



Citation for published version:

Foxhall, M, Hamilton-Giachritsis, C & Button, K 2019, 'The link between rejection sensitivity and borderline personality disorder: A systematic review and meta-analysis', *British Journal of Clinical Psychology*, vol. 58, no. 3, pp. 289-326. <https://doi.org/10.1111/bjc.12216>

DOI:

[10.1111/bjc.12216](https://doi.org/10.1111/bjc.12216)

Publication date:

2019

Document Version

Peer reviewed version

[Link to publication](#)

This is the peer reviewed version of the following article: Foxhall, M. , HamiltonGiachritsis, C. and Button, K. (2019), The link between rejection sensitivity and borderline personality disorder: A systematic review and meta analysis. *Br J Clin Psychol*, 58: 289-326., which has been published in final form at <https://doi.org/10.1111/bjc.12216>. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving.

University of Bath

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**The link between Rejection Sensitivity and Borderline Personality Disorder: A
systematic review and meta-analysis**

Mia Foxhall*¹, Dr Catherine Hamilton-Giachritsis¹, and Dr Katherine Button¹

¹Department of Psychology, University of Bath, United Kingdom

Accepted: British Journal of Clinical Psychology (07.12.18). In press.

*Corresponding author information: Mia Foxhall, 10W Department of Psychology, University of Bath,
Bath, BA2 7AY (mia.foxhall@nhs.net)

Abstract

Objective: People with Borderline Personality Disorder (BPD) may experience heightened rejection sensitivity (RS), a disposition developing from repeated childhood rejecting experiences. It is not known whether the full RS model accounts for the cognitive-affective experiences common in BPD. This systematic review extends upon previous reviews, firstly by assessing the link between childhood rejecting experiences and adult RS the link between BPD and RS in non-clinical and clinical samples, and secondly by considering . Secondly the link between BPD and RS in both non-clinical and clinical samples., the link between childhood rejecting experiences and adult RS is considered, with reference to the impact on BPD.

Method: Two research questions were devised and searches based on predetermined criteria were conducted using PsycNET, Pubmed, SCOPUS and Web of Science. Data was extracted by one researcher and 20% was inter-rated, with high levels of agreement. Thirty-eightForty-three papers were systematically reviewed, and 31 included in meta-analysis and meta-regression.

Results: Pooled effect sizes suggest RS is linked with BPD ($r = .302$), with strong effect sizes when comparing clinical and control samples ($r = .705$). Qualitative synthesis suggests this may be mediated by executive control, although further research is required. Studies assessing the link between childhood rejection and RS are limited, however emotional abuse and neglect appears linked with RS. Pooled effect sizes suggest RS is linked with BPD ($r = .326$), with strong effect sizes when comparing clinical and control samples ($r = .655$). Qualitative synthesis suggests this may be mediated by executive control, although further research is required. The small number of studies considering the full RS model with regards BPD suggests the interaction between emotional abuse and neglect affects rejection sensitivity, however outcomes are inconsistent.

Conclusions: Childhood rejection, particularly emotional abuse and neglect, appears to be linked to rejection sensitivity, and rejection sensitivity is linked to BPD. However, this may not be linear. Implications for clinical practice and research are discussed.

Practitioner points:

Rejection Sensitivity and Borderline Personality Disorder

- Rejection sensitivity is consistently linked with BPD, in clinical and non-clinical samples. Supporting mentalization or improved theory of mind may offer a therapeutic target for this disposition.
- Considering the causes and effects of rejection sensitivity may offer a non-blaming explanation of interpersonal difficulties in BPD and could be utilised as part of formulation and the therapeutic relationship.
- However, the possible interaction between emotional abuse and neglect and rejection sensitivity suggests rejection sensitivity is not always apparent for people with BPD. Idiosyncratic formulation should consider this.
- The literature included in the review is limited to Western populations with a high proportion of females, which may limit generalisability.
- Measures of rejection sensitivity included in the review were restricted to self-report, which may be subject to bias. Furthermore, measures of childhood rejection were retrospective in nature due to the exclusion of child samples. Further research should consider longitudinal and observational study designs.

Keywords:

Borderline Personality Disorder, Rejection Sensitivity, Rejection, Childhood trauma, Meta-analysis

Acknowledgements:

With thanks to Dr Amy Caswell for her support as second reviewer, and Adam Von Ende for his support with statistical analysis.

Rejection Sensitivity and Borderline Personality Disorder

Humans are primed to identify and respond appropriately to signs of rejection to maintain the central human motivation to belong (Baumeister & Leary, 1995). However, people with a diagnosis of Borderline Personality Disorder (BPD) differ in the degree to which they perceive and respond to rejection (American Psychological Association, 2013). The following review explores the existing evidence base to consider the influence of Rejection Sensitivity (RS) on BPD.

Early rejection experiences from primary caregivers, such as neglect or abuse, can give rise to an Internal Working Model characterised by expectations of, and hypervigilance to, rejection (Feldman & Downey, 1994). Rejection Sensitivity (RS) refers to this processing disposition and consequent cognitive-affective responses, such as intense cognitive responses to perceived rejection (e.g. self-blame, defensiveness, or aggression; Feldman & Downey, 1994). RS is proposed to develop in response to childhood rejecting environments, including those characterised by neglect and abuse, and has an adaptive purpose of keeping individuals safe (Pietrzak, Downey, Ayduk, & Baldwin, 2005). However, research into the link between childhood rejection and RS appears sparse and hampered by limitations in defining and measuring early childhood rejection.

The cognitive-affective responses initiated by high RS may unintentionally initiate rejection from others, maintaining a self-fulfilling feedback loop (Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010; Rosenbach & Renneberg, 2011). For example, individuals with high RS are more likely to experience heightened arousal following rejection cues (Downey, Mougios, Ayduk, London, & Shoda, 2004), process rejection cues more automatically (Berenson et al., 2009), and have greater sensitivity to identifying angry faces (Olsson, Carmona, Downey, Bolger, & Ochsner, 2013). Behaviourally, RS is linked with increased risk of domestic violence (Downey, Feldman, & Ayduk, 2000; Murphy & Russell, 2016), social avoidance (London, Downey, Bonica, & Paltin, 2007; Watson & Nesdaale, 2012), and self-silencing of opinions (Harper, Dickson, & Welsh, 2006).

RS has been linked with reduced self-esteem (Watson & Nesdaale, 2012) and may give rise to significant psychopathology (Gao, Assink, Cipriani, & Lin, 2017; Pietrzak et al., 2005; Rosenbach & Renneberg, 2011). The RS model may be especially pertinent to BPD (Renneberg et al., 2012) as several

diagnostic factors subsumed within the DSM-5 diagnostic criteria are similar to features of RS, including “fear of rejection” and “anxious preoccupation with real or imagined abandonment” (American Psychological Association, 2013). Furthermore, the early rejection experiences proposed to underlie RS may overlap within the invalidating environments frequently observed in the childhood of people with BPD (Ball & Links, 2009; Crowell, Beauchaine, & Linehan, 2009). Finally, research indicates that people with BPD are hypersensitive to social exclusion (Domes et al., 2008; Gratz, Dixon-Gordon, Breetz, & Tull, 2013; Renneberg et al., 2012), which may be explained by the cognitive-affective processing bias proposed in RS.

Since a seminal study showed RS was higher in participants with BPD compared to healthy controls (Staebler, Helbing, Rosenbach, & Renneberg, 2011), several studies have attempted to explore the model of RS to explain the experience of BPD (Boldero et al., 2009; Miano, Fertuck, Arntz, & Stanley, 2013; Zielinski & Veilleux, 2014). A recent meta-analysis identified a moderate pooled correlation of BPD symptoms and RS as part of a larger review exploring the link between RS and psychopathology ($r = .413, p < 0.001$; Gao et al., 2017). The meta-analysis incorporated 19 papers, including 31 effect sizes, and employed a three-level meta-analytic model to account for the inclusion of multiple statistics from same samples. However, the paper only included correlational data where participants were more often drawn from non-clinical populations. It is important to consider comparisons between clinical and control groups to develop a fuller understanding about the link between RS and BPD. Finally, the full model posits that high RS results from early childhood experiences, therefore it seems important to identify whether this assumption is valid to help understand the relationship between BPD and RS more fully.

This review aims to explore whether 1) early childhood rejection is a risk factor for elevated RS and 2) whether elevated RS is associated with BPD. Whilst the Needs Threat Scale (Williams, 2009) and Interpersonal Sensitivity Questionnaire (Boyce & Parker, 1989) are thought to capture RS, both include constructs broader than RS, such as shyness (Boyce & Parker, 1989) and meaningful existence (Williams, 2009). Accordingly, only studies employing the Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996) will be considered here, in line with previous research (Rosenbach &

Rejection Sensitivity and Borderline Personality Disorder

Renneberg, 2011). Studies were restricted to adult populations for consistency across questions and reports of retrospective childhood experiences were chosen, excluding studies reporting on concurrent experiences of rejection. This is most consistent with the RS model (i.e. childhood experiences affect trait RS) and allows for stronger causal conclusions.

Method

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines are used to report this review. Details of the protocol were registered on PROSPERO and can be accessed at: https://www.crd.york.ac.uk/prospero/display_record.asp?ID=CRD42017065936.

Search strategy

Electronic databases (PsycNet, PubMed, Web of Science and SCOPUS) were searched individually for each question on 7th July 2017 and 22nd August 2018. Searches were restricted to English publications. Question one employed the search terms: “rejection sensitivity” OR “sensitivity to rejection” AND “maltreat*” OR “abuse*” OR “neglect” OR “peer rejection” OR "parental rejection" OR “maternal rejection” OR “paternal rejection” OR “trauma*”. Question two employed the search terms: “rejection sensitivity” OR “sensitivity to rejection” OR “rejection” AND “Borderline Personality Disorder” OR “Borderline Characteristics” OR “Borderline States” OR "Borderline Personality" OR "Borderline Personality Features" OR "Borderline Personality Symptoms" OR “BPD”. Reference lists of included texts were checked for relevant publications. Authors were contacted to access unpublished data.

Study selection

Inclusion criteria. Papers were included if they: (a) included a measure of past childhood rejection experiences (question 1); (b) included participants with a diagnosis of BPD and a healthy comparison group or measured BPD traits within non-clinical populations (question 2) (c) employed the Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996) or adaptations (e.g. ARSQ)

Rejection Sensitivity and Borderline Personality Disorder

to measure RS; (d) were published in peer-reviewed journals, conference papers or doctorate-level dissertations; and (e) were reported in English.

Exclusion criteria. Papers were excluded if: (a) participants were less than 18 years old; (b) the study design was an individual case study, qualitative, or assessing effectiveness of pharmacological treatments; or (c) they reported on reviews or were theoretical. Unpublished data was excluded if quality could not be assessed.

Selection process. Titles and abstracts were imported to a reference management system and screened for eligibility and duplicates. A second reviewer screened 20% of abstracts for each search. Inter-rater agreement was moderate for the first search ($k = .53$) and good for the second ($k = .74$). Raters met to resolve disagreements and it was acknowledged that exclusion criteria for the first search had not specified that rejection experiences should be retrospective. Exclusion criteria was refined and all disagreements resolved.

Remaining full texts were reviewed for inclusion. A second reviewer assessed 20% for each search. Perfect agreement was achieved for both. Where it was suspected that study samples overlapped, research authors were contacted for clarifications. Outcomes from the first search included measures of several different types of rejection, such as different forms of trauma and neglect and rejection from parents and peers, and studies typically reported on multiple statistics for the same sample. Accordingly, meta-analysis was not conducted as outcomes violated assumption of independence and were considered too heterogeneous for meaningful comparison. Meta-analysis was conducted for the second search. Papers were included in the meta-analysis if reported statistics allowed calculation of effect sizes. Where partially overlapping samples were indicated, the largest sample was included.

Data extraction and quality assessment

Data was extracted by the first author using a piloted data extraction form. Primary summary measures include correlational data between measures of BPD or childhood rejecting experiences and RS, or difference in mean RSQ between target and controls groups. Secondary measures include other relevant statistical analyses.

Quality was assessed using adapted versions of the Newcastle-Ottawa Quality Assessment Scale for case control (Wells et al., 2000) and cross-sectional studies (Herzog et al., 2013), assessing for quality in participant selection, comparability of cases, and measurement and analysis of outcomes. Studies that scored between 0 and 3 were considered low quality, moderate quality between 4 and 5, good quality between 6 and 7, and excellent quality between 8 and 10. A second-rater repeated data extraction and quality assessment for 20% of the papers and perfect agreement was achieved.

Quantitative analysis

Standard effect sizes of association between RS and BPD (r) were extracted or calculated using available data. Where subscales of RS were reported, a summary effect was calculated. Outcomes were converted to Fisher's Z and the standard error calculated. Transformations were conducted using methods from Borenstein et al (2009).

Some papers employed multiple statistics or control groups, which may violate assumption of independence. Accordingly, separate analyses were run for correlational data, case-control data with healthy controls, case-control data with clinical controls and an overall meta-analysis (excluding overlapped samples; prioritising correlational data). Random-effects meta-analyses were conducted to estimate effect size using Stata Version 15 (StataCorp, 2017), employing the user-contributed command `metan` (Harris et al., 2008). Cohen's (1992) guidelines of interpreting r were used, assuming 0.1 is a small effect, 0.3 is moderate and 0.5 large. Funnel plots were created and Eggers test computed to assess for risk of publication bias (Egger, Smith, Schneider, & Minder, 1997). Trim and fill statistics (Duval & Tweedie, 2000) were calculated to correct this, where relevant.

The independent measure of inconsistency (I^2) indicated high heterogeneity of effect sizes. A meta-regression was conducted to estimate how covariates affect between-study heterogeneity using the `metareg` command (Harbord & Higgins, 2009). In step 1, potential covariates were entered independently, before entering all significant covariates in a multivariate analysis in step 2.

Results

Question 1: Is elevated RS linked with past childhood rejecting experiences?

Study selection. Searches yielded 359 articles, and 51 were included for full-text review. Of remaining papers, 37 were excluded. Fourteen full-texts were included in the review (see Figure 1).

Study characteristics.

Study design. Fourteen data sets were identified, consisting of a pooled sample of 3620 participants ($k = 258.57$, range = 85 – 882). Mean age of participants was 25.22 (SD: 6.33) and 52% of participants were female. Twelve studies employed a correlational, questionnaire design and two studies employed a case-control design. The majority of studies were conducted in the USA ($n = 9$), and a minority in Europe (Germany, $n = 3$; Turkey, $n = 2$). See Supplementary Material for a summary of demographic variables and Table 1 for a summary of outcomes. In terms of quality assessment, nine studies were rated good quality and five were moderate (see Supplementary Material).

Sample characteristics. The majority recruited a student-only sample ($n = 7$). Other samples included a mix of student and community samples ($n = 3$), community sample of men ($n = 1$) and women ($n = 1$), highly sexually active gay men ($n = 1$) and people with major depressive disorder ($n = 1$). Two studies included participants with diagnosed BPD (pooled sample = 137), and four studies explored BPD symptom severity in non-clinical samples. Three samples were deemed representative and only one study reported sample size justification. The remaining could not be considered representative, limiting generalisability.

Two studies controlled for one demographic variable and seven studies controlled for an additional variable. Inclusion criteria meant all studies included a self-report measure of RS. Finally, statistical tests were usually reported adequately and confidence intervals were included in four studies.

[Figure 1]

Measures. The RSQ was the most commonly administered measure of RS ($n = 8$). An amended version of the RSQ and the ARSQ were each used three times. Childhood rejecting experiences were defined in several of ways, most commonly as childhood abuse. Parental and peer rejection was the second most common definition ($n = 4$) and parental divorce was measured once. The Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003) was used frequently ($n = 7$), incorporating subscales of emotional neglect, emotional abuse, physical neglect, physical abuse and sexual abuse. Three studies amalgamated the emotional neglect and abuse subscales. For further details, see Supplementary Material.

[Table 1]

Narrative review. Outcomes are summarised according to study quality in Table 2 and discussed according to rejection type.

Abuse.

Non-clinical sample. Emotional abuse and/or neglect (EAN) consistently correlated with RS in a non-clinical sample despite study quality, with typically moderate effect sizes though the range was large ($r = .17 - .49$). Two studies considered the overall CTQ and found significant moderate correlations (Bungert, Liebke, et al., 2015; Kahya, 2018). There was less consistency in outcomes on other forms of abuse. Five studies indicated physical abuse significantly correlated with RS (Bungert, Liebke, et al., 2015; Erozkhan, 2015; Feldman & Downey, 1994; Hernandez, Trout, & Liu, 2016; Kahya, 2018) and three studies indicated physical neglect correlated significantly (Bungert, Liebke, et al., 2015; Goodman et al., 2014; Kahya, 2018). However, one study reported no significant relationship between physical abuse and RS in a non-clinical population (Goodman et al., 2014) and another reported no significant relationship between physical abuse or neglect in a mixed population (Masland, 2018). Furthermore, a case-control study did not find a significant difference in RS scores between those who had and had not experienced physical violence and/or threatening behaviour from a parent as a child (Berenson & Anderson, 2006). Sexual abuse was measured on four occasions and excluded from statistical analysis once due to low numbers of participants endorsing these items (Goodman et al.,

2014). One study did not identify a significant relationship (Hernandez et al., 2016). Two others indicated that sexual abuse did correlate with RS (Erozkan, 2015), although the effect was small in the higher quality study (Kahya, 2018).

[Table 2]

Clinical samples. EAN correlated with RS in a mixed sample of people with BPD and/or MDD (Chesin et al., 2015), but not in a pure BPD sample (Bungert, Liebke, et al., 2015) or community sample with clinically significant levels of BPD (Masland, 2016). Physical neglect was only measured in one study due to low internal reliability and a small correlation was found with RS (Bungert, Liebke, et al., 2015). Physical abuse showed a strong correlation in a community sample with clinically significant levels of BPD traits (Masland, 2016). Sexual abuse did not correlate with RS (Bungert, Liebke, et al., 2015; Chesin et al., 2015). As there are limited studies with clinical samples, it is difficult to identify patterns of quality.

Rejection by others. Rejection by others was measured in non-clinical samples and studies were moderate to good quality. Parental rejection significantly correlated with RS on the two occasions it was measured ($r = .27-.45$) (Rosenbach & Renneberg, 2014), with one study suggesting that rejection from the same sex parent predicted more variance in RS (Ibrahim, Rohner, Smith, & Flannery, 2015). Parental punishment was measured once and did not significantly correlate with RS (Rosenbach & Renneberg, 2014). Peer rejection was measured twice and each found a significant correlation (Pachankis et al., 2015; Rosenbach & Renneberg, 2014).

Link with BPD. Four studies considered the relationship between childhood rejecting experiences, RS and BPD. Another study considered adult interpersonal stress. One study concluded that RS did not mediate the link between childhood abuse on BPD in a clinical group, or BPD symptom severity in a non-clinical group (Bungert, Liebke, et al., 2015). However, this study did not consider sub-types of childhood abuse. In contrast, two studies measuring EAN in isolation report the interaction between RS and EAN significantly predicted BPD diagnosis in clinical populations (Chesin et al., 2015), and BPD symptom frequency in non-clinical populations (Goodman et al.,

2014), although the latter suggested an attenuated effect for those reporting greater than average abuse. In non-clinical samples, studies identified a mediational role of RS in the link between parental rejection and BPD symptoms (Rosenbach & Renneberg, 2014) and emotional neglect and interpersonal stress (Hernandez et al., 2016).

Question 2: Is elevated RS associated with BPD, defined as a BPD diagnosis or high number of BPD features?

Data selection. Searches yielded 714 articles and 142 were included for full-text review. Of these, 108 papers were excluded. Thirty-four full texts, incorporating 37 data sets and 50 effect sizes, were included in the review (Figure 2).

[Figure 2]

Study Characteristics.

Study Design. Fifteen data sets compared clinical and control groups: pooled sample = 538 people with BPD ($k = 38.43$; range = 14-77), 517 healthy controls ($k = 39.76$; range = 15-76) and 248 clinical controls ($k = 35.43$; range = 39-145). Twenty-two correlated BPD symptoms with RS in non-clinical samples: pooled sample = 4589 participants ($k = 208.59$; range = 87-596). Studies were conducted in Western countries. Where studies were conducted in similar locations or with similar authors, authors were contacted to identify overlapped samples. Four BPD samples partially overlap (Bungert, Koppe, et al., 2015; Bungert, Liebke, et al., 2015; Thome et al., 2016; Liebke et al. 2018). As the authors contacted were not certain of the extent of this, all three are reported in the narrative review and highlighted grey in tables. The study with the largest sample was included in the meta-analysis (Bungert, Liebke, et al., 2015). With regards quality assessment, two studies were rated as excellent, twelve as good, nineteen were moderate and one was low quality (see Supplementary Material).

Sample Characteristics. BPD and healthy control samples were similar in age; correlational samples were younger on average as they typically recruited students. Most studies controlled for at least one demographic variable, including matching groups and checking for differences between

groups across measures/variables. However, a limitation across studies was the recruitment of representative cases; there is an over-representation of women across all sample types, particularly the BPD sample. See Table 3 and Supplementary Material for demographic variables and Table 4 for full outcomes.

People with BPD were recruited from clinical ($n = 6$) and community groups ($n = 5$), with two recruiting from a mix. Two studies did not report recruitment methods. Of note, one study recruited a community sample with high levels of self-reported BPD features (Berenson et al, 2018). Studies differed in the inclusion of individuals undergoing BPD treatment. Four studies only included people who were not taking psychiatric medication, five studies included a mix of people who were/were not taking medication, and six did not report this. Furthermore, three studies only included inpatients, two studies only included outpatients, and one included a mix (nine did not report). Of those that reported exclusion criteria, all excluded people with a history of psychosis, developmental disorder or organic impairment. Additional exclusion criteria included: current substance use ($n = 8$), pregnancy ($n = 3$) and PTSD ($n = 5$).

Healthy control groups were typically recruited from community samples ($n = 6$), students ($n = 2$) or both ($n = 4$) (two did not report). One study did not include a healthy control (Chesin, Fertuck, Goodman, Lichenstein, & Stanley, 2015). The majority of studies recruited with mixed methods ($n = 7$) and three recruited using one method only (online, at a public event, university database). Five did not provide details. Of those that provided details of exclusion criteria ($n = 11$), ten excluded participants with current or past Axis I or II diagnoses (one study defined past as ‘previous 10 years’, others referred to lifetime occurrence). One study excluded people who met over three diagnostic criteria for PD. Six studies recruited an additional hospital control, including people with depression, remitted BPD, avoidant personality disorder, social anxiety and general mental health outpatients.

Correlational studies largely recruited students ($n = 17$), with three recruiting from community samples and two recruiting a mix. Community samples were recruited from online platforms ($n = 2$), a pre-existing cohort study ($n = 1$), snowballing ($n = 1$), or mixed methods ($n = 1$). Finally, two studies

recruiting from student populations invited people with a high number of BPD features (Selby, Ward, & Joiner, 2010; Skinner, 2014).

[Table 3]

Measures. When measuring RS, the majority used the RSQ ($n = 19$) or an adaptation of this ($n = 6$). A version of the RSQ adapted to consider adult rather than student scenarios was also used (ARSQ; $n = 8$), particularly in case control studies, and sometimes translated to other languages ($n = 4$). Of note, the names RSQ and ARSQ appeared to be used interchangeably across studies.

The Structured Clinical Interviews for DSM-IV Axis I/II Disorders (SCID I/II; First, Gibbon, Spitzer, & Benjamin, 1997) and International Personality Disorder Examination (IPDE; Loranger, 1997) were used to identify BPD in case-control studies. Generally, the same method of assessment was used for case and control samples. However, two studies used screening tools for the control (Fertuck, Grinband, & Stanley, 2013; Jobst et al., 2016) and some studies did not provide enough information to determine (Bungert, Koppe, et al., 2015; Bungert, Liebke, et al., 2015; Rosenbach & Renneberg, 2015; Staebler et al., 2011; Winter, Koplin, & Lis, 2015). In cross-sectional studies, the Personality Assessment Inventory – Borderline Features (PAI-BOR; Morey, 1991) was used frequently ($n = 11$), followed by the SCID-II-Screen ($n = 3$) and other screens.

[Table 4.]

Narrative synthesis.

Group comparison outcomes . When compared with healthy controls, people with BPD had significantly higher RS. Large effect sizes were detected ($d = .83 - 3.25$), and not impacted by quality (see Table 5). In one study, people with acute BPD had higher RS than people with remitted BPS, approaching significance, although this attenuated when controlling for symptom severity. Furthermore, three studies reported community samples with high levels of BPD had significantly higher RS than those with low levels of BPD, although one did not report enough details to calculate the effect size (Miano et al., 2013).

[Table 5]

People with BPD also had significantly higher RS than most clinical groups including people with social anxiety disorder ($d = .7$; Gutz, Renneberg, Roepke, & Niedeggen, 2015) and people attending outpatient mental health teams with other mental health conditions ($d = 1.67$; Staebler et al., 2011). Three studies found RS was significantly higher in people with BPD compared with people with a current mood disorder ($d = .83 - 2.28$; Chesin et al., 2015; Rosenbach & Renneberg, 2015; Staebler et al., 2011). However, 50% of the BPD sample had concurrent MDD in Chesin et al.'s (2015) study, whilst only 32% of the MDD sample had current MDD. This finding was not replicated in one other study (Beeney, Levy, Gatzke-Kopp, & Hallquist, 2014), although the sample of people with MDD was small. One study indicated higher RS in a sample with Avoidant Personality Disorder compared with BPD, but this was non-significant (Berenson, Gregory, et al., 2016).

Correlational outcomes. In non-clinical samples, RS correlated with BPD features, with variation in effect sizes ($r = .11 - .63$). Two studies did not find a significant effect in five different community samples and a clinical sample, though the effect size remained small

to moderate ($r = .16-.35$; Brown, 2014; Liebke et al, 2018). Large effect sizes were found in studies of moderate quality, however quality did not differentiate moderate and small effects.

Four data-sets identified the effect of RS on BPD was mediated by executive control; RS was related to number of BPD features in individuals low on executive control (Ayduk et al., 2008; De Panfilis, Meehan, Cain, & Clarkin, 2016). Similarly, one study identified a significant correlation when neuroticism was controlled for (Boldero et al., 2009), whilst another indicated the effect of RS on BPD symptom severity was mediated by self-esteem (Bungert, Liebke, et al., 2015). Finally, one study found the association to be higher in individuals who report lower than average emotional neglect (Goodman, Fertuck, Chesin, Lichenstein, & Stanley, 2014). Only one study considered individual symptoms of BPD; in this study ‘dysfunctional responses to emotion’ accounted for large portion of effect of RS on PAI-BOR (Peters, Smart, & Baer, 2015).

Quantitative synthesis.

Main analyses. Outcomes from the meta-analyses are summarised in Table 6. The main meta-analysis ($k = 41$) indicates a moderate to large relationship between BPD and RS (see Figure 3 for Forrest Plot). Visual inspection of the funnel plot (Figure 4) suggested asymmetry and this was confirmed with Eggers test ($p < .001$). Trim and fill correction was undertaken and 11 studies were added (Figure 5). Following correction, effect size was moderate.

Meta-analysis of correlational outcomes ($k = 31$) indicated a moderate pooled effect size. Similarly, visual inspection of the funnel plot indicated some asymmetry and this was confirmed with Eggers test ($p = .03$), suggesting publication bias. Trim and fill analysis identified a small to moderate effect size following correction. With regards case-control studies, where healthy controls were employed ($k = 12$) meta-analysis indicated a large effect size. In studies where clinical controls were employed ($k = 7$), the pooled effect size was

moderate. Neither meta-analyses indicated publication bias against small studies ($p > .05$), so corrections were not performed (see Supplementary Material for forest and funnel plots). Fifty separate effect sizes were analysed in total.

[Table 6]

[Figures 3, 4, 5]

Meta-regression. Variability attributed to heterogeneity was high across the meta-analyses. Univariate meta-regressions were run for all analyses with the predictors: mean age, percentage of females, RS measure and quality. Study design and population type were included where appropriate. See Supplementary Material for outcomes.

Outcomes indicated heterogeneity was significantly predicted in the main meta-analysis by age, percentage of females, study design and population type ($p < .05$). However, when combined in a multivariate analysis, only population type approached significance. This factor correlated highly with other predictors, potentially explaining loss of significance. The overall effect of population type based upon an omnibus test was significant, $F(3,37) = 13.18$, $p < .001$, with mixed samples of clinical and non-clinical participants having significantly greater effect sizes than community ($F(1, 33) = 39.38$, $p < .001$), BPD ($F(1, 37) = 9.03$, $p < .01$), or other clinical samples ($F(1, 37) = 7.94$, $p = .008$). However, heterogeneity remains high, suggesting other factors account for differences.

Meta-regression for case-control studies with healthy controls indicated that percentage of females and population type (mixed vs. community) predicted heterogeneity, with studies using community samples incurring smaller effect sizes. Meta-regression for correlational and case-control studies with clinical samples did not indicate significant predictors of heterogeneity. This is unsurprising as these meta-analyses controlled for study design.

Discussion

Outcomes from this systematic review and meta-analysis indicate that RS is linked with BPD across clinical and non-clinical populations. Some forms of childhood rejecting experiences are associated with RS, particularly emotional neglect and abuse, which may mediate the effect on later BPD. However, outcomes regarding the effect of childhood rejection and RS on BPD are inconsistent and raise questions about the proposed linear relationship.

Elevated RS and past childhood rejecting experiences

Limited evidence means it is difficult to draw strong conclusions about the link between childhood rejection and RS. Remembered childhood rejecting experiences appear to contribute to adult RS, however effect magnitudes for different forms should be explored further. Currently, all seven studies measuring emotional abuse and neglect (EAN) in non-clinical samples (Chesin et al., 2015; Erozkhan, 2015; Goodman et al., 2014; Hernandez et al., 2016; Masland, 2016; Kahya, 2018; Pierce, Abbey, & Wegner, 2018) and all four studies measuring childhood rejection (Ibrahim et al., 2015; Pachankis et al., 2015; Rosenbach & Renneberg, 2014; Schaan & Vögele, 2016) indicated a significant correlation with adult RS, with moderate to high quality. Furthermore, correlations between RS and EAN were consistently higher than other forms of abuse, although this was not always true for BPD samples. Five studies indicated a link with physical abuse and/or neglect (Erozkhan, 2015; Feldman & Downey, 1994; Goodman et al., 2014; Hernandez et al., 2016; Kahya, 2018), however outcomes were mixed and the majority of studies were rated moderate to low quality. Furthermore, studies predominantly recruited from student populations, who may be considered relatively high functioning, potentially limiting generalisability.

Based on the original model (Downey & Feldman, 1996), the link between rejection experiences and BPD (Ball & Links, 2009) is hypothesised to be mediated by RS (Renneberg et al., 2012). A small number of studies explored the full model and outcomes are mixed. The highest quality study does not support the hypothesis in a non-clinical sample (Bungert, Liebke,

et al., 2015) however, the definition of childhood rejecting experiences was broad (i.e. overall childhood trauma). When childhood rejection was limited to EAN, two studies reported that an interaction between EAN and RS predicted BPD features in clinical and non-clinical samples (Chesin et al., 2015; Goodman et al., 2014) and RS mediated the impact of emotional neglect on adult interpersonal stress in a non-clinical sample (Hernandez et al., 2016).

Interestingly, the link between RS and EAN was not supported in a community sample with clinically relevant levels of BPD (i.e. 5 or more items on the SCID-II), although mediational analysis was not conducted (Masland, 2016). Furthermore, RS was less predictive of BPD in people who experienced greater than average abuse (Goodman et al., 2014), whilst high levels of EAN predicted BPD in a clinical sample despite low RS (Chesin et al., 2015). Accordingly, EAN may represent a stronger predictive factor than RS (Goodman et al., 2014). This questions the proposed linear relationship between RS and BPD, and suggests dispositional and environmental factors interact to predict BPD. Environmental factors may impact RS until a “qualitative switch” over to BPD, where RS can no longer account for symptom severity (p.9; Bungert, Liebke, et al., 2015). This may be linked with individual vulnerability factors such as executive control, where rejecting experiences may affect RS, but development of BPD may be buffered by greater EC (Ayduk et al., 2008; Goodman et al., 2014; De Panfilis et al., 2016).

Elevated RS and high BPD features or diagnosis

Overall, the meta-analysis indicated a moderate relationship between RS and BPD ($r = .338$) following correction for publication bias. Outcomes from separate meta-analyses based on study design confirmed a small to moderate relationship between RS and BPD in correlational studies and a large effect size in studies comparing BPD groups with a healthy control, although the effect size reduced when community samples with a high number of BPD features were used. Additionally, samples with BPD showed moderately greater RS when compared with samples of people with other mental health conditions. These findings are in

line with previous reviews which suggest RS is linked with BPD (Gao et al., 2017; Rosenbach & Renneberg, 2011). However, this current review extends upon the most recent (Gao et al., 2017) with an additional 15 papers, including statistical comparisons between clinical and healthy control groups and grey literature. Whilst it is important to consider non-clinical samples, given the subjectivity of thresholds for BPD (Zielinski & Veilleux, 2014), the finding that clinical BPD groups demonstrate significantly higher RS than control samples adds to the evidence base and provides a broader understanding of the experience of BPD across the spectrum. Furthermore, whilst RS is linked with other mental health problems (Gao et al., 2017), these outcomes indicate that the rate of RS is still larger in BPD. However, further research is required as outcomes were not always consistent, possibly due to methodological limitations in recruiting samples without co-morbidities.

The effect size in this meta-analysis is smaller than the effect size reported previously ($r = .437$; Gao et al., 2017). The current study's effect sizes prior to correction for publication bias were similar ($r = .431$), therefore differences may be related to trim-and-fill outcomes.

The moderate to high effect sizes are somewhat unsurprising given the similarity between RS and BPD diagnostic criteria. However, several studies indicated that RS is a distinct entity from BPD. For instance, shared variance between variables, including RS and BPD symptoms, did not reach 40% in one study (Boldero et al., 2009) and 10% in another (Tragesser, Lippman, Trull, & Barrett, 2008), and not all participants with BPD reported elevated RS (Winter et al., 2015). Some researchers have argued that explicit, behavioural responses to perceived rejection may distinguish people with high RS who do and do not have a diagnosis of BPD (Ayduk et al., 2008; Chesin et al., 2015). For example, elevated RS may lead to maladaptive interpersonal responses that make relationships difficult to maintain, such as self-blame, defensiveness (Feldman & Downey, 1994), and mistrust (Miano et al., 2013) initiating a self-fulfilling prophecy that may appear similar to BPD presentations. This distinction is important when one considers the interaction with executive control: RS may only

manifest as BPD in people with low levels of executive control (Ayduk et al., 2008; De Panfilis et al., 2016).

Limitations

This review is protocol-driven and extends upon previous reviews (Gao et al., 2017; Rosenbach & Renneberg, 2011) by adding additional data-sets, identifying overlapping samples, and assessing the full model of RS as it applies to BPD. However, there are some limitations to the review and the literature reviewed. Firstly, all outcomes were self-reported and measures of childhood rejecting experiences were retrospective, increasing risk of response bias and inaccurate reporting. Objective methods of assessing RS and longitudinal studies are required to confidently test the model. Some longitudinal studies have been conducted in childhood (London et al., 2007; Moretti, Bartolo, Craig, Slaney, & Odgers, 2014; Zimmer-Gembeck, 2015), however these tend to focus on peer rejection and do not extend to adulthood.

A representative sample was rarely recruited, leading to an over-representation of females, young adults and students. Gender was more equally represented in the first question. Additionally, there was a mixed response to including people undergoing treatment for BPD. Treatment may have an impact on RS in this sample, however this has not yet been studied. It will be important to consider this in future research to recognise the impact on study heterogeneity. Overall, few studies commented on power analyses and sample sizes were particularly small for clinical samples. Accordingly, it is difficult to determine power and reliability of statistical outcomes, such as risk of Type II errors.

Furthermore, non-randomised studies are not subject to guidelines such as CONSORT. Accordingly, information provided by authors can be limited, making it difficult to assess risk of bias accurately. The paper attempted to overcome this by employing recommended risk of bias assessment tools and making contact with authors to clarify missing information (Higgins & Green, 2011), however not all authors replied. Furthermore, some unpublished statistics

made available to the main author, could not be quality assessed and were not included in the review. Other unpublished data may also be available by researchers not included in the review.

Finally, between-study heterogeneity was moderate to high across meta-analyses. Multivariate meta-regression indicated that the difference between studies that compared groups of people with BPD and healthy controls and those that did not accounted for this. In line with Gao et al.'s (2017) findings, no other predictors were significant in other analyses except in case-control studies, where non-clinical samples incurred smaller effect sizes. Heterogeneity remained high in meta-regression analysis, therefore other factors may influence variance in effect size. However, a small number of studies were included in meta-regression, limiting the power of statistical analysis. Therefore, conclusions regarding between-study heterogeneity should be drawn cautiously.

Implications for research

Outcomes from this review report an association between RS and BPD symptoms across clinical and non-clinical populations. This meets the first criteria for Hill's (1965) criteria for demonstrating causality: strength of association. However, studies measuring the relationships between childhood rejecting experiences are limited, and there is variation in how childhood rejection is measured. Whilst EAN and parental rejection appears to have an impact on RS, this requires further research to help confidently ascertain association strength. With regards other criteria, the review attempted to control for temporality by including retrospective reports of childhood rejection, however longitudinal studies are required to confirm this. Further studies may wish to consider factors such as dose-response and assess consistency by recruiting representative or non-Western samples.

The review introduced some mediating factors, although this is limited to a handful of studies. Further research may consider these factors further, including mediation between childhood rejection and RS, RS and BPD, or the full relationship of all three. This may be important to understand why childhood rejection is only linked with BPD in a proportion of

people and may offer further evidence for the multifactorial development of personality disorders.

Implications for clinicians/clinical practice

The review indicates that RS is linked with BPD and should not be considered a purely diagnostic factor. Given research suggesting RS has a direct impact on cognitive and behavioural responses, clinical practice may consider targeting RS in an attempt to reduce BPD symptom frequency or severity. Understanding this process may be an intervention in itself, offering a non-blaming explanation of interpersonal difficulties.

To our knowledge, research has not extended to clinical management of RS, but mediating factors, such as executive control and self-esteem, may offer a starting point. Alternatively, therapeutic interventions may focus on thought challenging within a cognitive-behavioural paradigm, or improving mentalization to help understand own and others' mental states (Bateman & Fonagy, 2004). Other suggestions include attributional retraining and improving emotional literacy (Staebler et al., 2011).

Heightened RS may impact therapeutic relationships, given the cognitive-affective responses associated with perceived rejection. Although research has not considered this directly, research into the effect of RS on intimate relationships suggests heightened RS can lead to hostility or withdrawal if rejection is perceived (Downey & Feldman, 1996; Romero-Canyas et al., 2010). Clinicians should be sensitive to this and consider how it may be managed. Possibilities are being more conscious of language and facial expressions or explicitly reflecting on interactions (in terms of the RS model) with clients *in vivo*.

Conclusion

This review suggests RS is linked with BPD in clinical and non-clinical populations. Accordingly, RS appears to be an important factor linked with BPD and may offer a target for intervention. Although some suggest the link is a function of the diagnostic criteria of BPD, it

Rejection Sensitivity and Borderline Personality Disorder

appears that not all individuals with BPD have heightened RS and heightened RS does not inevitably lead to BPD. Some mediational factors are considered, including executive control, but are beyond the scope of the current review. Future research may consider this further.

Additionally, childhood rejecting experiences do appear to be linked with heightened RS, particularly EAN and rejection. The link with physical abuse was not consistently supported. However, research in this area is sparse and hampered by methodological limitations. Furthermore, few studies considered the mediating effect of RS on the relationship between childhood rejecting experiences and adult BPD and those that do report differing findings. The review indicates that further research in this area is deserved to help understand how the developmental model of RS fits with the experience of BPD.

References

- American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: APA.
- *Armenti, N. A., & Babcock, J. C. (2018). Borderline Personality Features, Anger, and Intimate Partner Violence: An Experimental Manipulation of Rejection. *Journal of Interpersonal Violence*.
- *Ayduk, O., Zayas, V., Downey, G., Cole, A. B., Shoda, Y., & Mischel, W. (2008). Rejection sensitivity and executive control: Joint predictors of borderline personality features. *Journal of Research in Personality*, 42(1), 151-168.
- Ball, J. S., & Links, P. S. (2009). Borderline personality disorder and childhood trauma: evidence for a causal relationship. *Current Psychiatry Reports*, 11(1), 63-68.
- Bateman, A. W., & Fonagy, P. (2004). Mentalization-based treatment of BPD. *Journal of Personality Disorders*, 18(1), 36-51.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529.
- *Beeney, J. E., Levy, K. N., Gatzke-Kopp, L. M., & Hallquist, M. N. (2014). EEG asymmetry in borderline personality disorder and depression following rejection. *Personality Disorders: Theory, Research, and Treatment*, 5(2), 178-185.
- *Berenson, K. R., & Andersen, S. M. (2006). Childhood physical and emotional abuse by a parent: Transference effects in adult interpersonal relations. *Personality and Social Psychology Bulletin*, 32(11), 1509-1522.
- *Berenson, K. R., Dochat, C., Martin, C. G., Yang, X., Rafaeli, E., & Downey, G. (2016). Identification of Mental States and Interpersonal Functioning in Borderline Personality Disorder. *Personality Disorders: Theory, Research and Treatment*, 9(2), 172-181.
- Berenson, K. R., Downey, G., Rafaeli, E., Coifman, K. G., & Paquin, N. L. (2011). The rejection-rage contingency in borderline personality disorder. *Journal of Abnormal Psychology*, 120(3), 681-690.
- Berenson, K. R., Gregory, W. E., Glaser, E., Romirowsky, A., Rafaeli, E., Yang, X., & Downey, G. (2016). Impulsivity, rejection sensitivity, and reactions to stressors in borderline personality disorder. *Cognitive Therapy and Research*, 40(4), 510-521.
- *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.
- *Berenson, K. R., Nynaes, O., Wakschal, E. S., Kapner, L. M., & Sweeney, E. C. (2018). Attributions for Rejection and Acceptance in Young Adults With Borderline and Avoidant Personality Features. *Journal of Social and Clinical Psychology*, 37(6), 431-452.
- *Berlingo, M. T. (2015). *Ostracism and Rejection Sensitivity: Are the sensitive really sensitive?* (Doctoral dissertation). Washington State University, Washington, USA.

Rejection Sensitivity and Borderline Personality Disorder

- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., . . . Desmond, D. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse and Neglect*, 27(2), 169-190.
- *Boldero, J. M., Hulbert, C. A., Bloom, L., Cooper, J., Gilbert, F., Mooney, J. L., & Salinger, J. (2009). Rejection sensitivity and negative self-beliefs as mediators of associations between the number of borderline personality disorder features and self-reported adult attachment. *Personality and Mental Health*, 3(4), 248-262.
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2009). *Introduction to Meta-Analysis*. Chichester, UK: John Wiley & Sons, Ltd.
- Bowlby, J. (1969). *Attachment and loss*. New York, USA: Basic Books.
- Bowlby, J. (1973). *Attachment and loss* (Vol. 2). New York, USA: Basic Books.
- 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, W. C. (2014). *Borderline features, rejection sensitivity, and romantic relationships: A daily diary study of romantic partners (Doctoral dissertation)*. University of Missouri, Missouri, USA.
- *Bungert, M., Koppe, G., Niedtfeld, I., 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), e0133693.
- *Bungert, M., Liebke, L., Thome, J., Haeussler, K., Bohus, M., & Lis, S. (2015). Rejection sensitivity and symptom severity in patients with borderline personality disorder: effects of childhood maltreatment and self-esteem. *Borderline Personality Disorder and Emotion Dysregulation*, 2(1), 4.
- *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.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155-159.
- Crowell, S. E., Beauchaine, T. P., & Linehan, M. M. (2009). A biosocial developmental model of borderline personality: Elaborating and extending linehan's theory. *Psychological Bulletin*, 135(3), 495-510.
- *De Panfilis, C., Meehan, K. B., Cain, N. M., & Clarkin, J. F. (2016). Effortful control, rejection sensitivity, and borderline personality disorder features in adulthood. *Journal of Personality Disorders*, 30(5), 595-612.
- Domes, G., Czeschnek, D., Weidler, F., Berger, C., Fast, K., & Herpertz, S. C. (2008). Recognition of facial affect in borderline personality disorder. *Journal of Personality Disorders*, 22(2), 135-147.
- Downey, G., Feldman, S., & Ayduk, O. (2000). Rejection sensitivity and male violence in romantic relationships. *Personal Relationships*, 7(1), 45-61.

Rejection Sensitivity and Borderline Personality Disorder

- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70(6), 1327-1343.
- 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.
- 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.
- Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, 315(7109), 629-634.
- *Erbe, J. K. (2014). *Mental representations, social exclusion, and neurobiological processes in borderline personality disorder: A multi-level study (doctoral dissertation)*. City University of New York, NY, USA.
- *Erozkan, A. (2015). The childhood trauma and late adolescent rejection sensitivity. *Anthropologist*, 19(2), 413-422.
- *Feldman, S., & Downey, G. (1994). Rejection sensitivity as a mediator of the impact of childhood exposure to family violence on adult attachment behavior. *Development and Psychopathology*, 6(01), 231-247.
- *Fertuck, E. A., Grinband, J., & Stanley, B. (2013). Facial trust appraisal negatively biased in borderline personality disorder. *Psychiatry Research*, 207(3), 195-202.
- First, M. B., Gibbon, M., Spitzer, R. L., & Benjamin, L. S. (1997). *User's guide for the structured clinical interview for DSM-IV axis II personality disorders: SCID-II*. USA: American Psychiatric Pub.
- 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.
- *Gardner, K. J., Qualter, P., Stylianou, M., & Robinson, A. J. (2010). Facial affect recognition in non-clinical adults with borderline personality features: The role of effortful control and rejection sensitivity. *Personality and Individual Differences*, 49(7), 799-804.
- *Goodman, J., Fertuck, E., Chesin, M., Lichenstein, S., & Stanley, B. (2014). The moderating role of rejection sensitivity in the relationship between emotional maltreatment and borderline symptoms. *Personality and Individual Differences*, 71, 146-150.
- Gratz, K. L., Dixon-Gordon, K. L., Breetz, A., & Tull, M. (2013). A laboratory-based examination of responses to social rejection in borderline personality disorder: the mediating role of emotion dysregulation. *Journal of Personality Disorders*, 27(2), 157-171.
- *Gutz, L., Renneberg, B., Roepke, S., & Niedeggen, M. (2015). Neural processing of social participation in borderline personality disorder and social anxiety disorder. *Journal of Abnormal Psychology*, 124(2), 421-431.
- Harbord, R., & Higgins, J. (2009). Metareg: Stata module to perform meta-analysis regression.

Rejection Sensitivity and Borderline Personality Disorder

- Harper, M. S., Dickson, J. W., & Welsh, D. P. (2006). Self-silencing and rejection sensitivity in adolescent romantic relationships. *Journal of Youth and Adolescence*, 35(3), 435-443.
- Harris, R., Bradburn, M., Deeks, J., Harbord, R., Altman, D., & Sterne, J. (2008). Meta-analysis: fixed- and random-effects meta-analysis. *Stata journal*, 8(1), 3.
- *Hernandez, E. M., Trout, Z. M., & Liu, R. T. (2016). Vulnerability-specific stress generation: childhood emotional abuse and the mediating role of depressogenic interpersonal processes. *Child Abuse and Neglect*, 62, 132-141.
- Herzog, R., Álvarez-Pasquin, M. J., Díaz, C., Del Barrio, J. L., Estrada, J. M., & Gil, Á. (2013). Are healthcare workers' intentions to vaccinate related to their knowledge, beliefs and attitudes? A systematic review. *BMC public health*, 13(1), 154.
- Higgins, J. P., & Green, S. (2011). *Cochrane handbook for systematic reviews of interventions* (Vol. 4). Chichester, UK: John Wiley & Sons.
- Hill, A. B. (1965). Environment and disease: association or accusation? *Proceedings of the Royal Society of Medicine*, 58(5), 295-300.
- *Ibrahim, D. M., Rohner, R. P., Smith, R. L., & Flannery, K. M. (2015). Adults' Remembrances of Parental Acceptance–Rejection in Childhood Predict Current Rejection Sensitivity in Adulthood. *Family and Consumer Sciences Research Journal*, 44(1), 51-62.
- *Jobst, A., Padberg, F., Mauer, M.-C., Daltrozzo, T., Bauriedl-Schmidt, C., Sabass, L., . . . Zill, P. (2016). Lower Oxytocin Plasma Levels in Borderline Patients with Unresolved Attachment Representations. *Frontiers in Human Neuroscience*, 10.
- *Kahya, Y. (2018). Intimate Partner Violence Victimization and Perpetration in a Turkish Female Sample: Rejection Sensitivity and Hostility. *Journal of Interpersonal Violence*.
- *Lazarus, S. A., Southward, M. W., & Cheavens, J. S. (2016). Do borderline personality disorder features and rejection sensitivity predict social network outcomes over time? *Personality and Individual Differences*, 100, 62-67.
- *Liebke, L., Koppe, G., Bungert, M., Thome, J., Hauschild, S., Defiebre, N., ... & Lis, S. (2018). Difficulties with being socially accepted: An experimental study in borderline personality disorder. *Journal of Abnormal Psychology*.
- 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.
- Loranger, A. W. (1997). International personality disorder examination (IPDE). In *Assessment and diagnosis of personality disorders. The ICD-10 international personality disorder examination (IPDE)*. Cambridge, UK: Cambridge University Press.
- *Masland, S. R. (2016). *Trustworthiness Appraisal in Borderline Personality Disorder (Doctoral dissertation)*. Harvard University, Massachusetts, USA.
- *Massing-Schaffer, M., Liu, R. T., Kraines, M. A., Choi, J. Y., & Alloy, L. B. (2015). Elucidating the relation between childhood emotional abuse and depressive symptoms in adulthood: The mediating role of maladaptive interpersonal processes. *Personality and Individual Differences*, 74, 106-111.

Rejection Sensitivity and Borderline Personality Disorder

- *Meyer, B., Ajchenbrenner, M., & Bowles, D. P. (2005). Sensory sensitivity, attachment experiences, and rejection responses among adults with borderline and avoidant features. *Journal of Personality Disorders, 19*(6), 641-658.
- *Miano, A., Fertuck, E. A., Arntz, A., & Stanley, B. (2013). Rejection sensitivity is a mediator between borderline personality disorder features and facial trust appraisal. *Journal of Personality Disorders, 27*(4), 442-456.
- Moretti, M. M., Bartolo, T., Craig, S., Slaney, K., & Odgers, C. (2014). Gender and the transmission of risk: A prospective study of adolescent girls exposed to maternal versus paternal interparental violence. *Journal of Research on Adolescence 24*(1), 80-92.
- Morey, L. C. (1991). *Personality assessment inventory professional manual*. Florida, USA: Personality assessment resources.
- Murphy, A. M., & Russell, G. (2016). Rejection sensitivity, jealousy, and the relationship to interpersonal aggression. *Journal of Interpersonal Violence*.
- 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.
- *Pachankis, J. E., Rendina, H. J., Restar, A., Ventuneac, A., Grov, C., & Parsons, J. T. (2015). A minority stress—emotion regulation model of sexual compulsivity among highly sexually active gay and bisexual men. *Health Psychology, 34*(8), 829.
- *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.
- *Pierce, J., Abbey, A., & Wegner, R. (2018). Mediators of the Association Between Childhood Emotional Maltreatment and Young Adult Men's Life Satisfaction. *Journal of Interpersonal Violence, 33*(4), 595-616.
- Pietrzak, J., Downey, G., Ayduk, O., & Baldwin, M. (2005). Rejection sensitivity as an interpersonal vulnerability. In M. W. Baldwin (Ed.), *Interpersonal Cognition* (pp. 62-84). New York, USA: Guilford Press.
- Renneberg, B., Herm, K., Hahn, A., Staebler, K., Lammers, C. H., & Roepke, S. (2012). Perception of social participation in borderline personality disorder. *Clinical psychology & psychotherapy, 19*(6), 473-480.
- 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.
- Rosenbach, C., & Renneberg, B. (2011). Rejected, excluded, ignored: The perception of social rejection and mental disorders—A review. *Verhaltenstherapie, 21*, 87-97.
- *Rosenbach, C., & Renneberg, B. (2014). Rejection sensitivity as a mediator of the relationship between experienced rejection and borderline characteristics. *Personality and Individual Differences, 69*, 176-181.

Rejection Sensitivity and Borderline Personality Disorder

- *Rosenbach, C., & Renneberg, B. (2015). Remembering rejection: Specificity and linguistic styles of autobiographical memories in borderline personality disorder and depression. *Journal of Behavior Therapy and Experimental Psychiatry*, 46, 85-92.
- *Schaan, V. K., & Vögele, C. (2016). Resilience and rejection sensitivity mediate long-term outcomes of parental divorce. *European Child and Adolescent Psychiatry*, 25(11), 1267-1269.
- *Selby, E. A., Ward, A. C., & Joiner, T. E. (2010). Dysregulated eating behaviors in borderline personality disorder: are rejection sensitivity and emotion dysregulation linking mechanisms? *International Journal of Eating Disorders*, 43(7), 667-670.
- *Skinner, S. (2014). *Responses to social rejection: The role of Borderline Personality Disorder traits (Doctoral dissertation)*. The University of North Carolina at Greensboro, North Carolina, USA.
- *Staebler, K., Helbing, E., Rosenbach, C., & Renneberg, B. (2011). Rejection sensitivity and borderline personality disorder. *Clinical psychology & psychotherapy*, 18(4), 275-283.
- StataCorp. (2017). *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC.
- *Thome, J., Liebke, L., Bungert, M., Schmahl, C., Domes, G., Bohus, M., & Lis, S. (2016). Confidence in facial emotion recognition in borderline personality disorder. *Personality Disorders: Theory, Research, and Treatment*, 7(2), 159-168.
- *Tragesser, S. L., Lippman, L. G., Trull, T. J., & Barrett, K. C. (2008). Borderline personality disorder features and cognitive, emotional, and predicted behavioral reactions to teasing. *Journal of Research in Personality*, 42(6), 1512-1523.
- Watson, J., & Nesdale, D. (2012). Rejection sensitivity, social withdrawal, and loneliness in young adults. *Journal of Applied Social Psychology*, 42(8), 1984-2005.
- Wells, G., Shea, B., O'connell, D., Peterson, J., Welch, V., Losos, M., & Tugwell, P. (2000). The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomized studies in meta-analyses. Retrieved from The Ottawa Hospital website: http://www.ohri.ca/programs/clinical_epidemiology/oxford.htm
- Williams, K. D. (2009). Ostracism: A temporal need-threat model. *Advances in Experimental Social Psychology*, 41, 275-314.
- *Winter, D., Koplun, K., & Lis, S. (2015). Can't stand the look in the mirror? Self-awareness avoidance in borderline personality disorder. *Borderline Personality Disorder and Emotion Dysregulation*, 2(1), 13.
- *Zielinski, M. J., & Veilleux, J. C. (2014). Examining the relation between borderline personality features and social support: The mediating role of rejection sensitivity. *Personality and Individual Differences*, 70, 235-238.
- Zimmer-Gembeck, M. J. (2015). Emotional sensitivity before and after coping with rejection: A longitudinal study. *Journal of Applied Developmental Psychology*, 41, 28-37.

Rejection Sensitivity and Borderline Personality Disorder

Table 1.

Table summarising demographic information, measurement tools and outcomes for included studies in Question 1

Authors and design	Participant groups and demographics	Measuring instruments	Key findings	Quality
Berenson & Anderson (2006) ^a USA Case control	TG: Abused undergraduate students ($n = 72$); CG: non-abused undergraduate students ($n = 72$) 100% F	Childhood rejection: CTS and Psychological Maltreatment Scale RS: RSQ	1) Participants with history of childhood abuse (severe violence and/or above median emotional maltreatment) had marginally higher RS than those who did not experience childhood abuse, but this was not significant ($d = .23$; $t(142) = -1.382$, $p = .169$)	6 Good
Bungert Liebke et al. (2015) Germany Cross-sectional	Outpatient BPD ($n = 77$) $M^{\text{age}} = 28.3$, $SD = 6.3$, 100% F; CG 1: Remitted BPD ($n = 15$) $M^{\text{age}} = 29.2$, $SD = 4.7$; 100% F; CG 2:	Childhood rejection: CTQ-SF RS: ARSQ BPD: IPDE and BSL	1) Frequency of childhood trauma events significantly correlated with RS in non-clinical samples. Strongest correlation - emotional neglect ($r = .55$, $p < .001$). This effect was not significant in sample with current or remitted BPD ($r = .20$, $.33$, $p > .05$). Only significant correlation was physical neglect and symptoms in acute BPD groups ($r = .27$, $p < .05$).	6 Good

Rejection Sensitivity and Borderline Personality Disorder

	Community ($n = 75$) $M^{\text{age}} = 26.8$, $SD = 6.6$, 100% F		2) RS did not affect the link between childhood trauma and BPD symptom severity in non-clinical samples ($z = .93$; $p = .353$). Hierarchical regression and Sobel Z test.	
Chesin, Fertuck, Goodman, Lichenstein & Stanley (2015) USA Cross-sectional	BPD and lifetime mood disorder (LMD; $n = 60$) $M^{\text{age}} = 30.4$; $SD = 10.6$, 82% F; EN, summed) CG: LMD, no BPD ($n = 25$) $M^{\text{age}} = 35.7$, $SD = 11.2$, 56% F	Childhood rejection: CTQ-SF (EA and EN, summed) RS: RSQ BPD: SCID-II	1) Frequency of childhood emotional neglect significantly correlated with RS ($r = .45$, $p < .01$). Other subscales were not significant (PA: $r = .17$, $p > .05$; SA: $r = .18$, $p > .05$). 2) RS and EAN interact to predict BPD ($\beta = -0.02$; $SE(B) = 0.01$; $\chi^2(1) = 4.28$; $p = 0.04$).	6 Good
Erozkan (2015) Turkey Cross-sectional	Undergraduate students, ($N = 882$), $M^{\text{age}} = 21.18$, $SD = 2.07$, 52% F	Childhood rejection: CTQ -SF RSQ: Turkish	1) Frequency of all forms of childhood trauma positively correlated with RS. P value not reported. (EA: $r = .49$; EN: $r = .47$; PA: $r = .39$; PN: $r = .32$; SA: $r = .3$) 2) Childhood trauma predicted RS ($\chi^2 = 816.33$, $df = 318$, $\chi^2/df = 2.56$, $p = .000$, RMSEA = .05, GFI = .95, AGFI = .93, NFI = .96, NNFI = .97, CFI = .96, IFI = .97, RMR = .07, SRMR = .06. Structural equation modelling.	4 Mod
Feldman & Downey (1994) USA Cross-sectional	Undergraduate students, ($N = 212$), $M^{\text{age}} = 19.47$, $SD = 2.59$, 54% F	Childhood rejection: CTS (PA scale) RS: RSQ	1) Frequency and severity of PA between parents (Frequency: $r = .2$; Severity: $r = .2$; $p < .01$) and towards the child (Frequency: $r = .3$; Severity: $r = .21$; $p < .01$) significantly correlated with RS	5 Mod.

Rejection Sensitivity and Borderline Personality Disorder

Goodman et al (2014) USA Cross-sectional	Undergraduate students, (N = 133), Median Age = 19, 67% F	Childhood rejection: CTQ-SF (EA and EN, summed) RS: RSQ BPD: SCID-II-SQ	1) Frequency of EAN ($r = .37, p < .01$), and PN ($r = .22, p < .01$) significantly correlated with RS. PA ($r = .13, p > .05$) did not correlate significantly. 2) EAN and RS independently predict BPD symptoms, as does their interaction (stronger effect for people less than average EAN). ($\chi^2 = 6.40, df = 1, p < .05$). Poisson Regression.	6 Good
Hernandez, Trout & Liu (2016) ^b USA Cross-sectional	Undergraduate students, (N = 185), $M^{age} = 19.65, SD = 1.48,$ 75% F	Childhood rejection: CTQ (EA, PA, SA) RS: RSQ	1) Frequency of EA ($r = .39, p < .001$) and PA ($r = .2, p < .01$) significantly correlated with RS. Correlation with frequency of SA ($r = .07, p > .05$) was not significant. 2) RS mediated link between childhood EA and current interpersonal stress ($\beta = 0.03, 95\% CI = 0.01-0.06$). Mediation analysis	6 Good
Ibrahim, Rohner, Smith & Flannery (2015) USA Cross-sectional	Undergraduate students, (N = 271), $M^{age} = 21, SD = .78-1.87, 65\% F$	Childhood rejection: Adult PARQ Mother and Adult PARQ Father RS: RSQ	1) Degree of parental rejection significantly correlated with RS (Female: paternal, $r = .35$; maternal, $r = .45$; Male: paternal, $r = .45$; maternal, $r = .43$). 2) Rejection from parents explains variance in RS, and this effect is stronger for same-sex parent. Hierarchical multiple regression	6 Good
Kahya (2018) Turkey Cross-sectional	Females with current/recent romantic relationships, (N =)	Childhood rejection: CTQ RS: RSQ	1) RS significantly correlated with total childhood abuse ($r = .4$), EAN ($r = .42$), physical abuse ($r = .26$), physical neglect ($r = .24$) and sexual abuse ($r = .15$). ($p < .01$)	6 Good

Rejection Sensitivity and Borderline Personality Disorder

	288), $M^{\text{age}} = 26.31$ (6.63), 100% F			
Masland (2016) ^c	Community: High BPD : ($n = 30$), $M^{\text{age}} = 23.2$; 80% F; Low BPD ($n = 47$) $M^{\text{age}} = 36.9$, 68% F	Childhood rejection: CTQ; BPD: SCID-II RS: ARSQ	1) Frequency of EA and EN significantly correlated with RS across the full sample (EA: $r = .28, p < .05$; EN $r = .30, p < .01$). No other subscale significantly correlated 2) Only frequency of PA correlated with RS in a BPD sample ($r = .64, p < .01$).	5 Mod.
Pachankis et al (2015)	Highly sexually active gay men, ($N = 374$), $M^{\text{age}} = 36.9$, SD = 11.4, 0% F	Childhood rejection: Mother-father-peer RS: RSQ (adapted for gay men)	1) Degree of childhood peer rejection significantly correlated with gay-related RS ($r = .29, p < .001$). Association confirmed in path analysis .	7 Good
Pierce, Abbey, & Wegner (2018)	Single, young men in metropolitan community, ($N = 423$), $M^{\text{age}} = 23.6$, SD = 5, 0% F	Childhood rejection: Early Trauma Inventory Self-Report RS: RSQ	1) Number of acts of childhood emotional maltreatment perpetrated by care providers correlated with RS ($r = .17, p < .01$) 2) Link between childhood emotional maltreatment and RS mediated by hostility ($B = .23, CI = .13 - .39$) Path analysis	4 Mod.

Rejection Sensitivity and Borderline Personality Disorder

Rosenbach & Renneberg (2014)	University students (N = 193) M ^{age} = 25, SD = 5.4, 79% F	Childhood rejection: PRSQ ^d & Questionnaire of rejection by peers	1) Degree of parental ($r = .27, p < .001$) and peer rejection ($r = .36, p < .001$) both significantly correlated with RS. Parental punishment did not correlate significantly with RS ($r = .11, p > .05$). 2) RS fully mediated link between parental rejection and BPD symptoms ($B_i = .13, p < .001, CI = .06 - .23$). RS partially mediated link with peer rejection ($B = .011, p < .001, CI = .006 - .02$). Current social support also significant mediator. Mediational analysis.	5 Mod.
Schaan & Voegle (2016)	TG = divorced parents; CG = undivorced parents (N = 186) M ^{age} = 22.3, SD = 3.75, 85% F	Childhood trauma: Divorce RS: RSQ	1) Adults whose parents divorced as children have higher RS ($d = .35, p < .05$) and CTQ scores ($d = .72, p < .05$) than those without divorced parents. Welch test 2) RS ($B = .213, CI = .01 - .17$) and CTQ ($B = .232, CI = .06 - .27$) mediated effect of childhood divorce on adult mental health. Mediation analysis	6 Good

Note. TG = Target group; CG = Control Group; Mod. = Moderate; RSQ = Rejection Sensitivity Questionnaire; ARSQ = Adult Rejection Sensitivity Questionnaire; CTQ = Childhood Trauma Questionnaire; CTS = Conflict Tactics Scale; PARQ = *Parental Acceptance-Rejection Questionnaire*; PRSQ = *Parental-Representation-Screening-Questionnaire*; MFP = Mother-Father-Peer Scale; BPD = Borderline Personality Disorder; IPDE = International Personality Disorder Examination; SCID-I = Structure Clinical Interview for DSM-IV Axis I; SCID-II = Structure Clinical Interview for DSM-IV Axis II; BSL = Borderline Symptom List; QTF = Questionnaire of Thoughts and Feelings; SCID – Screen = Structure Clinical Interview for DSM-IV – Screen; EA = Emotional Abuse; EN = Emotional Neglect; EAN = Emotional Abuse and Neglect; PA = Physical Abuse; PN = Physical Neglect; SA = Sexual Abuse.

Rejection Sensitivity and Borderline Personality Disorder

^a Statistical data obtained through email correspondence (K. Berenson, August 2018); ^b Correlational data from Massing-Schaffer, Liu, Kraines, Choi, and Alloy (2015); ^c Correlations obtained through email correspondence (S. Masland, April 2018) ^d Maternal and Paternal rejection subscales amalgamated. Also for punishment scale

Rejection Sensitivity and Borderline Personality Disorder

Table 2.

Summary of outcomes from studies included in Question 1, in order of quality

Study	Association found?				Mediation effect of RS on BPD	Quality	N
	Emo	Phys	Sex.	Rej.			
<i>Non-clinical samples</i>							
Pachanakis et al. (2015)	-	-	-	Y	-	7	374
Berenson & Anderson (2006)	N	N	-	-	-	6	144
Bungert, Liebke et al. (2015)	Y – total score			-	N	6	167
Goodman et al. (2014)	Y	Y ^b	-	-	Y	6	133
Hernandez et al. (2016)	Y	Y	N	-	Y ^a	6	185
Ibrahim et al. (2015)	-	-	-	Y	-	6	271
Kahya (2018)	Y	Y	Y	-	-	6	288
Schaan & Vogele (2016)	-	-	-	Y ^c	-	6	186
Feldman & Downey (1994)	-	Y	-	-	-	5	212
Masland (2016)	Y	N	N	-	-	5	77
Erozkan (2015)	Y	Y	Y	-	-	4	882
Rosenbach & Renneberg (2014)	-	-	-	Y	Y	5	193
Pierce et al. (2018)	Y	-	-	-	-	4	423
<i>Clinical samples</i>							

Rejection Sensitivity and Borderline Personality Disorder

Bungert, Liebke et al (2015)	N – total score	-	-	6	77		
Chesin et al. (2015)	Y	N	N	-	Y ^d	6	60
Masland (2016)	N	Y ^e	N	-	-	5	77

Note. Emo. = Emotional abuse/neglect; Phys. = Physical abuse/neglect; Sex. = Sexual abuse; Rej. =

Rejection. ^a Mediated effect on interpersonal distress; ^b Physical neglect only; ^c Divorce; ^d When

interacting with emotional neglect/abuse; ^e Physical abuse only

Table 3.

Table describing demographic information across different populations for Question 2

Characteristic	Total	Case control		Correlational	
	Total (<i>n</i> = 5586)	BPD group (<i>n</i> = 538)	Healthy control (<i>n</i> = 517)	Clinical control (<i>n</i> = 248)	Community (<i>n</i> = 4589)
	28	28.38	27.41	33.40	22.88
Mean age (SD)	(7.17)	(7.31)	(7.5)	(9.22)	(4.68)
% Female	74%	94%	91%	68%	70%

Rejection Sensitivity and Borderline Personality Disorder

Table 4.

Table summarising demographic information, measurement tools and outcomes for included studies in Question 2

Authors	Participant group and demographics	Outcome measure	Key findings	Effect size (<i>p</i>)	Quality
Armenti & Babcock (2018)	Undergraduate students N = 218, M ^{age} = 22.98, 51.8% F	BPD: PAI-BOR RS: RSQ	1) No. of BPD features significantly correlated with RS in non-clinical sample.	<i>r</i> = .38 (<i>p</i> < .01)	6 Good
USA					
Cross-sectional					
Ayduk et al. (2008) Study 1	Students N=379; M ^{age} =21.21, SD=3.57, 64% F	BPD: PAI-BOR RS: RSQ	1) No. of BPD symptoms correlated with RS. 2) Association was significant in people with low executive control (EC) (B= .66, <i>t</i> (374) = 3.54, <i>p</i> = .005) but not high EC (<i>b</i> = -.11, <i>t</i> < 1, <i>p</i> > .60). General Linear Modelling	<i>r</i> = .29 (<i>p</i> < .001)	6 Good
USA					
Cross-sectional					
Ayduk et al. (2008) Study 2	Community sample from cohort study N=104, M ^{age} = 38.88, SD=2.01, 63% F	BPD: PAI-BOR RS: RSQ	1) No. of BPD symptoms correlated with RS. 2) Association was significant in people with low EC (B= 1.43, <i>t</i> (100) = 4.81, (<i>p</i> < .001) but marginally significant in people with high executive control (B = .63, <i>t</i> (100) = 1.94, <i>p</i> = .055). General Linear Modelling.	<i>r</i> = .43	7 Good
USA					
Cross-sectional					

Rejection Sensitivity and Borderline Personality Disorder

Beeneey, Levy, Gazke-	BPD ($n=23$) $M^{\text{age}}=31.84$, $SD=9.1$, BPD: SCID-I &	1) Sample with BPD had significantly higher RS than HC $F(2,59) = 5.99$, $p <$	$d = 1.03$	5
Kopp & Hallquist	100% F; CG 1 : MDD ($n=13$), M^{age} IPDE	.005. ANOVA.	($< .05$)	Mod.
(2014)	= 32.12, $SD = 8.8$; 100% F; CG 2 : RS: ARSQ	2) Sample with BPD did not have significantly different RS scores from MDD	$d = .31$	
USA	Community ($n= 21$), $M^{\text{age}}=27.78$,	group. ANOVA.	($> .05$)	
Case control	$SD = 11.74$, 100% F			
Berenson et al. (2009)	Undergraduate students	BPD: IPDE-SQ	1) No. of BPD features significantly correlated with RS in non-clinical	$r = .42$ 5
Study 2	$N=87$, $M^{\text{age}} = 22.74$, $SD = 5.57$,	RS: ARSQ	sample.	($< .001$) Mod.
USA	79% F			
Cross-sectional				
Berenson, Dochat et	BPD : ($n =64$), 80% F;	BPD: SCID-I and	1) BPD sample RS significantly higher than HC ($t = 9.927$, $p = .000$). T-test	$d = 1.76$ 8
al. (2016) ^b	CG : community ($n=60$), 72% F;	SID-P-IV	2) Sub-sample of people with BPD showed no significant difference compared ($< .001$)	Exc.
USA	$M^{\text{age}}=32.12$, $SD =10.6$	RS: ARSQ	to small sample with APD ($n = 24$, 54% F) ($t = -1.03$, $p = >.05$)(Berenson,	$d = -.2$
Case control			Gregory, et al., 2016). T-test	($n.s.$)
Berenson, Nynaes,	BPD : Students with high BPD	BPD: SNAP-2	1) Community sample with high number of BPD features had significantly	$d = .90$ 5
Wakschal, Kapner, &	features ($n = 38$); CG : Students	RS: RSQ	higher RS than sample with low number of BPD features ($t (64) = -3.686$, $p <$	Good
Sweeney (2018) ^c	with low BPD features ($n = 35$)	(abbreviated)	.001). T-test.	($< .001$)
USA				

Rejection Sensitivity and Borderline Personality Disorder

Case control	Total: $M^{\text{age}} = 19.4$, $SD = 1.32$, 80.6% F				
Berlingo (2015) ^a	USA college students, N = 344,	BPD: PAI-BOR	1) No. of BPD features correlated with RS in a non-clinical sample.	$r = .34$	4
USA	72% F	RS: ARSQ		(< .001)	Mod.
Cross-sectional					
Boldero et al (2009)	Australian students, N = 101,	BPD: BPD-Q	1) No. of BPD features correlated with RS in a non-clinical sample.	$r = .63$	5
Study 1	$M^{\text{age}}=20.64$, $SD = 4.55$, 70% F	RS: RSQ	2) Higher RS predicted BPD when neuroticism statistically controlled ($F(1, 96) = 9.76, p = 0.002$). Hierarchical multiple regression.	(< .001)	Mod.
Australia					
Cross-sectional					
Boldero et al (2009)	Australian students, N=131,	BPD: BPD-Q	1) No. of BPD features significantly correlated with RS in a non-clinical	$r = .45$	5
Study 2	$M^{\text{age}}=20.1$, $SD=4.37$, 71% F	RS: RSQ	sample.	(< .001)	Mod.
Australia					
Cross-sectional					
Brown (2014) ^a	Undergraduate students, N = 201,	BPD = PAI-BOR	1) No. of BPD features was not significantly correlated with RS in two non-	$r = .21-$	5
USA	$M^{\text{age}} = 20.39$, $SD = 3.85$ (only	RS = RSQ	clinical samples with high BPD traits, or low BPD traits.	.35	Mod.
Cross-sectional	reported for partial sample)			(n.s.)	

Rejection Sensitivity and Borderline Personality Disorder

Bungert, Koppe et al. (2015)	Unmedicated BPD ($n = 20$) $M^{\text{age}} = 28.7$, $SD = 7.8$, 100% F; CG : Community ($n = 20$) $M^{\text{age}} = 29.2$, $SD = 7.5$, 100% F	BPD: IPDE RS: ARSQ (German)	1) Sample with BPD had significantly higher RS than HC ($t = -6.8$, $p < .001$). $d = 2.14$ T-test.	$d = 2.14$ ($< .001$)	6 Good
Bungert, Liebke et al. (2015)	Outpatient BPD ($n = 77$) $M^{\text{age}} = 28$, $SD = 6.3$, 100% F; CG 1 : Remitted BPD ($n = 15$) $M^{\text{age}} = 29.2$, $SD = 4.7$, 100% F; CG 2 : Community ($n = 75$) $M^{\text{age}} = 26.8$, $SD = 6.6$, 100% F	BPD: IPDE and BSL-23 RS: ARSQ (German)	1) Sample with BPD had significantly higher RS than HC ($t = 14.42$, $p < .001$). T-test 2) Acute BPD sample RS higher than remitted BPD, approaching significance. No significant difference when symptom severity controlled ($p > .999$). ANCOVA 3) Symptom severity correlated with RS across all groups. (TG: $r = .3$; CG1: $r = .62$; CG2: $r = .24$ (all $< .05$)). 4) Correlation mediated by self-esteem (BPD-A: $z = 2.12$, $p = .004$; CG1: $z = 2.36$, $p = .018$; CG2: $z = 2.16$, $p = .031$) Hierarchical regression (SOBEL z-test).	$d = 2.36$ ($< .001$) $d = .52$ (.056)	6 Good
Liebke et al. (2018) ^d	BPD : ($n = 56$) $M^{\text{age}} = 27$, $SD = 6.4$, 100% F; CG : Community ($n = 56$) $M^{\text{age}} = 27.25$, $SD = 5.6$, 100% F	BPD: IPDE and BSL-23 RS: ARSQ	1) BPD sample RS significantly higher than HC ($f = 168.10$, $p < .001$). ANOVA	$d = 2.46$	6 Good

Rejection Sensitivity and Borderline Personality Disorder

			2) RS did not significantly correlate with number of BPD features in the BPD sample ($r = .27, p = .053$) or HC sample ($r = .16, p = .23$)	($p < .001$)	
Thome et al. (2016)	Unmedicated BPD ($n = 36$) $M^{age} = 26.6$, $SD = 5.4$, 100% F; CG: community ($n = 36$) $M^{age} = 26.8$, $SD = 5.2$, 100% F	BPD: IPDE RS: ARSQ	1) Sample with BPD had significantly higher RS than HC ($t = 10.8, p < .001$). T-test	$d = 2.57$ ($p < .001$)	7 Good
Chesin, Fertuck, Goodman, Lichenstein & Stanley (2015)	BPD and lifetime mood disorder ($n = 60$) $M^{age} = 30.4$, $SD = 10.6$, 82% F; CG: Lifetime mood disorder ($n = 25$) $M^{age} = 35.7$, $SD = 11.2$, 56% F	BPD: SCID-I/II RS: ARSQ	1) Sample with BPD had significantly higher RS than sample with lifetime MDD without BPD ($t(82) = -3.28, p = .002$). T-test . 2) RS predicted BPD when interaction with emotional neglect/abuse considered i.e. RS predicted BPD in people with low past emotional neglect. ($B = -0.02$; $SE(B) = 0.01$; $\chi^2(1) = 4.28$; $p = 0.04$) Hierarchical Regression .	$d = .83$ ($p = .002$)	5 Mod.
De Panfilis, Meehan, Cain & Clarkin (2016)	Undergraduate students ($N = 596$) $M^{age} = 21.2$, $SD = 5.3$, 75% F (Based on full sample ($N = 625$))	BPD: PAI-BOR RS: RSQ	1) Number of BPD features shows a small, but significant, correlation with RS in a non-clinical sample. Pearson correlation . 2) RS did not have a significant direct effect on BPD ($c' = .003, p = .52$). Effect of BPD on RS mediated by interpersonal distress (CI: .004 -.011, $R^2 = .12, p < .001$), and moderated by EC i.e. indirect effect is greatest in people	$r = .11$ ($p < .01$)	7 Good

Rejection Sensitivity and Borderline Personality Disorder

low in EC. **Mediation analysis.**

De Panfilis, Meehan, Cain & Clarkin (2016) Study 2	Community sample (N = 562) M ^{age} = 33.7, SD= 11.5, 59% F	BPD: PAI-BOR RS: ARSQ + questions about anger	1) Number of BPD features significantly correlated with anxious and angry RS, in non-clinical sample. 2) Replicated moderated-mediation model in Study 1 when separating anxious and angry RS. Mediation analysis	$r = 0.23$, 0.43	8	Exc.
USA Cross-sectional						
Erbe (2014) ^a	Unmedicated BPD ($n = 14$) M ^{age} = 27.29, SD= 4.62, 100% F; CG: Community ($n = 15$) M ^{age} = 23.67, SD= 3.56, 100% F	BPD: SCID-I/II RS: RSQ	1) BPD group had significantly higher rates of RS compared to HC ($t(27)=4.96, p=.000$). T-test.	$d = 1.82$ ($<.001$)	7	Good
USA Case control						
Fertuck, Grinband & Stanley (2013)	BPD ($n = 17$) M ^{age} = 12.56, 76.5% F; CG: College students ($n = 19$) M ^{age} = 25.89, SD= 10.7, 68.4%F	BPD: SCID-I/II RS: RSQ	1) BPD group had significantly higher rates of RS compared to HC ($t(35) = 3.4, p = .002$). T-test.	$d = 1.16$	6	Good
USA Case control						

Rejection Sensitivity and Borderline Personality Disorder

Gardner, Qualter, Stylianou & Robinson (2010)	Undergraduate students and community sample N = 150, M ^{age} = 26.4, SD = 10.5, 70% F	BPD: PDQ – 4 RS: ARSQ	1) Number of BPD symptoms and RS correlated .	$r = .47$ ($< .001$)	4 Mod.
UK Cross-sectional					
Goodman et al. (2014)	Undergraduate students, N=133, USA Median Age = 19, 67% F	BPD: SCID-II self report RS: RSQ	1) Number of BPD symptoms significantly correlated with RS. 2) RS and the interaction between RS and EAN predict number of BPD symptoms (B = -.003, 95% CI (-.005, -.001), se(B) = .001, RR = .997, $X^2(1) =$ 7.95, $p = .005$) i.e. association stronger amongst people who reported less than average ENA. Physical abuse or neglect was not predictive Poisson Regression.	$r = .23$ (.01)	5 Mod.
Gutz, Renneberg, Roepke & Niedeggen (2015)	Unmedicated, inpatient BPD (n = 25) M ^{age} = 25, SD = 6.56, 92% F; CG1: SAD (n=25) M ^{age} = 28, SD= 4.82, 84% F, CG 2: community (n= 25) M ^{age} = 26, SD =4.44, 88% F	BPD: SCID-I/II RS: RSQ (German)	1) Total RS higher in sample with BPD than people with either SAD or HC (F = 23.04, $p = .001$). ANOVA 2) BPD sample had significantly higher rates of rejection expectancy than SAD and HC ($d = .62$, 1.9 $p < .05$) (F = 23.84, $p = .001$), and significantly higher rejection anxiety than HC ($d = 1.31$, $p < .05$) (F = 11.97, $p = .001$). No significant difference of rejection anxiety with SAD. ANOVA	$d = .69$, 1.91 ($< .05$)	7 Good
Germany Case control					

Rejection Sensitivity and Borderline Personality Disorder

Jobst et al. (2016)	BPD: ($n = 20$) $M^{\text{age}} = 29.85$, $SD = 7.46$, 100% F; CG: community ($n = 19$) $M^{\text{age}} = 30.42$, $SD = 10.55$, 100% F	BPD: SCID-II	1) BPD group had significantly higher rates of RS compared to HC ($t = -8.47$, $d = 2.75$, $p = <.001$) T-test.	$r = .26$	6
Germany		RS: RSQ		($<.001$)	Good
Case control					
Lazarus, Southward & Cheavens (2016)	Undergraduate students, $N = 127$, $M^{\text{age}} = 19.5$, $SD = 2.5$, 100% F	BPD: PAI-BOR	1) Number of BPD features significantly correlated with RS.	$r = .26$	5
USA		RS: RSQ		($<.01$)	Mod.
Cross-sectional					
Masland (2016) ^a	Community: High BPD ($n = 30$), $M^{\text{age}} = 23.2$, 80% F; Low BPD ($n = 47$) $M^{\text{age}} = 36.9$, 68.1% F	BPD: SNAP-2	1) Number of BPD features significantly correlated with RS.	$r = .51$	5
USA		RS: ARSQ	2) People with high levels of BPD features had greater RS than people with low levels of BPD ($t = 3.22$, $p = .002$, $d = .74$). T-test	($<.01$)	Mod.
Cross-sectional					
Meyer, Ajchenbrenner & Bowles (2005)	Undergraduate students and community, $N = 156$, $M^{\text{age}} = 30.2$, 72% F	BPD: SCID-II-SQ	1) Number of BPD features significantly correlated with rejection anxiety and rejection expectation.	$r = .21$, $.32$	5
UK		(adapted)		($<.01$)	Mod.
Cross-sectional					

Rejection Sensitivity and Borderline Personality Disorder

Miano, Fertruck, (2013) USA Cross-sectional	Undergraduate students, N = 95, M ^{age} = 19.8, SD = 2.95, 69% F	BPD: SCID-II SQ RS: RSQ	1) Number of BPD features correlated with RS. 2) When split into RS subscales correlations were not significant. 3) Non-clinical sample with high no. of BPD features (i.e. above median) had significantly higher RS than those with low BPD features ($z = -2.9, p = .002$, one- tailed). Mann-Whitney U.	$r = .19$ ($< .05$) $r = .12$, .14 (<i>n.s.</i>)	5 od.
Peters, Smart & Baer (2015) ^e USA Cross-sectional	Undergraduate students, N = 411, M ^{age} = 19.8, SD = 2.09, 68% F	BPD: PAI-BOR RS: RSQ	1) Number of BPD features significantly correlated with RS. 2) Dysfunctional responses to emotion accounted for large portion of effect of RS on PAI-BOR. Hierarchical multiple regression (Bootstrapping).	$r = .48$ ($< .001$)	7 Good
Rosenbach & Renneberg (2014) ^f Germany Cross-sectional	Undergraduate students, N = 193, M ^{age} = 25, SD = 5.4, 79% F	BPD: QTF RS: RSQ (German)	1) Number of thoughts and feelings characteristic of BPD significantly correlated with RS.	$r = .53$ ($< .001$)	5 Mod.
Rosenbach & Renneberg (2015) Germany Case control	BPD inpatient ($n = 30$) M ^{age} = 30.5, SD= 8.43, 93.3% F; CG 1: MDD Outpatient ($n = 27$) M ^{age} = 41.6, SD = 14.5, 66% F; CG 2:	BPD: MINI (German) and SCID-II	1) Sample with BPD had significantly higher RS than both sample with MDD and HC ($F(2, 85) = 19.52, p < .001$), ANOVA 2) There was no significant difference between MDD and HC ($p = .70$).	$d = .91$, 1.89 ($< .01$)	3 Low

Rejection Sensitivity and Borderline Personality Disorder

	community ($n = 30$) $M^{\text{age}} = 33$, SD= 10.4, 73.3% F	RS: RSQ (German)			
Selby, Ward & Joiner (2010) USA Cross-sectional	Students (proportion invited due to high scores on SCID-II) ($N = 94$) $M^{\text{age}} = 18.75$, SD = 1.05, 78.7% F	BPD: SCID-II RS: RSQ	1) Number of BPD symptoms significantly correlated with RS.	$r = .44$ ($< .05$)	5 Mod.
Skinner (2014) ^a USA Cross-sectional	Students (proportion with high PAI-BOR), $N = 147$, 77% F	BPD: PAI-BOR RS: RSQ	1) Number of BPD symptoms significantly correlated with RS.	$r = .21$ (.01)	5 Mod.
Staebler, Helbing, Rosenbach & Renneberg (2011) Germany Case control	BPD inpatient ($n = 26$) $M^{\text{age}} = 27.27$, SD = 7.69, 100% F; CG1: Outpatient group ($n = 119$) $M^{\text{age}} = 36.5$, SD = 10.9, 63.2% F; CG 2: students and community ($n = 76$) $M^{\text{age}} = 29.33$, SD= 9.47; 92.1% F	BPD: SCID – II and QTF RS: RSQ (German)	1) Sample with BPD had significantly higher RS than HC, and the outpatient group ($F(5,199) = 70.224, p < 0.001, \eta^2 = 0.638$) . ANOVA 2) RS correlated significantly with thoughts and feelings characteristic of BPD amongst all groups, but weakest amongst sample with BPD. (Total: $r = .79, p < .001$; BPD: $r = .32, p .033$; CG1: $.47 p < .001$; CG2: $.53, p < .001$)	$d = 3.25$, 1.69 ($< .02$)	5 Mod.

Rejection Sensitivity and Borderline Personality Disorder

Tragesser, Lippman,	Undergraduate students	BPD: PAI-BOR	1) Number of BPD symptoms significantly correlated with RS.	$r = .34$	5
Trull & Barrett (2008)	(N = 118) $M^{\text{age}} = 19.17$, USA SD = 1.78; 67% F (based on full Cross-sectional sample, $n = 121$)	RS: RSQ		(< .001)	Mod.
Winter, Koplin & Lis	BPD ($n = 30$) $M^{\text{age}} = 26.1$, SD = (2015) 4.76, 100% F; CG : community (n Germany = 30) $M^{\text{age}} = 26.13$, Case control SD = 7.29; 100% F	BPD: IPDE RS: RSQ	1) Sample with BPD scored significantly higher on RS than healthy controls ($t = -7.94$, $p = <.001$) T-test.	$d = 2.19$ (< .001)	6 Good
Zielinski & Veilleux	Undergraduate students, $N=165$, (2014) $M^{\text{age}} = 19.09$, SD= 1.14, 64% F USA Cross-sectional	BPD: MSI-BPD RS: RSQ	1) Number of BPD symptoms correlated with RS in a non-clinical sample.	$r = .28$ (< .01)	5 Mod.

Note. Q = Quality; TG = target group; CG = Control Group; BPD = Borderline Personality Disorder; MDD = Major Depressive Disorder; RSQ = Rejection Sensitivity Questionnaire; ARSQ = Adult Rejection Sensitivity Questionnaire; BPD = Borderline Personality Disorder; EC = Executive Control; EAN = Emotion abuse and neglect; SCID-I = Structure Clinical Interview for DSM-IV Axis I; SCID-II = Structure Clinical Interview for DSM-IV Axis II; PAI-BOR = Personality Assessment Inventory-Borderline Features; IPDE = International Personality Disorder Examination; SCID II – SQ = Structure Clinical Interview for DSM-IV II – Screener Questionnaire; BPD-Q = Borderline Personality Disorder Questionnaire; IPDE-SQ = International Personality Disorder Examination – Screening Questionnaire; BSL-23 = Borderline Symptom List; PDQ-4-BPD

Rejection Sensitivity and Borderline Personality Disorder

= Personality Diagnostic Questionnaire-4-Borderline Personality Disorder; QTF = Questionnaire of Thoughts and Feelings; MSI-BPD = McLean Screening Instrument for Borderline Personality Disorder; SID-P-IV = Structured Interview for DSM-IV Personality; SNAP-2 = Schedule for Non-adaptive and Adaptive Personality -2

^a Doctoral dissertation; ^b This paper describes the full sample reported as partial samples in two separate papers (Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011; Berenson, Gregory, et al., 2016). Although not reported in the paper, data was obtained via email correspondence (K. Berenson, August 2017); ^c Full statistical data obtained via email correspondence (K. Berenson, August 2018); ^d Correlational data obtained via email correspondence (L. Liebke, August 2018) ^e Full statistical data obtained via email correspondence (J. Peters, July 2017); ^f Correlation not reported in publication. Full statistical data obtained via email correspondence (C. Rosenbach, September 2017)

Rejection Sensitivity and Borderline Personality Disorder

Table 5.

Link between RS and BPD, case-control according to study quality in Question 2

Study	Association		Strength of association			Q	N
	Y	N	Lrg	Mod	Small		
<i>Clinical, group comparison</i>							
<i>outcomes</i>							
Berenson, Dochat et al (2016)	Y		X			8	124
Erbe (2014)	Y		X			7	29
Gutz et al. (2015)	Y		X			7	50
Thome et al. (2016)	Y		X			7	72
Bungert, Koppe et al. (2015)	Y		X			6	40
Bungert, Liebke et al. (2015)	Y		X			6	52
Liebke et al. (2018)	Y		X			6	112
Fertuck et al. (2013)	Y		X			6	36
Jobst et al. (2016)	Y		X			6	39
Winter et al. (2015)	Y		X			6	54
Beeney et al. (2014)	Y		X			5	57
Berenson et al. (2018)	Y		X			5	73
Chesin et al. (2015)	Y		X			5	85
Staebler et al. (2011)	Y		X			5	102
Rosenbach & Renneberg (2015)	Y		X			3	60
<i>Community, group comparison</i>							
<i>outcomes</i>							
Berenson et al. (2018)	Y		X			6	73
Masland (2016)	Y		X			5	77

Correlational, community sample

De Panfilis et al. (2016, study 2)	Y			X ^a	X ^b	8	562
Ayduk et al. (2008, Study 2)	Y			X		7	104
De Panfilis et al. (2016, study 1)	Y				X	7	596
Peters et al. (2015)	Y		X			7	411
Armenti & Babcock (2018)	Y			X		6	218
Ayduk et al. (2008, Study 1)	Y			X		6	379
Bungert, Liebke, et al. (2015)	Y				X	6	75
Liebke et al. (2018)		N			X	6	56
Berenson et al. (2009)	Y			X		5	87
Boldero et al. (2009, Study 1)	Y		X			5	101
Boldero et al. (2009, Study 2)	Y			X		5	131
Brown (2014)		N		X		5	201
Goodman et al. (2014)	Y				X	5	133
Lazarus et al. (2016)	Y				X	5	127
Masland (2016)	Y			X		5	77
Meyer et al. (2005)	Y			X ^c	X ^a	5	156
Miano et al. (2013)	Y				X	5	95
Rosenbach & Renneberg (2014)	Y		X			5	193
Staebler et al. (2011)	Y		X			5	76
Tragesser et al. (2008)	Y			X		5	118
Zielinski & Veilleux (2014)	Y				X	5	165
Berlingo (2015)	Y			X		5	344
Gardner et al. (2010)	Y			X		4	150
Selby et al. (2010)	Y			X		4	94

Rejection Sensitivity and Borderline Personality Disorder

Skinner (2014) Y X 4 147

Correlational, BPD sample

Bungert, Liebke et al. (2015)	Y				X		6	77
Liebke et al. (2018)		N			X		6	56
Staebler et al. (2011)	Y				X		5	26

Note. Q = Quality; ^a Anxious expectations of rejection; ^b Angry expectations of rejection; ^c Expectations of rejection

Rejection Sensitivity and Borderline Personality Disorder

Table 6.

Table describing outcomes from meta-analyses

Meta analysis	#	Mean	95% CI	Z value	Mean <i>r</i>	I²	Eggers
	ES	Z					test sig.
Main analyses	41	.431	.377 - .485	15.74***	.406	79.4%	.012
<i>Corrected</i>	52	.338	.279 - .397	11.23***	.326		
Correlational studies	31	.364	.310 - .417	13.36***	.349	69.1%	.03
<i>Corrected</i>	40	.289	.231 - .348	9.698***	.281	-	-
BPD vs. healthy control	12	.784	.633 - .936	10.15***	.655	80.3%	.285
BPD vs. clinical control	7	.294	.111 - .478	3.14**	.286	76%	.143

Note. Corrected results refer to outcomes corrected for publication bias. ES = Effect Size; Z = Fisher's Z; CI = Confidence Intervals; I² = independent measure of inconsistency

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

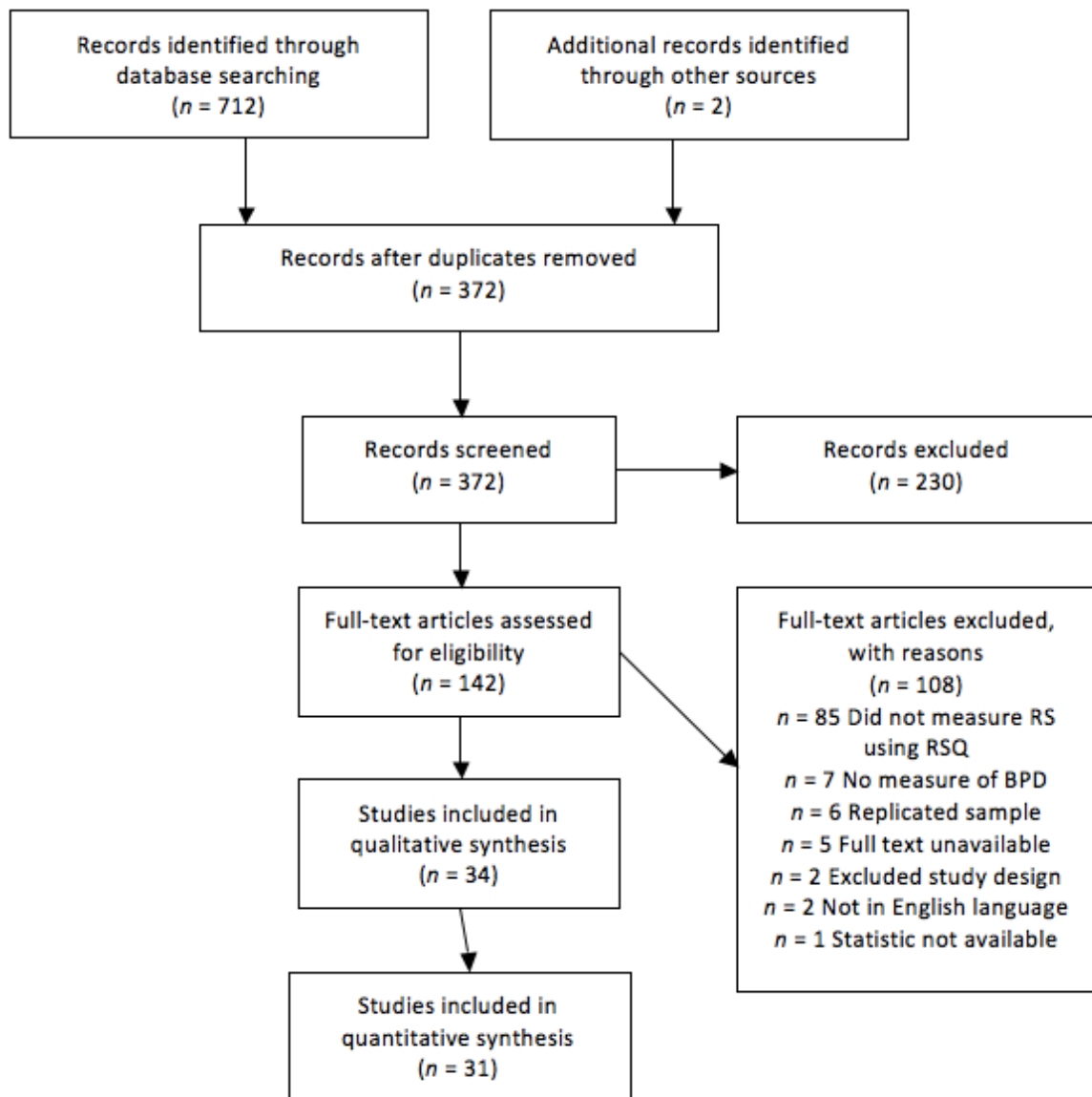


Figure 2. PRISMA flow chart for Question 2

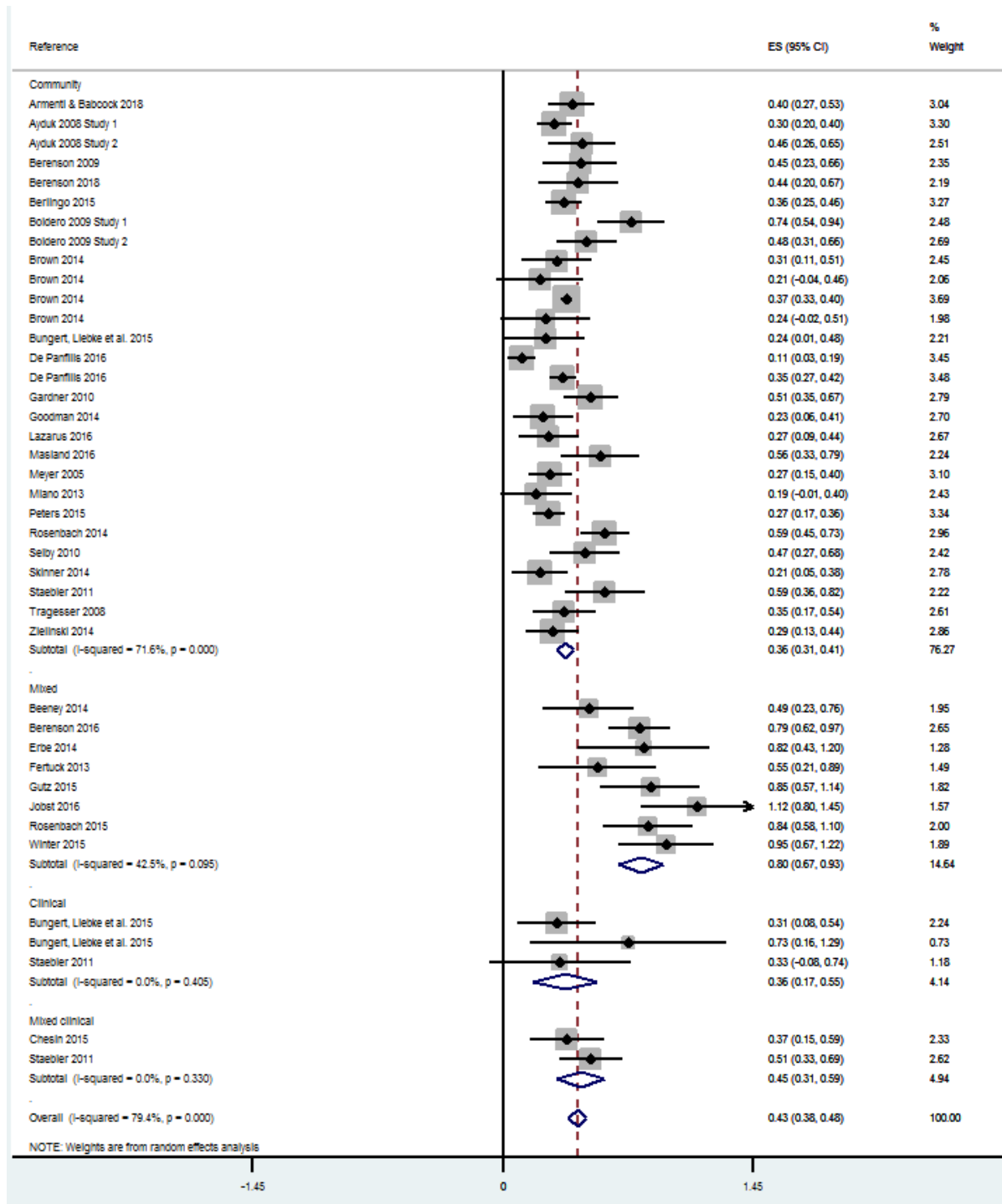


Figure 3. Forest plot for main meta-analysis

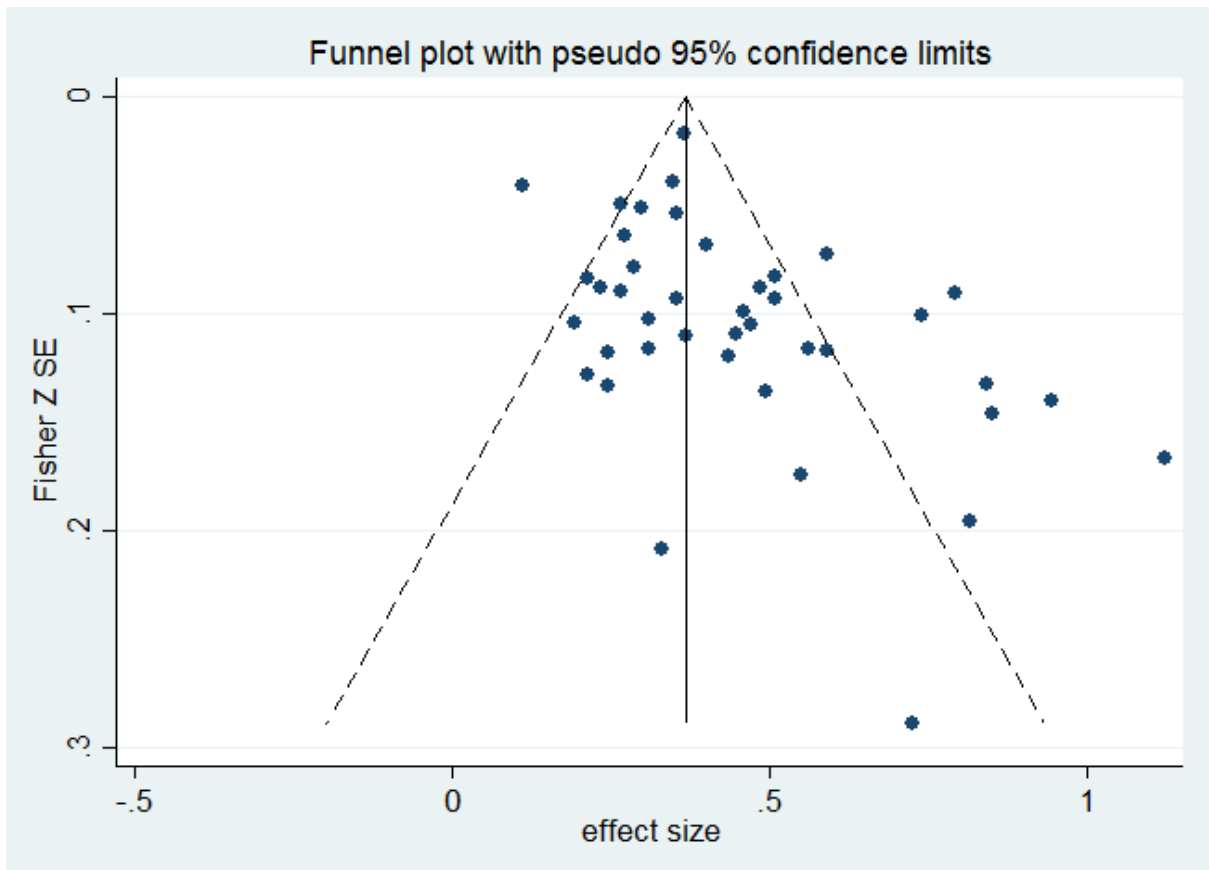


Figure 4. Funnel plot for main meta-analysis

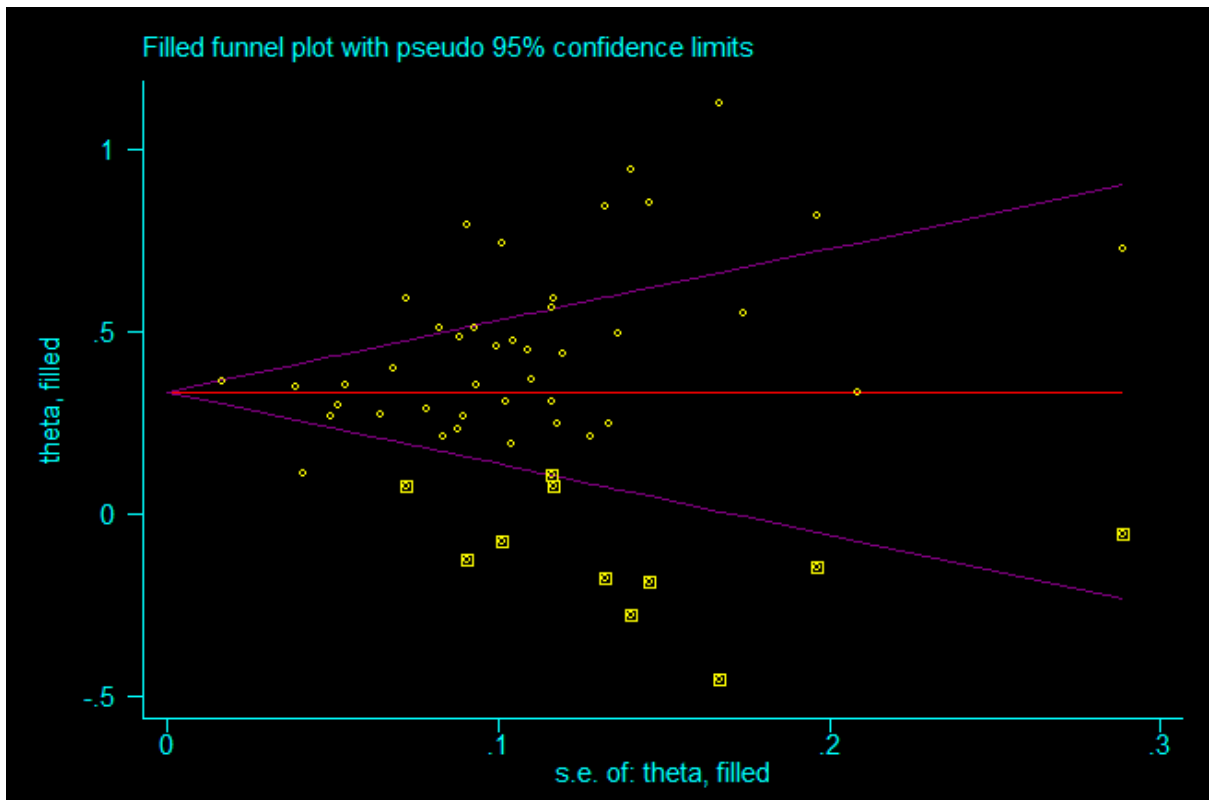


Figure 5. Filled funnel plot following trim and fill corrections