



## UvA-DARE (Digital Academic Repository)

### Associations between rejection sensitivity and mental health outcomes

*A meta-analytic review*

Gao, S.; Assink, M.; Cipriani, A.; Lin, K.

**DOI**

[10.1016/j.cpr.2017.08.007](https://doi.org/10.1016/j.cpr.2017.08.007)

**Publication date**

2017

**Document Version**

Final published version

**Published in**

Clinical Psychology Review

[Link to publication](#)

**Citation for published version (APA):**

Gao, S., Assink, M., Cipriani, A., & Lin, K. (2017). Associations between rejection sensitivity and mental health outcomes: A meta-analytic review. *Clinical Psychology Review*, 57, 59-74. <https://doi.org/10.1016/j.cpr.2017.08.007>

**General rights**

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

**Disclaimer/Complaints regulations**

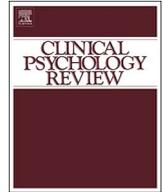
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.



ELSEVIER

Contents lists available at ScienceDirect

## Clinical Psychology Review

journal homepage: [www.elsevier.com/locate/clinspsychrev](http://www.elsevier.com/locate/clinspsychrev)

## Review

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

Shuling Gao<sup>a,b</sup>, Mark Assink<sup>c</sup>, Andrea Cipriani<sup>d</sup>, Kangguang Lin<sup>a,b,\*</sup><sup>a</sup> Department of Affective Disorders, The Affiliated Brain Hospital of Guangzhou Medical University, Guangzhou Huiai Hospital, Guangzhou, China<sup>b</sup> Laboratory of Emotion and Cognition, The Affiliated Brain Hospital of Guangzhou Medical University, Guangzhou Huiai Hospital, Guangzhou, China<sup>c</sup> Research Institute of Child Development and Education, University of Amsterdam, Amsterdam, The Netherlands<sup>d</sup> Department of Psychiatry, University of Oxford, Oxford OX3 7JX, UK

## HIGHLIGHTS

- This is the first meta-analysis examining rejection sensitivity and mental health.
- Rejection sensitivity is moderately associated with several mental health problems.
- The associations were similar for clinical and non-clinical samples.
- The association between rejection sensitivity and anxiety seems stronger for males.
- Paying attention to rejection sensitivity in clinical practice is recommended.

## ARTICLE INFO

## Keywords:

Rejection sensitivity  
 Depression  
 Anxiety  
 Borderline personality disorder  
 Body dysmorphic disorder  
 Meta-analysis

## ABSTRACT

Rejection sensitivity is a personality disposition characterized by oversensitivity to social rejection. Using a three-level meta-analytic model, 75 studies were reviewed that examined associations between rejection sensitivity and five 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  $r = 0.332$ ;  $p < 0.001$ ), anxiety (pooled  $r = 0.407$ ;  $p < 0.001$ ), loneliness (pooled  $r = 0.386$ ;  $p < 0.001$ ), borderline personality disorder (pooled  $r = 0.413$ ;  $p < 0.001$ ), and body dysmorphic disorder (pooled  $r = 0.428$ ;  $p < 0.001$ ). 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. The association between rejection sensitivity and anxiety was negatively moderated by percentage of females in samples. The association between rejection sensitivity and depression was negatively moderated by length of follow-up. The longitudinal associations between rejection sensitivity and depression, anxiety, and loneliness were stable over time. Implications of the findings for both risk assessment and prevention and intervention strategies in mental health practice are discussed.

## 1. Introduction

Numerous studies have reported that early interpersonal trauma (e.g., childhood maltreatment) has long-term effects on later psychopathology (see for instance, Kim & Cicchetti, 2010; Lansford et al., 2002; Wolfe, Wekerle, Scott, Straatman, & Grasley, 2004). However, the field has made little progress in identifying the mechanisms of these behavioral effects. Rejection sensitivity has been identified as a potential mechanism linking early interpersonal trauma to its sequelae (Downey, Khouri, & Feldman, 1997). Extensive research has shown that

rejection sensitivity is associated with a range of mental health problems (e.g., Chango, McElhaney, Allen, Schadt, & Marston, 2012; Chesin, Fertuck, Goodman, Lichenstein, & Stanley, 2015; Rowe, Gembeck, Rudolph, & Nesdale, 2015; Webb et al., 2015). However, there are discrepancies in the magnitude of reported associations. Therefore, synthesizing empirical evidence is important for a better understanding of how rejection sensitivity is connected to different mental health problems. Until now, a systematic review statistically summarizing associations between rejection sensitivity and mental health problems was not available. To remedy this deficiency, the aim

\* Corresponding author at: Department of Affective Disorders, The Affiliated Brain Hospital of Guangzhou Medical University, 36 Mingxin Road, Guangzhou, Guangdong Province 510370, China.

E-mail address: [klin@connect.hku.hk](mailto:klin@connect.hku.hk) (K. Lin).

<http://dx.doi.org/10.1016/j.cpr.2017.08.007>

Received 2 April 2017; Received in revised form 12 August 2017; Accepted 14 August 2017

Available online 15 August 2017

0272-7358/© 2017 Published by Elsevier Ltd.

of the present study was to statistically summarize associations between rejection sensitivity and a number of different mental health problems by conducting a series of meta-analyses.

### 1.1. Conceptualization and measurement of rejection sensitivity

Rejection sensitivity is thought to develop as a result of an individual's early experience of rejection, neglect, or abuse (Ayduk & Gyurak, 2008). More broadly, it is thought to arise as a result of an individual's exposure to situations in which the physical or emotional acts of others, either overt or covert, and active or passive, communicate rejection (Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010). Rejection sensitivity can be defined as 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 et al., 1997; Downey & Feldman, 1996). Boyce and Parker (1989) proposed the construct interpersonal sensitivity, which is a similar concept to rejection sensitivity, and 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 problems in any interpersonal interaction (Boyce & Parker, 1989).

Research has evidenced that individuals with high rejection sensitivity show greater responsivity to social rejection than individuals with low rejection sensitivity, implying that social rejection can be empirically differentiated from a broader sensitivity to threats. Specifically, this can be derived from the work of Burklund, Eisenberger, and Lieberman (2007), who examined neural responses to threatening facial expressions depicting disapproval, anger, and disgust, using functional magnetic resonance imaging (fMRI). They found that individuals who scored higher on a measure of rejection sensitivity exhibited greater dorsal anterior cingulate cortex activity in response to disapproving facial expressions, but not in response to facial expressions of anger or disgust. This suggests that, at the neural level, individuals high in rejection sensitivity may be more sensitive to facial expressions signaling potential rejection, but not to threatening facial expressions in general. This implies that rejection sensitivity may be qualitatively different from a general sensitivity to threats. Similar evidence can also be found in other research (e.g., Olsson, Carmona, Downey, Bolger, & Ochsner, 2013).

In the 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 concept, Downey and Feldman (1996) developed an instrument for measuring rejection sensitivity (the RSQ-Personal), which measures two components: concern or anxiety and 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 Children's RSQ (Downey, Lebolt, Rincon, & Freitas, 1998), the adult RSQ (Berenson et al., 2009), 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), the sexual minority women rejection sensitivity scale (Dyar, Feinstein, Eaton, & London, 2016), and the status-based rejection sensitivity questionnaire for Asian Americans (Chan & Mendoza-Denton, 2008).

In parallel with the RSQ and its different versions, the IPSM (Boyce & Parker, 1989) has also attracted growing interest from researchers and has been validated recently in Italy (Masillo et al., 2014) and Korea (Lee et al., 2013). The 36-item IPSM encompasses five factors: interpersonal awareness, the need for approval, separation anxiety, timidity, and a 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 out of 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.

### 1.2. 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 problems. The CAPS theory (Mischel & Shoda, 1995) explains why and how people's behavior varies stably across situations. It explains how personality processes emerge in specific Person  $\times$  Situation interactions (Romero-Canyas et al., 2010). Specifically, this theory stresses the presence of 'if ... then...' patterns in the association between rejection sensitivity and behavior (Ayduk & Gyurak, 2008) – that is, if situation X occurs, an individual does A; but if situation Y occurs, the individual does B. For example, Jane does not see herself as a pretty girl, but she does get good grades in school. If her peers are discussing school performance, she feels confident, but as soon as her peers start discussing appearance, she is prone to feelings of depression. These situation-behavior relations reflect the presence of a stable network of distinctive personality processing dynamics that is activated. 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 types of person variables (Mischel, 1973): encoding and construction competencies, expectations and beliefs, feelings and emotions, goals and values, 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 state of a defensive motivational 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 action in order to avert the danger by being self-defensive (Downey et al., 2004). Compared to individuals with low rejection sensitivity, individuals with high rejection sensitivity show heightened physiological activity (Downey et al., 2004), are on alert for rejection-related cues, automatically process rejection-related content (Berenson et al., 2009), show a lower threshold for detecting social threats, 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. This study is relevant for several reasons. First, new knowledge of the associations between rejection sensitivity and different mental health problems is generated. According to the DSM-IV (American Psychiatric Association, 1994), rejection sensitivity is an atypical feature of major depressive disorder. Additionally, individuals with a social anxiety disorder or a borderline personality disorder are very sensitive to being negatively evaluated and to social rejection (American Psychiatric Association, 2013). However, based on the DSM-5 (American Psychiatric Association, 2013), we do not know whether rejection sensitivity is also related to other types of negative mental health outcomes such as loneliness and body dysmorphic disorder. Second, examining the magnitude of these associations advances our fundamental knowledge of the degree to which rejection sensitivity contributes to negative mental health outcomes. Third, further 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 is to estimate overall associations between rejection sensitivity and different mental health problems. The secondary aim is to investigate whether and how each overall association between rejection sensitivity and a mental health problem is moderated by sample characteristics, research design characteristics, and other characteristics.

## 2. 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).

### 2.1. Protocol and registration

To minimize the risk of bias in this systematic review, the research protocol 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](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016053186).

### 2.2. Study selection

We were interested in the associations between rejection sensitivity and the broadest possible range of mental health problems. Therefore, 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 problems, we set two inclusion criteria: first, we included only those primary studies reporting on at least one association between rejection sensitivity and a specific mental health problem; and second, we only focused on those mental health problems for which sufficient primary studies were available. In this review, the minimum number of studies for examining a separate mental health outcome was set to five. We chose for this

minimum because of statistical power and reliability considerations (see, for instance, Borenstein, Hedges, Higgins, & Rothstein, 2009). Thus, we decided not to focus on mental health problems for which less than five studies were available. As a result, we focused on the following five mental health problems 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 the 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 research design characteristics) or publication status. Second, reference lists of eligible studies and relevant 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 of the current study (SG and KL) in the above-mentioned databases. The following combination of two syntax components were used in the electronic search: (“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 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 subsequently removed. Each unique search result was reviewed independently by two authors (SG and KL) to determine eligibility. First, the title and abstract of each potentially 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 this review if they fulfilled the following criteria. 1) The study design was quantitative and empirical in nature; thus 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 mental health problems: depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder. Studies not examining a specific mental health problem but examining constructs or symptoms that are only broadly related to mental health (e.g., general 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 the specific outcome of depression or anxiety. 5) The study reported on statistical information that is required to obtain or calculate at least one bivariate effect size (i.e., Pearson's  $r$ ).

When it was unclear 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. 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 study and was provided with a list of variables that were necessary for the meta-analysis (e.g., correlations between rejection sensitivity and one of the five mental health problems), but were not reported on in their studies. Four authors replied and provided the requested information.

As for the mental health problems in the present meta-analysis, we defined the following five domains: (a) depression; (b) anxiety; (c) loneliness; (d) borderline personality disorder; and (e) body dysmorphic disorder. These problems (except loneliness) can be defined using the criteria as described in the Diagnostic and Statistical Manual of Mental Disorders (DSM 5th ed.; American Psychiatric Association, 2013). 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. 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. 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). Borderline personality disorder is characterized by a pervasive pattern of instability in interpersonal relationships, self-image, and affects, together with marked impulsivity that is present in a variety of contexts. Body dysmorphic disorder is characterized by a persistent preoccupation with perceived defects or flaws in one's physical appearance, which are viewed as unattractive, abnormal or deformed. In this study, it is important to note that the above mentioned problems were regarded as either "symptoms" or "diagnoses." When regarded as "diagnoses," we followed the guidelines of DSM-5 to define the criteria of depressive disorders and anxiety disorders. The instruments that were used in primary studies to measure the five mental health problems are summarized in Appendix B1.

### 2.3. 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 in which the primary study was conducted (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 (in years); (h) age group (samples were coded as "younger than 18 years" or "18 years 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, or body dysmorphic disorder); (k) type of measurement for the outcome variables (e.g., Beck Depression Inventory, Children's Depression Inventory); (l) effect size (i.e., correlation coefficients). Whenever possible, unadjusted effect sizes (i.e., study results did not control for variables such as gender, age, or other variables) were extracted. For longitudinal studies, we extracted both cross-sectional associations (i.e., baseline correlations and correlations at multiple time points) and longitudinal associations (i.e., correlations between baseline rejection sensitivity and depression at all follow-ups). (m) type of effect size (i.e., associations were coded as baseline or follow-up); and (n) length of follow-up (time duration between associations measured at different time points, usually in months). 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. This reduced the problem of redundancy and enabled analyses for subgroups. 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. When studies reported on multiple outcomes (such as depression and anxiety and loneliness), multiple effect sizes were also 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, the gender of the sample was coded (i.e., the percentage of females) since previous research reported mixed findings on 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 reported mixed findings on how rejection sensitivity varies with age (e.g., De Panfilis, Meehan, Cain, & Clarkin, 2015; Rowe et al., 2015; Zimmer-Gembeck, Trevaskis, Nesdale, & Downey, 2014). We coded age both as 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, and mixed sample) since prior research found differences in associations between rejection sensitivity and mental health problems between populations (e.g., Staebler, Helbing, Rosenbach, & Renneberg, 2011).

As for research design descriptors, we coded the type of measurement of both rejection sensitivity and the five mental health problems to examine whether the type of instruments used by primary researchers moderates the overall associations between rejection sensitivity and the mental health problems. We also coded type of effect size (baseline or follow-up) and length of follow-up (in months). Lastly, we coded publication year and continent (i.e., North America, Europe, Australia, and Asia) in which the study was performed.

Two authors (SG and KL) coded independently all primary studies that were included in this meta-analysis. Inter-rater reliability was assessed by calculating intraclass correlation coefficients (ICC) for continuous variables and by calculating kappa coefficients ( $k$ ) for categorical variables. In cases where 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.

### 2.4. 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 primary study (e.g., by using  $t$ -statistics). It was not possible to convert betas from multiple regression models into correlation coefficients as we were interested in calculating a bivariate association (see also the inclusion criteria described above). A positive  $r$  value indicates that a high level of rejection sensitivity is associated with a high level of a specific mental health problem (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 problem. The formulae of Hedges and Olkin (1985), Borenstein et al. (2009), Card (2012), and Cheung (2014) were used for calculating (and transforming) the Pearson's correlation coefficient 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  $\pm 3.29$ ) (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 used multiple instruments to assess the same construct. In addition, many studies reported 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 meta-analysis (Assink & Wibbelink, 2016), which is a strong method for dealing with dependency of effect sizes, 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 effect sizes and to conduct 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 this 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 studies using more traditional two-level meta-analytic models, effect sizes extracted from the same primary 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). In each meta-analysis, 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 0.05 was considered statistically significant. Before variables were tested as moderators, each continuous variable was centered around its mean, and dichotomous dummy variables were created for each category of a

discrete 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., 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 problems were examined. In a mixed-effects model, the effect sizes (i.e., correlation coefficients) are considered as a random-effect, whereas the potential moderator is considered a fixed-effect.

Publication bias is a common concern in conducting meta-analytic research. That is, studies reporting on nonsignificant findings are less likely to be published than studies reporting on significant findings. Consequently, the results of meta-analytic research may be biased. To evaluate the extent to which the results of the present meta-analytic review were 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 were 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 can be added to the original dataset, after which an adjusted overall effect can be estimated. If the initial and adjusted overall effect sizes differ, this indicates that publication bias may be present in the results of the meta-analysis.

Following a similar procedure as outlined above, we also performed a number of meta-analyses on the association between rejection sensitivity and mental health problems using only longitudinal associations that could be extracted from the included primary studies. For the purpose of these analyses, we defined longitudinal associations as correlations that were measured at different points in time (e.g., rejection sensitivity measured at baseline and depression measured in a follow-up one year later). These longitudinal associations differ from cross-sectional associations in the sense that the latter were defined as (bivariate) correlations between rejection sensitivity and one of the mental health problems that were simultaneously measured at a single point in time.

### 3. Results

#### 3.1. Description of included studies

The results of the literature search strategy are presented in Appendix C. Seventy-five studies (44 on depression, 31 on anxiety, 9 on loneliness, 19 on borderline personality disorder, and 5 on body dysmorphic disorder), from which a total of 245 correlations (212 cross-sectional and 33 longitudinal 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 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), which was controlled for age and sex. As for the inter-rater agreement between the two raters, it was excellent for all coded variables (the ICCs ranged from 0.90 to 1.00 and the kappa values ranged from 0.95 to 1.00). All disagreements were

subsequently resolved and, in the end, 100% consensus was reached.

The included studies and some their characteristics are presented in Appendix B1. Of the 75 studies included in this review, 68.0% ( $n = 51$ ) used a cross-sectional design, 24.0% ( $n = 18$ ) used a longitudinal design, and 8.0% ( $n = 6$ ) used an experimental design. 6.7% ( $n = 5$ ) of the studies used a clinical or high-risk sample, 82.7% ( $n = 62$ ) used a community sample, and 10.7% ( $n = 8$ ) used a mixed sample. 60.0% ( $n = 45$ ) of the studies were conducted in North America, 18.7% ( $n = 14$ ) of the studies took place in Europe, and only 13.3% ( $n = 10$ ) and 8.0% ( $n = 6$ ) of the studies were conducted in Australia and Asia, respectively. The total sample size was 21,008 and the mean age of all the participants was 24.058 years ( $SD = 11.520$ ). The references of the included studies that were used in the meta-analyses of cross-sectional associations are marked with an asterisk in Appendix E, whereas the references of the included studies that were used in the meta-analyses of longitudinal associations are marked with the symbol  $\Delta$ .

### 3.2. Overall effect sizes and publication bias

#### 3.2.1. Overall effect sizes

An overview of the overall associations between rejection sensitivity and each of the five mental health problems is presented in Table 1. The overall associations were all significant and ranged from  $r = 0.332$  (for depression) to  $r = 0.428$  (for body dysmorphic disorder). According to the criteria of Cohen (1992), all overall associations were moderate in size. The results of the likelihood-ratio tests showed significant variance between effect sizes from the same study (i.e., level 2 variance) in four mental health domains, and significant variance between studies (i.e., level 3 variance) in two mental health domains (see Table 1). Therefore, we conducted moderator analyses in four mental health domains in order to determine variables 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 for this mental health outcome.

#### 3.2.2. 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 outcomes (see Table 1). The adjusted overall effect sizes for the four mental health outcomes were all significant and moderate in size, based on the criteria of Cohen (1992). For each mental health outcome, the funnel plot of effect sizes against the standard error is presented in Figs. 1 to 5.

### 3.3. Moderator analyses

Moderators are classified into sample descriptors, research design descriptors, and other descriptors (see Tables 2 to 5). 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).

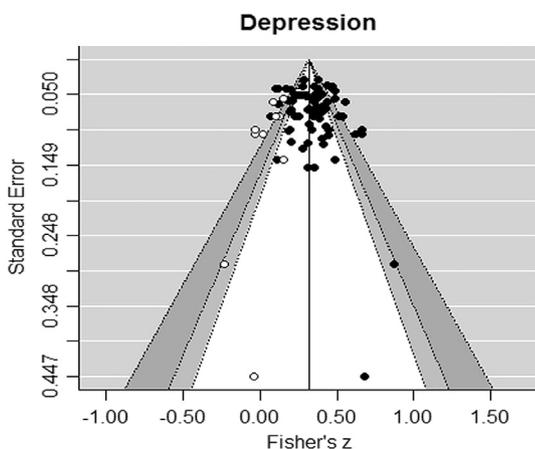
#### 3.3.1. Depression

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 shown by the results of the omnibus test ( $F(2, 76) = 6.756, p < 0.01$ ). The mean effect of mixed samples ( $r = 0.571$ ) was substantially larger than the mean effect of community ( $r = 0.322$ ) and clinical ( $r = 0.331$ ) samples, and therefore the significant moderating effect of sample type was likely driven by the mixed sample category only. The mean effect of clinical samples ( $r = 0.331$ ) was not significantly higher than the mean effect of community samples ( $r = 0.322$ ), as the regression coefficient was not significant

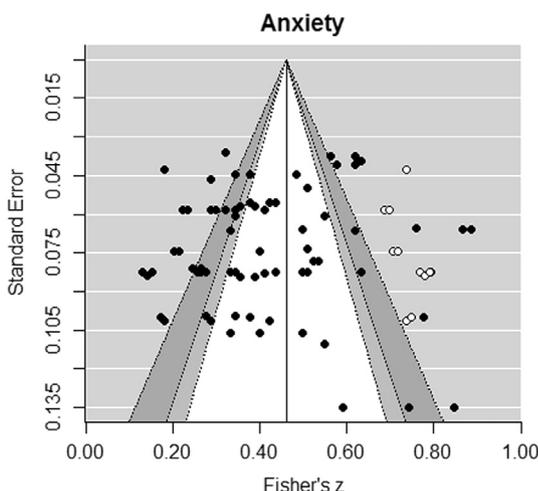
**Table 1**  
Results for the overall mean effect sizes of the five mental health outcomes.

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
<b>Prior to trim-and-fill analyses</b>											
Depression	43	79	0.345 (0.017)	0.312; 0.378	20.747***	0.332	25.5	0.003**	23.8	0.007**	50.6
Anxiety	30	75	0.432 (0.029)	0.375; 0.490	14.999***	0.407	13.7	0.008***	26.5	0.018***	59.8
Loneliness	9	18	0.407 (0.018)	0.368; 0.446	22.066***	0.386	70.7	0.002	29.3	0.000	1.3e-07
BPD	19	31	0.439 (0.046)	0.345; 0.532	9.613***	0.413	12.5	0.018***	41.7	0.020	45.8
BDD	5	9	0.458 (0.087)	0.257; 0.660	5.244**	0.428	12.2	0.058***	87.8	0.000	3.0e-09
<b>After trim-and-fill analyses<sup>a</sup></b>											
Depression	51	89	0.315 (0.019)	0.277; 0.353	16.557***	0.305	19.3	0.003**	15.4	0.012***	65.3
Anxiety	37	86	0.486 (0.031)	0.425; 0.547	15.852***	0.451	10.7	0.007***	17.2	0.028***	72.1
Loneliness	11	20	0.415 (0.018)	0.377; 0.453	22.785***	0.393	69.8	0.002	30.2	0.000	2.1e-07
BPD	21	33	0.468 (0.047)	0.372; 0.564	9.944**	0.437	10.5	0.017***	35.1	0.027	54.4

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.  
 \*\*  $p < 0.01$ .  
 \*\*\*  $p < 0.001$ .  
<sup>a</sup> 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.



**Fig. 1.** Trim-and-fill plot for the association between rejection sensitivity and depression. A contour enhanced funnel plot is presented for each of the five mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), with the standard error on the y-axis and Fisher's *z* on the x-axis. The black dots denote the observed effect sizes, whereas the white dots denote the filled effect sizes. The solid vertical line represents the overall mean effect. From inside to outside, the dashed lines limit the 90%, 95%, and 99% pseudo confidence interval regions.

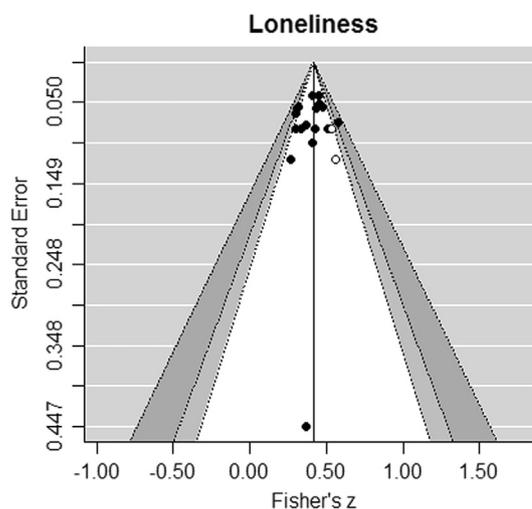


**Fig. 2.** Trim-and-fill plot for the association between rejection sensitivity and anxiety. A contour enhanced funnel plot is presented for each of the five mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), with the standard error on the y-axis and Fisher's *z* on the x-axis. The black dots denote the observed effect sizes, whereas the white dots denote the filled effect sizes. The solid vertical line represents the overall mean effect. From inside to outside, the dashed lines limit the 90%, 95%, and 99% pseudo confidence interval regions.

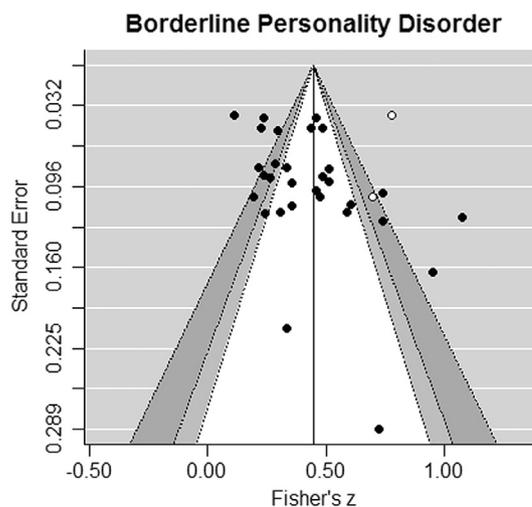
( $\beta_1 = 0.012$ , *ns*). This implies that the association between rejection sensitivity and depression was not significantly higher for clinical samples than for community samples. Further, we found a significant negative moderating effect of the length of follow-up, suggesting that the strength of the association between rejection sensitivity and depression became smaller over time. No significant moderating effect was found for percentage of females, mean age of the sample, participants' age (categorized), type of measurement for rejection sensitivity, type of measurement for depression, type of effect size, publication year, and continent in which studies were performed.

### 3.3.2. Anxiety

As shown in Table 3, we found that the association between rejection sensitivity and anxiety was smaller when the percentage of females increased. Further, we observed a moderating effect of sample type on the association between rejection sensitivity and anxiety. The mean effect of mixed samples ( $r = 0.616$ ) was significantly higher than the



**Fig. 3.** Trim-and-fill plot for the association between rejection sensitivity and loneliness. A contour enhanced funnel plot is presented for each of the five mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), with the standard error on the y-axis and Fisher's *z* on the x-axis. The black dots denote the observed effect sizes, whereas the white dots denote the filled effect sizes. The solid vertical line represents the overall mean effect. From inside to outside, the dashed lines limit the 90%, 95%, and 99% pseudo confidence interval regions.



**Fig. 4.** Trim-and-fill plot for the association between rejection sensitivity and borderline personality disorder. A contour enhanced funnel plot is presented for each of the five mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), with the standard error on the y-axis and Fisher's *z* on the x-axis. The black dots denote the observed effect sizes, whereas the white dots denote the filled effect sizes. The solid vertical line represents the overall mean effect. From inside to outside, the dashed lines limit the 90%, 95%, and 99% pseudo confidence interval regions.

mean effect of community samples ( $r = 0.394$ ), but the mean effect of clinical samples ( $r = 0.300$ ) was not significantly lower than the mean effect of community samples ( $r = 0.394$ ), as the regression coefficient was not significant ( $\beta_1 = -0.107$ , *ns*). As for the depression outcome, this moderating effect of sample type was likely to be driven by the mixed sample category only. We found no significant moderating effect for mean age of the sample, participants' age (categorized), type of measurement for rejection sensitivity, type of measurement for anxiety, type of effect size, length of follow-up, publication year, and continent in which studies were performed.

### 3.3.3. Borderline personality disorder

For this outcome, we also found a moderating effect of the sample

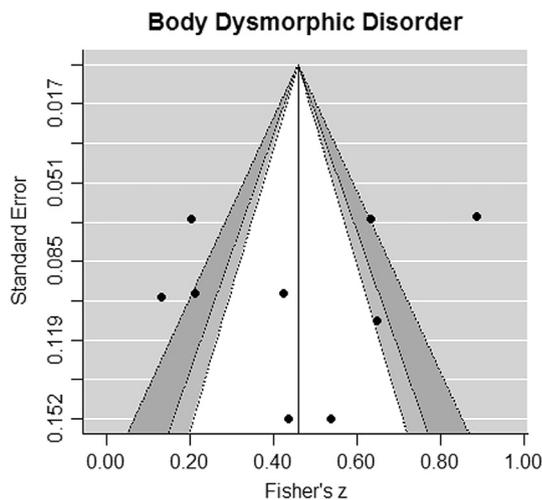


Fig. 5. Trim-and-fill plot for the association between rejection sensitivity and body dysmorphic disorder.

A contour enhanced funnel plot is presented for each of the five mental health problems (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder), with the standard error on the y-axis and Fisher's  $z$  on the x-axis. The black dots denote the observed effect sizes, whereas the white dots denote the filled effect sizes. The solid vertical line represents the overall mean effect. From inside to outside, the dashed lines limit the 90%, 95%, and 99% pseudo confidence interval regions.

type (see Table 4). The mean effect of mixed samples ( $r = 0.619$ ) was significantly higher than the mean effect of community samples ( $r = 0.379$ ), but the mean effect of clinical samples ( $r = 0.402$ ) was not significantly higher than the mean effect of community samples ( $r = 0.362$ ), as the regression coefficient was not significant ( $\beta_1 = 0.047$ , *ns*). As in the depression and anxiety domains, this significant moderating effect seemed to be driven by the mixed sample category only. No significant moderating effect was found for percentage of females, mean age of the sample, type of measurement for rejection sensitivity, type of measurement for borderline personality disorder, publication year, and continent in which studies were performed (see Table 4).

### 3.3.4. Body dysmorphic disorder

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

## 3.4. Longitudinal associations

As we were also interested in longitudinal evidence for associations between rejection sensitivity and the five mental health problems, we additionally estimated overall associations in 3-level meta-analytic models using only longitudinal associations (see also the Methods section). For these analyses, 12 longitudinal primary studies examining the associations between rejection sensitivity and depression, anxiety, or loneliness were used. The results showed a significant overall association between baseline rejection sensitivity and depression ( $r = 0.248$ ), anxiety ( $r = 0.279$ ), and loneliness ( $r = 0.336$ ) at follow-up (see Table 6). These effects were small to moderate in size according to Cohen's (1992) criteria. After considering the possibility of bias in these results by performing trim-and-fill-analyses, the adjusted overall effect sizes became somewhat smaller ( $r = 0.212$  for depression and  $r = 0.320$  for loneliness) or larger ( $r = 0.300$  for anxiety), but were all still significant. No significant moderating effect was found for length of follow-up on any of these associations. We did not perform a meta-

analysis of longitudinal associations for borderline personality disorder and body dysmorphic disorder, because no longitudinal associations between rejection sensitivity and either of these mental health problems were reported in the included primary studies.

## 4. Discussion

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

### 4.1. 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 moderately strong overall associations that we found. First, we specifically captured cross-sectional associations between rejection sensitivity and mental health outcomes, as the large majority of available primary studies is cross-sectional in nature. Our results indicate that overall associations based on cross-sectional associations tend to be larger than overall associations based on longitudinal associations. This may be due to the fact that memories of major life events (i.e., hurtful rejection experiences) tend to fade after longer recall periods (Paykel, 1997). Additionally, 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 on the association between rejection sensitivity and (feelings of) depression among American adolescent girls over a fourteen-month period, Norona, Roberson, and Welsh (2016) found that there was a moderate and significant correlation between rejection sensitivity and depression at baseline ( $r = 0.30$ ), whereas this correlation became smaller and nonsignificant one year later ( $r = 0.13$ ). A similar result was observed in Rowe et al.'s (2015) study among early adolescents in Australia, suggesting that the strength of the associations between rejection sensitivity and socioemotional symptoms became less strong over a fourteen-month period. This implies a need for further research in this area, in order to gain a better understanding of the relations between rejection sensitivity and mental health outcomes. In particular, research with longitudinal designs in which rejection sensitivity and mental health problems are assessed at multiple points in time are recommended.

Second, the cognitive-affective processing systems (CAPS) framework (Ayduk & Gyurak, 2008; Mischel, 1973; Mischel & Shoda, 1995) states that 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. Based on this framework, substantial associations between rejection sensitivity and different mental health problems were to be expected. Previous research already 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). Our results support the CAPS framework, as they indicate moderate associations between rejection sensitivity and five mental health problems.

On the other hand, the five mental health problems examined in the

**Table 2**  
Results of aggregation and continuous moderators for the depression domain (bivariate models).

Moderator variables	# Studies	# ES	Intercept/mean $z$ (95% CI)	$\beta_1$ (95% CI)	Mean $r$	$F$ (df1, df2) <sup>a</sup>	$p$ <sup>b</sup>	Level 2 variance	Level 3 variance
<b>Sample descriptors</b>									
Percentage of females	43	79	0.346 (0.312; 0.380)***	0.000 (− 0.001; 0.002)	–	$F(1, 77)$ = 0.114	0.736	0.003**	0.007*
Mean age of the sample	43	79	0.347 (0.313; 0.382)***	0.001 (− 0.002; 0.004)	–	$F(1, 77)$ = 0.297	0.587	0.003**	0.007**
<b>Participants' age (categorized)</b>									
18 years or older (RC)	27	51	0.345 (0.302; 0.389)***		0.332	$F(1, 77)$ = 0.000	0.990	0.003**	0.007**
Younger than 18 years	16	28	0.345 (0.293; 0.397)***	− 0.000 (− 0.069; 0.068)	0.332				
<b>Type of sample</b>									
Community sample (RC)	38	67	0.334 (0.302; 0.365)***		0.322				
Clinical sample	5	9	0.346 (0.224; 0.467)***	0.012 (− 0.113; 0.137)	0.331				
Mixed sample	2	2	0.649 (0.481; 0.817)***	0.316 (0.145; 0.487)***	0.571				
<b>Research design descriptors</b>									
<b>Measurement of RS</b>									
RSQ (RC)	38	65	0.355 (0.321; 0.388)***		0.341	$F(2, 76)$ = 2.141	0.125	0.003**	0.005*
IPSM	3	11	0.327 (0.224; 0.430)***	− 0.028 (− 0.136; 0.081)	0.316				
Other	2	3	0.205 (0.063; 0.347)**	− 0.149 (− 0.295; − 0.003)*	0.202				
<b>Measurement of depression</b>									
BDI (RC)	11	15	0.415 (0.340; 0.490)***		0.393	$F(3, 75)$ = 2.293	0.085	0.003**	0.006*
CDI	9	17	0.371 (0.305; 0.436)***	− 0.045 (− 0.144; 0.055)	0.355				
CES-D	10	18	0.325 (0.260; 0.390)***	− 0.090 (− 0.189; 0.009)	0.314				
Other	15	29	0.304 (0.249; 0.359)***	− 0.111 (− 0.202; − 0.020)*	0.295				
<b>Type of effect size</b>									
Baseline (RC)	43	72	0.346 (0.312; 0.381)***		0.333	$F(1, 77)$ = 0.125	0.724	0.003**	0.007**
Follow-up	6	7	0.333 (0.254; 0.411)***	− 0.014 (− 0.092; 0.064)	0.321				
Length of follow-up	6	7	0.351 (0.300; 0.402)***	− 0.030 (− 0.041; − 0.018)**	–	$F(1, 5)$ = 41.529	0.001**	0.000	0.000
<b>Other descriptors</b>									
Publication year	43	79	0.345 (0.312; 0.378)***	− 0.004 (− 0.013; 0.004)	–	$F(1, 77)$ = 0.981	0.325	0.003**	0.007*
<b>Continent</b>									
Australia (RC)	5	10	0.392 (0.308; 0.477)***		0.373	$F(3, 75)$ = 1.390	0.253	0.003**	0.006**
North America	25	48	0.325 (0.282; 0.368)***	− 0.067 (− 0.162; 0.028)	0.314				
Europe	9	16	0.336 (0.264; 0.408)***	− 0.056 (− 0.167; 0.054)	0.324				
Asia	4	5	0.434 (0.309; 0.559)***	0.042 (− 0.109; 0.192)	0.409				

Note. # Studies = number of studies; # ES = number of effect sizes; mean  $z$  = mean effect size (Fisher's  $z$ ); CI = confidence interval;  $\beta_1$  = 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.

<sup>a</sup> Omnibus test of all regression coefficients in the model.

<sup>b</sup>  $p$ -Value of the omnibus test.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

present study may overlap and be comorbid conditions at least to some extent. This may explain why rejection sensitivity is consistently related to the mental health problems that we examined. Therefore, the moderately strong associations that we found should be interpreted with caution given that we could not control for the overlapping effect of comorbid conditions in our study design. For example, in examining how rejection sensitivity was associated with depression, we were not able to control for the effect of anxiety nor for the effect of other mental health problems. Future review studies examining the unique association between rejection sensitivity and single mental health problems would provide a more nuanced understanding of this.

In our analyses of only longitudinal associations, significant associations were found between rejection sensitivity and depression, anxiety, and loneliness, which provided the evidence for a true association between rejection sensitivity and these mental health problems. Given the fact that these associations were based on longitudinal data,

rejection sensitivity may not only be proximally, but also distally related to several mental health problems. This implies that rejection sensitivity may play an important role in the etiology and persistence of several mental health problems. In other words, the findings of the present review suggest that rejection sensitivity may make individuals more vulnerable to developing different mental health problems. For more firm conclusions on this, future review studies should be based on a larger number of prospective primary studies.

As for publication bias, the results of the trim-and-fill analyses showed indications of missing data in four of the five meta-analyses that were performed on the cross-sectional associations, suggesting that the true overall associations between rejection sensitivity and four mental health problems may be different from the overall associations that were estimated in the current study. For depression, small effect sizes were underrepresented (the adjusted mean  $r$  was smaller than the unadjusted mean  $r$ ); whereas for anxiety, loneliness, and borderline

**Table 3**  
Results of categorical and continuous moderators for the anxiety domain (bivariate models).

Moderator variables	# Studies	# ES	Intercept/mean $z$ (95% CI)	$\beta_1$ (95% CI)	Mean $r$	$F$ (df1, df2) <sup>a</sup>	$p$ <sup>b</sup>	Level 2 variance	Level 3 variance
<i>Sample descriptors</i>									
Percentage of females	30	75	0.432 (0.375; 0.490)***	-0.001 (-0.003; -0.001)*	-	$F(1, 73) = 4.348$	0.041*	0.008***	0.018***
Mean age of the sample	30	75	0.433 (0.374; 0.492)***	-0.001 (-0.007; 0.006)	-	$F(1, 73) = 0.064$	0.801	0.008***	0.019***
Participants' age (categorized)						$F(1, 73) = 0.338$	0.563	0.008***	0.018***
18 years or older (RC)	17	35	0.416 (0.337; 0.496)***		0.394				
Younger than 18 years	13	40	0.450 (0.365; 0.536)***	0.034 (-0.083; 0.150)	0.422				
Type of sample						$F(2, 72) = 4.305$	0.017*	0.008***	0.013***
Community sample (RC)	27	68	0.417 (0.362; 0.471)***		0.394				
Clinical sample	1	2	0.310 (0.013; 0.607)*	-0.107 (-0.408; 0.195)	0.300				
Mixed sample	2	5	0.718 (0.511; 0.924)***	0.301 (0.088; 0.514)**	0.616				
<i>Research design descriptors</i>									
Measurement of RS						$F(1, 73) = 3.682$	0.059	0.008***	0.015***
RSQ (RC)	28	69	0.418 (0.361; 0.474)***		0.395				
IPSM	2	6	0.616 (0.418; 0.815)***	0.199 (-0.008; 0.405)	0.548				
Measurement of anxiety						$F(4, 70) = 2.025$	0.100	0.007***	0.017***
SASC-R (RC)	7	25	0.523 (0.412; 0.633)***		0.480				
BFNE	6	10	0.451 (0.334; 0.567)***	-0.072 (-0.233; 0.088)	0.423				
ECRI	4	9	0.486 (0.333; 0.639)***	-0.037 (-0.226; 0.152)	0.451				
GAD	2	5	0.362 (0.210; 0.514)***	-0.161 (-0.349; 0.027)	0.347				
Other	15	26	0.364 (0.285; 0.442)***	-0.159 (-0.295; -0.023)*	0.349				
Type of effect size						$F(1, 73) = 0.436$	0.511	0.008***	0.018***
Baseline (RC)	30	66	0.429 (0.370; 0.488)***		0.404				
Follow-up	5	9	0.463 (0.354; 0.571)***	0.034 (-0.068; 0.135)	0.433				
Length of follow-up	5	9	0.416 (0.266; 0.566)***	0.011 (-0.009; 0.031)	-	$F(1, 7) = 1.791$	0.223	0.004	0.014
<i>Other descriptors</i>									
Publication year	30	75	0.432 (0.373; 0.492)***	-0.000 (-0.016; 0.015)	-	$F(1, 73) = 0.002$	0.967	0.008***	0.019***
<i>Continent</i>									
Australia (RC)	7	13	0.554 (0.439; 0.670)***		0.504				
North America	17	52	0.391 (0.319; 0.464)***	-0.163 (-0.299; -0.027)*	0.372				
Europe	4	6	0.388 (0.227; 0.549)***	-0.167 (-0.365; 0.032)	0.370				
Asia	2	4	0.448 (0.237; 0.658)***	-0.107 (-0.347; 0.133)	0.420	$F(3, 71) = 2.014$	0.120	0.007***	0.016***

Note. # Studies = number of studies # ES = number of effect sizes; mean  $z$  = mean effect size (Fisher's  $z$ ); CI = confidence interval;  $\beta_1$  = 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.

<sup>a</sup> Omnibus test of all regression coefficients in the model.

<sup>b</sup>  $p$ -Value of the omnibus test.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

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 estimated mean associations, the biasing effects were small (for depression,  $\Delta$  mean  $r = 0.027$ ; for anxiety,  $\Delta$  mean  $r = 0.044$ ; for loneliness,  $\Delta$  mean  $r = 0.007$ ; and for borderline personality disorder,  $\Delta$  mean  $r = 0.024$ ). Similar results were observed in the meta-analyses on the longitudinal associations, as the adjusted mean associations for depression, anxiety, and loneliness slightly differed from the unadjusted mean associations. In general, these results indicate that the estimated overall associations between rejection sensitivity and the five mental health problems 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.

#### 4.2. Moderating effects of sample and research design characteristics

In general, sample and research design characteristics were found to moderate the estimated overall associations to a limited extent. First, the association between rejection sensitivity and anxiety decreased as the percentage of females in samples increased. This suggests that the association between rejection sensitivity and anxiety is larger for males than for females, implying that there may be differences in risk factors for anxiety between males and females. This has been an important issue in the literature on gender differences in social anxiety disorder (e.g., Xu et al., 2012). In contrast, the percentage of females did not moderate the overall associations in the depression, borderline personality disorder, and body dysmorphic disorder domains, suggesting that rejection sensitivity is similarly related to these mental health problems for both males and females. These findings are in line with previous research showing that gender did not moderate the association between rejection sensitivity and depression (Zimmer-Gembeck,

**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)	$\beta_1$ (95% CI)	Mean $r$	$F$ (df1, df2) <sup>a</sup>	$p^b$	Level 2 variance	Level 3 variance
<b>Sample descriptors</b>									
Percentage of females	19	31	0.437 (0.358; 0.516) <sup>***</sup>	0.005 (− 0.000; 0.011)	–	$F(1, 29)$ = 3.914	0.058	0.025 <sup>***</sup>	0.005
Mean age of the sample	19	31	0.448 (0.348; 0.547) <sup>***</sup>	0.011 (− 0.001; 0.023)	–	$F(1, 29)$ = 3.682	0.065	0.011 <sup>***</sup>	0.029
<b>Type of sample</b>									
Community sample (RC)	15	23	0.379 (0.296; 0.462) <sup>***</sup>		0.362	$F(2, 28)$ = 5.038	0.014 <sup>*</sup>	0.019 <sup>***</sup>	0.006
Clinical sample	2	4	0.426 (0.189; 0.663) <sup>***</sup>	0.047 (− 0.200; 0.294)	0.402				
Mixed sample	3	3	0.724 (0.518; 0.931) <sup>***</sup>	0.345 (0.122; 0.568) <sup>**</sup>	0.619				
<b>Research design descriptors</b>									
<b>Measurement of RS</b>									
RSQ (RC)	18	30	0.425 (0.333; 0.516) <sup>***</sup>	0.317 (− 0.151; 0.784)	0.401	$F(1, 29)$ = 1.920	0.176	0.018 <sup>***</sup>	0.017
Other	1	1	0.741 (0.283; 1.200) <sup>**</sup>		0.630				
<b>Measurement of BPD</b>									
BSL (RC)	3	5	0.700 (0.454; 0.946) <sup>***</sup>		0.604	$F(3, 27)$ = 2.319	0.098	0.016 <sup>***</sup>	0.018
PAI-BOR	6	12	0.380 (0.231; 0.530) <sup>***</sup>	− 0.320 (− 0.608; − 0.032) <sup>*</sup>	0.363				
SCID	6	7	0.346 (0.176; 0.515) <sup>***</sup>	− 0.355 (− 0.653; − 0.056) <sup>*</sup>	0.333				
Other	4	7	0.489 (0.299; 0.678) <sup>***</sup>	− 0.212 (− 0.522; 0.099)	0.453				
<b>Other descriptors</b>									
Publication year	19	31	0.440 (0.341; 0.539) <sup>***</sup>	0.007 (− 0.024; 0.037)	–	$F(1, 29)$ = 0.214	0.647	0.017 <sup>***</sup>	0.025
<b>Continent</b>									
Australia (RC)	1	2	0.607 (0.243; 0.971) <sup>**</sup>		0.542	$F(2, 28)$ = 2.042	0.149	0.016 <sup>***</sup>	0.019
North America	12	18	0.369 (0.254; 0.485) <sup>***</sup>	− 0.238 (− 0.620; 0.144)	0.353				
Europe	6	11	0.542 (0.378; 0.705) <sup>***</sup>	− 0.066 (− 0.464; 0.333)	0.495				

Note. # Studies = number of studies # ES = number of effect sizes; mean  $z$  = mean effect size (Fisher's  $z$ ); CI = confidence interval;  $\beta_1$  = 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 = Structured Clinical Interview for DSM-IV Axis II or Axis I Personality Disorders screening questionnaire.

<sup>a</sup> Omnibus test of all regression coefficients in the model.

<sup>b</sup>  $p$ -Value of the omnibus test.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

Nesdale, Webb, Khatibi, & Downey, 2016) nor 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 can also be found in the literature. In particular, gender differences were observed in rejection sensitivity, depression, and body dysmorphic disorder symptoms in several studies (e.g., Webb et al., 2015; Zimmer-Gembeck, 2015; Thomas & Bowker, 2015; Rowe et al., 2015).

As for the moderating effect of age, either tested as a continuous or a discrete variable, our study did not reveal any moderating effect, which is consistent with previous research showing that age is not correlated with rejection sensitivity, depression (Rowe et al., 2015; Zimmer-Gembeck et al., 2016), social anxiety (Rowe et al., 2015), or borderline personality disorder (Peters, Smart, & Baer, 2015). A possible explanation is that the rather narrow age range of participants in the primary studies limited detecting a real moderating effect of age on the associations. For example, the mean age of samples used in primary studies on borderline personality disorder ranged from 18.8 to 38.9 years and the mean age of samples used in primary studies on body dysmorphic disorder ranged from 11.9 to 32.6 years. Since there are studies available that report a significant correlation between age and rejection sensitivity (e.g., De Panfilis et al., 2015), future research should be based on participants with a broader age range. In this way more insight can be provided on how age moderates the associations between rejection sensitivity and different mental health problems.

There was a moderating effect of sample type (categorized as community sample, clinical sample, and mixed sample) on the association between rejection sensitivity and depression. However, there was no difference in the strength of this association between clinical and community samples. Similar results were found for anxiety and borderline personality disorder. Despite these findings, we can reason that it remains necessary to study rejection sensitivity and mental health outcomes in both clinical and non-clinical samples, as studies conducted in non-clinical populations can be informative for understanding processes in the clinical populations, and vice versa.

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 the five mental health problems. However, we did find a marginally significant moderating effect of the type of instrument that was used for assessing rejection sensitivity on the association between rejection sensitivity and anxiety ( $p = 0.059$ ). This finding suggests that the way in which rejection sensitivity is measured may affect the strength of the association between rejection sensitivity and anxiety. Further research may be recommended to determine whether and how the use of different instruments for assessing rejection sensitivity influences the association between rejection sensitivity and anxiety.

As for length of follow-up, we found a significant moderating effect on the association between rejection sensitivity and depression in the cross-sectional meta-analysis. The negative moderating effect suggests

**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)	$\beta_1$ (95% CI)	Mean r	F (df1, df2) <sup>a</sup>	$p^b$	Level 2 variance	Level 3 variance
<i>Sample descriptors</i>									
Percentage of females	5	9	0.457 (0.251; 0.664)**	-0.003 (-0.011; 0.004)	-	F(1, 7) = 1.061	0.337	0.058***	0.000
Mean age of the sample	5	9	0.460 (0.243; 0.677)**	0.005 (-0.028; 0.037)	-	F(1, 7) = 0.122	0.738	0.065***	0.000
Participants' age (categorized)						F(1, 7) = 0.179	0.685	0.065***	0.000
18 years or older (RC)	4	7	0.479 (0.233; 0.724)**		0.445				
Younger than 18 years	1	2	0.385 (-0.076; 0.847)	-0.093 (-0.616; 0.429)	0.367				
Type of sample						F(1, 7) = 0.021	0.888	0.066***	0.000
Community sample (RC)	4	7	0.452 (0.209; 0.694)**		0.424				
Clinical sample	1	2	0.486 (-0.013; 0.985)	0.034 (-0.521; 0.589)	0.451				
<i>Research design descriptors</i>									
Measurement of BDD						F(2, 6) = 0.439	0.664	0.067***	0.000
AAI (RC)	2	3	0.563 (0.175; 0.951)*		0.510				
BDD-YBOCS	1	2	0.486 (-0.034; 1.005)	-0.078 (-0.726; 0.571)	0.451				
BDDQ	2	4	0.370 (0.037; 0.702)*	-0.193 (-0.705; 0.318)	0.354				
<i>Other descriptors</i>									
Publication year	5	9	0.448 (0.234; 0.662)**	0.030 (-0.065; 0.125)	-	F(1, 7) = 0.557	0.480	0.062***	0.000
Continent						F(2, 6) = 0.477	0.643	0.067***	0.000
Australia (RC)	2	3	0.564 (0.175; 0.952)*		0.511				
North America	2	4	0.448 (0.102; 0.794)*	-0.116 (-0.636; 0.405)	0.420				
Europe	1	2	0.318 (-0.161; 0.798)	-0.245 (-0.863; 0.372)	0.308				

Note. # Studies = number of studies # ES = number of effect sizes; mean z = mean effect size (Fisher's z); CI = confidence interval;  $\beta_1$  = 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.

- <sup>a</sup> Omnibus test of all regression coefficients in the model.
- <sup>b</sup> p-Value of the omnibus test.
- \*  $p < 0.05$ .
- \*\*  $p < 0.01$ .
- \*\*\*  $p < 0.001$ .

that the strength of the association between rejection sensitivity and depression may become smaller over time. On the other hand, follow-up length was only a marginally significant moderator in the

corresponding longitudinal meta-analysis, but this may be due to a lack of statistical power because of the rather low number of effect sizes. Further research is necessary to clarify the moderating effect of follow-

**Table 6**  
Overall associations and moderator analysis of length of follow-up for depression, anxiety, and loneliness using longitudinal associations (bivariate models).

	# 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
<i>Overall associations (prior to trim-and-fill analyses)</i>											
Depression	11	20	0.253 (0.027)	0.196; 0.310	9.267***	0.248	31.7	0.003*	30.0	0.003	38.3
Anxiety	6	10	0.287 (0.027)	0.226; 0.347	10.770***	0.279	66.1	0.000	5.0	0.002	28.9
Loneliness	2	3	0.350 (0.033)	0.206; 0.494	10.466**	0.336	100.0	0.000	8.0e-11	0.000	1.1e-07
<i>Overall associations (after trim-and-fill analyses)</i>											
Depression	14	23	0.215 (0.035)	0.143; 0.287	6.200***	0.212	18.2	0.003*	19.5	0.010	62.3
Anxiety	7	11	0.309 (0.041)	0.218; 0.400	7.562***	0.300	30.2	0.002	17.7	0.007	52.0
Loneliness	3	5	0.332 (0.029)	0.251; 0.412	11.421***	0.320	100.0	0.000	0.0	0.000	1.1e-07

Results of testing follow-up length as potential moderator

	# Studies	# ES	Intercept/mean z (95% CI)	$\beta_1$ (95% CI)	F (df1, df2) <sup>a</sup>	$p^b$	Level 2 variance	Level 3 variance
Depression	11	20	0.263 (0.201; 0.324)***	-0.008 (-0.016; 0.001)	F(1, 18) = 3.888	0.064	0.002	0.005*
Anxiety	6	10	0.281 (0.234; 0.327)***	0.009 (-0.001; 0.018)	F(1, 8) = 4.767	0.061	0.000	0.000
Loneliness	2	3	0.370 (-0.235; 0.975)	-0.006 (-0.113; 0.101)	F(1, 1) = 0.459	0.621	0.000	0.001

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.

- <sup>a</sup> Omnibus test of all regression coefficients in the model.
- <sup>b</sup> p-Value of the omnibus test.
- \*  $p < 0.05$ .
- \*\*  $p < 0.01$ .
- \*\*\*  $p < 0.001$ .

up length, so that more insight can be gained in how the association between rejection sensitivity and depression varies over time.

For other descriptors, such as the continent in which the primary studies were performed, no significant moderating effects were found. In this regard, it must be noted that the number of studies and/or effect sizes in some categories of the variables that were tested as potential moderators were rather small, resulting in a low statistical power in the analyses. As previous studies did find 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 a participant's cultural background on the associations between rejection sensitivity and mental health problems could strengthen the knowledge on how rejection sensitivity is related to mental health. Further, as publication year was not found to be a moderator in any of the five mental health domains, we can infer that the associations between rejection sensitivity and the five mental health problems remain fairly stable over time.

#### 4.3. 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 non-experimental nature of the primary studies that were included. Thus, the associations between rejection sensitivity and mental health problems may be bi-directionally (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 experimental designs that allow for more causal conclusions. Further, more primary research with a longitudinal design allows for a better assessment of the temporal relation between rejection sensitivity and different mental health problems. Accordingly, future meta-analyses of longitudinal data would help advance our understanding of the relationship between rejection sensitivity and mental health outcomes.

Second, we were unable to examine effects of different types of rejection sensitivity (e.g., gender-based rejection sensitivity, appearance-based rejection sensitivity, and race-based rejection sensitivity) on the associations between rejection sensitivity and mental health problems, as most primary studies focused on one type only. In the present study, we were primarily interested in the mean associations between rejection sensitivity and different mental health problems, and we therefore synthesized primary studies on different types of rejection sensitivity. It is likely that specific types of rejection sensitivity may in particular be related to mental health problems. 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 aimed at exploring the unique effect of different types of rejection sensitivity on mental health outcomes would provide further insights. Moreover, different types of rejection sensitivity, such as gender-based rejection sensitivity and appearance-based rejection sensitivity, may not be exclusively present but coexisting and interacting with each other. We expect that individuals exposed to multiple types of rejection sensitivity are more likely to suffer from more severe negative mental health problems. 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 the limited number of available studies reporting on such effects (see Bondü & Esser, 2015; McDonald, Bowker, Rubin, Laursen, & Duchene, 2010; Zimmer-Gembeck et al., 2016; London,

Downey, Bonica, & Paltin, 2007; McDonald et al., 2010; Scharf, Oshri, Eshkol, & Pilowsky, 2014; Ferguson & Zimmer-Gembeck, 2014; London et al., 2007). Previous research has found that anxious expectations of rejection were uniquely positively associated with social anxiety and withdrawal, whereas angry expectations of rejection were negatively associated with social anxiety (London et al., 2007). Both anxious and angry expectations predicted loneliness, but neither were unique predictors of loneliness. Therefore, future research is needed to ascertain whether different dimensions of rejection sensitivity have a distinct influence on different mental health problems.

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, and/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 a few primary studies (e.g., Zimmer-Gembeck et al., 2014), the number of primary studies using multiple-report methods was too small to examine the influence of reporting method on the associations between rejection sensitivity and mental health problems. Future studies using multi-report methods, including self-report, peer-report, parent-report, and especially clinician-report, would be beneficial in reducing CMV.

Lastly, many moderator analyses were based on a small number of effect sizes, implying a low statistical power in analyses to detect the true effect of moderator variables. Future moderator analyses based on a large number of effect sizes would provide more convincing results.

#### 4.4. Implications for clinical practice

The present study has potential implications for clinical practice and intervention services. First, the findings of this study produced more knowledge on the true 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 support for the existing knowledge that rejection sensitivity is related to depression, anxiety, and borderline personality disorder, but also generate new knowledge in the sense that rejection sensitivity is related to 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, as rejection sensitivity is related to negative mental health outcomes, it may be fruitful to assess rejection sensitivity in determining who is at risk for mental health problems and who should be subject to treatment or prevention programs. In addition, assessing rejection sensitivity is relevant for clients of all ages, since the results of this study showed that the strength of the associations between rejection sensitivity and the five mental health problems did not change by age.

Second, the results of this study hold potential to improve interventions for negative mental health problems associated with rejection sensitivity (i.e., depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder). As our findings indicate that rejection sensitivity is moderately and significantly associated with five mental health problems, clinicians and service providers should consider treating rejection sensitivity. For example, given that we found a significant association between rejection sensitivity and borderline personality disorder, paying attention to rejection sensitivity could be integrated into existing psychotherapeutic approaches aimed at treating borderline personality disorder (Bateman & Fonagy, 2009; Giesen-Bloo et al., 2006), which may improve the effectiveness of these approaches. Since the association between rejection sensitivity and borderline personality disorder did not differ between males and females or between

different age groups, intervention programs targeting rejection sensitivity may be effective for both males and females across different ages. Furthermore, since we found that the association between rejection sensitivity and anxiety was larger for males than for females, it is important that interventions targeting anxiety be gender-specific, so that differences in needs between males and females can best be addressed and treatment efficacy can be enhanced.

## 5. Conclusion

This is the first meta-analytic review of associations between rejection sensitivity and five mental health problems: depression, anxiety, loneliness, borderline personality disorder, and body dysmorphic disorder. Overall, the results showed that rejection sensitivity was significantly and moderately associated with each of these mental health problems. The strength of 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 samples (i.e., community samples). Further, we found that rejection sensitivity is less related to anxiety among females than among males. In addition, based on longitudinal associations, this study showed that rejection sensitivity is significantly related to depression, anxiety, and loneliness, over time. The findings of the present study open avenues for more focused research in the future, and are important for the development and improvement of both assessment and intervention practices.

## Role of funding sources

This study was funded by the National Natural Science Foundation of China (NSFC, 81671347). NSFC had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

## Contributors

Author Shuling Gao participated in the design of the study, conducted literature searches, coded all primary studies, conducted statistical analyses, and drafted the manuscript. Author Mark Assink conducted statistical analyses and critically reviewed and revised the manuscript. Author Andrea Cipriani critically reviewed and revised the manuscript. Author Kangguang Lin participated in the design of the study, conducted literature searches, coded all primary studies, and critically reviewed and revised the manuscript. All authors contributed to and have approved the final manuscript.

## Conflict of interest

All authors declare that they have no conflicts of interest.

## Appendix A–E. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.cpr.2017.08.007>.

## References

- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV*. Washington, DC: American Psychiatric Association.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders (DSM-5)* (5th ed.). Arlington, VA: American Psychiatric Association.
- Assink, M., Van der Put, C. E., Hoeve, M., De Vries, S. L., Stams, G. J. J., & Oort, F. J. (2015). Risk factors for persistent delinquent behavior among juveniles: A meta-analytic review. *Clinical Psychology Review*, 42, 47–61. <http://dx.doi.org/10.1016/j.cpr.2015.08.002>.
- Assink, M., & Wibbelink, C. J. (2016). Fitting three-level meta-analytic models in R: A step-by-step tutorial. *The Quantitative Methods for Psychology*, 12(3), 154–174. <http://dx.doi.org/10.20982/tqmp.12.3.p154>.

- Ayduk, Ö., & Gyurak, A. (2008). Applying the cognitive-affective processing systems approach to conceptualizing rejection sensitivity. *Social and Personality Psychology Compass*, 2(5), 2016–2033. <http://dx.doi.org/10.1111/j.1751-9004.2008.00143.x>.
- Bateman, A., & Fonagy, P. (2009). Randomized controlled trial of outpatient mentalization-based treatment versus structured clinical management for borderline personality disorder. *American Journal of Psychiatry*, 166(12), 1355–1364. <http://dx.doi.org/10.1176/appi.ajp.2009.09040539>.
- Berenson, K. R., Gyurak, A., Ayduk, Ö., Downey, G., Garner, M. J., Mogg, K., ... Pine, D. S. (2009). Rejection sensitivity and disruption of attention by social threat cues. *Journal of Research in Personality*, 43(6), 1064–1072. <http://dx.doi.org/10.1016/j.jrp.2009.07.007>.
- Bijttebier, P., Beck, I., Claes, L., & Vandereycken, W. (2009). Gray's reinforcement sensitivity theory as a framework for research on personality-psychopathology associations. *Clinical Psychology Review*, 29(5), 421–430. <http://dx.doi.org/10.1016/j.cpr.2009.04.002>.
- Bondü, R., & Esser, G. (2015). Justice and rejection sensitivity in children and adolescents with ADHD symptoms. *European Child & Adolescent Psychiatry*, 24(2), 185–198. <http://dx.doi.org/10.1007/s00787-014-0560-9>.
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Chichester, UK: Wiley.
- Bowker, J. C., Thomas, K. K., Norman, K. E., & Spencer, S. V. (2011). Mutual best friendship involvement, best friends' rejection sensitivity, and psychological maladaptation. *Journal of Youth and Adolescence*, 40(5), 545–555. <http://dx.doi.org/10.1007/s10964-010-9582-x>.
- Boyce, P., & Parker, G. (1989). Development of a scale to measure interpersonal sensitivity. *Australian and New Zealand Journal of Psychiatry*, 23(3), 341–351.
- Brown, G. W., & Harris, T. (1982). Fall-off in the reporting of life events. *Social Psychiatry*, 17(1), 23–28. <http://dx.doi.org/10.1007/BF00583889>.
- Bungert, M., Koppe, G., Niedtfield, L., Vollstädt-Klein, S., Schmahl, C., Lis, S., & Bohus, M. (2015). Pain processing after social exclusion and its relation to rejection sensitivity in borderline personality disorder. *PLoS One*, 10(8), 1–22. <http://dx.doi.org/10.1371/journal.pone.0133693>.
- Burklund, L. J., Eisenberger, N. I., & Lieberman, M. D. (2007). The face of rejection: Rejection sensitivity moderates dorsal anterior cingulate activity to disapproving facial expressions. *Social Neuroscience*, 2(3–4), 238–253. <http://dx.doi.org/10.1080/17470910701391711>.
- Calogero, R. M., Park, L. E., Rahemtulla, Z. K., & Williams, K. C. D. (2010). Predicting excessive body image concerns among British university students: The unique role of appearance-based rejection sensitivity. *Body Image*, 7(1), 78–81. <http://dx.doi.org/10.1016/j.bodyim.2009.09.005>.
- Card, N. A. (2012). *Applied meta-analysis for social science research*. New York: Guilford Press.
- Chan, W., & Mendoza-Denton, R. (2008). Status-based rejection sensitivity among Asian Americans: Implications for psychological distress. *Journal of Personality*, 76(5), 1317–1346. <http://dx.doi.org/10.1111/j.1467-6494.2008.00522.x>.
- Chango, J. M., McElhaney, K. B., Allen, J. P., Schad, M. M., & Marston, E. (2012). Relational stressors and depressive symptoms in late adolescence: Rejection sensitivity as a vulnerability. *Journal of Abnormal Child Psychology*, 40(3), 369–379. <http://dx.doi.org/10.1007/s10802-011-9570-y>.
- Chesin, M., Fertuck, E., Goodman, J., Lichenstein, S., & Stanley, B. (2015). The interaction between rejection sensitivity and emotional maltreatment in borderline personality disorder. *Psychopathology*, 48(1), 31–35. <http://dx.doi.org/10.1159/000365196>.
- Cheung, M. W.-L. (2014). Modeling dependent effect sizes with three-level meta-analyses: A structural equation modeling approach. *Psychological Methods*, 19(2), 211–229. <http://dx.doi.org/10.1037/a0032968>.
- Chow, D. S.-K., Au, E. W. M., & Chiu, C.-Y. (2008). Predicting the psychological health of older adults: Interaction of age-based rejection sensitivity and discriminative facility. *Journal of Research in Personality*, 42(1), 169–182. <http://dx.doi.org/10.1016/j.jrp.2007.05.001>.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159. <http://dx.doi.org/10.1037/0033-2909.112.1.155>.
- De Jong-Gierveld, J. (1987). Developing and testing a model of loneliness. *Journal of Personality and Social Psychology*, 53(1), 119–128. <http://dx.doi.org/10.1037/0022-3514.53.1.119>.
- De Panfilis, C., Meehan, K. B., Cain, N. M., & Clarkin, J. F. (2015). Effortful control, rejection sensitivity, and borderline personality disorder features in adulthood. *Journal of Personality Disorders*, 29, 1–18. <http://dx.doi.org/10.1521/pedi.2015.29.226>.
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70(6), 1327–1343. <http://dx.doi.org/10.1037/0022-3514.70.6.1327>.
- Downey, G., Freitas, A. L., Michaelis, B., & Khouri, H. (1998). The self-fulfilling prophecy in close relationships: Rejection sensitivity and rejection by romantic partners. *Journal of Personality and Social Psychology*, 75(2), 545–560. <http://dx.doi.org/10.1037/0022-3514.75.2.545>.
- Downey, G., Khouri, H., & Feldman, S. I. (1997). Early interpersonal trauma and later adjustment: The mediational role of rejection sensitivity. *Developmental perspectives on trauma: Theory, research, and intervention* (pp. 85–114). Rochester, NY: University of Rochester Press.
- Downey, G., Lebolt, A., Rincon, C., & Freitas, A. L. (1998). Rejection sensitivity and children's interpersonal difficulties. *Child Development*, 69(4), 1074–1091. <http://dx.doi.org/10.1111/j.1467-8624.1998.tb06161.x>.
- Downey, G., Mougios, V., Ayduk, O., London, B. E., & Shoda, Y. (2004). Rejection sensitivity and the defensive motivational system: Insights from the startle response to rejection cues. *Psychological Science*, 15(10), 668–673. <http://dx.doi.org/10.1111/j.0956-7976.2004.00738.x>.

- Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, 56(2), 455–463. <http://dx.doi.org/10.1111/j.0006-341X.2000.00455.x>.
- Dyar, C., Feinstein, B. A., Eaton, N. R., & London, B. (2016). Development and initial validation of the sexual minority women rejection sensitivity scale. *Psychology of Women Quarterly*, 40(1), 120–137. <http://dx.doi.org/10.1177/0361684315608843>.
- Ferguson, S., & Zimmer-Gembeck, M. J. (2014). Associations of parental and peer rejection with preadolescents' loneliness: Emotional sensitivities as mediators. *Journal of Relationships Research*, 5(e9), 1–11. <http://dx.doi.org/10.1017/jrr.2014.9>.
- Giesen-Bloo, J., Van Dyck, R., Spinhoven, P., Van Tilburg, W., Dirksen, C., Van Asselt, T., ... Arntz, A. (2006). Outpatient psychotherapy for borderline personality disorder: Randomized trial of schema-focused therapy vs transference-focused psychotherapy. *Archives of General Psychiatry*, 63(6), 649–658. <http://dx.doi.org/10.1001/archpsyc.63.6.649>.
- Gray, J. A. (1987). *The psychology of fear and stress* (2nd ed.). Cambridge, England: Cambridge University Press.
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando: Academic Press.
- Huynh, V. W., & Fuligni, A. J. (2010). Discrimination hurts: The academic, psychological, and physical well-being of adolescents. *Journal of Research on Adolescence*, 20(4), 916–941. <http://dx.doi.org/10.1111/j.1532-7795.2010.00670.x>.
- Kang, S. K., & Chasteen, A. L. (2009). The development and validation of the age-based rejection sensitivity questionnaire. *The Gerontologist*, 49(3), 303–316. <http://dx.doi.org/10.1093/geront/gnp035>.
- Kawamoto, T., Ura, M., & Hiraki, K. (2017). Curious people are less affected by social rejection. *Personality and Individual Differences*, 105, 264–267. <http://dx.doi.org/10.1016/j.paid.2016.10.006>.
- Kim, J., & Cicchetti, D. (2010). Longitudinal pathways linking child maltreatment, emotion regulation, peer relations, and psychopathology. *Journal of Child Psychology and Psychiatry*, 51(6), 706–716. <http://dx.doi.org/10.1111/j.1469-7610.2009.02202.x>.
- Lang, P. J., Davis, M., & Öhman, A. (2000). Fear and anxiety: Animal models and human cognitive psychophysiology. *Journal of Affective Disorders*, 61(3), 137–159. [http://dx.doi.org/10.1016/S0165-0327\(00\)00343-8](http://dx.doi.org/10.1016/S0165-0327(00)00343-8).
- Lansford, J. E., Dodge, K. A., Pettit, G. S., Bates, J. E., Crozier, J., & Kaplow, J. (2002). A 12-year prospective study of the long-term effects of early child physical maltreatment on psychological, behavioral, and academic problems in adolescence. *Archives of Pediatrics and Adolescent Medicine*, 156(8), 824–830. <http://dx.doi.org/10.1001/archpedi.156.8.824>.
- Lavell, C. H., Zimmer-Gembeck, M. J., Farrell, L. J., & Webb, H. (2014). Victimization, social anxiety, and body dysmorphic concerns: Appearance-based rejection sensitivity as a mediator. *Body Image*, 11(4), 391–395. <http://dx.doi.org/10.1016/j.bodyim.2014.06.008>.
- Lee, K.-U., Jung, N. Y., Rauch, S. A., Chae, J. H., Lee, H.-K., Kweon, Y.-S., & Lee, C. T. (2013). Psychometric properties of the Korean version of the interpersonal sensitivity measure (IPSM-K). *Comprehensive Psychiatry*, 54(7), 918–924. <http://dx.doi.org/10.1016/j.comppsy.2013.03.022>.
- Levy, S. R., Ayduk, O., & Downey, G. (2001). The role of rejection sensitivity in people's relationships with significant others and valued social groups. In M. R. Leary (Ed.), *Interpersonal rejection* (pp. 251–289). New York: Oxford University Press.
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks: Sage.
- London, B., Downey, G., Bonica, C., & Paltin, I. (2007). Social causes and consequences of rejection sensitivity. *Journal of Research on Adolescence*, 17(3), 481–506. <http://dx.doi.org/10.1111/j.1532-7795.2007.00531.x>.
- London, B., Downey, G., Romero-Canyas, R., Rattan, A., & Tyson, D. (2012). Gender-based rejection sensitivity and academic self-silencing in women. *Journal of Personality and Social Psychology*, 102(5), 961–979. <http://dx.doi.org/10.1037/a0026615>.
- Marin, T. J., & Miller, G. E. (2013). The interpersonally sensitive disposition and health: An integrative review. *Psychological Bulletin*, 139(5), 941–984. <http://dx.doi.org/10.1037/a0030800>.
- Masillo, A., Valmaggia, L., Lanna, A., Brandizzi, M., Lindau, J., Curto, M., ... Godeas, L. (2014). Validation of the Italian version of interpersonal sensitivity measure (IPSM) in adolescents and young adults. *Journal of Affective Disorders*, 156, 164–170. <http://dx.doi.org/10.1016/j.jad.2013.12.012>.
- McClure Brenchley, K. J., & Quinn, D. M. (2016). Weight-based rejection sensitivity: Scale development and implications for well-being. *Body Image*, 16, 79–92. <http://dx.doi.org/10.1016/j.bodyim.2015.11.005>.
- McDonald, K. L., Bowker, J. C., Rubin, K. H., Laursen, B., & Ducheane, M. S. (2010). Interactions between rejection sensitivity and supportive relationships in the prediction of adolescents' internalizing difficulties. *Journal of Youth and Adolescence*, 39(5), 563–574. <http://dx.doi.org/10.1007/s10964-010-9519-4>.
- Mendoza-Denton, R., Downey, G., Purdie, V. J., Davis, A., & Pietrzak, J. (2002). Sensitivity to status-based rejection: Implications for African American students' college experience. *Journal of Personality and Social Psychology*, 83(4), 896–918. <http://dx.doi.org/10.1037/0022-3514.83.4.896>.
- Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, 80(4), 252–283. <http://dx.doi.org/10.1037/h0035002>.
- Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review*, 102(2), 246–268. <http://dx.doi.org/10.1037/0033-295X.102.2.246>.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine*, 151(4), 264–269. <http://dx.doi.org/10.1371/journal.pmed.1000097>.
- National Institute of Health (2014). Quality assessment tool for observational cohort and cross-sectional studies. Retrieved from <https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort>.
- Norona, J. C., Roberson, P. N. E., & Welsh, D. P. (2016). Rejection sensitivity and depressive symptoms: Longitudinal actor-partner effects in adolescent romantic relationships. *Journal of Adolescence*, 51, 6–18. <http://dx.doi.org/10.1016/j.adolescence.2016.05.007>.
- Olsson, A., Carmona, S., Downey, G., Bolger, N., & Ochsner, K. (2008). *Perceptual and learning biases underlying individual differences in sensitivity to social rejection*. (Manuscript submitted for publication).
- Olsson, A., Carmona, S., Downey, G., Bolger, N., & Ochsner, K. N. (2013). Learning biases underlying individual differences in sensitivity to social rejection. *Emotion*, 13(4), 616–621. <http://dx.doi.org/10.1037/a0033150>.
- Pachankis, J. E., Goldfried, M. R., & Ramrattan, M. E. (2008). Extension of the rejection sensitivity construct to the interpersonal functioning of gay men. *Journal of Consulting and Clinical Psychology*, 76(2), 306–317. <http://dx.doi.org/10.1037/0022-006X.76.2.306>.
- Park, L. E. (2007). Appearance-based rejection sensitivity: Implications for mental and physical health, affect, and motivation. *Personality and Social Psychology Bulletin*, 33(4), 490–504. <http://dx.doi.org/10.1177/0146167206296301>.
- Park, L. E., Calogero, R. M., Young, A. F., & Diraddo, A. M. (2010). Appearance-based rejection sensitivity predicts body dysmorphic disorder symptoms and cosmetic surgery acceptance. *Journal of Social and Clinical Psychology*, 29(5), 489–509. <http://dx.doi.org/10.1521/jscp.2010.29.5.489>.
- Paykel, E. (1997). The interview for recent life events. *Psychological Medicine*, 27(2), 301–310.
- Pearson, K. A., Watkins, E. R., & Mullan, E. G. (2011). Rejection sensitivity prospectively predicts increased rumination. *Behaviour Research and Therapy*, 49(10), 597–605. <http://dx.doi.org/10.1016/j.brat.2011.06.004>.
- Peters, J. R., Smart, L. M., & Baer, R. A. (2015). Dysfunctional responses to emotion mediate the cross-sectional relationship between rejection sensitivity and borderline personality features. *Journal of Personality Disorders*, 29(2), 231–240. <http://dx.doi.org/10.1521/pedi.2014.28.151>.
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63, 539–569. <http://dx.doi.org/10.1146/annurev-psych-120710-100452>.
- Premkumar, P. (2012). Are you being rejected or excluded? Insights from neuroimaging studies using different rejection paradigms. *Clinical Psychopharmacology and Neuroscience*, 10(3), 144–154. <http://dx.doi.org/10.9758/cpn.2012.10.3.144>.
- R Core Team (2016). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <https://www.r-project.org/>.
- Romero-Canyas, R., Downey, G., Berenson, K., Ayduk, O., & Kang, N. J. (2010). Rejection sensitivity and the rejection-hostility link in romantic relationships. *Journal of Personality*, 78(1), 119–148. <http://dx.doi.org/10.1111/j.1467-6494.2009.00611.x>.
- Rowe, S. L., Gembeck, M. J. Z., Rudolph, J., & Nesdale, D. (2015). A longitudinal study of rejecting and autonomy-restrictive parenting, rejection sensitivity, and socio-emotional symptoms in early adolescents. *Journal of Abnormal Child Psychology*, 43(6), 1107–1118. <http://dx.doi.org/10.1007/s10802-014-9966-6>.
- Sato, K., Yuki, M., & Norasakkunkit, V. (2014). A socio-ecological approach to cross-cultural differences in the sensitivity to social rejection: The partially mediating role of relational mobility. *Journal of Cross-Cultural Psychology*, 45(10), 1549–1560. <http://dx.doi.org/10.1177/0022022114544320>.
- Scharf, M., Oshri, A., Eshkol, V., & Pilowsky, T. (2014). Adolescents' ADHD symptoms and adjustment: The role of attachment and rejection sensitivity. *American Journal of Orthopsychiatry*, 84(2), 209–217. <http://dx.doi.org/10.1037/h0099391>.
- Staebler, K., Helbing, E., Rosenbach, C., & Renneberg, B. (2011). Rejection sensitivity and borderline personality disorder. *Clinical Psychology & Psychotherapy*, 18(4), 275–283. <http://dx.doi.org/10.1002/cpp.705>.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston: Allyn and Bacon.
- Thomas, K., & Bowker, J. (2015). Rejection sensitivity and adjustment during adolescence: Do friendship self-silencing and parent support matter? *Journal of Child and Family Studies*, 24(3), 608–616. <http://dx.doi.org/10.1007/s10826-013-9871-6>.
- Van den Noortgate, W., López-López, J. A., Marín-Martínez, F., & Sánchez-Meca, J. (2013). Three-level meta-analysis of dependent effect sizes. *Behavior Research Methods*, 45(2), 576–594. <http://dx.doi.org/10.3758/s13428-012-0261-6>.
- Van den Noortgate, W., López-López, J. A., Marín-Martínez, F., & Sánchez-Meca, J. (2015). Meta-analysis of multiple outcomes: A multilevel approach. *Behavior Research Methods*, 47(4), 1274–1294. <http://dx.doi.org/10.3758/s13428-014-0527-2>.
- Van Den Noortgate, W., & Onghena, P. (2003). Multilevel meta-analysis: A comparison with traditional meta-analytical procedures. *Educational and Psychological Measurement*, 63(5), 765–790. <http://dx.doi.org/10.1177/0013164403251027>.
- Viechtbauer, W. (2005). Bias and efficiency of meta-analytic variance estimators in the random-effects model. *Journal of Educational and Behavioral Statistics*, 30(3), 261–293. <http://dx.doi.org/10.3102/10769986030003261>.
- Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36(3), 1–48.
- Watson, J., & Nesdale, D. (2012). Rejection sensitivity, social withdrawal, and loneliness in young adults. *Journal of Applied Social Psychology*, 42(8), 1984–2005. <http://dx.doi.org/10.1111/j.1559-1816.2012.00927.x>.
- Way, B. M., & Lieberman, M. D. (2010). Is there a genetic contribution to cultural differences? Collectivism, individualism and genetic markers of social sensitivity. *Social Cognitive and Affective Neuroscience*, 5(2-3), 203–211. <http://dx.doi.org/10.1093/scan/nsq059>.
- Webb, H. J., Zimmer-Gembeck, M. J., Mastro, S., Farrell, L. J., Waters, A. M., & Lavell, C. H. (2015). Young adolescents' body dysmorphic symptoms: Associations with same-

- and cross-sex peer teasing via appearance-based rejection sensitivity. *Journal of Abnormal Child Psychology*, 43(6), 1161–1173. <http://dx.doi.org/10.1007/s10802-014-9971-9>.
- Wolfe, D. A., Wekerle, C., Scott, K., Straatman, A.-L., & Grasley, C. (2004). Predicting abuse in adolescent dating relationships over 1 year: The role of child maltreatment and trauma. *Journal of Abnormal Psychology*, 113(3), 406–415. <http://dx.doi.org/10.1037/0021-843X.113.3.406>.
- Xu, Y., Schneier, F., Heimberg, R. G., Princisvalle, K., Liebowitz, M. R., Wang, S., & Blanco, C. (2012). Gender differences in social anxiety disorder: Results from the national epidemiologic sample on alcohol and related conditions. *Journal of Anxiety Disorders*, 26(1), 12–19. <http://dx.doi.org/10.1016/j.janxdis.2011.08.006>.
- Zimmer-Gembeck, M. J. (2015). Emotional sensitivity before and after coping with rejection: A longitudinal study. *Journal of Applied Developmental Psychology*, 41, 28–37. <http://dx.doi.org/10.1016/j.appdev.2015.05.001>.
- Zimmer-Gembeck, M. J., Nesdale, D., Webb, H. J., Khatibi, M., & Downey, G. (2016). A longitudinal rejection sensitivity model of depression and aggression: Unique roles of anxiety, anger, blame, withdrawal and retribution. *Journal of Abnormal Child Psychology*, 44(1), 1–17. <http://dx.doi.org/10.1007/s10802-016-0127-y>.
- Zimmer-Gembeck, M. J., Trevaskis, S., Nesdale, D., & Downey, G. A. (2014). Relational victimization, loneliness and depressive symptoms: Indirect associations via self and peer reports of rejection sensitivity. *Journal of Youth and Adolescence*, 43(4), 568–582. <http://dx.doi.org/10.1007/s10964-013-9993-6>.