Associations between rejection sensitivity and mental health outcomes: A meta-analytic review

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Abstract

Rejection sensitivity is a personality disposition characterized by oversensitivity to social rejection. This meta-analysis reviewed 72 studies that examined associations between rejection sensitivity and the following five different mental health outcomes: depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder. The results showed significant and moderate associations between rejection sensitivity and depression (pooled $r = 0.335$; $p < .001$), anxiety (pooled $r = 0.411$; $p < .001$), loneliness (pooled $r = 0.376$; $p < .001$), borderline personality disorder (pooled $r = 0.407$; $p < .001$), and body dysmorphic disorder (pooled $r = 0.428$; $p < .001$). The associations between rejection sensitivity and depression, anxiety, and borderline personality disorder varied by type of sample, but the associations were similar for clinical and non-clinical (i.e., community) samples. Gender, age, type of measurement of rejection sensitivity, continent, and publication year did not moderate the associations between rejection sensitivity and the five mental health outcomes. Implications of the findings for both risk assessment and prevention and intervention strategies in mental health practice are discussed.

Keywords: rejection sensitivity, depression, anxiety, borderline personality disorder, body dysmorphic disorder, meta-analysis

Numerous studies have documented that early interpersonal trauma (e.g., childhood maltreatment) has long-term effects on later psychopathology (for instance, Kim & Cicchetti, 2010; Lansford et al., 2002; Wolfe, Wekerle, Scott, Straatman, & Grasley, 2004). Nonetheless, the field has made little headway in identifying the mechanisms of these behavioral effects. Rejection sensitivity has been identified as a potential mechanism linking early interpersonal trauma to its subsequent sequelae (Downey, Khouri, & Feldman, 1997). Extensive research has shown that rejection sensitivity is associated with different mental health problems (e.g., Chango, McElhaney, Allen, Schad, & Marston, 2012; Chesin, Fertuck, Goodman, Lichenstein, & Stanley, 2015; Rowe, Gembeck, Rudolph, & Nesdale, 2015; Webb et al., 2015). However, there were discrepant reports regarding these associations between rejection sensitivity and different mental health problems. It is thus important to synthesize empirical evidence to better understand these associations. Until now, a systematic review in which the associations between rejection sensitivity and mental health problems is statistically summarized, was not available. Therefore, the aim of the present study was to statistically summarize the associations between rejection sensitivity and different mental health problems by conducting a series of meta-analyses.

Conceptualization and Measurement of Rejection Sensitivity

Rejection sensitivity is thought to develop out of an individual's early experience of rejection, neglect, or abuse (Ayduk & Gyurak, 2008). More broadly, it is thought to develop in situations out of overt or covert, active or passive, and physical or emotional acts of others that communicate rejection (Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010). Rejection sensitivity is a personality disposition characterized by oversensitivity to social rejection. In particular, Downey and colleagues defined rejection sensitivity as a cognitive-affective processing disposition to anxiously expect, readily perceive, and overreact (emotionally or behaviorally) to rejection (Downey & Feldman, 1996; Downey, Khouri, & Feldman, 1997). Similar to rejection sensitivity, Boyce and Park (1989) proposed the construct interpersonal sensitivity which they defined as an undue and excessive awareness of, and sensitivity to, the behavior and feelings of others. Individuals with high interpersonal sensitivity are particularly preoccupied with perceived or actual situations of criticism or rejection, vigilant to the behavior and moods of others, and overly sensitive to troubles of any interpersonal interaction (Boyce & Parker, 1989). Experimental research has evidenced that individuals with high rejection sensitivity show greater responsivity to social rejection which is differentiated from a broader threat.

Specifically, using a classical fear conditioning task in which images of rejection-relevant (angry faces), rejection-irrelevant social stimuli (neutral faces), and nonsocial stimuli (geometric figures) serving as conditioned stimuli were paired with an aversive outcome (a mild shock to the wrist) served as the unconditioned stimulus, it has been found that individuals with high rejection sensitivity compared to those with low rejection sensitivity displayed a resistance to extinction of the conditioned response to social rejection threat, but not to neutral stimuli or nonsocial threat (Olsson, Carmona, Downey, Bolger, & Ochsner, 2013).

In empirical literature, rejection sensitivity has been measured predominantly by different versions of the Rejection Sensitivity Questionnaire (RSQ) (Downey & Feldman, 1996), and the Interpersonal Sensitivity Measure (IPSM) (Boyce & Parker, 1989). The RSQ was coined by Downey and colleagues who viewed defensive expectations of rejection to be the core component of rejection sensitivity (Downey et al., 1997). They operationalized rejection sensitivity as anxious or angry expectations of rejection in situations where rejection is possible. Based on this, Downey and Feldman (1996) developed the RSQ-personal rejection sensitivity (RS), which measures two components: anxious expectations and angry expectations. Researchers have argued that rejection sensitivity is learned through experience (Romero-Canyas et al., 2010), and that the learned nature of feeling rejected implies that rejection sensitivity may be situation specific (Levy, Ayduk, & Downey, 2001). Consequently, researchers have recently developed various instruments for measuring rejection sensitivity for different populations, including the appearance-based RSQ (Park, 2007), the weight-based RSQ (McClure Brenchley & Quinn, 2016), the gender-based RSQ (London, Downey, Romero-Canyas, Rattan, & Tyson, 2012), the race-based RSQ (Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002), the age-based RSQ (Kang & Chasteen, 2009), the gay-related rejection scale (Pachankis, Goldfried, & Ramrattan, 2008), and the sexual minority women rejection sensitivity scale (Dyar, Feinstein, Eaton, & London, 2016).

In parallel with the RSQ and its different versions, the interpersonal sensitivity measure (IPSM) (Boyce & Parker, 1989) has also been attracting growing concern by researchers, and it has been recently validated in Italy (Masillo et al., 2014) and Korea (Lee et al., 2013). The 36-item IPSM encompasses five factors: interpersonal awareness, need for approval, separation anxiety, timidity, and fragile inner-self (Boyce & Parker, 1989). Unlike the RSQ, which is based on traditional theories (i.e., a cognitive-affective framework, and a defensive motivational system), the IPSM was developed based on clinical experience. The RSQ tends to consider rejection sensitivity as a personality disposition, whereas rejection sensitivity is regarded as a personality trait in the IPSM. Appendix A presents an overview of available

instruments measuring rejection sensitivity.

Rejection Sensitivity and Mental Health

The cognitive-affective processing systems (CAPS) framework (Mischel, 1973; Mischel & Shoda, 1995) can be used to account for possible associations between rejection sensitivity and mental health outcomes. The CAPS theory (Mischel & Shoda, 1995) explains why and how people's behavior varies stably across situations. It is concerned with understanding how personality processes emerge in specific Person × Situation interactions (Romero-Canyas et al., 2010). Specifically, it reveals an if …then…(e.g., if situation X, he does A, but if situation Y, he does B) pattern of rejction sensitivity and behaviors (Ayduk & Gyurak, 2008). For example, Jane does not see herself as a pretty girl, but she does get good grades in school. If her peers discuss school performance, she is confident, but when her peers discuss appearance, she is prone to depression. These situation-behavior relations reflect a stable activation network of distinctive personality processing dynamics. These dynamics link fears and expectations of rejection, perceptions or attributions of rejection, and affective or behavioral overreactions to perceived rejection (Ayduk & Gyurak, 2008). The relation between psychological features of situations and behavior is assumed to be mediated by five type of person variables (Mischel, 1973): encoding and construals, expectations and beliefs, feelings and emotions, goals and values, and competencies and self-regulatory abilities. Individuals with high levels of rejection sensitivity tend to fear or anxiously expect rejection of others (Ayduk & Gyurak, 2008; Romero-Canyas et al., 2010). This anticipation may lead to a self-fulfilling prophecy in which individuals behave out of fear, thereby creating a situation that elicits rejection from others and in which the previous fears are confirmed (Downey, Freitas, Michaelis, & Khouri, 1998).

Rejection sensitivity can also be explained as a defensive motivation system (Downey, Mougios, Ayduk, London, & Shoda, 2004; Romero-Canyas et al., 2010). Rejection sensitivity results from previous experiences of social rejection and the rejection sensitivity system is intended to protect the self against future rejection by triggering rapid defensive responses when social threats exist (Romero-Canyas et al., 2010). When rejection is the threat, activation of the rejection sensitivity system prepares individuals to detect signs of social threat, and to be ready for immediate acting in order to avert the danger by being self-defensive (Downey, Mougios, Ayduk, London, & Shoda, 2004). Relative to individuals low in rejection sensitivity, individuals high in rejection sensitivity show heightened physiological activity (Downey et al., 2004), are vigilant for rejection-related cues, automatically process

rejection-related content (Berenson et al., 2009), show a lower threshold for detecting social threat, see cues of rejection as more negative (Olsson, Carmona, Downey, Bolger, & Ochsner, 2008), and are prone to personalize ambiguous cues of rejection (Downey & Feldman, 1996). The defensive motivational system disposes the individual toward active avoidance and fight-or-flight behavior (Gray, 1987; Lang, Davis, & Öhman, 2000), which may lead to increased internalizing symptoms or disorders such as depression, anxiety, and personality disorders (Bijttebier, Beck, Claes, & Vandereycken, 2009).

In the present study, associations between rejection sensitivity and different mental health problems will be further examined using a meta-analytic design, and this is relevant for several reasons. First, this meta-analytic study generates new knowledge on the associations between rejection sensitivity and different mental health problems. According to the DSM-IV (American Psychiatric Association, 2013), individuals with a social anxiety disorder fear being negatively evaluated and being rejected as a result. Further, individuals suffering from a borderline personality disorder are very sensitive to environmental circumstances and the perception of impending separation or rejection can lead to a marked change of mood (American Psychiatric Association, 2013). However, based on the DSM-IV (American Psychiatric Association, 2013), we do not know whether rejection sensitivity is also related to other types of negative mental health outcomes such as depression, loneliness, and body dysmorphic disorder. Second, examining these associations advances the fundamental knowledge of the degree to which rejection sensitivity contributes to negative mental health outcomes. Third, more insight into the associations between rejection sensitivity and negative mental health outcomes may improve current clinical assessment practices. After all, if rejection sensitivity is related to negative mental health outcomes, it becomes relevant to measure rejection sensitivity in the identification of both mental health problems and care needs. Fourth, the results of the present study may foster the development and improvement of programs aimed at the prevention or treatment of mental health problems.

Taken together, the primary aim of this meta-analytic review was to estimate overall associations between rejection sensitivity and different mental health problems. The secondary aim was to investigate whether and how each overall association between rejection sensitivity and each mental health problem was moderated by sample characteristics, research design characteristics, and other characteristics.

Methods

The present review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009).

Protocol and Registration

To minimize the risk of bias in this systematic review, the protocol of this review was registered on the International Prospective Register for Systematic Reviews (PROSPERO), registration number CRD42016053389, available from http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016053186.

Study Selection

We were interested in the broadest range of mental health outcomes. At the initial stage of study selection, the first author merely used the keyword "rejection sensitivity" to search for primary studies published between January 1, 1990 and December 31, 2016 in six electronic databases: PsycINFO, MEDLINE, EMBASE, ScienceDirect, Web of Science, and Google Scholar. After the first author screened all the primary studies on rejection sensitivity and mental health outcomes, we set two inclusion criteria for this meta-analytic review: 1) We only included primary studies reporting on at least one association between rejection sensitivity and a specific mental health problem. 2) We only focused on those mental health problems for which sufficient effect sizes could be extracted from the primary studies. In this review, the minimum number of studies for creating a separate mental health outcome was set to five. Thus, we decided not to focus on mental health problems reported on in less than five studies. As a result, we focused on five mental health outcomes in the present review: depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder.

Next, a three-step literature search was adopted to identify relevant literature on five mental health outcomes (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder). First, we searched in the following six electronic databases for primary studies published between January 1, 1990 and December 31, 2016: PsycINFO, MEDLINE, EMBASE, ScienceDirect, Web of Science, and Google Scholar. No restrictions were set in terms of study characteristics (i.e., participants and study design) and reporting characteristics (i.e., language and publication status). Second, reference lists of eligible studies and review articles (i.e., Marin & Miller, 2013; Premkumar, 2012; Romero-Canyas et al., 2010) were searched manually to reduce the likelihood of missing relevant studies. Third,

prominent researchers in the field were identified and all their publications were evaluated for inclusion.

The literature search was independently performed by two authors (SG and KL) in the above-mentioned databases. The following combination of two components were used to retrieve literature: ("rejection sensitivity") AND ("depression" OR "depressive symptoms" OR "depressed mood" OR "anxiety" OR "anxious symptoms" OR "loneliness" OR "borderline personality disorder" OR "borderline personality features" OR "borderline personality symptoms" OR "body dysmorphic disorder" OR "body dysmorphic symptoms" OR "mental health" OR "psychopathology" OR "internalizing problems" OR "psychological well-being" OR "adjustment" OR "negative affect" OR "psychological stress" OR "negative feelings" OR "general distress" OR "total difficulties"). Using these syntax components, we conducted advanced searches in the keywords, title, and abstract fields of each database to retrieve relevant literature. Results from all information resources were combined and duplicates were removed subsequently.

Each unique search result was reviewed independently by two authors (SG and KL) of the current study to determine eligibility. First, the title and abstract of each potential relevant primary study were screened to ascertain whether the study met the inclusion criteria. In cases where the eligibility of the study could not be ruled out based on the title and abstract, the full article text was also examined.

Primary studies were included in the review if they fulfilled the following criteria: 1) The study design was quantitative and empirical in nature, implying that review papers, qualitative studies, and case studies were discarded. 2) The study was written in English. 3) Studies had a cross-sectional, longitudinal, or experimental design. 4) The study examined at least one association between rejection sensitivity and one or more of the following negative mental health outcomes: depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder. Studies only examining constructs or symptoms broadly – but not specifically – related to mental health outcomes (e.g., mental health, psychological stress, negative affect, negative feelings, total difficulties, internalizing problems, general distress, or adjustment) were excluded. Studies combining anxiety and depression disorders into a single outcome (e.g., depressive and anxious symptoms) were also excluded, because including such outcomes would undermine our conclusions regarding the association between rejection sensitivity and specifically depression or anxiety. 5) The study reported on statistical information required to obtain or calculate at least one bivariate effect size (i.e., Pearson's *r*). 6) Longitudinal studies had to report on baseline associations, to rule out possible confounding developmental effects. Longitudinal studies were excluded if only follow-up associations were reported.

When it was not clear whether a study should be included or not, the disagreement was handled by consulting an expert in rejection sensitivity to determine whether the primary study should be included or not. If a study appeared eligible on the basis of the inclusion criteria, but not all required information could be coded, we contacted the study's authors and requested the required information. In total, six authors were contacted in an attempt to obtain missing information. Each author was informed of the purpose of the current meta-analysis and was provided a list of variables that were necessary for the current meta-analysis (e.g., correlations between rejection sensitivity and one of the five mental health outcomes), but were not reported on in their studies. Four authors replied and provided the requested information.

As for the mental health outcomes in the present meta-analysis, we defined the following five different domains: (a) depression, (b) anxiety, (c) loneliness, (d) borderline personality disorder, and (e) body dysmorphic disorder. In short, depression is a state of sad, empty, or irritable mood, accompanied by somatic and cognitive changes that affect the individual's capacity to function (American Psychiatric Association, 2013). Anxiety is an emotion characterized by expectations of future threat, associated with muscle tension and vigilance in preparation for future danger and cautious or avoidant behaviors (American Psychiatric Association, 2013). Loneliness is a subjective feeling of social isolation, associated with the absence of certain social relationships, feelings of emptiness or abandonment (De Jong-Gierveld, 1987). The borderline personality disorder is characterized by a pervasive pattern of instability of interpersonal relationships, self-image, and affects, and marked impulsivity that is present in a variety of contexts (American Psychiatric Association, 2013). Body dysmorphic disorder is characterized by a persistent preoccupation with perceived defects or flaws in the physical appearance, which are viewed as unattractive, abnormal or deformed (American Psychiatric Association, 2013). Important to note is that in this study, five outcomes (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder) were regarded as either "symptoms" or "diagnoses". When regarded as "diagnoses", we followed the guideline of DSM-5 to define the criteria of depressive disorders and anxiety disorders (American Psychiatric Association, 2013). The measurements of the five outcomes are summarized in Appendix B1.

Coding of Studies

If inclusion criteria were met, the full-text of each article was retrieved and coded using a standardized extraction sheet and codebook in accordance with the

guidelines of Lipsey and Wilson (2001). To meaningfully synthesize results, each study was coded and evaluated based on the following characteristics: (a) authors and year of publication, (b) study design (i.e., cross-sectional, longitudinal, or experimental), (c) continent (grouped into four continents: North America, Europe, Australia, and Asia), (d) sample type (sample was coded as "clinical" when participants were recruited from clinical settings, "community" when participants were recruited from general community settings, and "mixed" when participants were recruited in both clinical and community settings), (e) sample size, (f) gender (i.e., percentage of females), (g) mean age, (h) age group (samples were coded as "younger than 18 years of age" and "18 years of age or older", (i) measure of rejection sensitivity (i.e., RSQ and versions thereof, IPSM, and others), (j) type of mental health outcome (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), (k) type of measurement for outcome variables (e.g., Beck Depression Inventory, Children's Depression Inventory), and (l) effect size (i.e., zero-order correlation coefficients). Whenever possible, unadjusted effect sizes (i.e., study results not controlled for variables such as gender, age, etc.) were extracted. Appendix B2 presents an overview of the coded variables.

If studies reported on results of more than one sample, effect sizes for each sample were included in the meta-analysis, where possible. If studies reported effect sizes for both a total sample and subgroups (for instance, males and females), only effect sizes reported for the subgroups were included. In this way, the problems of redundancy is reduced and analysis for subgroups is possible. If studies analyzed males and females separately, the male and female samples were considered unique samples. If studies reported on multiple measures for the same construct (such as two different measures of rejection sensitivity or anxiety), multiple effect sizes were coded. If studies reported on multiple outcomes (such as depression and anxiety and loneliness), multiple effect sizes were coded. If the study was designed to be a longitudinal study or other type of prospective study, only baseline data were coded. If studies reported on duplicate samples (for instance, two articles used the same sample and reported similar results), only one study was included and coded.

We coded several sample descriptors, research design descriptors, and other descriptors that may moderate overall associations. First, participants' gender (i.e., the percentage of females) in the sample was coded since previous research reported mixed findings of rejection sensitivity for males and females (e.g., Calogero, Park, Rahemtulla, & Williams, 2010; Park, Calogero, Young, & Diraddo, 2010; Webb et al., 2015). Second, we coded the age of participants since several researchers found mixed findings of participants' age in rejection sensitivity (e.g., De Panfilis, Meehan, Cain, & Clarkin, 2015; Rowe et al., 2015; Zimmer-Gembeck, Trevaskis, Nesdale, &

Downey, 2014). We coded age as both a continuous variable (i.e., mean age of the sample) and a categorical variable (i.e., 18 years or older versus younger than 18 years). Third, we coded type of sample (clinical, community, mixed sample) since prior research found differences in associations between rejection sensitivity and mental health outcomes between populations (e.g., Staebler, Helbing, Rosenbach, & Renneberg, 2011).

As for research design descriptors, we coded type of measurement of rejection sensitivity and type of measurement of the five mental health outcomes to examine whether the type of instrument used by researchers moderates the overall associations. Lastly, we coded publication year and continent (i.e., North America, Europe, Australia, and Asia) in which the study was performed for descriptive purposes only.

Two authors (SG and KL) worked independently and coded 100% of the primary studies included in this meta-analysis. Inter-rater reliability was assessed by calculating intraclass correlation coefficients (ICC) for continuous variables and by calculating kappas (*k*) for categorical variables. In case discrepancies between coders were identified, both coders independently reviewed the study again, after which errors were identified and corrected.

To minimize possible bias in individual studies, the National Institutes of Health's Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Institutes of Health, 2014) was used to assess the quality of the included studies. Each study was assessed using 14 criteria and was rated using a three-point scale (good, fair, and poor). The specific list of criteria used in the present study and results of the quality assessment is available from the authors upon request. Quality assessment was independently conducted by two authors (SG and KL), and disagreements were resolved via discussion between these two raters.

Statistical Analyses

The correlation coefficient was chosen as the primary index of effect size in the present meta-analysis. We computed Pearson's *r* for each effect size that could be extracted from each primary study. Prior to conducting the meta-analyses, all correlations were converted to the Fisher's transformation of *r* (Z_r), since the sampling distribution of *r* is negatively skewed (Card, 2012; Hedges & Olkin, 1985). After conducting all analyses, the Fisher's *z* values were re-transformed into Pearson's *r* for interpretability. If studies did not report on the Pearson's correlation coefficient *r*, it was calculated whenever possible using the available data reported in the article (e.g., by using *t*-statistics). It was not possible to convert betas from multiple regression or most advanced statistical techniques into correlation

coefficients as we were interested in calculating a bivariate association (see also the inclusion criteria in Section 2.2). A positive *r* value indicates that a high level of rejection sensitivity is associated with a high level of a specific mental health outcome (i.e., depression, anxiety, loneliness, borderline personality disorder, or body dysmorphic disorder). Conversely, a negative *r* value indicates that a high level of rejection sensitivity is associated with a low level of a specific mental health outcome. The formulas of Hedges and Olkin (1985), Borenstein, Hedges, Higgins, and Rothstein (2009), Card (2012), and Cheung (2014) were used for calculating (and transforming) the Pearson's correlation and Fisher's *z* values (see Appendix D).

To reduce the disproportionate influence of extreme effect sizes on the results of the statistical analyses, we checked for outliers by searching for effect sizes with very large standardized *z* scores (i.e., in excess of +/-3.29) (Tabachnik & Fidell, 2013). One effect size in the depression domain was identified with a *z* value larger than 3.29. To reduce the impact of this outlier, the raw *r* value of the outlier was replaced by a new *r* value that equaled the highest effect falling within the normal range.

Most primary studies included in the present meta-analysis reported on multiple effect sizes that could be extracted, because many studies reported on multiple outcome variables, or different scales that were used to assess the same construct. In addition, many studies report on results using different types of reporters, or different study samples and/or subsamples. As effect sizes obtained from the same study are more likely to be related than effect sizes obtained from different studies, the assumption of independence of effect sizes in traditional meta-analytic approaches is violated (see, for instance, Lipsey & Wilson, 2001). Therefore, a traditional two-level meta-analytic approach would not be appropriate in the present review. To deal with the interdependency of effect sizes, we used a multilevel approach to the meta-analysis, which is a strong method for dealing with dependency of effect sizes (Assink & Wibbelink, 2016), as it accounts for the hierarchical structure of the data in which effect sizes are nested within studies (Van Den Noortgate & Onghena, 2003).

In the present study, a three-level meta-analytic model was used to synthesize the combined effect sizes and to conduct the moderator analyses. The three-level random effects model examined three sources of variance: sampling variance of the observed effect sizes (Level 1), variance between effect sizes from the same study (Level 2), and variance between studies (Level 3) (Cheung, 2014; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013, 2015). Using a three-level meta-analytic model, all relevant effect sizes can be extracted from one primary study, so that all information can be preserved and maximum statistical power can be achieved (Assink et al., 2015). In contrast, in more traditional two-level meta-analytic models, effect sizes from the same study are often averaged into a single effect or discarded,

meaning loss of information and lower statistical power in the analyses.

All analyses were conducted in R version 3.3.2 (R Core Team, 2016), using the metafor package (Viechtbauer, 2010).The R syntax was written following Assink and Wibbelink's (2016) tutorial. We estimated the sampling variance of observed effect sizes (Level 1) using the formula of Cheung (2014). We performed two separate one-tailed log-likelihood-ratio-tests to examine whether the variance between effect sizes extracted from the same study (Level 2) and the variance between studies (Level 3) were significant. These tests were performed one-sided, since variance components can only deviate from zero in a positive direction (Assink & Wibbelink, 2016). All other tests were conducted two-tailed, and a *p* value smaller than .05 was considered statistically significant. Before moderator analyses were performed, each continuous moderator variable was centered around its mean and dichotomous dummy variables were created for each category of a potential moderating variable. All model parameters were estimated using the restricted maximum likelihood method (REML) (Viechtbauer, 2005).

In performing the statistical analyses, we first estimated an overall association between rejection sensitivity and each of the five mental health outcomes (i.e., for depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder) by building five separate meta-analytic intercept-only models. In interpreting these overall associations, we followed Cohen's (1992) guidelines in which *r* of at least 0.1 is a small effect; *r* of at least 0.3 is a medium effect, and *r* of at least 0.5 is a large effect. Second, using mixed-effect models we conducted bivariate moderator analyses in which potential moderators of the associations between rejection sensitivity and one of the five mental health outcomes were examined. In a mixed-model, the effect sizes (i.e., correlation coefficients) are estimated as a random-effect, whereas potential moderator is examined as a fixed-effect.

Publication bias is a common concern in conducting meta-analysis. That is, studies reporting on nonsignificant findings are less likely to be published than studies reporting on significant findings. Consequently, results of meta-analytic research may be biased. To evaluate the extent to which the results of the present meta-analytic review are biased because of publication bias or any other form of bias, we visually inspected funnel plots of the effect sizes, and we conducted Duval and Tweedie's trim-and-fill analysis (Duval & Tweedie, 2000). A funnel plot was created (for each mental health outcome) in which the effect sizes are plotted against their standard errors. If effect sizes are symmetrically distributed around the mean effect, it is assumed that the results are not affected by a form of bias. However, an asymmetric distribution of effect sizes may indicate that bias is present in a meta-analysis (Borenstein et al., 2009). Duval and Tweedie's trim-and-fill analysis generates

estimates of effect sizes that seem to be missing based on the asymmetry of a funnel plot. Next, these estimated missing effect sizes were added to the original data set, after which an adjusted overall effect could be estimated. If the initial and adjusted overall effect sizes differ, this indicates that publication bias may be present in the meta-analysis.

Results

Description of Included Studies

The results of the literature search strategy are presented in Appendix C. Seventy two studies (42 on depression, 31 on anxiety, 9 on loneliness, 18 on borderline personality disorder, and 5 on body dysmorphic disorder) from which a total of 186 correlations could be extracted met the inclusion criteria and were thus included in the present meta-analytic study. Because multiple correlations could be extracted from many single primary studies, there were more correlations than studies. All the associations included in the present meta-analysis were unadjusted estimates except the association that was extracted from the study of Kawamoto, Ura, and Hiraki (2017), who controlled for age and sex. As for the interrater agreement between the two raters, it was excellent (all ICCs = 0.90-1.00 and *ks* = 0.95-1.00). All disagreements were subsequently solved and in the end 100% consensus was reached.

The included studies and some of the study characteristics are presented in Appendix B1. Of the 72 studies included in this review, 6.9% (*n* = 5) used clinical or high-risk samples, 84.7% (*n* = 61) used community samples, and 8.3% (*n* =6) used mixed samples. 58.3% (*n* = 42) of the studies were conducted in North America, 19.4% (*n* = 14) of the studies in Europe, and only 13.9% (*n* = 10) and 8.3% (*n* = 6) of the studies in Australia and Asia, respectively. The total sample size was 20,385 and the mean age of all the participants was 23.481 (*SD* = 11.342) years. The references of the included studies are shown in Appendix E.

Overall Effect Sizes and Publication Bias

Overall effect sizes

An overview of the overall association between rejection sensitivity and each of the five mental health outcomes is presented in Table 1. The overall associations were all significant and could be designated as moderate effect sizes (the magnitude ranged from *r* = 0.335 for depression to *r* = 0.428 for body dysmorphic disorder), according to the criteria of Cohen (1992) for interpreting the magnitude of effect sizes. The

results of the likelihood-ratio tests showed that there was significant variance between effect sizes from the same study (i.e., level 2 variance) in four mental health outcomes and that there was significant variance between studies (i.e., level 3 variance) in one mental health outcome (see Table 1). Therefore, we conducted moderator analyses in four mental health outcomes in order to determine characteristics of studies that can explain level 2 or level 3 variance. As there was no significant variance at level 2 or level 3 in the loneliness domain, we did not conduct moderator analyses in this mental health outcome.

Publication bias

The trim-and-fill analyses suggested that publication bias was present in four of the five mental health outcomes (i.e., depression, anxiety, loneliness, and borderline personality disorder), as indicated by an asymmetrical distribution of effect sizes. Therefore, "corrected" overall effect sizes were estimated for these domains (see Table 1). The adjusted overall effect sizes for the four mental health outcomes were all significant and moderate, based on the criteria proposed by Cohen (1992). For each mental health outcome, the funnel plot of effect sizes against the standard error is presented in Appendix F.

Moderator Analyses

Moderators are classified into sample descriptors, research design descriptors, and other descriptors. Below, the variables tested as potential moderators are presented by mental health outcomes in which effect sizes proved to be heterogeneous (i.e., significant level 2 and/or level 3 variance).

Depression

The results of the moderator analyses for the depression outcome are presented in Table 2. We found a significant moderating effect of the type of sample on the association between rejection sensitivity and depression, as the results of the omnibus test towards a significant moderating effect , F (2, 62) = 5.683, $p < .01$. However, the mean effect of clinical sample (Cohen's $d = 0.355$) was not significantly higher than the mean effect of community sample (Cohen's $d = 0.338$), as the regression coefficient was not significant ($p > .05$). This implies that the association between rejection sensitivity and depression was not significantly higher for clinical sample than for community sample. No significant moderating effect was found for percentage of females, mean age of the sample, participants' age (categorized), measurement of rejection sensitivity, measurement of depression, publication year,

and continent.

Anxiety

As shown in Table 3, we observed a moderating effect of type of sample on the association between rejection sensitivity and anxiety. However, the mean effect of clinical sample (Cohen's $d = 0.310$) was not significantly lower than the mean effect of community sample (Cohen's $d = 0.420$), as the regression coefficient was not significant ($p > .05$). We found no significant moderating effect for percentage of females, mean age of the sample, participants' age (categorized), measurement of rejection sensitivity, measurement of anxiety, publication year, and continent.

Borderline personality disorder

For this outcome, we also found a moderating effect of the sample type. However, the mean effect of clinical sample (Cohen's $d = 0.425$) was not significantly higher than the mean effect of community sample (Cohen's $d = 0.379$), as the regression coefficient was not significant ($p > .05$). No significant moderating effect was found for percentage of females, mean age of the sample, measurement of rejection sensitivity, measurement of borderline personality disorder, publication year, and continent (see Table 4).

Body dysmorphic disorder

None of the variables tested (i.e., percentage of females, mean age of the sample, type of sample, participants' age (categorized), measurement of body dysmorphic disorder, publication year, and continent) significantly moderated the association between rejection sensitivity and body dysmorphic disorder (see Table 5).

Discussion

The aim of the present meta-analytic study was to estimate an overall association between rejection sensitivity and each of five mental health outcomes (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), and to assess whether the strength of these associations differ by sample descriptors, research design descriptors, and other descriptors.

Overall Associations Between Rejection Sensitivity and Mental Health Outcomes

In general, higher levels of rejection sensitivity were significantly and moderately associated with higher levels of depression, anxiety, loneliness, borderline

personality disorder, and body dysmorphic disorder. Several explanations can be given for these rather strong overall associations that we found. First, we specifically captured cross-sectional associations between rejection sensitivity and mental health outcomes. If we had coded only longitudinal associations, we would probably find weaker overall associations, because memories of major life events (i.e., hurtful rejection experiences) tend to fade after longer recall periods (Paykel, 1997), and less severe events (i.e., less hurtful rejection experiences) are often forgotten over briefer intervals (Brown & Harris, 1982). The associations between rejection sensitivity and mental health outcomes may be much more proximally related to the occurrence of mental health outcomes. For example, in a study of American adolescents' rejection sensitivity and depression over around 14 months, Norona et al. (2016) found that there was a moderate and significant correlation between rejection sensitivity and depression at baseline for girls ($r = 0.30$), while this correlation became smaller and nonsignificant one year later ($r = 0.13$). A similar result was observed in Rowe et al.'s (2015) study on the association between rejection sensitivity and socioemotional symptoms over 14 months in early adolescents in Australia. Specifically, the correlation between rejection sensitivity and depression was 0.44 at baseline and 0.24 at follow-up. For anxiety this was 0.55 at baseline and 0.31 at follow-up, and for loneliness this was 0.39 at baseline and 0.32 at follow-up. Although correlations at follow-up were weaker than correlations at baseline in Rowe et al.'s study, the three correlations at follow-up were significant, indicating that rejection sensitivity may also have distal effects on mental health outcomes. Thus, future research utilizing longitudinal designs with different time periods in the assessment of rejection sensitivity is required to gain more understanding of the relations between rejection sensitivity and mental health outcomes.

A second possibility is that rejection sensitivity and five mental health problems do indeed share moderate associations. According to the cognitive-affective processing systems (CAPS) framework (Ayduk & Gyurak, 2008; Mischel, 1973; Mischel & Shoda, 1995), individuals with high levels of rejection sensitivity may misinterpret and distort the actions of others, which may lead to feelings of anger, loneliness, or depression. Although previous research has documented small to large associations between rejection sensitivity and depression (Huynh & Fuligni, 2010; Pearson, Watkins, & Mullan, 2011), anxiety (Bowker, Thomas, Norman, & Spencer, 2011; Thomas & Bowker, 2015), loneliness (Chow, Au, & Chiu, 2008; Watson & Nesdale, 2012), borderline personality disorder (Bungert et al., 2015; De Panfilis et al., 2015), and body dysmorphic disorder (Lavell, Zimmer-Gembeck, Farrell, & Webb, 2014; Webb et al., 2015), the results of this study indicate that associations between rejection sensitivity and these five mental health outcomes are moderate in

magnitude. This indicates that rejection sensitivity may be important in the etiology and persistence of several mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder). In other words, the findings of the present review suggest that the presence of rejection sensitivity is likely to make individuals vulnerable to developing different mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder).

In addition, the different mental health problems that were considered as outcomes in the present review may overlap and are comorbid conditions at least to some extent. This may partly explain why rejection sensitivity is consistently related to mental health outcomes that we examined. However, due to the cross-sectional nature of the studies that were included in the present review, the rather strong associations that we found should be interpreted with caution given the fact that well-designed prospective, longitudinal studies are needed for more firm conclusions about how rejection sensitivity is associated with different mental health problems.

As for publication bias, the results of the trim and fill analyses showed indications for missing data in four of the five meta-analyses we performed, suggesting that the true overall associations between rejection sensitivity and four mental health outcomes may be different from the overall associations that were estimated in the current meta-analytic study. For depression, small effect sizes were underrepresented (the adjusted mean *r* was smaller than the unadjusted mean *r*), whereas for anxiety, loneliness, and the borderline personality disorder large effect sizes were underrepresented (the adjusted mean *r* was larger than the unadjusted mean *r*). Although the adjusted mean associations were either smaller or larger than the unadjusted mean associations for four mental health outcomes, the biasing effects were small (for depression Δ mean $r = 0.018$, for anxiety Δ mean $r = 0.042$, for loneliness Δ mean $r = 0.009$, for borderline personality disorder Δ mean $r = 0.025$), indicating that the mean associations of these four mental health outcomes would not change substantively had the missing data been found. Nonetheless, the findings of this study should be interpreted with caution given that bias in our results was identified.

Moderating Effects of Sample and Research Design Characteristics

In general, sample and research design characteristics were found to moderate the estimated overall associations only to a limited extent. First, the gender of samples as assessed by the percentage of females in samples did not moderate the overall associations for the outcomes depression, anxiety, borderline personality, and body

dysmorphic disorder. This suggests that a high level of rejection sensitivity is similarly related to higher levels of mental health outcomes for both males and females. These findings are in line with previous research showing that gender did not moderate the association between rejection sensitivity an depression (Zimmer-Gembeck, Nesdale, Webb, Khatibi, & Downey, 2016), was not related significantly to both personal rejection sensitivity and anxiety (Bowker, Thomas, Spencer, & Park, 2013), was unrelated with both rejection sensitivity and borderline personality disorder (Peters, Smart, & Baer, 2015), and did not moderate the association between appearance-based rejection sensitivity and body dysmorphic disorder (Calogero et al., 2010; Park et al., 2010). However, future research is needed to provide further support for these findings, as contradictory findings were also reported in previous studies. In particular, gender differences were also observed in rejection sensitivity, depression, anxiety, and body dysmorphic disorder symptoms (e.g., Webb et al., 2015; Zimmer-Gembeck, 2015; Thomas & Bowker, 2015; Rowe et al., 2015). Additional research is therefore needed to advance our understanding of the potential moderating effect of gender on the associations between rejection sensitivity and mental health outcomes.

As for the moderating effect of age, either assessed as a continuous variable or discrete variable, our study did not reveal a moderating effect, which is consistent with previous research showing that age is not correlated with rejection sensitivity, and/or depression (Rowe et al., 2015; Zimmer-Gembeck et al., 2016), social anxiety (Rowe et al., 2015), and the borderline personality disorder (Peters et al., 2015). A possible explanation is the rather narrow age range of participants in the primary studies on borderline personality disorder (the mean age of primary studies ranges from 18.8 to 38.9 years of age) and body dysmorphic disorder (the mean age of primary studies ranges from 11.9 to 32.6 years of age). Moreover, as De Panfilis and colleagues (2015) reported a significant correlation between age and rejection sensitivity, future research into the moderating effect of age on the association between rejection sensitivity and mental health should include participants with a broader age range.

There was a moderating effect of type of sample (i.e., community sample, clinical sample, and mixed sample) on the association between rejection sensitivity and depression. However, for clinical sample (Cohen's $d = 0.355$), the association was not significantly different from community sample (Cohen's $d = 0.338$). Similar observations were also found in anxiety and borderline personality disorder. These are important findings, since these findings suggests that associations between rejection sensitivity and mental health outcomes (i.e., depression, anxiety, and borderline personality disorder) may be similar for clinical and non-clinical (i.e., community) samples. Based on this, we can reason that it remains necessary to study rejection

sensitivity and mental health outcomes in both clinical and nonclinical samples, as studies involving variation in nonclinical populations can be informative for understanding processes in the clinical populations, and vice versa. Of note, the current findings suggest that high rejection sensitivity among nonclinical participants may lead to mental health problems and that fundamental qualitative differences between clinical and nonclinical participants need not be present.

Regarding the way in which rejection sensitivity and mental health outcomes were measured in primary studies, our results showed that the overall associations were not moderated by the type of instrument that was used to assess rejection sensitivity or five mental health outcomes. However, we did find a marginally significant moderating effect of measurements of rejection sensitivity on the association between rejection sensitivity and anxiety ($p = .055$), and a marginally significant moderating effect of measurements of borderline personality disorder on the association between rejection sensitivity and borderline personality disorder ($p = .062$). These findings suggest that the way in which rejection sensitivity is measured may affect the association between rejection sensitivity and anxiety/borderline personality disorder and that further research is needed to clarify whether significant moderating effects exist in these relationships.

For other descriptors, such as continent in which the primary studies were performed, the moderator analyses yielded no significant moderating effects. This may be explained by the small number of studies and/or effect sizes in some categories of the variables that were tested as potential moderators, resulting in a low statistical power for detecting moderating effects. As previous studies found cross-cultural differences in both sensitivity to social rejection and prevalence of depression and anxiety (Sato, Yuki, & Norasakkunkit, 2014; Way & Lieberman, 2010), future research examining the influence of cultural background of participants on the associations between rejection sensitivity and mental health outcomes could provide better understanding in the associations. Additionally, this study found that publication year did not moderate the overall associations of rejection sensitivity and the five mental health outcomes, indicating that the associations between rejection sensitivity and five mental health problems remained fairly stable over time.

Limitations

Several limitations should be taken into account when interpreting the results of the current study. First, although we considered rejection sensitivity as explanatory variables and mental health problems as outcome variables in the analyses, the present study does not permit conclusions about causality, due to the cross-sectional nature of

the primary studies that were included. Thus, the associations between rejection sensitivity and mental health problems should be interpreted bidirectionally (i.e., rejection sensitivity may evoke mental health problems, but mental health problems may also elicit rejection sensitivity). The field would clearly benefit from studies using designs (such as an experimental design) that allow for more causal conclusions. Besides, longitudinal study designs would allow for a better assessment of the temporal relation between rejection sensitivity and different mental health problems. Accordingly, future meta-analytic studies focusing on longitudinal data would help advance our understanding of the relationship between rejection sensitivity and mental health outcomes.

Second, we were unable to examine different types of rejection sensitivity (e.g., gender-based rejection sensitivity, appearance-based rejection sensitivity, race-based rejection sensitivity) as most primary studies only focused on one type. In the present study, we were primarily interested in the mean associations between rejection sensitivity and different mental health problems, and we therefore synthesized different types of rejection sensitivity. It is likely that specific type of rejection sensitivity may be significantly related to specific mental health problem. For example, it is possible that appearance-based rejection sensitivity is uniquely associated with body dysmorphic disorder, whereas race-based rejection sensitivity may not be significantly associated with this disorder. Therefore, future research aiming to explore the unique effect of different types of rejection sensitivity on mental health outcomes would provide more insights. Moreover, different types of rejection sensitivity, such as gender-based rejection sensitivity and appearance-based rejection sensitivity, may not be exclusively present, but may coexist and interact with each other. We expect that individuals who are exposed to multiple types of rejection sensitivity are more likely to suffer from more severe negative mental health outcomes. Therefore, future research is warranted to examine whether multiple types of rejection sensitivity can play both additive and interactive roles in mental health problems.

Third, this study was unable to differentiate between effects of different dimensions of rejection sensitivity (i.e., anxious rejection sensitivity and angry rejection sensitivity) on mental health outcomes, due to a few studies reported associations of different dimensions of rejection sensitivity with depression (Bondü & Esser, 2015; McDonald, Bowker, Rubin, Laursen, & Duchene, 2010; Zimmer-Gembeck et al., 2016), anxiety (London, Downey, Bonica, & Paltin, 2007; McDonald et al., 2010; Scharf, Oshri, Eshkol, & Pilowsky, 2014), and loneliness (Ferguson & Zimmer-Gembeck, 2014; London et al., 2007). Previous research (London et al., 2007) found that anxious expectations of rejection were uniquely predictive of

increased social anxiety and withdrawal, whereas angry expectations of rejection predicted decreased social anxiety. Both anxious and angry expectations predicted increased loneliness, but neither were unique predictors of loneliness. Therefore, future research is needed to ascertain whether different dimensions of rejection sensitivity have distinct influence on different mental health outcomes.

Fourth, in most of the primary studies, rejection sensitivity was assessed using the same method (i.e., self-report), rather than using multiple methods (such as self-report, parent-report, peer-report, or clinician-report). This may lead to the inflationary effects of common method variance (CMV), which is the systematic variance that is shared among variables when variables are measured using the same method (Podsakoff, MacKenzie, & Podsakoff, 2012). Although rejection sensitivity was assessed using both peer-report and self-report methods in few primary studies (e.g., Zimmer-Gembeck et al., 2014), the number of primary studies using multiple-reporter methods was too small to examine the influence of the reporting method on the association between rejection sensitivity and mental health outcomes. Future studies using multi-reporter methods including self-report, peer-report, parent-report, and especially clinician-report, would be beneficial in reducing CMV. Additionally, many moderator analyses were based on a small number of effect sizes, implying a low statistical power to detect the real effect of the moderator variables. Future moderator analyses based on more effect sizes would provide more convincing results.

Implications for Clinical Practice

The present study has potential implications for clinical practice and intervention services. First, the findings of this study produced new knowledge on the associations between rejection sensitivity and mental health problems, and could inform clinicians in improving the assessment procedures in their clinical practice. The findings of the present study not only provide not only support for the existing knowledge that rejection sensitivity is related to anxiety and borderline personality disorder (American Psychiatric Association, 2013), but also generate new knowledge in the sense that rejection sensitivity is also related to depression, loneliness, and body dysmorphic disorder. Since we found that rejection sensitivity was moderately and significantly related to depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder, rejection sensitivity should be considered in assessing and identifying these five mental health problems. Furthermore, rejection sensitivity should be assessed by clinicians to determine who is at risk for high level of rejection sensitivity and should be subject to treatment or prevention programs. In addition, the assessment of rejection sensitivity should be implemented in both females and males

and in both adolescents and adults, since results of this study showed that the associations between rejection sensitivity and five mental health problems did not change by gender and age.

Second, the results of this study hold potential to facilitate the development of targeted interventions for negative mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder) associated with rejection sensitivity. As findings of our study indicated that rejection sensitivity was moderately and significantly associated with five mental health problems, clinicians and service providers should consider treating rejection sensitivity when developing intervention and prevention programs. By example, given that we found a significant association between rejection sensitivity and personality disorder, rejection sensitivity could be integrated into existing psychotherapy approaches for treating borderline personality disorder (Bateman & Fonagy, 2009; Giesen-Bloo et al., 2006) to improve the effect of these approaches. Since the association between rejection sensitivity and borderline personality disorder did not differ between males and females and between different age groups, it may be fruitful for intervention programs to target both males and females across different ages. However, due to the limited age range (mean age range from 18.8 to 38.9) of the included sample, future research using samples with broad age ranges would refine our understanding of the moderating effects of age on the association between rejection sensitivity and borderline personality disorder. Given that rejection sensitivity has been identified as a potential antecedent of early interpersonal trauma and later adjustment problems (Downey, Khouri, & Feldman, 1997), interventions targeting rejection sensitivity may hold promise in disrupting the trajectory from early interpersonal trauma to subsequent psychopathology.

Conclusion

This is the first systematic and meta-analytic review of associations between rejection sensitivity and the following five negative mental health outcomes: depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder. Overall, the results showed that rejection sensitivity was significantly and moderately associated with these five mental health problems. The strength of the associations between rejection sensitivity and depression, anxiety, and borderline personality disorder varied by type of sample, but these associations were similar for clinical and non-clinical samples (i.e., community samples). The variables gender, age, measurements of rejection sensitivity and five mental health outcomes, continent, and publication year did not moderate any of the associations between rejection sensitivity

and the five mental health outcomes. The findings of the present study foster more focused future research and are important for the development and improvement of both risk assessment and intervention practices.

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Table 1

Results for the Overall Mean Effect Sizes of the Five Mental Health Outcomes

Domain of outcomes	# Studies	# ES	Mean *z* (SE)	95% CI	*t* value (Sig)	Mean *r*	% var. at level 1	Level 2 variance	% Var. at level 2	Level 3 variance	% Var. at level 3
Prior to trim-and-fill analyses											
Depression	42	65	0.349 (0.016)	0.317; 0.381	21.746***	.335	27.4	.007**	55.6	.002	17.0
Anxiety	31	67	0.437 (0.030)	0.376; 0.497	14.466***	.411	13.0	.009***	28.6	.019***	58.4
Loneliness	9	15	0.395 (0.022)	0.348; 0.443	17.695***	.376	63.7	.002	32.4	.000	3.9
BPD	18	30	0.432 (0.047)	0.336; 0.528	9.182***	.407	12.1	.018***	41.4	.020	46.5
BDD	5	9	0.458 (0.087)	0.257; 0.660	5.244***	.428	12.2	.058***	87.8	.000	3.0
After trim-and-fill analyses [a]											
Depression	48	73	0.328 (0.019)	0.291; 0.366	17.448***	.317	22.0	.004**	25.9	.009	52.1
Anxiety	38	75	0.488 (0.031)	0.426; 0.550	15.603***	.453	10.6	.009***	22.0	.027***	67.4
Loneliness	11	17	0.406 (0.022)	0.359; 0.453	18.136***	.385	63.8	.002	27.2	.001	9.0
BPD	20	32	0.462 (0.048)	0.363; 0.561	9.544***	.432	10.2	.017***	34.9	.027	54.9

Note. # Studies = number of studies; # ES = number of effect sizes; Mean *z* = Mean effect size (Fisher's *z*); SE = standard error; CI = confidence interval; Sig = significance; Mean *r* = Mean effect size expressed as a Pearson's correlation; Var = variance; Level 1 variance = sampling variance of observed effect sizes; Level 2 variance = variance between effect sizes extracted from the same study; Level 3 variance = variance between studies; BPD = borderline personality disorder; BDD = body dysmorphic disorder.

[a] According to the results of the trim-and-fill analysis, no effect sizes were missing in the BDD data set, and thus re-estimation of the overall effect for the BDD domain was not performed.

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

Table 2

Results of Categorical and Continuous Moderators for the Depression Domain (Bivariate Models)

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Sample descriptors									
Percentage of females	42	65	0.348 (0.317; 0.379)***	-0.001 (-0.002; 0.001)	-	*F*(1, 63) = 0.730	.396	.009**	.001
Mean age of the sample	42	65	0.347 (0.313; 0.380)***	0.001 (-0.002; 0.004)	-	*F*(1, 63) = 0.494	.485	.007**	.003
Type of sample						*F*(2, 62) = 5.683	.005**	.006**	.002
Community sample (RC)	36	50	0.338 (0.306; 0.371)***		.326				
Clinical sample	6	13	0.355 (0.265; 0.445)***	0.017 (-0.079; 0.113)	.341				
Mixed sample	2	2	0.663 (0.473; 0.852)***	0.324 (0.132; 0.516)**	.580				
Participants' age (categorized)						*F*(1, 63) = 0.006	.938	.007**	.003
18 years or older (RC)	26	42	0.350 (0.307; 0.393)***		.336				
younger than18 years	16	23	0.348 (0.298; 0.398)***	-0.003 (-0.069; 0.064)	.335				
Research design descriptors									
Measurement of RS						*F*(2, 62) = 1.215	.304	.006**	.003
RSQ (RC)	38	58	0.354 (0.320; 0.388)***		.340				
IPSM	2	5	0.361 (0.235; 0.488)***	0.007 (-0.124; 0.138)	.346				
Other	2	2	0.230 (0.072; 0.387)**	-0.125 (-0.286; 0.036)	.226				
Measurement of depression						*F*(3, 61) = 1.692	.178	.006**	0.002
BDI (RC)	10	13	0.404 (0.325; 0.484) ***		.383				
CDI	9	13	0.384 (0.320; 0.447) ***	-0.021 (-0.123; 0.081)	.366				
CES-D	10	18	0.322 (0.262; 0.381) ***	-0.083 (-0.182; 0.017)	.311				

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Other	14	21	0.319 (0.263; 0.376)***	-0.085 (-0.183; 0.013)	.309				
Other descriptors									
Publication year	42	65	0.348 (0.316; 0.380)***	-0.003 (-0.011; 0.005)	-	*F*(1, 63) = 0.668	.417	.008**	.002
Continent						*F*(3, 61) = 1.476	.230	.006**	.003
Australia (RC)	5	8	0.400 (0.319; 0.482)***		.380				
America	24	38	0.330 (0.287; 0.373)***	-0.070 (-0.162; 0.022)	.319				
Europe	9	14	0.336 (0.266; 0.406)***	-0.065 (-0.172; 0.043)	.324				
Asia	4	5	0.435 (0.312; 0.558)***	0.034 (-0.113; 0.182)	.409				

Note. # Studies = number of studies; # ES = number of effect sizes; mean *z* = mean effect size (Fisher's *z*); CI = confidence interval; β_1 = estimated regression coefficient; *r* = mean effect size expressed as a Pearson's correlation; df = degrees of freedom; Level 2 variance = variance between effect sizes extracted from the same study; Level 3 variance = variance between studies; RS = rejection sensitivity; RSQ = Rejection Sensitivity Questionnaire and versions thereof; IPSM = Interpersonal Sensitivity Measure; BDI = Beck Depression Inventory; CDI = Children's Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale.

[a] Omnibus test of all regression coefficients in the model.

[b] *p*-Value of the omnibus test.

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

Table 3

Results of Categorical and Continuous Moderators for the Anxiety Domain (Bivariate Models)

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Sample descriptors									
Percentage of females	31	67	0.433 (0.372; 0.494)***	-0.001 (-0.003; 0.000)	-	*F*(1, 65) = 3.258	.076	.009***	.020***
Mean age of the sample	31	67	0.437 (0.375; 0.498)***	-0.000 (-0.007; 0.007)	-	*F*(1, 65) = 0.005	.943	.009***	.020***
Type of sample						*F*(2, 64) = 3.932	.025*	.010***	.014**
Community sample (RC)	28	60	0.420 (0.363; 0.478)***		.397				
Clinical sample	1	2	0.310 (0.002; 0.618)*	-0.110 (-0.423; 0.203)	.300				
Mixed sample	2	5	0.717 (0.503; 0.932)***	0.297 (0.076; 0.519)**	.615				
Participants' age (categorized)						*F*(1, 65) = 0.085	.772	.009***	.020***
18 years or older (RC)	18	36	0.429 (0.347; 0.510)***		.404				
younger than18 years	13	31	0.447 (0.354; 0.539)***	0.018 (-0.106; 0.141)	.419				
Research design descriptors									
Measurement of RS						*F*(2, 64) = 3.041	.055	.010***	.015**
RSQ (RC)	28	60	0.414 (0.356; 0.473)***		.392				
IPSM	2	6	0.617 (0.415; 0.819)***	0.203 (-0.008; 0.413)	.549				
Other	1	1	0.741 (0.342; 1.141)***	0.327 (-0.077; 0.731)	.630				
Measurement of anxiety						*F*(4, 62) = 1.489	.216	.009***	.019***
SASC-R (RC)	7	19	0.520 (0.397; 0.642) ***		.478				
BFNE	6	10	0.456(0.332;0.579) ***	-0.064(-0.238; 0.110)	.427				
ECRI	4	9	0.488(0.323;0.652) ***	-0.032(-0.237; 0.173)	.453				

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
GAD	2	5	0.367(0.206;0.528)***	-0.153(-0.355;0.050)	.351				
Other	16	24	0.377(0.293;0.460)***	-0.143(-0.292;0.005)	.360				
Other descriptors									
Publication year	31	67	0.437 (0.375; 0.499)***	0.001 (-0.016; 0.017)	-	*F*(1, 65) = 0.008	.931	.009***	.020***
Continent						*F*(3, 63) = 1.651	.187	.009***	.019***
Australia (RC)	7	11	0.559 (0.423; 0.685)***		.507				
America	18	46	0.400 (0.323; 0.477)***	-0.159(-0.307; -0.011)*	.380				
Europe	4	6	0.389 (0.218; 0.560)***	-0.170 (-0.382; 0.043)	.370				
Asia	2	4	0.448 (0.223; 0.672)***	-0.111 (-0.369; 0.147)	.420				

Note. # Studies = number of studies # ES = number of effect sizes; mean *z* = mean effect size (Fisher's *z*); CI = confidence interval; β_1 = estimated regression coefficient; *r* = mean effect size expressed as a Pearson's correlation; df = degrees of freedom; Level 2 variance = variance between effect sizes extracted from the same study; Level 3 variance = variance between studies; RS = rejection sensitivity; RSQ = Rejection Sensitivity Questionnaire and versions thereof; IPSM = Interpersonal Sensitivity Measure; SASC-R = Social Anxiety Scale for Children - Revised; BFNE = Brief Fear of Negative Evaluation Scale; ECRI = Experiences in Close Relationships Inventory; GAD = Generalized Anxiety Disorder Questionnaire.

[a] Omnibus test of all regression coefficients in the model.

[b] *p*-Value of the omnibus test.

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

Table 4

Results of Categorical and Continuous Moderators for the Borderline Personality Disorder Domain (Bivariate Models)

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Sample descriptors									
Percentage of females	18	30	0.391 (0.305; 0.478)***	0.005 (-0.000; 0.011)	-	*F*(1, 28) = 3.888	.059	.025***	.005
Mean age of the sample	18	30	0.435 (0.331; 0.540)***	0.011 (-0.002; 0.023)	-	*F*(1, 28) = 3.232	.083	.012***	.031*
Type of sample						*F*(2, 27) = 4.775	.017*	.019***	.007
Community sample (RC)	15	23	0.379 (0.295; 0.464)***		.362				
Clinical sample	2	4	0.425 (0.185; 0.665)**	0.046 (-0.204; 0.296)	.401				
Mixed sample	3	3	0.770 (0.525; 1.015)***	0.391 (0.131; 0.650)**	.647				
Research design descriptors									
Measurement of RS						*F*(1, 28) = 2.002	.168	.018***	.017
RSQ (RC)	17	29	0.417 (0.323; 0.511)***		.394				
Other	1	1	0.741 (0.281; 1.202)**	0.325 (-0.145; 0.794)	.630				
Measurement of BPD						*F*(3, 26) = 2.774	.062	.016***	.016
BSL (RC)	3	5	0.696 (0.455; 0.937) ***		.602				
PAI-BOR	6	12	0.379 (0.234; 0.524) ***	-0.317(-0.598; -0.036) *	.362				
SCID-II	5	6	0.300 (0.121; 0.480) **	-0.396(-0.696; -0.095) *	.291				
Other	4	7	0.489 (0.305; 0.674) ***	-0.207(-0.510; 0.097)	.453				
Other descriptors									
Publication year	18	30	0.433 (0.330; 0.535)***	0.008 (-0.023; 0.039)	-	*F*(1, 28) = 0.269	.608	.017***	.026
Continent						*F*(2, 27) = 2.402	.110	.016***	.018

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Australia (RC)	1	2	0.607 (0.248; 0.967)**		.542				
America	11	17	0.352 (0.234; 0.471)***	-0.255 (-0.633; 0.124)	.338				
Europe	6	11	0.540 (0.379; 0.702)***	-0.067 (-0.461; 0.327)	.493				
Asia (delete)									

Note. # Studies = number of studies # ES = number of effect sizes; mean *z* = mean effect size (Fisher's *z*); CI = confidence interval; β_1 = estimated regression coefficient; *r* = mean effect size expressed as a Pearson's correlation; df = degrees of freedom; Level 2 variance = variance between effect sizes extracted from the same study; Level 3 variance = variance between studies; RS = rejection sensitivity; RSQ = Rejection Sensitivity Questionnaire and versions thereof; BPD = borderline personality disorder; BSL = Borderline Symptom List; PAI-BOR = Personality Assessment Inventory - Borderline subscale; SCID-II = Structured Clinical Interview for DSM-IV Axis II Personality Disorders screening questionnaire.

[a] Omnibus test of all regression coefficients in the model.

[b] *p*-Value of the omnibus test.

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

Table 5

Results of Categorical and Continuous Moderators for the Body Dysmorphic Disorder Domain (Bivariate Models)

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Sample descriptors									
Percentage of females	5	9	0.462 (0.256; 0.669)**	-0.003 (-0.011; 0.004)	-	*F*(1, 7) = 1.061	.337	.058***	.000
Mean age of the sample	5	9	0.453 (0.234; 0.672)**	0.005 (-0.028; 0.037)	-	*F*(1, 7) = 0.122	.738	.065***	.000
Type of sample						*F*(1, 7) = 0.021	.888	.066***	.000
Community sample (RC)	4	7	0.452 (0.209; 0.694)**		.424				
Clinical sample	1	2	0.486 (-0.013; 0.985)	0.034 (-0.521; 0.589)	.451				
Participants' age (categorized)						*F*(1, 7) = 0.179	.685	.065***	.000
18 years or older (RC)	4	7	0.479 (0.233; 0.724)**		.445				
younger than18 years	1	2	0.385 (-0.076; 0.847)	-0.093 (-0.616; 0.429)	.367				
Research design descriptors									
Measurement of BDD						*F*(2, 6) = 0.439	.664	.067***	.000
AAI (RC)	2	3	0.563(0.175;0.951) *		.510				
BDD-YBOCS	1	2	0.486(-0.034;1.005)	-0.078(-0.726;0.571)	.451				
BDDQ	2	4	0.370(0.037;0.702) *	-0.193(-0.705;0.318)	.354				
Other descriptors									
Publication year	5	9	0.448 (0.234; 0.662)**	0.030 (-0.065; 0.125)	-	*F*(1, 7) = 0.557	.480	.062***	.000
Continent						*F*(2, 6) = 0.477	.643	.067***	.000
Australia (RC)	2	3	0.564 (0.175; 0.952)**		.511				
America	2	4	0.448 (0.102; 0.794)*	-0.116 (-0.636; 0.405)	.420				

Moderator variables	# Studies	# ES	Intercept / Mean *z* (95% CI)	β_1(95% CI)	Mean *r*	*F* (df1, df2)[a]	*p*[b]	Level 2 variance	Level 3 variance
Europe	1	2	0.318 (-0.161; 0.798)	-0.245 (-0.863; 0.372)	.308				

Note. # Studies = number of studies # ES = number of effect sizes; mean *z* = mean effect size (Fisher's *z*); CI = confidence interval; β_1 = estimated regression coefficient; *r* = mean effect size expressed as a Pearson's correlation; df = degrees of freedom; Level 2 variance = variance between effect sizes extracted from the same study; Level 3 variance = variance between studies; BDD = body dysmorphic disorder; AAI = Appearance Anxiety Inventory; BDD-YBOCS = Yale-Brown Obsessive-Compulsive Scale Modified for BDD; BDDQ = Body Dysmorphic Disorder Questionnaire.

[a] Omnibus test of all regression coefficients in the model.

[b] *p*-Value of the omnibus test.

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

Figures. [a] Funnel Plots

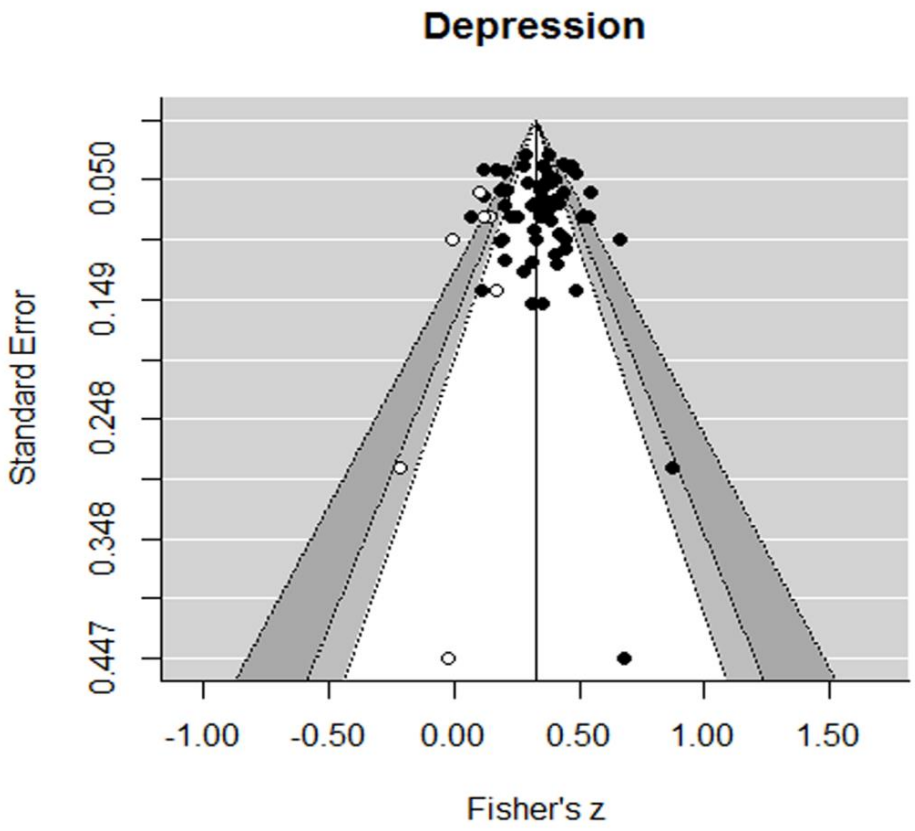

Fig. 1. Trim-and-fill plot for the association between rejection sensitivity and depression.