress measure, and sample type by performing a series of all possible two-group comparisons to test which group(s) differed significantly (see Supplemental Material E). For each group comparison, the resultant Q_B was tested using a χ^2 test with one *df*. To ensure findings were meaningful, studies assessing perfectionism using composite scores were excluded from tests of the moderating effects of perfectionism subscale. Lastly, publication bias was tested by inspecting funnel plots with observed and imputed studies (see Supplemental Material F), and computing Egger's test of regression to the intercept (Egger, Smith, Schneider, & Minder, 1997; see Table 2).

2.4. Two-Stage Meta-Analytic Structural Equation Modeling

To evaluate the stress generation model of perfectionism and the PSDM, we conducted TS-MASEM (Cheung & Chan, 2005) using the *metaSEM* package for R (Cheung, 2015a, 2015b; see Supplemental Material G for syntax). The first stage in TS-MASEM uses multigroup

confirmatory factor analysis to calculate a pooled correlation matrix and evaluates homogeneity via Q_T and I^2 . The second stage in TS-MASEM uses weighted least squares estimation (WLS) to fit path models, estimate parameters, and estimate model fit. For Stage 1, we first used a fixed-effect model to obtain goodness-of-fit statistics and to inform if a fixed-effect or random effect model was most appropriate for Stage 2.

Across models, perfectionism (perfectionistic concerns or perfectionistic strivings) and baseline depressive symptoms were the predictors, stress or social disconnection were the mediators, and follow-up depressive symptoms were the outcome.¹ Chi-square difference tests ($\Delta\chi^2$) were used to select the most parsimonious solution with the best fit. When appropriate, an indirect effect with 95% confidence intervals was calculated using matrix algebra. When a 95% confidence interval for an indirect effect does not contain zero in its upper and lower bounds it suggests mediation (Shrout & Bolger, 2002). Following Hu and Bentler (1999), model fit was interpreted using the Comparative Fit Index (CFI; recommended cut off $> .95$), the Tucker-Lewis Index (TLI; recommended cut off $> .95$), the Standardized Root Mean Squared Error (SRMR; recommended cut off $< .08$), and the Root Mean Squared Error of Approximation (RMSEA; recommended cut off $< .06$).

2.5. Description of Studies

Our search identified 18 longitudinal studies (17 journal articles and 1 dissertation) suitable for inclusion (Table 1). Included studies were published between 1995 and 2017, with a median year of 2009. Sample size varied considerably (range: 66 to 737; $M = 278.4$; $SD =$

¹Alternative models with perfectionism (perfectionistic concerns or perfectionistic strivings) and baseline depressive symptoms as predictors, follow-up depressive symptoms as the mediator, and stress or social disconnection as the outcome are in Supplemental Material H (see Supplemental Material I for syntax).

163.4). The number of participants pooled across samples was 5,568. There were eight community adult samples, eight university samples, three psychiatric samples, and one medical student sample. The mean age was 28.0 ($SD = 11.7$). The mean percentage of females was 61.7% ($SD = 31.6$). The mean time lag between baseline and follow-up was 7.4 months (range: 0.8 to 48.0; $SD = 11.2$); the average attrition rate was 23.4% (range: 3.3% to 55.1%; $SD = 16.0\%$).

2.6. Perfectionism

Perfectionism was assessed using seven self-report measures (see Table 1). Guided by theory (Stoeber & Otto, 2006), and similar meta-analyses (e.g., Smith et al., 2016), we categorized socially prescribed perfectionism, concern over mistakes, doubts about actions, discrepancy, perfectionistic attitudes, and self-criticism as facets of perfectionistic concerns. Similarly, we categorized self-oriented perfectionism, personal standards, and high standards as facets of perfectionistic strivings. Consistent with Kehayes, Smith, Sherry, Vidovic, and Sakloske (2019) we categorized Joiner and Schmidt's (1995) modified socially prescribed perfectionism subscale and modified self-oriented perfectionism subscale as facets of perfectionistic concerns and strivings, respectively.

2.7. Depressive Symptoms, Stress, and Social Disconnection

Depressive symptoms were measured using ten self-report measures, stress was measured using six self-report measures, and social disconnection was measured using 14 self-report measures (see Table 1). We operationalized stress as situations and events that are objectively or subjectively distressing. We operationalized social disconnection as cognitions and behaviors characterized by relational negativity, conflict, and alienation.

3. Results

3.1. Bivariate Meta-Analysis

Overall weighted mean effects between perfectionistic strivings, perfectionistic concerns, stress, social disconnection, baseline depressive symptoms, and follow-up depressive symptoms are in Table 2. Perfectionistic concerns had large positive relationships with baseline and follow-up depressive symptoms ($r = .30$ to $.36$) and social disconnection ($r = .30$), and a moderate positive relationship with stress ($r = .21$). Perfectionistic strivings had small positive relationships with baseline and follow-up depressive symptoms ($r = .11$) and social disconnection ($r = .16$), and a marginal non-significant relationship with stress ($r = .05$). Baseline depressive symptoms had a strong positive relationship with follow-up depressive symptoms ($r = .59$) and moderate positive relationships with stress ($r = .27$) and social disconnection ($r = .29$). The percentage of total heterogeneity across studies ranged from 0.0% to 90.1%, suggesting the possible influence of moderators on certain relationships.

3.2. Moderator Analysis

Following the inclusion of covariates, meta-regression revealed the year of data collection moderated the relationship between perfectionistic concerns and social disconnection ($\beta = -.051, p = .018$), implying perfectionistic concerns' positive relationship with social disconnection decreased as the year of data collection increased. Likewise, again following the inclusion of covariates, the perfectionistic strivings-social disconnection link was moderated by age ($\beta = .020, p = .001$) and time lag ($\beta = -0.042, p = .009$), such that perfectionistic strivings' positive relation with social disconnection increased as age increased and decreased as time lag increased. Nonetheless, inspection of scatter plots revealed the moderating effect of age may have been driven by outliers and should be interpreted with caution (Supplemental Material D).

Categorical moderation indicated concern over mistakes' relationships with baseline depressive symptoms ($r = .49$) and follow-up depressive symptoms ($r = .40$) was larger relative

to socially prescribed perfectionism's relationships with baseline depressive symptoms ($r = .30$) and follow-up depressive symptoms ($r = .26$), and doubts about actions' relationships with baseline depressive symptoms ($r = .33$) and follow-up depressive symptoms ($r = .26$). Results also implied the relationship between perfectionistic concerns and stress was larger for achievement-related stressors ($r = .26$) relative to person-dependent stressors ($r = .10$).

3.3. Publication Bias

Funnel plots (Supplemental Material F) and Egger's regression intercepts (Table 2) provided mixed evidence for publication bias. Egger's regression intercept was significant for certain effects, whereas adjusted "trim and fill" estimates provided the same substantive implications in terms of magnitude and significance of observed effects.

3.4. TS-MASEM–Homogeneity of Correlation Matrices

The approximate fit statistics obtained via fixed-effect estimates were poor and suggested random-effect models were more appropriate. Thus, Stage 1 was repeated, and random-effect estimates were used for all remaining analysis. Q_T was significant across the four pooled correlation matrices ($p < .001$) and implied substantial heterogeneity (see Table 3 and Table 4). However, similar to other applications of random effects, such as multilevel models (Cheung & Hong, 2017), there is value in testing if a proposed solution fits the average study. As such, following Cheung and Cheung's (2016) recommendations, we proceeded to Stage 2.

3.5. TS-MASEM–Meta-Analytic Structural Equation Modeling

Congruent with the stress-generation model, and as hypothesized, the indirect effect of perfectionistic concerns on follow-up depressive symptoms, controlling for baseline depressive symptoms, via stress was significant: .03 (95% CI: .01; .06). Constraining the path from perfectionistic concerns to follow-up depressive symptoms to zero did not result in a significant

loss of fit: $\Delta\chi^2(1) = 2.64, p = .104$ (Model 1c in Table 5 and Figure 1). Likewise, congruent with the PSDM, the indirect effect of perfectionistic concerns on follow-up depressive symptoms (controlling for baseline depressive symptoms) via social disconnection was significant: .05 (95% CI: .02; .09). And constraining the path from perfectionistic concerns to follow-up depressive symptoms to zero did not result in a substantial loss of fit: $\Delta\chi^2(1) = 1.15, p = .283$ (Model 2C in Table 5 and Figure 2). Results suggest stress and social disconnection fully explained why perfectionistic concerns confer risk for increased depressive symptoms.

Contrary to the stress generation model, the indirect effect of perfectionistic strivings on follow-up depressive symptoms, controlling for baseline depressive symptoms, via stress was not significant: .06 (95% CI: $-.01$; .02). Likewise, constraining the path from perfectionistic strivings to stress to zero, and the path from perfectionistic strivings to follow-up depressive symptoms to zero, did not result in a significant loss of fit: $\Delta\chi^2(2) = 2.46, p = .292$ (Table 5: Model 3E and Figure 3). Even so, consistent with the PSDM, the indirect effect of perfectionistic strivings on follow-up depressive symptoms, controlling for baseline depressive symptoms, through social disconnection was significant: .03 (95% CI: .01; .06). And constraining the direct effect from perfectionistic strivings to follow-up depressive symptoms did not lead to a significant loss of fit: $\Delta\chi^2(1) = 0.01, p = .931$ (Table 5: Model 4C and Figure 4). Thus, results indicate perfectionistic strivings engender depressive symptoms due to social disconnection, but not stress.

4. Discussion

The stress generation model of perfectionism posits perfectionism indirectly predicts depressive symptoms through stress (Hewitt & Flett, 2002). Alternatively, the PSDM maintains perfectionism indirectly predicts depressive symptoms through social disconnection (Hewitt et al., 2006). However, despite decades of research, understanding of these important models was

limited by inconsistent findings, underpowered studies, and an overreliance on cross-sectional designs. We addressed these challenges by conducting the first meta-analytic test of these two models. Findings were derived from 18 longitudinal studies with 20 samples and 5,568 participants. Depressive symptoms displayed strong rank-order stability and controlling for this stability allowed us to test the extent to which stress and social disconnection mediated the effect of perfectionistic concerns and perfectionistic strivings on change in follow-up depressive symptoms. Results indicated perfectionistic concerns predicted increased depressive symptoms through both stress and social disconnection, whereas perfectionistic strivings predicted increased depressive symptoms through social disconnection, but not through stress.

4.1. An Improved Understanding of the Perfectionism–Depressive Symptoms Link

Congruent with Smith et al. (2016) and Limburg et al. (2017), perfectionistic concerns and perfectionistic strivings had small-to-large positive relationships with depressive symptoms at baseline and follow-up. This result is consistent with longstanding conceptualizations of perfectionism as part of the premorbid personality of people vulnerable to depressive symptoms (e.g., Hewitt & Flett, 1991). This finding also adds to accumulating evidence calling into question Stoeber and Otto's (2006) conceptualization of perfectionistic strivings as a resiliency factor that protects against depressive symptoms.

We also found perfectionistic strivings' relationship with social disconnection increased as the mean sample age increased. This complements a broader literature suggesting perfectionistic strivings corrode mental health over time (Smith et al., 2019). But why do people high in perfectionistic strivings appear to experience greater social disconnection as they transition from adolescence to adulthood? We speculate this reflects the tendency for people high on perfectionistic strivings to strive rigidly for agentic goals, at the expense of communal goals,

which over time might cause them to become increasingly disconnected from their social world (Sherry et al., 2016).

4.2. An Improved Understanding of the Role of Stress

Perfectionistic concerns had a moderate positive relationship with stress, and stress mediated the relationship between perfectionistic concerns and follow-up depressive symptoms (controlling for baseline depressive symptoms). Thus, consistent with the stress generation model, people high in perfectionistic concerns appear to think, feel, and behave in ways that increase the likelihood of experiencing and eliciting stressful events, leaving them vulnerable to depressive symptoms (Hewitt & Flett, 2002). Consequently, our findings are congruent with a broader literature suggesting people high in perfectionistic concerns generate stress due to their proclivity to use ineffective coping strategies in the face of either perceived or actual stressors (Dunkley et al., 2003).

In contrast, unlike perfectionistic concerns, stress was not related to perfectionistic strivings, and stress did not mediate the effect of perfectionistic strivings on depressive symptoms. However, some evidence suggests people high in perfectionistic strivings are more likely to experience depressive symptoms in the presence of ego-involving stressors (Békés et al., 2015; Flett, Blankstein, & Mosher, 1995; Hewitt & Flett, 1993; Hewitt et al., 1996).

Accordingly, we speculate that stress as a moderator, rather than stress as a mediator, may be more relevant to understanding perfectionistic strivings' link to depressive symptoms.

Nonetheless, we are unable to evaluate this contention, as TS-MASEM does not allow for tests of moderation (Cheung & Cheung, 2016; Cheung, & Hong, 2017).

4.3. An Improved Understanding of the Role of Social Disconnection

Congruent with the PSDM (Hewitt et al., 2006; Hewitt et al., 2017), perfectionistic

concerns and strivings had small-to-large positive relationships with social disconnection. Findings also revealed that age moderated the relationship between perfectionistic strivings and social disconnection, such that people higher in perfectionistic strivings appear to become increasingly disconnected from their social world as time passes (Hewitt et al., 2006; Sherry et al., 2016). Moreover, consistent with the PSDM, both perfectionistic concerns and perfectionistic strivings indirectly predicted increased depressive symptoms through social disconnection.

Overall, this accords with theory (Hewitt et al., 2017; Sherry et al., 2016) and evidence (Smith et al., 2017) that social disconnection is essential for understanding why perfectionism places people at risk for depressive symptoms. Indeed, establishing meaningful connections with others is often difficult for people high in perfectionistic concerns, as others' approval, acceptance, and love are judged as forthcoming only if they achieve perfect outcomes (Hewitt & Flett, 1991; Hewitt et al., 2006; Hewitt et al., 2017). Likewise, people high in perfectionistic strivings frequently pursue agentic goals, at the expense of collective goals, which we speculate causes them to miss or ignore chances for participating in meaningful relationships, which, in turn, leads to depressive symptoms (Sherry et al., 2016).

4.4. Limitations of Overall Literature

Our meta-analysis offers new insights into the state of research on the stress generation model and the PSDM, and by doing so, underscores limitations. Most tests of the stress generation model and the PSDM rely on cross-sectional designs which are not adequate for assessing temporal precedence. Research in this area would benefit from more longitudinal studies controlling for baseline depressive symptoms. Except for Smith et al. (2017), all included studies used mono-source designs. Mono-source designs are problematic when studying traits such as perfectionism in which self-presentational bias could influence results. Likewise, 10

included studies had sample sizes below 250, suggesting much of the longitudinal literature on the stress generation model and the PSDM is underpowered. As well, 14 included studies tested stress or social disconnection, without reference to a unifying integrative model explaining how stress and social disconnection combine to produce depressive symptoms.

4.5. Limitations of Present Study and Future Directions

Limitations in the literature translate into limitations of the present study. Apart from Mandel et al. (2015), Sherry et al. (2013), and Smith et al. (2017), stress and/or socially disconnection were extracted from the same time point as follow-up depressive symptoms. As such, we were unable to conduct a full test of mediation with predictors, mediators, and outcomes measured at separate time points. Likewise, the extent to which perfectionistic concerns and strivings predicted changes in the mediators which, in turn, lead to changes in depressive symptoms, is unclear. Future research should address these limitations by testing all variables (perfectionistic concerns, perfectionistic strivings, stress, social disconnection, and depressive symptoms) at all points in time as part of a longitudinal study with three or more waves. Additionally, the exclusive use of self-reports may have inflated the effect sizes reported due to shared method variance and prevented us from distinguishing between actual versus perceived stressors and objective versus subjective social disconnection. It is essential for future research to address this limitation by supplementing self-reports with observer reports (see McCrae, 1994) or interview-based measures (see Alloy, Liu, & Bender, 2010). Samples were also predominantly Caucasian, and results may not generalize to more diverse samples. Similarly, the extent to which participants in included studies were suffering from a diagnosed disorder is unclear, and future research should attempt to determine the generalizability of our findings to clinical samples. Likewise, the age of participants in included studies was narrow (range = 15.3 to 46.1

years), and we were unable to test the moderating effect of age on observed relationships across the full lifespan. As such, future research should test whether the age differences reported replicate by studying perfectionism, stress, and social disconnection in a large sample with a broad age range. Furthermore, based on theoretical accounts (Hewitt & Flett, 2002; Hewitt et al., 2006; Hewitt et al., 2017; Sherry et al., 2016) and empirical evidence (e.g., Joiner & Schmidt, 1995; Sherry et al., 2013; Smith et al., 2017), we tested a specific sequence of events. However, different sequences are possible. For instance, perfectionistic concerns and strivings might be consequences of, rather than antecedents of, depressive symptoms. Nonetheless, we were unable to test such models as 14 of the 18 studies included did not report stability coefficients for perfectionism dimensions. Similarly, we were unable to evaluate moderated mediation as TS-MASEM does not allow for the inclusion of continuous moderators (Cheung & Cheung, 2016; Cheung, & Hong, 2017). Lastly, some authors contend funnel plots are ill-equipped to detect publication bias and future research could address this through the use of alternatives, such as *p*-curve analysis (Simonsohn, Nelson, & Simmons, 2014).

4.6. Concluding Remarks

Our study is the most rigorous test to date of the stress generation model of perfectionism and the PSDM. In synthesizing extant longitudinal research, we found partial support for the stress generation model and full support for the PSDM. Perfectionistic concerns, but not perfectionistic strivings, predicted increased depressive symptoms through stress. In contrast, perfectionistic strivings and perfectionistic concerns both predicted increased depressive symptoms through social disconnection. Researchers and clinicians seeking to understand depressed perfectionists are encouraged to consider how they may shape their environments by generating stressful events and social disconnection conducive to depressive symptoms.

Acknowledgements

This research was funded by a grant from the Social Sciences and Humanities Research Council (435-2013-1304) awarded to second author. The authors wish to thank XXX and XXX for their assistance with this project.

References

Studies marked with an asterisk were included in the present meta-analysis.

Alloy, L. B., Liu, R. T., & Bender, R. E. (2010). Stress generation research in depression: A commentary. *International Journal of Cognitive Therapy*, 3, 380-388.

doi:10.1521/ijct.2010.3.4.380

Altstötter-Gleich, C., & Bergemann, N. (2006). Testgüte einer deutschsprachigen Version der mehrdimensionalen Perfektionsmuskala von Frost, Marten, Lahart und Rosenblate (MPS-F). *Diagnostica*, 52, 105-118. doi:10.1026/0012-1924.52.3.105

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author. doi:10.1176/appi.books.9780890425596

Bagby, R. M., Parker, I. D. A., Joffe, R. T., & Buis, T. (1994). Reconstruction and validation of the Depressive Experiences Questionnaire. *Assessment*, 1, 59-68.

doi:10.1177/1073191194001001009

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529.

doi:10.1037/0033-2909.117.3.497

Beck, A.T., Rush, A.J., Shaw, B.F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory manual* (2nd ed.). San Antonio, TX: Psychological Corporation.

Békés, V., Dunkley, D. M., Taylor, G., Zuroff, D. C., Lewkowski, M., Foley, J. E., ... & Westreich, R. (2015). Chronic stress and attenuated improvement in depression over 1 year: The moderating role of perfectionism. *Behavior Therapy*, 46, 478-492.

doi:10.1016/j.beth.2015.02.003

Blankstein, K. R., Dunkley, D. M., & Wilson, J. (2008). Evaluative concerns and personal standards perfectionism: Self-esteem as a mediator and moderator of relations with personal and academic needs and estimated GPA. *Current Psychology*, 27, 29-61.

doi:10.1007/s12144-008-9022-1

Blasberg, J. S., Hewitt, P. L., Flett, G. L., Sherry, S. B., & Chen, C. (2016). The importance of item wording: The distinction between measuring high standards versus measuring perfectionism and why it matters. *Journal of Psychoeducational Assessment*, 34, 702-717.

doi:10.1177/0734282916653701

Blatt, S. J., D'Afflitti, J. P., & Quinlan, D. M. (1976). Experiences of depression in normal young adults. *Journal of Abnormal Psychology*, 85, 383-389. doi:10.1037/0021-843X.85.4.383

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology*, 69, 890-902. doi:10.1037/0022-

3514.69.5.890

Bolger, N., Zuckerman, A., & Kessler, R. C. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology*, 79, 953-961. doi: 10.1037/0022-

3514.79.6.953

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2005). *Comprehensive meta-analysis (version 2) [computer software]*. Englewood, NJ: Biostat.

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to meta-analysis*. John Wiley & Sons. doi:10.1002/9780470743386

Brockington, I. F., Oates, J., George, S., Turner, D., Vostanis, P., Sullivan, M., ... & Murdoch, C. (2001). A screening questionnaire for mother-infant bonding disorders. *Archives of*

- Women's Mental Health*, 3, 133-140. doi:10.1007/s007370170010
- Cacioppo, J. T., Fowler, J. H., & Christakis, N. A. (2009). Alone in the crowd: The structure and spread of loneliness in a large social network. *Journal of Personality and Social Psychology*, 97, 977-991. doi:10.1037/a0016076
- Card, N. A. (2012). *Applied meta-analysis for social science research*. New York: Guilford.
- Cheung, M. W. L. (2014). Fixed- and random-effects meta-analytic structural equation modeling: Examples and analyses in R. *Behavior Research Methods*, 46, 29-40. doi:10.3758/s13428-013-0361-y
- Cheung, M. W. L. (2015a). metaSEM: An R package for meta-analysis using structural equation modeling. *Frontiers in Psychology*, 5, 1521. doi:10.3389/fpsyg.2014.01521
- Cheung, M. W. L. (2015b). *Meta-analysis: A structural equation modeling approach*. Chichester: Wiley. doi:10.1002/9781118957813
- Cheung, M. W. L., & Chan, W. (2005). Meta-analytic structural equation modeling. A two-stage approach. *Psychological Methods*, 10, 40-64. doi:10.1037/1082-989X.10.1.40
- Cheung, M. W. L., & Cheung, S. F. (2016). Random-effects models for meta-analytic structural equation modeling: Review, issues, and illustrations. *Research Synthesis Methods*, 7, 140-155. doi:10.1002/jrsm.1166.
- Cheung, M. W. L., & Hong, R. Y. (2017). Applications of meta-analytic structural equation modeling in health psychology: examples, issues, and recommendations. *Health Psychology Review*, 11, 265-279. doi:10.1080/17437199.2017.1343678
- Cochrane, R., & Robertson, A. (1973). The Life Events Inventory: A measure of the relative severity of psycho-social stressors. *Journal of Psychosomatic Research*, 17, 135-139. doi:10.1016/0022-3999(73)90014-7

Cohen, S., Kamarack, T., & Mermelstein, R. (1983). A global measure of perceived stress.

Journal of Health and Social Behaviour, 24, 385-396. doi:10.2307/2136404

*Cox, B. J., Clara, I. P., & Enns, M. W. (2009). Self-criticism, maladaptive perfectionism, and depression symptoms in a community sample: A longitudinal test of the mediating effects of person-dependent stressful life events. *Journal of Cognitive Psychotherapy*, 23, 336-349. doi:10.1891/0889-8391.23.4.336

Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postpartum depression.

Development of the 10-item Edinburgh Postpartum Depression Scale. *British Journal of Psychiatry*, 150, 782-786. doi:10.1192/bjp.150.6.782

Curran, T., & Hill, A. P. (2019). Perfectionism is increasing over time: A meta-analysis of birth cohort differences from 1989 to 2016. *Psychological Bulletin*, 145, 410-429. doi:10.1037/bul0000138

Derogatis, L. R. (1994). *Symptom Checklist-90-R (SCL-90-R): Administration, scoring and procedures manual* (3rd ed.). Minneapolis, MN: National Computer Systems.

*Dittner, A. J., Rimes, K., & Thorpe, S. (2011). Negative perfectionism increases the risk of fatigue following a period of stress. *Psychology and Health*, 26, 253-268. doi:10.1080/08870440903225892

Dunkley, D. M., Mandel, T., & Ma, D. (2014). Perfectionism, neuroticism, and daily stress reactivity and coping effectiveness 6 months and 3 years later. *Journal of Counseling Psychology*, 61, 616-633. doi:10.1037/cou0000036

Dunkley, D. M., Zuroff, D. C., & Blankstein, K. R. (2003). Self-critical perfectionism and daily affect: Dispositional and situational influences on stress and coping. *Journal of Personality and Social Psychology*, 84, 234-252. doi:10.1037/0022-3514.84.1.234

- Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analyses detected by a simple graphical test. *BMJ*, *315*, 629-634. doi:10.1136/bmj.315.7109.629
- *Enns, M. W., & Cox, B. J. (2005). Perfectionism, stressful life events, and the 1-year outcome of depression. *Cognitive Therapy and Research*, *29*, 541-553. doi:10.1007/s10608-005-2414-8
- *Enns, M. W., Cox, B. J., & Clara, I. P. (2005). Perfectionism and neuroticism: A longitudinal study of specific vulnerability and diathesis-stress models. *Cognitive Therapy and Research*, *29*, 463-478. doi:10.1007/s10608-005-2843-04
- Flett, G. L., & Hewitt, P. L. (2012). *The multidimensional discrepancy inventory*. Unpublished manuscript, Department of Psychology, York University, Toronto, Canada.
- Flett, G. L., Hewitt, P. L., Blankstein, K. R., & Mosher, S. W. (1995). Perfectionism, life events, and depressive symptoms: A test of a diathesis-stress model. *Current Psychology*, *14*, 112-137. doi:10.1007/BF02686885
- Flett, G. L., Hewitt, P. L., Blankstein, K. R., & Gray, L. (1998). Psychological distress and the frequency of perfectionistic thinking. *Journal of Personality and Social Psychology*, *75*, 1363-1381. doi:10.1037/0022-3514.75.5.1363
- Flett, G. L., Hewitt, P. L., Besser, A., Su, C., Vaillancourt, T., Boucher, D., . . . Gale, O. (2016). The child-adolescent perfectionism scale: Development, psychometric properties, and associations with stress, distress, and psychiatric symptoms. *Journal of Psychoeducational Assessment*, *34*, 634-652. doi:10.1177/0734282916651381
- Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research*, *14*, 449-468. doi:10.1007/BF01172967
- Garner, D. M., Olmsted, 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, 15-34. doi:10.1002/1098-108X
- Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual difference researchers. *Personality and Individual Differences*, 102, 74-78.
doi:10.1016/j.paid.2016.06.069
- Harrell, S. P. (2000). A multidimensional conceptualization of racism-related stress: Implications for the well-being of people of color. *American Journal of Orthopsychiatry*, 70, 42-57.
doi:10.1037/h0087722
- Heatherton, T. F., & Polivy, J. (1991). Development and validation of a scale for measuring state self-esteem. *Journal of Personality and Social Psychology*, 60, 895-910.
doi:10.1037/0022-3514.60.6.895
- Hewitt, P. L., & Flett, G. L. (1991). Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *Journal of Personality and Social Psychology*, 60, 456-470. doi:10.1037/0022-3514.60.3.456
- Hewitt, P. L., & Flett, G. L. (2002). Perfectionism and stress processes in psychopathology. In G. L. Flett & P. L. Hewitt (Eds.), *Perfectionism: Theory, research, and treatment* (pp. 255-284). Washington, DC: American Psychological Association. doi:10.1037/10458-011
- Hewitt, P. L., & Flett, G. L. (1993). Dimensions of perfectionism, daily stress, and depression: a test of the specific vulnerability hypothesis. *Journal of Abnormal Psychology*, 102, 58-65.
doi:10.1037/0021-843X.102.1.58
- *Hewitt, P. L., Flett, G. L., & Ediger, E. (1996). Perfectionism and depression: Longitudinal assessment of a specific vulnerability hypothesis. *Journal of Abnormal Psychology*, 105, 276-280. doi:10.1037/0021-843X.105.2.276

- Hewitt, P. L., Flett, G. L., Sherry, S. B., & Caelian, C. (2006). Trait perfectionism dimensions and suicidal behavior. In T. E. Ellis (Ed.), *Cognition and suicide: Theory, research, and therapy* (pp. 215-235). Washington, DC: American Psychological Association.
doi:10.1037/11377-010
- Hewitt, P. L., Flett, G. L., & Mikail, S. F. (2017). *Perfectionism: A relational approach to conceptualization, assessment, and treatment*. New York: Guilford.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1-55. doi:10.1080/10705519909540118
- Hunter, J. E., & Schmidt, F. L. (1990). Dichotomization of continuous variables: Implications for meta-analysis. *Journal of Applied Psychology*, 75, 334-349. doi:10.1037/0021-9010.75.3.334
- Ialongo, N. S., Kellam, S. G., & Poduska, J. (1999). *Manual for the Baltimore How I Feel* (Tech. Rep No. 2). Baltimore: Johns Hopkins University.
- Imber, S. D., Pilkonis, P. A., Sotsky, S. M., Elkin, I., Watkins, J. T., Collins, J. F., ... & Glass, D. R. (1990). Mode-specific effects among three treatments for depression. *Journal of Consulting and Clinical Psychology*, 58, 352-359. doi:10.1037/0022-006X.58.3.352
- *Joiner, T. E., & Schmidt, N. B. (1995). Dimensions of perfectionism, life stress, and depressed and anxious symptoms: Prospective support for diathesis-stress but not specific vulnerability among male undergraduates. *Journal of Social and Clinical Psychology*, 14, 165-183. doi:10.1521/jscp.1995.14.2.165
- Kehayes, I. L. L., Smith, M. M., Sherry, S. B., Vidovic, V., & Saklofske, D. H. (2019). Are perfectionism dimensions risk factors for bulimic symptoms? A meta-analysis of

longitudinal studies. *Personality and Individual Differences*, 138, 117-125.

doi:10.1016/j.paid.2018.09.022

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The inventory of college students' recent life experiences: A decontaminated hassles scale for a special population. *Journal of Behavioral Medicine*, 13, 619-630. doi:10.1007/BF00844738

*Lambert, S. F., Robinson, W. L., & Ialongo, N. S. (2014). The role of socially prescribed perfectionism in the link between perceived racial discrimination and African American adolescents' depressive symptoms. *Journal of Abnormal Child Psychology*, 42, 577-587. doi:10.1007/s10802-013-9814-0

Landis, R. S. (2013). Successfully combining meta-analysis and structural equation modeling: Recommendations and strategies. *Journal of Business and Psychology*, 28, 251-261. doi:10.1007/s10869-013-9285-x

Lee, R. M., & Robbins, S. B. (1995). Measuring belongingness: The Social Connectedness and the Social Assurance Scales. *Journal of Counseling Psychology*, 42, 232-241. doi:10.1037/0022-0167.42.2.232

Lépine, J. P., & Briley, M. (2011). The increasing burden of depression. *Neuropsychiatric Disease and Treatment*, 7, 3-7. doi:10.2147/NDT.S19617

Lerner, D., & Henke, R. M. (2008). What does research tell us about depression, job performance, and work productivity? *Journal of Occupational and Environmental Medicine*, 50, 401-410. doi:10.1097/JOM.0b013e31816bae50

Liu, R. T., & Alloy, L. B. (2010). Stress generation in depression: A systematic review of the empirical literature and recommendations for future study. *Clinical Psychology Review*, 30, 582-593. doi:10.1016/j.cpr.2010.04.010

- Limburg, K., Watson, H. J., Hagger, M. S., & Egan, S. J. (2017). The relationship between perfectionism and psychopathology: A meta-analysis. *Journal of Clinical Psychology, 73*, 1301-1326. doi:10.1002/jclp.22435
- Lovibond, S.H., & Lovibond, P.F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation Monograph.
- *Mackinnon, S. P., Sherry, S. B., Graham, A. R., Stewart, S. H., Sherry, D. L., Allen, S. L., & McGrath, D. S. (2011). Reformulating and testing the perfectionism model of binge eating among undergraduate women: A short-term, three-wave longitudinal study. *Journal of Counseling Psychology, 58*, 630-646. doi:10.1037/a0025068
- *Mackinnon, S. P., Sherry, S. B., Antony, M. M., Stewart, S. H., Sherry, D. L., & Hartling, N. (2012). Caught in a bad romance: Perfectionism, conflict, and depression in romantic relationships. *Journal of Family Psychology, 26*, 215-225. doi:10.1037/a0027402
- *Mackinnon, S. P., Sherry, S. B., Pratt, M. W., & Smith, M. M. (2014). Perfectionism, friendship intimacy, and depressive affect in transitioning university students: A longitudinal study using mixed methods. *Canadian Journal of Behavioural Science, 46*, 49-59. doi:10.1037/a0033764
- *Mandel, T., Dunkley, D. M., & Moroz, M. (2015). Self-critical perfectionism and depressive and anxious symptoms over 4 years: The mediating role of daily stress reactivity. *Journal of Counseling Psychology, 62*, 703-717. doi:10.1037/cou0000101
- McCrae, R. R. (1994). The counterpoint of personality assessment: Self reports and observer ratings. *Assessment, 1*, 159-172. doi:10.1177/1073191194001002006
- Murray, S. L., Griffin, D. W., Rose, P., & Bellavia, G. M. (2002). Calibrating the sociometer: The relational contingencies of self-esteem. *Journal of Personality and Social Psychology, 82*, 108-120. doi:10.1037/0022-3514.82.1.108

- 85, 63-84. doi: 10.1111/j.1752-0606.2002.tb01188.x
- *O'Connor, R. C., Rasmussen, S., & Hawton, K. (2010). Predicting depression, anxiety and self-harm in adolescents: The role of perfectionism and acute life stress. *Behaviour Research and Therapy*, 48, 52-59. doi:10.1016/j.brat.2009.09.008
- *Oddo-Sommerfeld, S., Hain, S., Louwen, F., & Schermelleh-Engel, K. (2016). Longitudinal effects of dysfunctional perfectionism and avoidant personality style on postpartum mental disorders: Pathways through antepartum depression and anxiety. *Journal of Affective Disorders*, 191, 280-288. doi:10.1016/j.jad.2015.11.040
- Oishi, S., & Sullivan, H. W. (2006). The predictive value of daily vs. retrospective well-being judgments in relationship stability. *Journal of Experimental Social Psychology*, 42, 460-470. doi:10.1016/j.jesp.2005.07.001
- *Olson, M. L., & Kwon, P. (2008). Brooding perfectionism: Refining the roles of rumination and perfectionism in the etiology of depression. *Cognitive Therapy and Research*, 32, 788-802. doi:10.1007/s10608-007-9173-7
- Radloff, L. S. (1987). Center for Epidemiologic Studies: Depressed mood scale. In K. Corcoran & J. Fischer (Eds.), *Measures for clinical practice: A sourcebook* (pp. 118–119). New York: Collier Macmillan Inc.
- Reck, C., Klier, C. M., Pabst, K., Stehle, E., Steffenelli, U., Struben, K., & Backenstrass, M. (2006). The German version of the Postpartum Bonding Instrument: Psychometric properties and association with postpartum depression. *Archives of Women's Mental Health*, 9, 265-271. doi:10.1007/s00737-006-0144-x
- *Rice, K. G., Leever, B. A., Christopher, J., & Porter, J. D. (2006). Perfectionism, stress, and social (dis) connection: A short-term study of hopelessness, depression, and academic

adjustment among honors students. *Journal of Counseling Psychology*, 53, 524-534.

doi:10.1037/0022-0167.53.4.524

Saxe, L. L., & Abramson, L. Y. (1987). *The Negative Life Events Questionnaire: Reliability and validity*. Unpublished manuscript, Department of Psychology, University of Pennsylvania, Pennsylvania, United States.

Schmitt, M., Altstötter-Gleich, C., Hinz, A., Maes, J., Brähler, E., (2006). Normwertefür das Vereinfachte Beck-Depressions-Inventar (BDI-V) in der Allgemeinbevölkerung [Norms for the simplified Beck Depression Inventory (BDI-V) in a non-clinical population].

Diagnostica, 52, 51-59. doi:10.1026/0012-1924.52.2.51

Schönbrodt, F. D., & Perugini, M. (2013). At what sample size do correlations stabilize? *Journal of Research in Personality*, 47, 609-612. doi:10.1016/j.jrp.2013.05.009

Sherry, S. B., & Hall, P. A. (2009). The perfectionism model of binge eating: Tests of an integrative model. *Journal of Personality and Social Psychology*, 96, 690-709.

doi:10.1037/a0014528

Sherry, S. B., Hewitt, P. L., Flett, G. L., Lee-Baggley, D. L., & Hall, P. A. (2007). Trait perfectionism and perfectionistic self-presentation in personality pathology. *Personality and Individual Differences*, 42, 477-490. doi:10.1016/j.paid.2006.07.026

Sherry, S. B., Mackinnon, S. P., & Gaudreau, C. G. (2016). Perfectionists don't place nicely with others: Expanding the social disconnection model. In F. M. Sirois & D. Molnar (Eds.), *Perfectionism, health, and well-being* (pp. 225-243). NY: Springer. doi:10.1007/978-3-319-18582-8_10

*Sherry, S. B., MacKinnon, A. L., Fossum, K. L., Antony, M. M., Stewart, S. H., Sherry, D. L., ... & Mushquash, A. R. (2013). Perfectionism, discrepancies, and depression:

Testing the perfectionism social disconnection model in a short-term, four-wave longitudinal study. *Personality and Individual Differences*, 54, 692-697.

doi:10.1016/j.paid.2012.11.017

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: new procedures and recommendations. *Psychological Methods*, 7, 422-445. doi:10.1037/1082-989X.7.4.422

Sirois, F. M., Molnar, D. S., & Hirsch, J. K. (2017). A meta-analytic and conceptual update on the associations between procrastination and multidimensional perfectionism. *European Journal of Personality*, 31, 137-159. doi:10.1002/per.2098

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: A key to the file-drawer. *Journal of Experimental Psychology: General*, 143, 534-547. doi:10.1037/a0033242

Slaney, R. B., Rice, K. G., Mobley, M., Trippi, J., & Ashby, J. S. (2001). The revised almost perfect scale. *Measurement and Evaluation in Counseling and Development*, 34, 130-145. doi:10.1037/t02161-000

Slavich, G. M., & Irwin, M. R. (2014). From stress to inflammation and major depressive disorder: A social signal transduction theory of depression. *Psychological Bulletin*, 140, 774-815. doi:10.1037/a0035302

Smith, M. M., Sherry, S. B., Chen, S., Saklofske, D. H., Flett, G. L., & Hewitt, P. L. (2016a). Perfectionism and narcissism: A meta-analytic review. *Journal of Research in Personality*, 64, 90-101. doi:10.1016/j.jrp.2016.07.012

Smith, M. M., Sherry, S. B., Chen, S., Saklofske, D. H., Mushquash, C., Flett, G. L., & Hewitt, P. L. (2018). The perniciousness of perfectionism: A meta-analytic review of the

perfectionism–suicide relationship. *Journal of Personality*, 86, 522-542.

doi:10.1111/jopy.12333

*Smith, M. M., Sherry, S. B., Mushquash, A. R., Saklofske, D. H., Gautreau, C. M., & Nealis,

L. J. (2017). Perfectionism erodes social self-esteem and generates depressive symptoms:

Studying mother-daughter dyads using a daily diary design with longitudinal follow-up.

Journal of Research in Personality, 71, 72-79. doi:10.1016/j.jrp.2017.10.001

Smith, M. M., Sherry, S. B., Rnic, K., Saklofske, D. H., Enns, M., & Gralnick, T. (2016b). Are

perfectionism dimensions vulnerability factors for depressive symptoms after controlling

for neuroticism? A meta-analysis of 10 longitudinal studies. *European Journal of*

Personality, 30, 201-212. doi:10.1002/per.2053

Smith, M. M., Sherry, S. B., Vidovic, V., Saklofske, D. H., Stoeber, J., & Benoit, A. (2019).

Perfectionism and the five-factor model of personality. A meta-analytic review.

Personality and Social Psychology Review, 23, 367-390. doi: 10.1177/1088868318814973

Stoeber, J., & Otto, K. (2006). Positive conceptions of perfectionism: Approaches, evidence,

challenges. *Personality and Social Psychology Review*, 10, 295-319.

doi:10.1207/s15327957pspr1004_2

Stoeber, J., Noland, A. B., Mawenu, T. W., Henderson, T. M., & Kent, D. N. (2017).

Perfectionism, social disconnection, and interpersonal hostility: Not all perfectionists don't

play nicely with others. *Personality and Individual Differences*, 119, 112-117.

doi:10.1016/j.paid.2017.07.008

Sturman, E. D., Flett, G. L., Hewitt, P. L., & Rudolph, S. G. (2009). Dimensions of

perfectionism and self-worth contingencies in depression. *Journal of Rational-Emotive &*

Cognitive-Behavior Therapy, 27, 213-231. doi:10.1007/s10942-007-0079-9

- *Triesch, S. (2001). *Interpersonal expectations and adjustment to depression* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database (UMI No: 3044972).
- Vos, T., Abajobir, A. A., Abbafati, C., Abbas, K. M., Abate, K. H., Abd-Allah, F., ... Murray, C. J. L. (2017). Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, 390, 1211-1259. doi:10.1016/S0140-6736(17)32154-2
- Watson, D., & Clark, L. A. (1991). *The Mood and Anxiety Symptom Questionnaire*. Iowa City, IA: Department of Psychology, University of Iowa.
- Weissman, A. N., & Beck, A. T. (1978, August-September). *Development and validation of the Dysfunctional Attitude Scale: A preliminary investigation*. Paper presented at the 86th Annual Convention of the American Psychological Association, Toronto, Canada.
- World Health Organization. (2017). *Depression and other common mental disorders: Global health estimates*. Author. Retrieved from <https://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2-eng.pdf>
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, 67, 361-370. doi: 10.1111/j.1600-0447.1983.tb09716.x
- Zimmerman, M. & Coryell, W. (1987). The Inventory to Diagnose Depression (IDD): A self-report scale to diagnose major depressive disorder. *Journal of Consulting and Clinical Psychology*, 55, 55-59. doi:10.1001/archpsyc.1986.01800110062008

Table 1

Characteristics of longitudinal studies included in the meta-analysis

	Sample							Measures			
	<i>N</i>	Sample type	Mean age	Time lag	Attrition %	Female %	Status	Perfectionism	Depression	Stress	Social disconnection
Cox et al. (2009), women	359	community ^a	43.7	12.0	21.7	100.0	article	FMPS-SF-COM FMPS-SF-DAA MPS-SF-SPP	BDI-SF	LEI-PD	—
Cox et al. (2009), men	364	community ^a	43.7	12.0	25.6	0.0	article	FMPS-SF-COM FMPS-SF-DAA MPS-SF-SPP	BDI-SF	LEI-PD	—
Dittner et al. (2011)	436	university ^b	20.4	4.0	52.8	70.6	article	MPS-SPP	CES-D	PSS	—
Enns et al. (2005)	206	medical students	24.0	5.0	32.5	44.2	article	FMPS-COM FMPS-DAA MPS-SF-SOP MPS-SF-SPP	BDI	LEI-ACH	LEI-IP
Enns & Cox (2005)	267	psychiatric ^c	41.1	12.0	38.6	63.7	article	MPS-SOP MPS-SPP	BDI	LEI-ACH	—
Hewitt et al. (1996)	121	psychiatric ^c	46.1	4.0	14.9	69.4	article	MPS-SOP MPS-SPP	BDI	LEI-ACH	LEI-IP
Joiner & Schmidt (1995)	174	university ^b	19.8	0.8	NR	62.6	article	EDI-P-SOP EDI-P-SPP	BDI	NLEQ-A	NLEQ-I
Lambert et al. (2014)	585	community ^a	12.8	24.0	15.9	46.7	article	CAPS-SPP	BHIF-DEP	—	RaLES
Mackinnon et al. (2011)	200	university ^b	19.9	0.8	5.5	100.0	article	FMPS-SF-COM FMPS-SF-PS	POMS-SF-DEP	—	SSES-SF-IE RDEQ-SF-ID
Mackinnon et al. (2012), women	226	community ^a	21.7	1.0	NR	100.0	article	FMPS-SF-COM ^d MPS-SF-SPP	CES-D	—	IQS-SF RIB

Mackinnon et al. (2012), men	226	community ^a	21.7	1.0	NR	0.0	article	FMPS-SF-COM ^d MPS-SF-SPP ^d	CES-D	—	IQS-SF RIB
Mackinnon et al. (2014)	127	university ^b	18.3	4.3	9.5	75.5	article	MPS-SF-SOP MPS-SF-SPP	CES-D POMS-SF-DEP	—	FI
Mandel et al. (2015)	150	community ^a	41.0	48.0	NR	70.0	article	FMPS-COM MPS-SPP APS-R-DIS DAS-SC DEQ-SC	MASQ-SF-AD MASQ-SF-GDD	SA	—
O'Connor et al. (2010)	737	community ^a	15.2	6.0	30.1	49.8	article	CAPS-SOP CAPS-SPP	HADS-DEP	ALS	—
Oddo-Sommerfeld et al. (2016)	297	community ^a	32.4	4.5	10.4	100.0	article	MPS-COM ^e MPS-DAA ^e	BDI-V EPDS	—	PBQ
Olson & Kwon (2008)	388	university ^b	18.6	1.0	21.4	74.4	article	MPS-SOP MPS-SPP	BDI-II	ICSRLE	—
Rice et al. (2006)	181	university ^b	NR	2.5	55.1	56.0	article	APS-R-HS APS-R-DIS	CES-D	PSS	SCS
Sherry et al. (2013)	240	university ^b	20.0	1.0	3.3	83.3	article	FMPS-SF-COM FMPS-DAA FMPS-SF-PS	DASS-21-DEP POMS-SF-DEP SCL-90-R-DEP	—	RDEQ-ID MDI-ID APS-R-ID
Smith et al. (2017)	218	university ^b	20.0	0.8	0.5	100.0	article	MPS-SOP MPS-SPP	CESD-D	—	SSES-SF-IE
Triesch (2001)	66	psychiatric ^c	38.7	3.0	31.8	67.0	disseration	MPS-SPP	IDD	—	TPC TPE

Note. Time lag in months. **NR** = not reported; **SF** = short form; **MPS** = Hewitt and Flett's (1991) Multidimensional Perfectionism Scale; **SOP** = self-oriented perfectionism; **OOP** = other-oriented perfectionism; **SPP** = socially prescribed perfectionism; **FMPS** = Frost et al.'s (1990) Multidimensional Perfectionism Scale; **COM** = concern over mistakes; **DAA** = doubts about actions; **PS** = personal standards; **DEQ** = Blatt et al.'s (1976) Depressive Experiences Questionnaire; **RDEQ** = Bagby et al.'s (1994) DEQ; **DAS** = Weissman and Beck's (1978) Dysfunctional Attitudes Scale; **SC** = self-criticism; **CAPS** = Flett et al.'s (2016) Child and Adolescent Perfectionism Scale; **EDI-P** = Joiner and Schmidts's (1995) modified version of Garner et al.'s (1983) Eating Disorder Inventory; **APS-R** = Slaney et al.'s (2001) Almost Perfect Scale-Revised; **Dis** =

discrepancy; **BDI-SF** = Cox et al.'s (2009) modified short-form of Beck et al.'s (1979) Beck Depression Inventory; **BDI** = Beck et al.'s (1979) Beck Depression Inventory; **CES-D** = Radloff's (1987) Center for Epidemiologic Studies Depression Scale; **BHIF-DEP** = Ialongo et al.'s (1999) Baltimore How I Feel depression subscale; **POMS-SF-DEP** = Bolger et al.'s (2000) Profile of Mood States short form depression subscale; **MASQ** = Watson and Clark's (1991) Mood and Anxiety Symptom Questionnaire; **AD** = anhedonic depressive symptoms; **GDD** = general distress depressive symptoms; **HADS-DEP** = Zigmond and Snaith's (1983) Hospital Anxiety and Depression Scale depression subscale; **BDI-V** = Schmitt et al.'s (2006) Simplified Beck Depression Inventory; **EPDS** = Cox et al.'s (1987) Edinburgh Postpartum Depression Scale; **BDI-II** = Beck et al.'s (1996) Beck Depression Inventory, second edition; **DASS-21-DEP** = Lovibond and Lovibond's (1995) Depression Anxiety Stress Scales depression subscale; **SCL-90-R** = Derogatis et al.'s (1994) Symptom Checklist-90-Revised depression subscale; **IDD** = Zimmerman et al.'s (1987) Inventory to Diagnose Depression; **LEI** = Cochrane and Robertson's (1973) Life Events Inventory; **PD** = person dependent events; **ACH** = achievement events; **PSS** = Cohen et al.'s (1983) Perceived Stress Scale; **NLEQ-A** = Saxe and Abramson's (1987) Negative Life Events Questionnaire achievement domain subscale; **SA** = Dunkley et al.'s (2003) Stress Appraisal Scale; **ALS** = O'Connor et al.'s (2010) Acute Life Stress Scale; **ICSRLE** = Kohn et al.'s (1990) Inventory of College Students' Recent Life Experiences; **IP** = interpersonal life events; **NLEQ-I** = Saxe and Abramson's (1987) Negative Life Events Questionnaire, interpersonal domain subscale; **RaLES** = Harrell's (2000) Racism and Life Experiences Scales; **SSES-IE** = Heatherton and Polivy's (1991) State Self-Esteem Scale interpersonal esteem subscale; **ID** = interpersonal discrepancies; **IQS** = Oishi and Sullivan's (2006) Interpersonal Qualities Scale; **RIB** = Murray et al.'s (2003) Rejecting Interpersonal Behaviors scale; **FI** = Mackinnon et al.'s (2014) Friendship Intimacy Scale; **PBQ** = Reck et al.'s (2006) German version of Brockington et al.'s (2001) Postpartum Bonding Questionnaire; **MDI-ID** = Flett and Hewitt's (2012) Multidimensional Discrepancies Inventory; **TPC** = Triesch's (2001) measure of family functioning; **TPE** = Triesch's (2001) Perceived Expectations Scale. **SCS** = Lee and Robbins' (1995) Social Connectedness Scale.

^aCommunity-dwelling adults

^bUniversity undergraduates

^cPsychiatric patients

^dPartner specific

^eGerman version of the MPS (Altstötter-Gliech & Bergemann, 2006)

Table 2

Summary of overall bivariate effect sizes for the relationships between perfectionism, baseline depressive symptoms, social disconnection, stress, and follow-up depressive symptoms

Variable	<i>k</i>	<i>N</i>	<i>r</i> ⁺	95% CI	<i>Q_T</i>	<i>I</i> ² (%)	Egger's intercept	95% CI	<i>k</i> ^{TF}	"Trim and fill" estimates <i>r</i> ⁺ [95% CI]
Baseline depression										
<i>Perfectionistic concerns</i>	20	7,870	.36***	[.30; .42]	157.68***	87.95	−0.40	[−4.39; 3.58]	2	.34 [.28; .40]
Socially prescribed perfectionism	15	4,500	.30***	[.23; .35]	66.30***	78.88	−2.37	[−6.50; 1.77]	3	.29 [.26; .20]
Concern over mistakes	6	1,581	.33***	[.24; .41]	18.26**	72.62	2.75	[−15.48; 20.98]	0	.33 [.24; .41]
Doubts about actions	3	929	.49***	[.44; .54]	1.67	0.00	2.00	[−68.77; 72.77]	0	.49 [.44; .54]
Discrepancy	1	181	.50***	[.38; .60]	0.00	0.00	—	—	—	—
Evaluative concerns perfectionism	3	679	.56***	[.51; .62]	0.03	0.00	0.61	[−2.47; 3.69]	0	.56 [.51; .61]
<i>Perfectionistic strivings</i>	11	2,851	.11***	[.05; .18]	26.08**	61.66	1.89	[−2.15; 5.92]	0	.11 [.05; .18]
Self-oriented perfectionism	8	2,238	.12***	[.05; .19]	19.81**	64.67	2.35	[−2.33; 7.03]	0	.12 [.05; .19]
Personal standards	2	432	.17***	[.08; .26]	0.05	0.00	—	—	—	—
High standards	1	181	−.05	[−.19; .10]	0.00	0.00	—	—	—	—
<i>Stress</i>	11	2,397	.27***	[.18; .36]	56.84	82.41	1.45	[−5.37; 8.27]	0	.27 [.18; .36]
<i>Social disconnection</i>	14	2,689	.29***	[.21; .37]	63.76***	79.61	1.07	[−4.04; 6.19]	0	.21 [.21; .37]
<i>Follow-up depression</i>	20	4,406	.59***	[.55; .62]	51.24***	62.92	−0.34	[−3.41; 2.74]	0	.59 [.55; .62]
Social disconnection										
<i>Perfectionistic concerns</i>	14	3,408	.30***	[.19; .39]	131.43***	90.08	4.13	[−1.63; 9.89]	0	.27 [.18; .36]
Socially prescribed perfectionism	10	1,895	.23***	[.13; .32]	37.99***	76.31	3.86	[−0.72; 8.43]	1	.21 [.11; .30]
Concern over mistakes	4	780	.28***	[.11; .44]	18.61***	83.88	−1.16	[−69.00; 66.68]	0	.28 [.11; .44]
Doubts about actions	1	139	.11	[−.06; .27]	0.00	0.00	—	—	—	—
Discrepancy	1	360	.36***	[.17; .52]	0.00	0.00	—	—	—	—
Evaluative concerns perfectionism	2	498	.45***	[.07; .78]	40.13***	97.51	—	—	—	—
<i>Perfectionistic strivings</i>	9	1,423	.16***	[.05; .26]	30.25***	73.55	−5.13	[−14.99; 4.72]	0	.17 [.05; .25]
Self-oriented perfectionism	6	906	.19***	[.06; .31]	19.18**	73.94	−2.83	[−21.84; 16.17]	0	.19 [.06; .31]
Personal standards	2	421	.19***	[.10; .28]	0.04	0.00	—	—	—	—
High standards	1	96	−.16	[−.35; .04]	0.00	0.00	—	—	—	—
<i>Follow-up depression</i>	14	2,678	.40***	[.32; .48]	77.81	83.29	2.79	[−2.63; 8.21]	4	.34 [.26; .42]
Stress										
<i>Perfectionistic concerns</i>	11	3,779	.21***	[.15; .27]	37.76***	73.51	−0.25	[−4.13; 3.63]	0	.21 [.15; .27]
Socially prescribed perfectionism	9	2,151	.20***	[.11; .28]	31.89***	74.91	−1.58	[−8.65; 5.49]	0	.20 [.11; .28]
Concern over mistakes	3	691	.13**	[.06; .20]	0.50	0.00	−1.90	[−26.10; 22.29]	0	.13 [.06; .20]
Doubts about actions	3	691	.24**	[.10; .37]	6.70*	70.15	−9.77	[−22.31; 2.77]	0	.24 [.10; .37]

Discrepancy	1	96	.41***	[.23; .56]	0.00	0.00	—	—	—	—
Evaluative concerns perfectionism	1	150	.32***	[.17; .46]	0.00	0.00	—	—	—	—
<i>Perfectionistic strivings</i>	7	1,489	.05	[−.04; .14]	15.29*	60.77	1.34	[−4.17; 6.85]	0	.05 [−.04; .14]
Self-oriented perfectionism	6	1,393	.06	[−.03; .16]	14.67*	65.92	2.37	[−4.61; 9.34]	0	.06 [−.03; .16]
Personal standards	—	—	—	—	—	—	—	—	—	—
High standards	1	96	−.04	[−.24; .16]	0.00	0.00	—	—	—	—
<i>Follow-up depression</i>	11	2,397	.41***	[.26; .54]	167.26	94.02	3.30	[−8.28; 14.88]	0	.41 [.26; .54]
Follow-up depression										
<i>Perfectionistic concerns</i>	20	6,240	.30***	[.25; .34]	71.50***	71.49	−0.17	[−2.92; 2.58]	3	.27 [.22; .32]
Socially prescribed perfectionism	15	3,473	.26***	[.20; .31]	37.70**	62.86	−0.85	[−4.29; 2.60]	5	.21 [.15; .27]
Concern over mistakes	6	1,332	.26***	[.21; .31]	5.33	6.24	5.45	[−3.15; 14.05]	0	.26 [.21; .31]
Doubts about actions	3	691	.40***	[.33; .46]	2.10	4.57	−1.75	[−67.90; 64.39]	0	.40 [.33; .46]
Discrepancy	1	96	.46***	[.29; .61]	0.00	0.00	—	—	—	—
Evaluative concerns perfectionism	3	648	.42***	[.35; .49]	2.22	9.82	1.56	[−88.39; 91.50]	0	.42 [.35; .49]
<i>Perfectionistic strivings</i>	11	2,243	.11***	[.06; .15]	12.80	21.88	0.17	[−3.03; 3.38]	0	.11 [.06; .15]
Self-oriented perfectionism	8	1,726	.12***	[.06; .17]	7.98	12.32	1.32	[−2.16; 4.79]	0	.12 [.06; .17]
Personal standards	2	421	.09	[−.06; .25]	2.68	62.72	—	—	—	—
High standards	1	96	−.04	[−.24; .16]	0.00	0.00	—	—	—	—

Note. k = number of included samples; N = total number of participants in k samples; r^+ = observed weighted mean correlation; r_c^+ = corrected weighted mean correlation; corrected effect sizes were obtained by dividing the observed correlation by the square root of the product of the two corresponding Cronbach's alpha coefficients; CI = confidence interval for r_c^+ ; Q_T = measure of heterogeneity for r_c^+ ; I^2 = percentage of heterogeneity for r_c^+ ; k^{TF} = number of imputed studies as part of “trim and fill” method for r_c^+ .

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3

Random effect estimates of mean correlations for perfectionistic concerns, baseline depressive symptoms, social disconnection, stress, and follow-up depressive symptoms

Mediating variable	<i>k</i>	<i>N</i>	<i>Q_T</i>	<i>df</i>	Mean <i>r</i>	<i>SE</i>	95% CI	<i>I²</i>
Stress	11	2,397	276.63***	60				
Perfectionistic concerns with follow-up depression					.30***	.03	[.23; .36]	67.87
Baseline depression with follow-up depression					.57***	.02	[.54; .61]	39.89
Stress with follow-up depression					.39***	.06	[.28; .50]	89.53
Perfectionistic concerns with baseline depression					.35***	.05	[.27; .44]	83.37
Perfectionistic concerns with stress					.21***	.04	[.15; .26]	47.58
Baseline depression with stress					.27***	.04	[.20; .34]	69.26
Social disconnection	14	2,678	354.24***	78				
Perfectionistic concerns with follow-up depression					.28***	.03	[.22; .34]	65.22
Baseline depression with follow-up depression					.58***	.02	[.54; .62]	54.37
Social disconnection with follow-up depression					.39***	.04	[.32; .47]	79.81
Perfectionistic concerns with baseline depression					.34***	.04	[.25; .43]	85.18
Perfectionistic concerns with social disconnection					.28***	.04	[.20; .37]	80.87
Baseline depression with social disconnection					.29***	.03	[.23; .36]	68.68

Note. Depression = depressive symptoms; *k* = number of included samples; *N* = total number of participants in *k* samples; *Q* = measure of homogeneity of effect sizes; *df* = degrees of freedom for Q statistic; **mean *r*** = corrected weighted mean correlation; *SE* = standard error; *CI* = confidence interval; *I²* = percentage of heterogeneity.

p* < .05; *p* < .01; ****p* < .001.

Table 4

Random effect estimates of mean correlations for perfectionistic strivings, baseline depressive symptoms, social disconnection, stress, and follow-up depressive symptoms

Mediating variable	<i>k</i>	<i>N</i>	<i>Q_T</i>	<i>df</i>	Mean <i>r</i>	<i>SE</i>	95% CI	<i>I²</i>
Stress	7	1,489	99.17***	36				
Perfectionistic strivings with follow-up depression					.10**	.03	[.04; .17]	0.00
Baseline depression with follow-up depression					.55***	.02	[.51; .59]	19.10
Stress with follow-up depression					.30***	.05	[.19; .40]	78.14
Perfectionistic strivings with baseline depression					.10**	.03	[.03; .17]	29.92
Perfectionistic strivings with stress					.05	.04	[-.03; .13]	51.68
Baseline depression with stress					.19***	.04	[.12; .27]	54.83
Social disconnection	9	1,423	156.92***	48				
Perfectionistic strivings with follow-up depression					.11***	.03	[.01; .16]	0.00
Baseline depression with follow-up depression					.56***	.03	[.51; .62]	50.98
Social disconnection with follow-up depression					.42***	.06	[.30; .53]	85.61
Perfectionistic strivings with baseline depression					.13***	.03	[.08; .19]	17.26
Perfectionistic strivings with social disconnection					.15***	.04	[.07; .24]	64.05
Baseline depression with social disconnection					.32***	.04	[.23; .41]	71.29

Note. Depression = depressive symptoms; *k* = number of included samples; *N* = total number of participants in *k* samples; *Q* = measure of homogeneity of effect sizes; *df* = degrees of freedom for Q statistic; **mean *r*** = corrected weighted mean correlation; *SE* = standard error; *CI* = confidence interval; *I²* = percentage of heterogeneity.

* *p* < .05; ** *p* < .01; *** *p* < .001.

Table 5

Model comparison

Stage/Model	<i>k</i>	<i>N</i>	<i>x</i> ²	<i>df</i>	<i>p</i>	CFI	TLI	SRMR	RMSEA [95% CI]	Δx^2
Stress as a mediator of perfectionistic concerns and baseline depressive symptoms on follow-up depressive symptoms										
Stage 1–Homogeneity of correlation matrices	11	2,397	299.00	60	<.001	.88	.86	.13	.14 [.12; .15]	—
Stage 2–Meta-analytic structural equation modeling	—	—	—	—	—	—	—	—	—	—
Model 1A	11	2,397	0.00	0	—	—	—	—	—	—
Model 1B	11	2,397	132.46	1	<.001	.88	.27	.20	.23 [.20; .27]	132.46***
Model 1C	11	2,397	2.64	1	.104	1.00	1.00	.02	.03 [.00; .07]	2.64
Model 1D	11	2,397	12.64	1	<.001	.99	.94	.05	.07 [.04; .11]	12.64***
Model 1E	11	2,397	14.28	2	<.001	.99	.97	.05	.05 [.03; .08]	14.28***
Model 1F	11	2,397	98.70	2	<.001	.91	.73	.14	.14 [.12; .17]	98.70***
Model 1G	11	2,397	168.77	2	<.001	.85	.54	.25	.19 [.16; .21]	168.77***
Social disconnection as a mediator of perfectionistic concerns and baseline depressive symptoms on follow-up depressive symptoms										
Stage 1–Homogeneity of correlation matrices	14	2,678	364.58	78	<.001	.88	.87	.14	.14 [.12; .15]	—
Stage 2–Meta-analytic structural equation modeling	—	—	—	—	—	—	—	—	—	—
Model 2A	14	2,678	0.00	0	—	—	—	—	—	—
Model 2B	14	2,678	149.71	1	<.001	.85	.11	.18	.24 [.20; .27]	149.71***
Model 2C	14	2,678	1.15	1	.283	1.00	1.00	.02	.01 [.00; .05]	1.15
Model 2D	14	2,678	17.01	2	<.001	.98	.90	.07	.08 [.05; .11]	17.01***
Model 2E	14	2,678	18.84	2	<.001	.98	.95	.07	.06 [.03; .08]	18.84***
Model 2F	14	2,678	118.15	2	<.001	.88	.65	.17	.15 [.13; .17]	118.15***
Model 2G	14	2,678	203.08	2	<.001	.80	.40	.20	.19 [.17; .22]	203.08***
Stress as a mediator of perfectionistic strivings and baseline depressive symptoms on follow-up depressive symptoms										
Stage 1–Homogeneity of correlation matrices	7	1,489	110.08	36	<.001	.90	.89	.11	.10 [.08; .12]	—
Stage 2–Meta-analytic structural equation modeling	—	—	—	—	—	—	—	—	—	—
Model 3A	7	1,489	0.00	0	—	—	—	—	—	—
Model 3B	7	1,489	181.39	1	<.001	.74	-.55	.26	.35 [.31; .39]	181.39***
Model 3C	7	1,489	1.84	1	.175	1.00	1.00	.01	.02 [.00; .08]	1.84
Model 3D	7	1,489	0.53	1	.465	1.00	1.00	.01	.00 [.00; .05]	0.53
Model 3E	7	1,489	2.46	2	.292	1.00	1.00	.02	.01 [.00; .05]	2.46

Model 3F	7	1,489	24.72	2	<.001	.97	.90	.08	.09 [.06; .12]	24.72***
Model 3G	7	1,489	186.74	2	<.001	.74	.21	.26	.25 [.22; .28]	186.74***
Social disconnection as a mediator of perfectionistic strivings and baseline depressive symptoms on follow-up depressive symptoms										
Stage 1–Homogeneity of correlation matrices	9	1,423	147.80	48	<.001	.90	.89	.11	.11 [.09; .14]	—
Stage 2–Meta-analytic structural equation modeling	—	—	—	—	—	—	—	—	—	—
Model 4A	9	1,423	0.00	0	—	—	—	—	—	—
Model 4B	9	1,423	94.23	1	<.001	.82	-.05	.19	.26 [.21; .30]	94.23***
Model 4C	9	1,423	0.01	1	.931	1.00	1.00	.00	.00 [.00; .02]	0.01
Model 4D	9	1,423	6.48	1	.012	.99	.94	.04	.06 [.02; .11]	6.48*
Model 4E	9	1,423	7.29	2	.026	.99	.97	.05	.04 [.04; .08]	7.29*
Model 4F	9	1,423	62.63	2	<.001	.89	.66	.15	.15 [.12; .18]	62.63***
Model 4G	9	1,423	94.28	2	<.001	.83	.48	.19	.18 [.15; .21]	94.28***

Note. k = number of included samples; N = total number of participants in k samples; df = degrees of freedom for χ^2 ; p = p value of χ^2 ; **CFI** = comparative fit index; **TLI** = tucker-lewis index; **SRMR** = standardized root mean squared error; **RMSEA** = root mean squared error of approximation. Results for Stage 1 are based on a fixed effect model; results for Stage 2 are based on a random effects model. **Model A** = unconstrained model; **Model B** = path from baseline depression to follow-up depression constrained to zero; **Model C** = path from perfectionism to follow-up depression constrained to zero; **Model E** = path from perfectionism to mediator constrained to zero; **Model E** = path from perfectionism to follow-up depression constrained to zero and path from perfectionism to mediator constrained to zero; **Model F** = path from perfectionism to mediator constrained to zero and path from baseline depression to follow-up depression constrained to zero; **Model G** = path from perfectionism to follow-up depression constrained to zero and path from baseline depression to follow-up depression constrained to zero. Bolded models correspond to model selected based on model comparisons.

* $p < .05$; ** $p < .01$; *** $p < .001$.

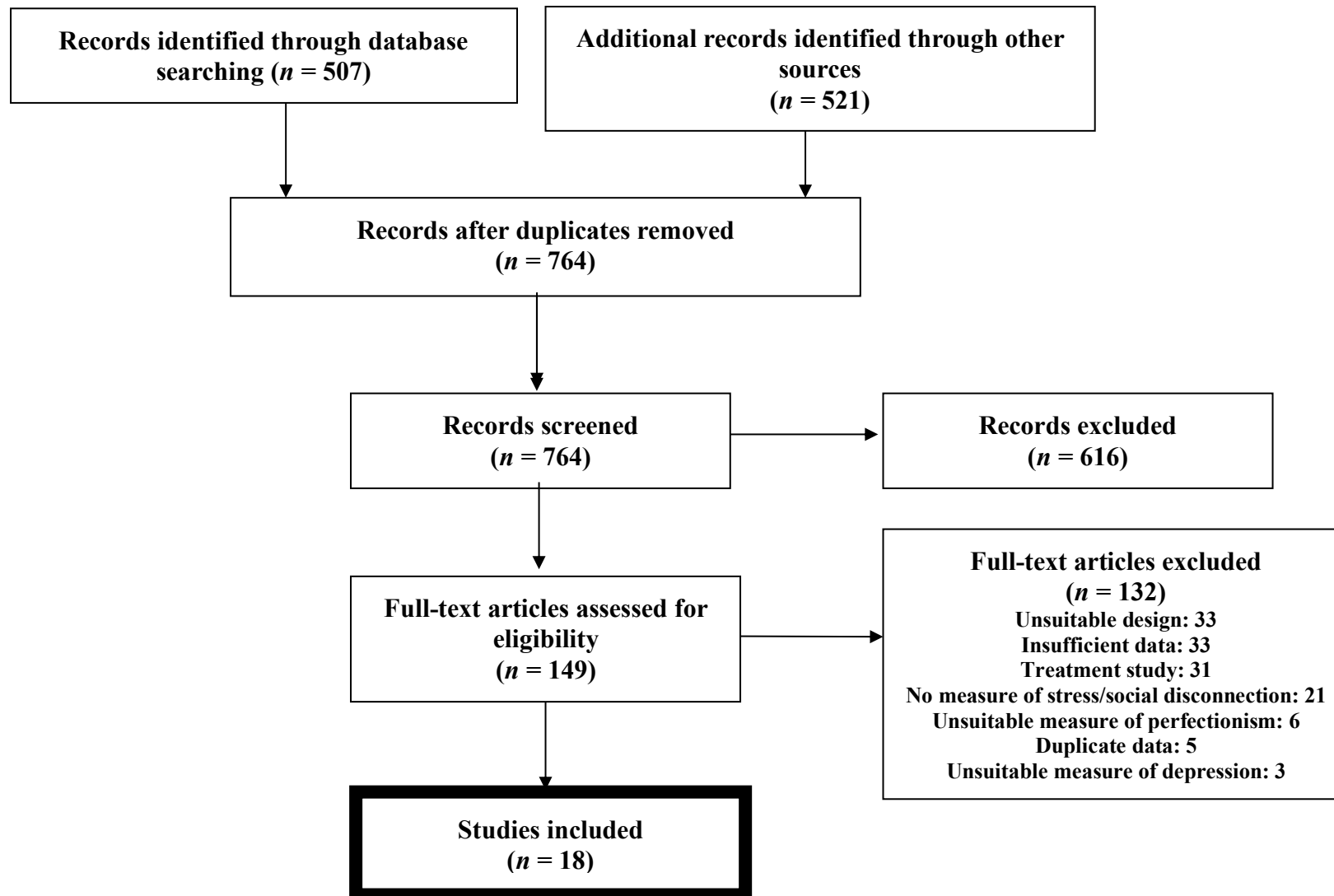


Figure 1. Study selection procedure.

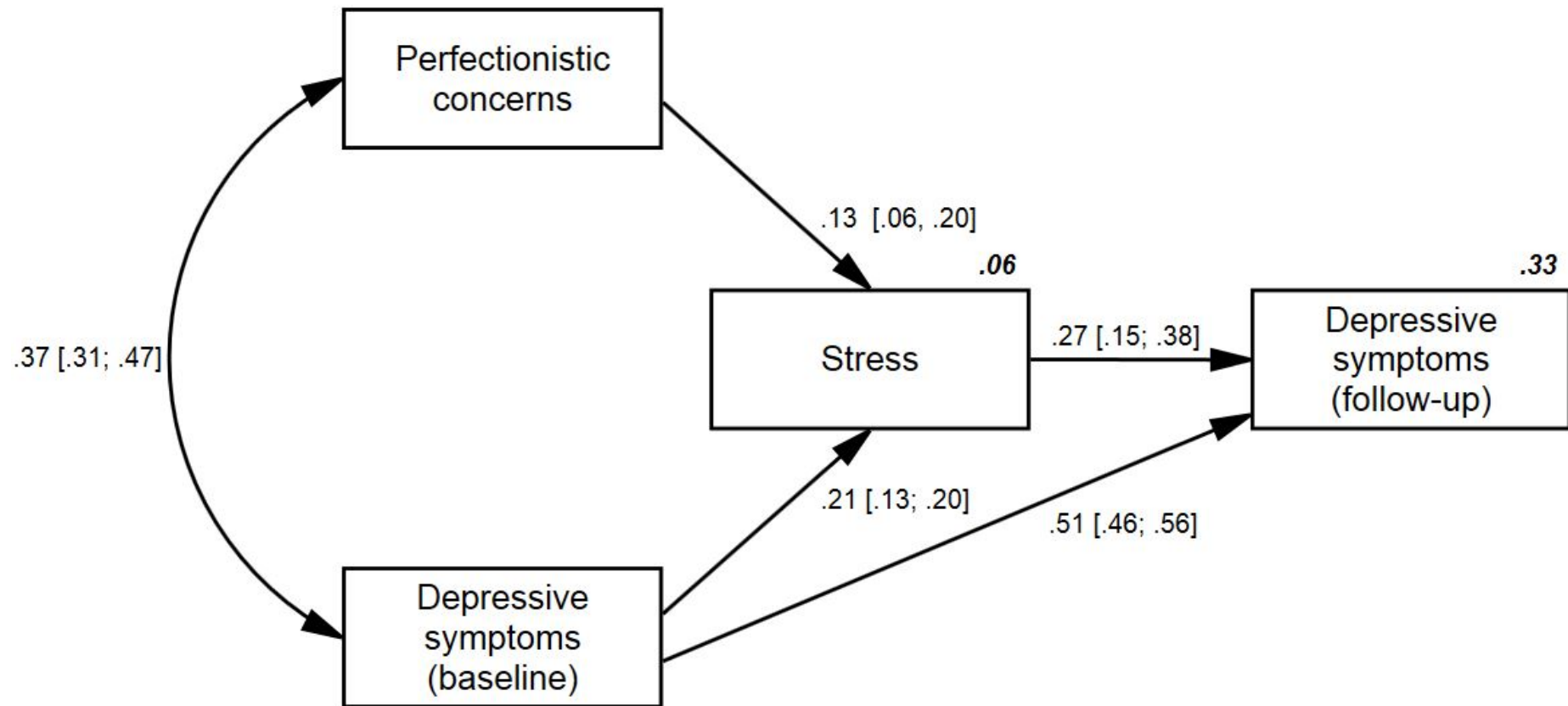


Figure 2. Selected path model for the mediating role of stress in the relationship between baseline perfectionistic concerns and follow-up depressive symptoms, controlling for baseline depressive symptoms (see Table 2 Model 1C). Rectangles represent observed variables. Bolded italicized numbers in the top right-hand corner of rectangles represent the proportion of variance explained by exogenous variables. Standardized path coefficients are reported with 95% confidence intervals in brackets.

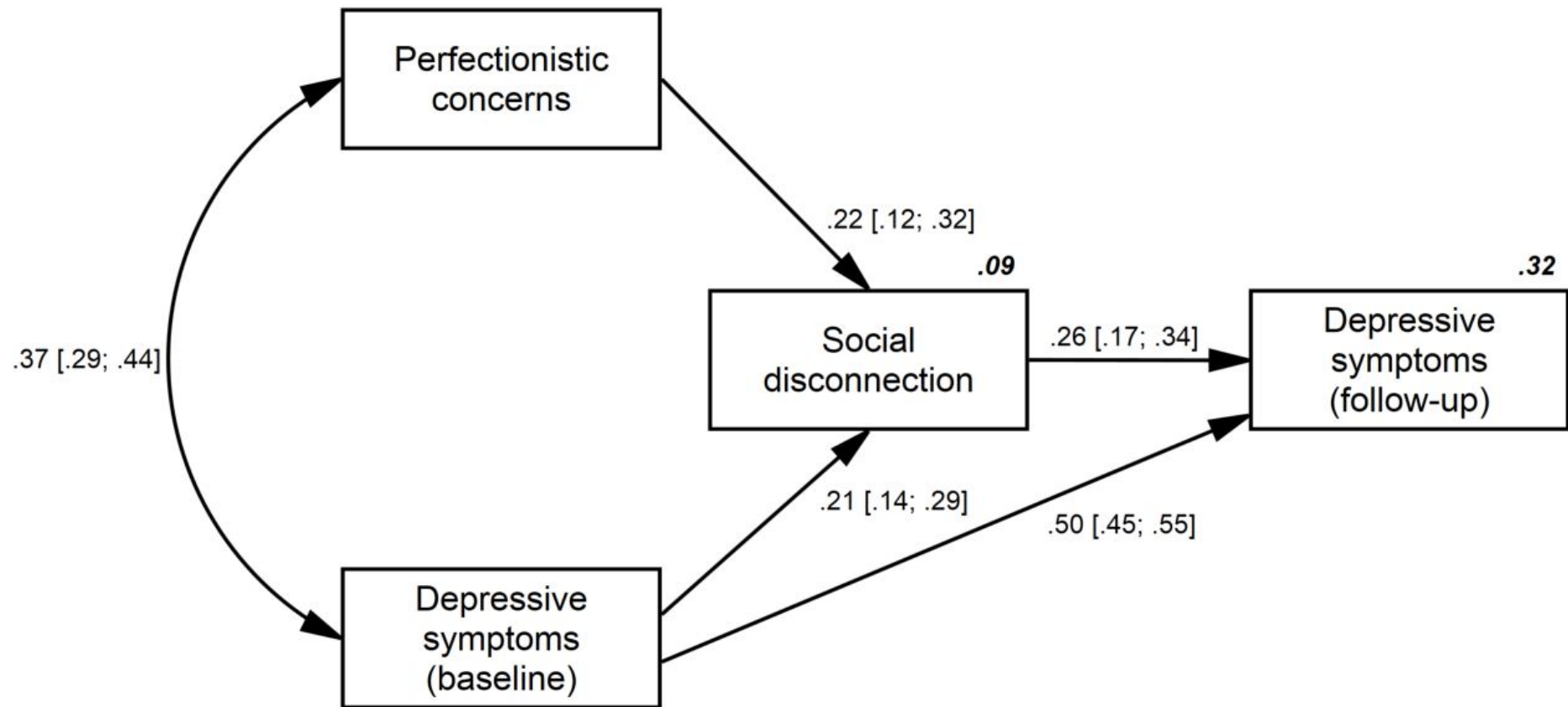


Figure 3. Selected path model for the mediating role of social disconnection in the relationship between baseline perfectionistic concerns and follow-up depressive symptoms, controlling for baseline depressive symptoms (see Table 2 Model 2C). Rectangles represent observed variables. Bolded italicized numbers in the top right-hand corner of rectangles represent the proportion of variance explained by exogenous variables.

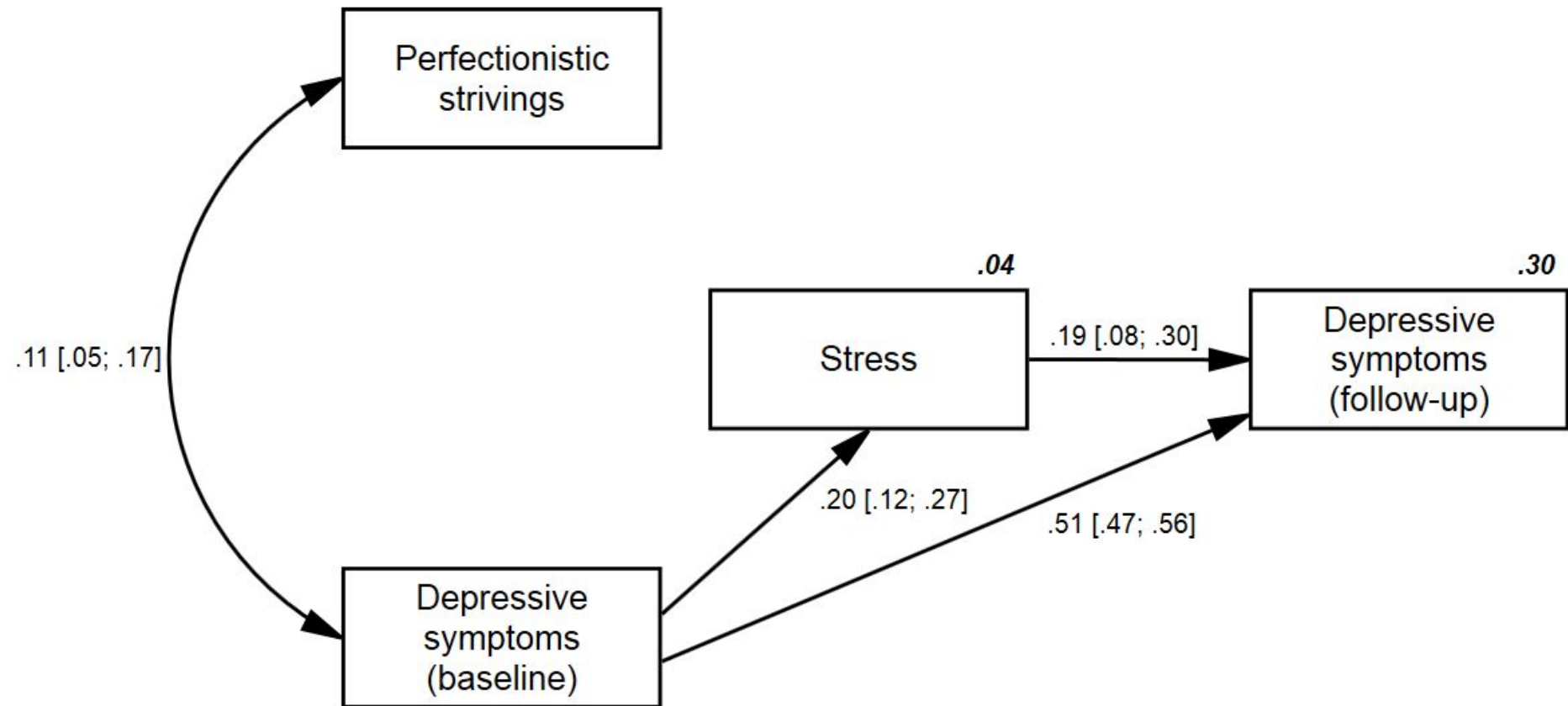


Figure 4. Selected path model for the mediating role of stress in the relationship between baseline perfectionistic strivings and follow-up depressive symptoms, controlling for baseline depressive symptoms (see Table 2 Model 3E). Rectangles represent observed variables. Bolded italicized numbers in the top right-hand corner of rectangles represent the proportion of variance explained by exogenous variables. Standardized path coefficients are reported with 95% confidence intervals in brackets.

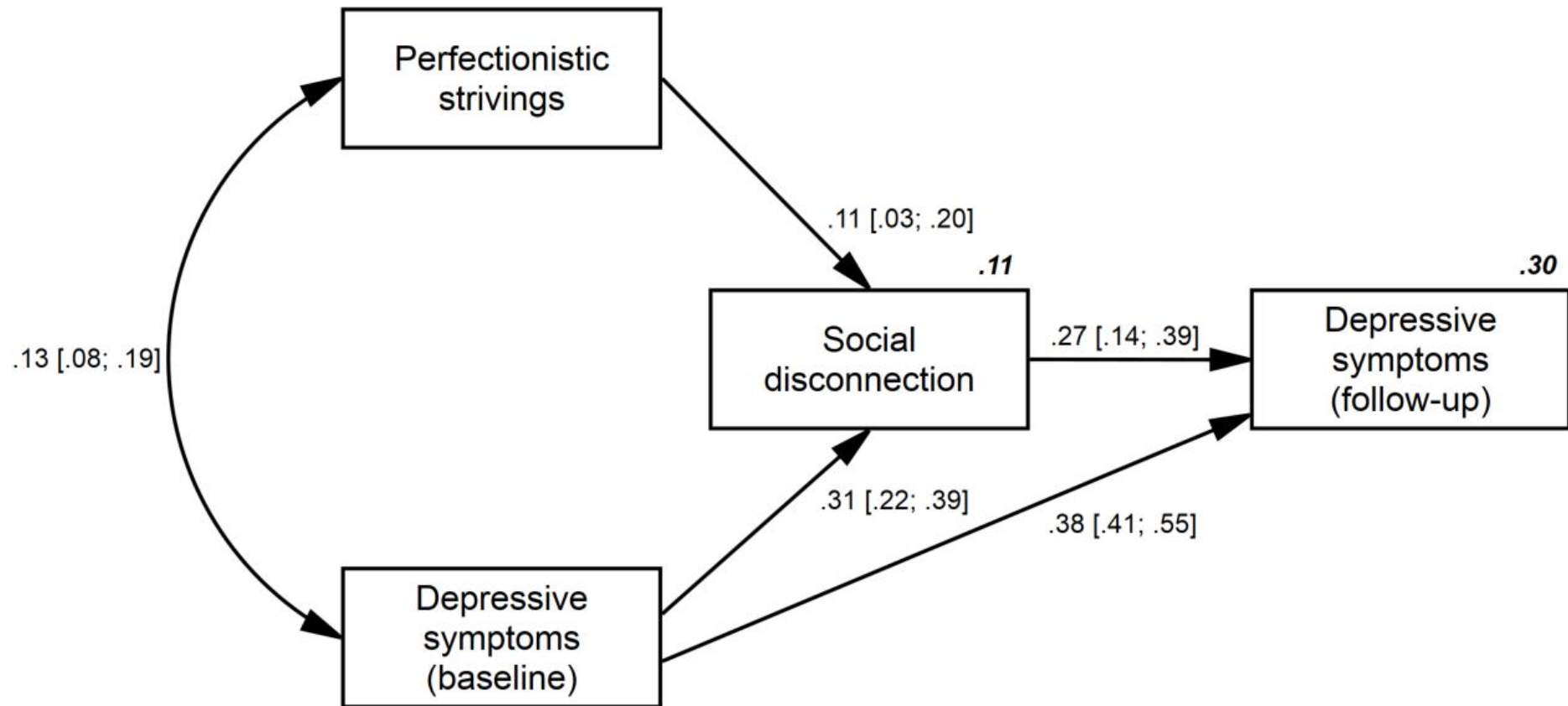


Figure 5. Selected path model for the mediating role of social disconnection in the relationship between baseline perfectionistic strivings and follow-up depressive symptoms, controlling for baseline depressive symptoms (see Table 2 Model 4C). Rectangles represent observed variables. Bolded italicized numbers in the top right-hand corner of rectangles represent the proportion of variance explained by exogenous variables. Standardized path coefficients are reported with 95% confidence intervals in brackets.