



Published in final edited form as:

Pers Individ Dif. 2013 August ; 55(4): 367–374. doi:10.1016/j.paid.2013.03.019.

Gender differences in rumination: A meta-analysis

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Abstract

Starting in adolescence and continuing through adulthood, women are twice as likely as men to experience depression. According to the response styles theory (RST), gender differences in depression result, in part, from women's tendency to ruminate more than men. A meta-analysis was performed to evaluate gender differences in rumination in adults ($k = 59$; $N = 14,321$); additionally, an analysis of subtypes of rumination – brooding and reflection – was conducted ($k = 23$). Fixed effects analyses indicated that women scored higher than men in rumination ($d = .24$, $p < .01$, $SEd = .02$), brooding ($d = .19$, $p < .01$, $SEd = .03$) and reflection ($d = .17$, $p < .01$, $SEd = .03$); there was no evidence of heterogeneity or publication bias across studies for these effect sizes. Although statistically significant, the effect sizes for gender differences in rumination were small in magnitude. Results are discussed with respect to the RST and gender differences in depression.

Keywords

Rumination; Gender difference; Sex difference; Depression; Brooding; Reflection

1. Introduction

Gender differences in rates of depression are well documented in the literature; beginning in adolescence, rates of depression in women are greater than in men, and by adulthood, women are twice as likely as men to become depressed (for a review, see Kessler, 2006). Numerous theories have been set forth to explain the gender differences in depression, citing psychological, sociocultural, and biological factors (for reviews, see Boughten & Street, 2007; Hankin & Abramson, 2001; Hyde, Mezulis, & Abramson, 2008). A prominent psychological theory, the response styles theory (RST; Nolen-Hoeksema, 1987, 1991), purports that women have a greater tendency to ruminate on their depressive symptoms and distress than do men, and this contributes to greater rates of depression in women. According to the RST, rumination involves repetitively and passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms. Because rumination enhances the effects of depressed mood on thinking, impairs effective problem solving, interferes with instrumental behavior, and erodes social support, the initial symptoms of depression among people who chronically ruminate are likely to become more severe and evolve into episodes of major depression and rumination may prolong current depressive episodes (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). The RST has spurred a large body of empirical research on the role of rumination in the onset and

duration of depression (for reviews, see Nolen-Hoeksema, 2012; Nolen-Hoeksema et al., 2008). Furthermore, the theoretical assumptions of the RST have been incorporated into broader models of depression risk (e.g., Hankin & Abramson, 2001; Hyde et al., 2008).

Although evidence for gender differences in rumination has emerged consistently in the literature, the magnitude of this difference has varied from study to study. In an effort to systematically review the rumination literature in children and adolescents, Rood and colleagues (2009) conducted a meta-analysis of gender differences in rumination in youth. Results of their analysis indicated that gender differences in rumination are quite small in children ($d = .14$) with girls significantly more likely to ruminate than boys. In adolescence, this gender difference was significant and larger in magnitude ($d = .36$). The authors reported that these results provide some evidence of the RST in youth and suggest that during adolescence, the increased magnitude of gender differences in rumination may parallel that seen in rates of depression.

Another meta-analysis, conducted by Tamres and colleagues (2002), examined gender differences in coping mechanisms and included 10 studies reporting on gender differences in rumination. Results yielded a small but significant effect of gender on rumination ($d = .19$), with women more likely to ruminate than men. However, the Tamres analysis differs from the current study in several important ways. First, Tamres and colleagues focused on methods of coping (e.g., their search terms included “coping”, “stress management”) in response to a broad range of stressors, including relationship stress, physical pain, and health issues (e.g., cancer, artificial insemination). Thus, their analysis was based on a much broader definition of rumination (i.e., including thoughts about physical pain, academic performance, relationships) rather than specifically on depressive rumination as defined above. Secondly, their review included studies of children and adults and results were collapsed across these groups, thus obscuring potential influences of developmental stages on the gender differences in rumination (Rood et al., 2009). In contrast, the current study focuses specifically on depressive rumination in adults so as to directly address the tenets of the RST.

Despite the prominence of the RST in the field, no quantitative analysis of gender differences in depressive rumination has been conducted in the adult literature. The current review was conducted to provide a meta-analysis of the literature on gender differences in rumination in adult samples. We reviewed studies that included a measure of rumination, focusing on depressive rumination, which is most commonly measured by the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991) and the Rumination on Sadness Scale (RSS; Conway, Csank, Holm, & Blake, 2000), both of which are self-report measures. The RRS is a 22-item subscale from the Response Styles Questionnaire; participants rate how often they experience each response when they feel sad, blue, or depressed. Items focus on the meaning of rumination, on the subjective feelings related to depressed mood, on symptoms, and on consequences and causes of the mood (Luminet, 2004). Sample items on the RRS include, “*Think, ‘What am I doing to deserve this?’*” and “*Go away by yourself and think about why you feel this way.*” The RSS is a 13-item measure assessing how often participants experience each response in situations in which they feel sad, down, or blue. Items focus on the intensity and repetitive quality of ruminative thoughts, the difficulty with stopping ruminative thoughts, attempts at understanding the nature of one’s distress, and the lack of instrumental goal orientation (Luminet, 2004). Sample items on the RSS include “*I repeatedly analyze and keep thinking about the reasons for my sadness*” and “*I exhaust myself by thinking so much about myself and the reasons for my sadness.*” A review of the psychometric properties of the RRS and RSS can be found in Luminet (2004).

In addition to our analysis of global measures of depressive rumination, we examined gender differences in subtypes or components of rumination – brooding and reflection – obtained from a factor analysis of the RRS items that remained after eliminating items that could be argued to overlap with depressive symptoms (Treyner, Gonzalez, & Nolen-Hoeksema, 2003). This scale consists of five items assessing brooding, or passive, perseverative, maladaptive self-focused thought, and five items assessing reflection, a neutrally valenced, less maladaptive self-reflective strategy. Compared to reflection, brooding may be more strongly associated with depression severity, particularly over time, and some evidence suggests that gender differences in brooding may be greater than gender differences in reflection (e.g., Treyner et al., 2003). By estimating the overall effect size of gender differences in rumination, as well as the brooding and reflection components of rumination, we sought to provide the field with a quantitative analysis of past research and examine the basic tenets of the RST regarding gender differences in rumination in adults. Furthermore, the results of the current study may serve to guide future research efforts in elucidating the gender differences in rates of depression.

2. Material and methods

2.1. Literature search and inclusion criteria

We followed two steps to ensure we reviewed all published papers reporting on gender differences in rumination. First, using the citation index in Web of Science, we reviewed all studies through October 2011 citing the original publication of the RRS (Nolen-Hoeksema & Morrow, 1991) or the RSS (Conway et al., 2000), as they are the most commonly used self-report measures of individual differences in the tendency to engage in depressive rumination. Next, we searched the PsycINFO and Web of Science databases through October 2011 using combinations of the search terms *gender difference(s)* or *sex difference(s)*, paired with *rumination*. After identifying relevant studies (approximately 650), we reviewed the methods and results section of each manuscript for reports of gender differences in rumination and applied our inclusion criteria.

Inclusion criteria for our analysis were as follows: (a) used a measure assessing depressive rumination, (b) published in English in a peer-reviewed journal, (c) utilized an experimental design suitable for calculating one or more effect size, and (d) included adult samples only (i.e., college age or older).

In addition to reviewing studies that reported on gender differences in rumination, we also included studies in our analysis that did not explicitly report on gender differences, but did administer a measure of depressive rumination to a sample that included adult men and women. Using the citation index in Web of Science, we reviewed the studies that cited the original publication of the RRS (Nolen-Hoeksema & Morrow, 1991), but *did not* report on gender differences in rumination. We limited this search to studies published between 2008 and 2011 to increase our likelihood of receiving the necessary data, on the assumption that compared to authors of older papers, authors of more recent papers would be more likely to have the raw data required for examining gender and rumination in their study. Using the same inclusion criteria described above, we identified 71 studies and contacted the corresponding author of each study requesting statistical values necessary for calculating an effect size. Of the 71 authors contacted, 30 (43%) replied and provided the necessary values. Those authors who replied but were unable to provide values said that they were no longer able to access the data.

We focused specifically on depressive rumination rather than including other rumination constructs – such as anger rumination or rumination on specific events – so as to review the literature most relevant to RST. We included both clinical and non-clinical samples as the

basic tenets of RST do not suggest that gender differences in rumination should change in magnitude as a function of diagnostic status. When data from the same study was included in more than one paper, we used the data from the paper with the largest sample size. In the case of studies that reported on multiple independent samples, a separate effect size was computed for each sample. When gender differences were examined in a paper and the paper reported that there were no significant gender differences but did not provide means or results from statistical tests, the authors were contacted and means and standard deviations for men and women were requested. Additional data were requested for five studies and were received for two of those studies. For the remaining three studies (two in the rumination analysis, one in the brooding and reflection analysis), a conservative effect size estimate of $d = 0.00$ was imputed.

2.2. Analyses

All analyses were completed in Comprehensive Meta Analysis, Version 2.2.064. To examine the extent to which women ruminate more than men, we computed Cohen's d as an index of effect size. Cohen's d was calculated for each study from group means and standard deviations, correlation coefficients, independent sample t-test values, or regression coefficients. An aggregate effect size weighted by sample size was computed to provide an overall effect size for gender across studies.

Homogeneity among studies was computed using the Q statistic and the I^2 statistic. A significant Q statistic suggests that the distribution of effect sizes around the mean is greater than would be predicted from sampling error alone, whereas the I^2 provides an estimate of the proportion of the variance in the aggregate effect size that is attributable to between-studies heterogeneity (as opposed to within-studies sampling error), with values of .25, .50, and .75 indicating low, moderate, and high degrees of heterogeneity (Higgins & Thompson, 2002).

The robustness of the observed overall effect was assessed using Orwin's Fail-safe N test (Orwin, 1983) to determine how many hypothetical studies with non-significant findings would need to be published in order to reduce the overall effect size to become trivial (which we defined as a Cohen's $d < .01$).

Publication bias was assessed using a funnel plot analysis and Duval and Tweedie's (2000) trim-and-fill method. Funnel plots are scatter plots that plot effect size on the X axis and the standard error of the effect size on the Y axis and provide pseudo-95% confidence intervals (represented by cone-shaped lines) around the mean effect size. If few studies with negative or small effect sizes are included in the analysis, or more than 5% of included studies fall outside of the confidence intervals, this will lead to asymmetry in the funnel plot and can indicate publication bias (Baldwin & Shadish, 2011). The trim-and-fill method identifies studies that may reflect publication bias (based on the funnel plot), omits or "trims" them, and calculates an aggregate effect size with the remaining studies. The aggregate effect sizes (pre- and post-trim) can be compared to assess the impact of potential publication bias.

3. Results

3.1. Rumination analysis

Our review of the literature on gender differences in rumination yielded 57 studies, including 59 separate samples, which met our inclusion criteria for analysis. The majority of studies included in the analysis used the RRS or the RSS to assess depressive rumination, however a few studies used other measures [Repetitive Negative Thinking subscale of the Repetitive Thought Questionnaire (RTQ; McEvoy, Mahoney, & Moulds, 2010); the Rumination subscale of the Rumination-Reflection Scale (RRQ; Trapnell & Campbell,

1999)]. We were unable to find any studies that reported gender differences in the Stress Reactive Rumination Scale (Alloy et al., 2000), which is also a measure of depressive rumination. A forest plot of the effect sizes from these studies is presented in Fig. 1. As can be seen in this figure, our analysis yielded an aggregate effect size for gender of $d = .24$ ($p < .01$, $SEd = .02$) in a pooled sample of 14,321 individuals (8675 women; 5646 men). This result suggests that adult women tend to ruminate more than adult men, and this effect was in the range of a small effect size, according to Cohen's (1988) guidelines.

The 59 independent effect sizes were assessed for homogeneity to determine whether variability across Cohen's d was greater than expected from sampling error alone. There was no evidence of heterogeneity ($Q = 53.81$, $p = .63$, $I^2 = 0.00$). Furthermore, results suggested no evidence of publication bias, as indicated by the minimal asymmetry in the funnel plot (Fig. 2), and the result of the trim-and-fill analysis. This analysis identified and trimmed five studies that may have generated asymmetry in the funnel plot, however with these studies removed, the aggregate effect size did not change substantially ($d = .01$). The fact that we found no evidence of heterogeneity or publication bias when combining studies that reported gender differences in rumination and those that did not report gender differences provides a strong case for a minimal impact of publication bias on the aggregate effect size. The aggregate effect size was robust, as results of the Orwin's Fail Safe N test ($N_{fs} = 1350$) indicated that 1350 studies with no gender differences in rumination ($d = 0.00$) would be needed to reduce the effect size to a trivial magnitude (Cohen's $d < .01$).

3.2. Brooding and reflection analysis

Our review yielded 23 studies with data from the brooding subscale of the RRS and 21 of these studies also had data from the reflection subscale. The 23 studies yielded a pooled sample of 4873 individuals (3141 women; 1732 men). Results for each subscale indicated a small, significant effect size for gender (brooding: $k = 23$, $d = .19$, $p < .01$, $SEd = .03$; reflection: $k = 21$, $d = .17$, $p < .01$, $SEd = .03$), suggesting that compared to men, women are more likely to engage both in brooding and reflection. Between study heterogeneity was low in magnitude and non-significant in the brooding analysis ($Q = 22.04$, $p = .46$; $I^2 = .18$) and in the reflection analysis ($Q = 26.56$, $p = .15$; $I^2 = 24.70$). In considering publication bias, there was minimal asymmetry in the funnel plots (Figs. 3 and 4). The trim-and-fill analysis identified one study to be trimmed in the brooding analysis ($d = .005$) and one study to be trimmed in the reflection analysis ($d = .005$), and trimming these studies had a negligible impact on the aggregate effect size. Taken together, these results suggested no evidence of publication bias for either subscale. Results of the Orwin's Fail Safe N test indicated that both aggregate effect sizes were robust (brooding: $N_{fs} = 404$, reflection: $N_{fs} = 340$).

4. Discussion

The current study provides a quantitative analysis of the literature on gender differences in depressive rumination and an examination of the basic tenets of the RST in adults. In our review of the literature, we identified studies that reported on gender differences in rumination as well as requested data from studies that did not report on gender differences, calculated independent effect sizes for each sample, and summarized these findings into an aggregate effect size for gender in the rumination literature. Results of the meta-analysis for rumination indicated a small, but significant effect size across studies ($d = .24$), suggesting that women ruminate more than men. As indicated by homogeneity in our sample, this result was consistent across studies and across several commonly cited measures of depressive rumination (Ruminative Responses Scale; Rumination on Sadness Scale; Repetitive Thought Questionnaire; Rumination-Reflection Scale), suggesting that the magnitude of the gender difference in depressive rumination does not vary as a result of study design or the measure used. Although statistically significant and robust, the overall effect size of gender on

rumination fell in the small effect size range (Cohen, 1988). Our results are consistent with those reported in a meta-analysis of the child and adolescent literature (Rood et al., 2009), which found small but significant differences in rumination between boys and girls in childhood ($d = .14$) and adolescence ($d = .36$), with girls more likely to ruminate than boys. In line with findings from children and adolescents, results of the current study provide some support for the basic tenets of the RST in adults, but also suggest that the gender difference in rumination is limited in magnitude.

We also assessed subtypes of rumination – brooding and reflection – as extensions of RST predict that gender differences may be most salient in brooding (Treyner et al., 2003). Results from this analysis showed that gender differences in brooding ($d = .19$) and reflection ($d = .17$) were similar and smaller in magnitude than the gender difference in rumination. That is, isolating the constructs of brooding and reflection did not yield different effect sizes of gender for the subscales, and thus, the extended hypothesis of RST is not supported by the results of our meta-analysis.

Although we believe our meta-analytic review provides an unbiased representation of gender differences in the rumination literature, our method of selecting studies may have influenced the representativeness of our sample. First, although our review included studies that explicitly reported gender differences in rumination and those that did not, our review of studies that did not report on gender differences was limited to studies published between 2008 and 2011. This time limit was based on the feasibility of requesting data from authors and the probability of researchers having access to data. Given the large sample size included in our analysis, the robustness of effect sizes, and the fact that we found no evidence of significant between study heterogeneity or publication bias, we are confident that this search criterion did not bias our review. Second, our focus on depression-related rumination may have biased our review toward specific measures of rumination and may limit the generalizability of our findings to other measures of rumination. However, the measure most commonly used in the included studies – the RRS – is considered a gold standard measure of rumination in adults and is the most widely used measure of depressive rumination in research (Arney et al., 2009; Kasch, Klein, & Lara, 2001). Furthermore, our results were consistent across several measures of depressive rumination. With these considerations in mind, we are confident that our review of the literature yielded a sample of studies that is representative of the literature on gender differences in rumination and the RST.

In summary, results of the current meta-analysis provide some support for the tenets of the response styles theory. Across pooled samples of 14,321 individuals (for rumination), 4873 individuals (for brooding) and 4644 individuals (for reflection), we found that rates of rumination, brooding, and reflection were higher in women than in men. These results are consistent with qualitative reviews of the rumination literature (Nolen-Hoeksema, 2012; Nolen-Hoeksema et al., 2008) and etiological models of gender differences in depression (e.g., Cambron, Acitelli, & Pettit, 2009; Hyde et al., 2008). However, the findings also suggest that the gender difference in rumination is small in magnitude for adults.

We hope that our results will help to guide future investigations of the gender differences in depression. To account for gender differences in depression, researchers may need to examine how rumination interacts with other risk factors for depression. For example, some studies suggest that rumination interacts with stressful life events to trigger depression, and this interaction may be stronger for women than men, especially within certain domains (e.g., Hankin, 2009; Hyde et al., 2008). We believe research that evaluates how rumination interacts with other risk factors for depression may help to increase understanding of the well-established gender differences in depression.

Acknowledgments

The authors would like to thank the researchers who provided us with unpublished data to include in the meta-analysis. We would also like to thank our team of research assistants who provided assistance with the extensive literature review. This research was supported in part by grants from the National Alliance for Research on Schizophrenia and Depression and the National Institute of Child Health & Human Development (HD007289).

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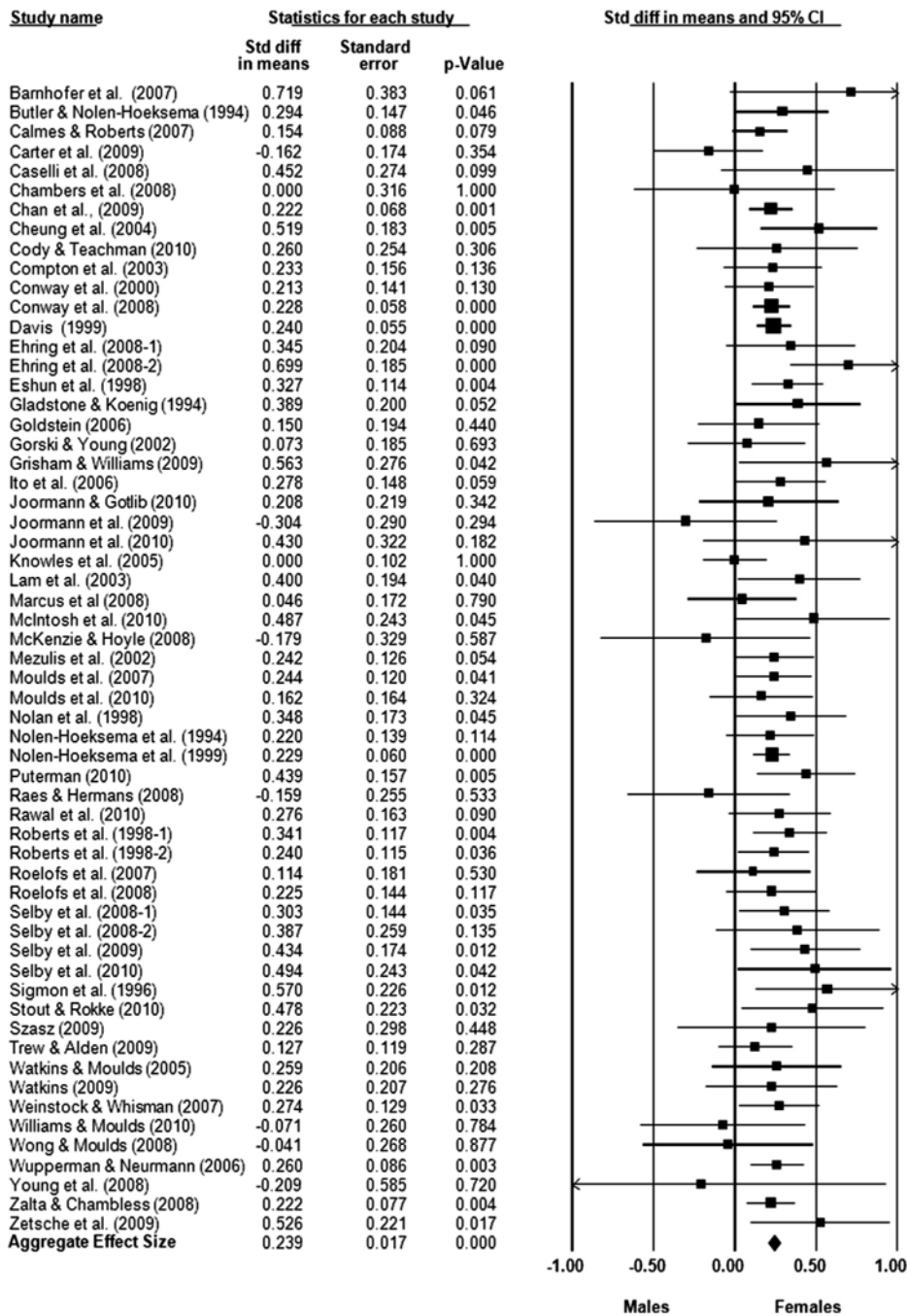


Fig. 1. Effect sizes (standard difference in means) and forest plot of gender differences in rumination.

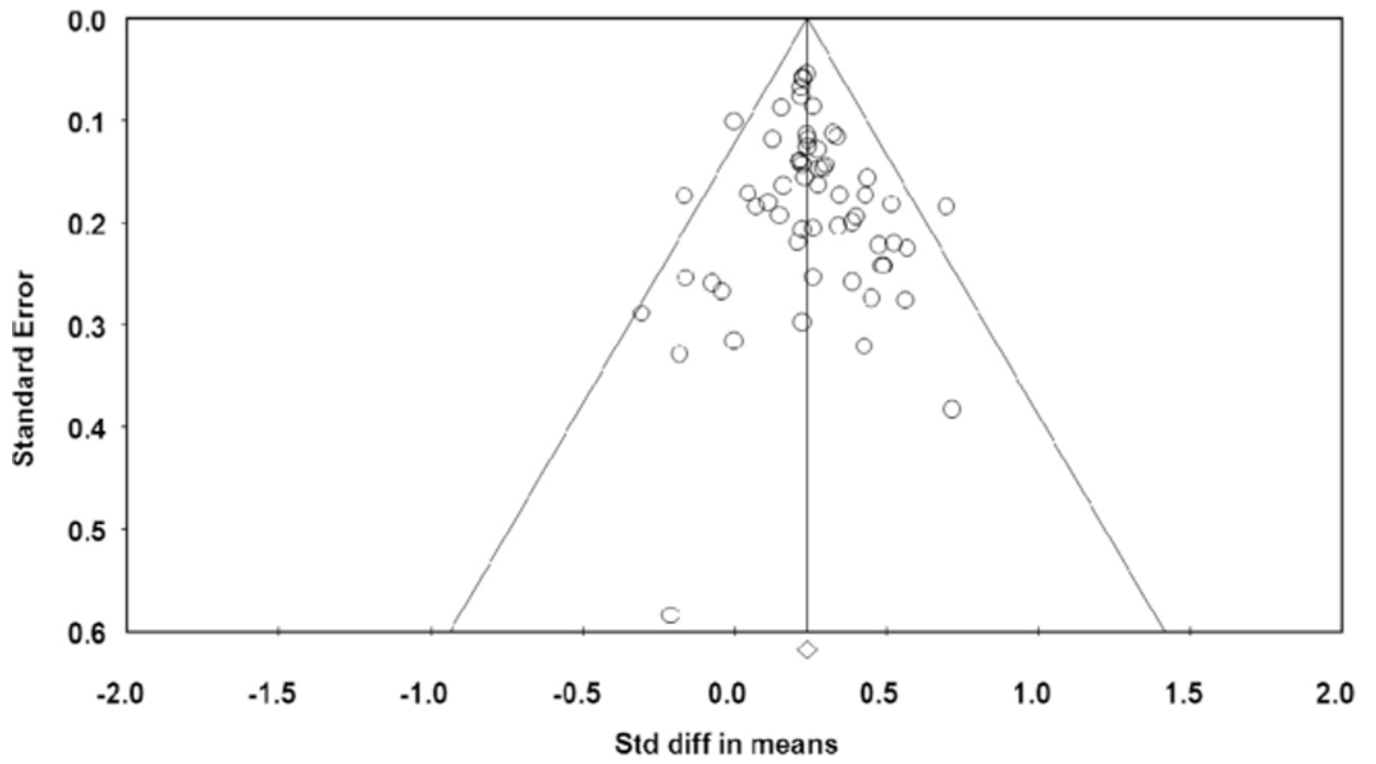


Fig. 2.
Funnel plot for rumination analysis.

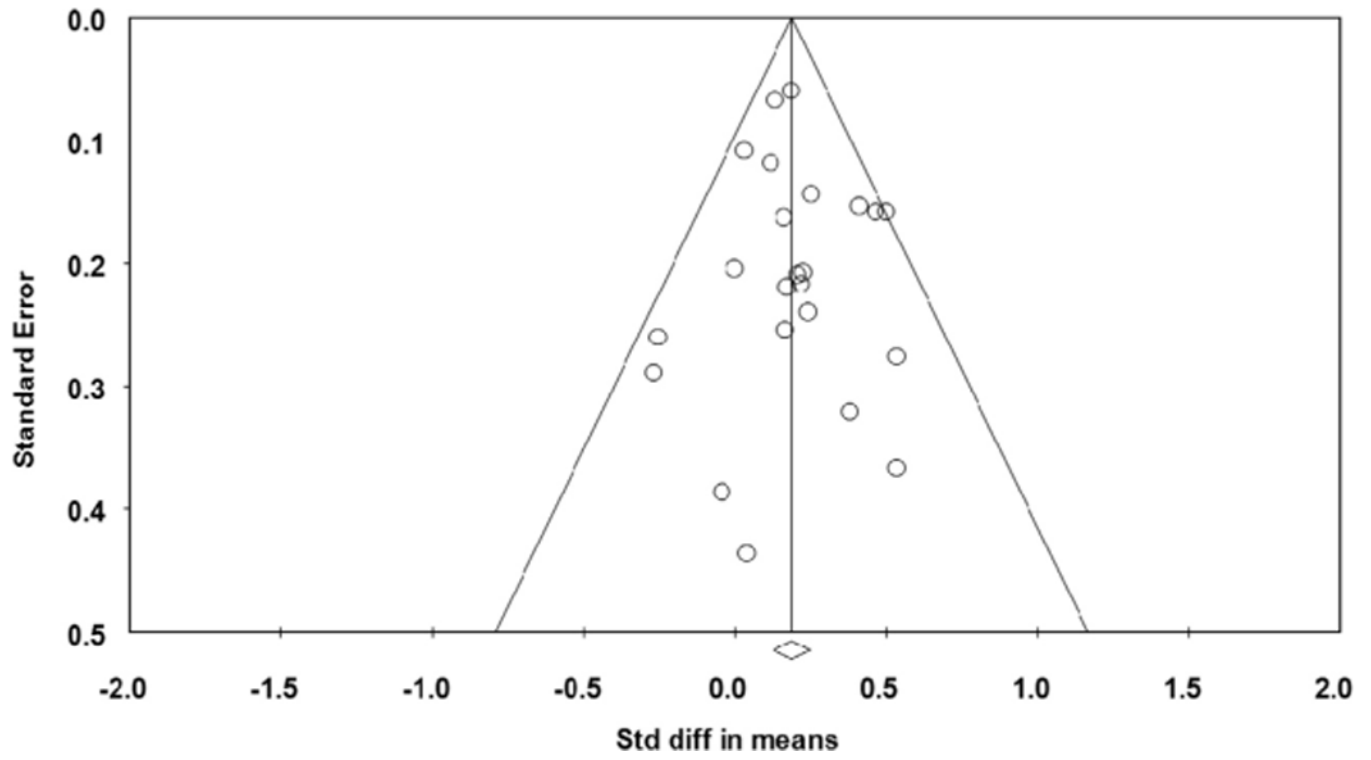


Fig. 3.
Funnel plot for brooding analysis.

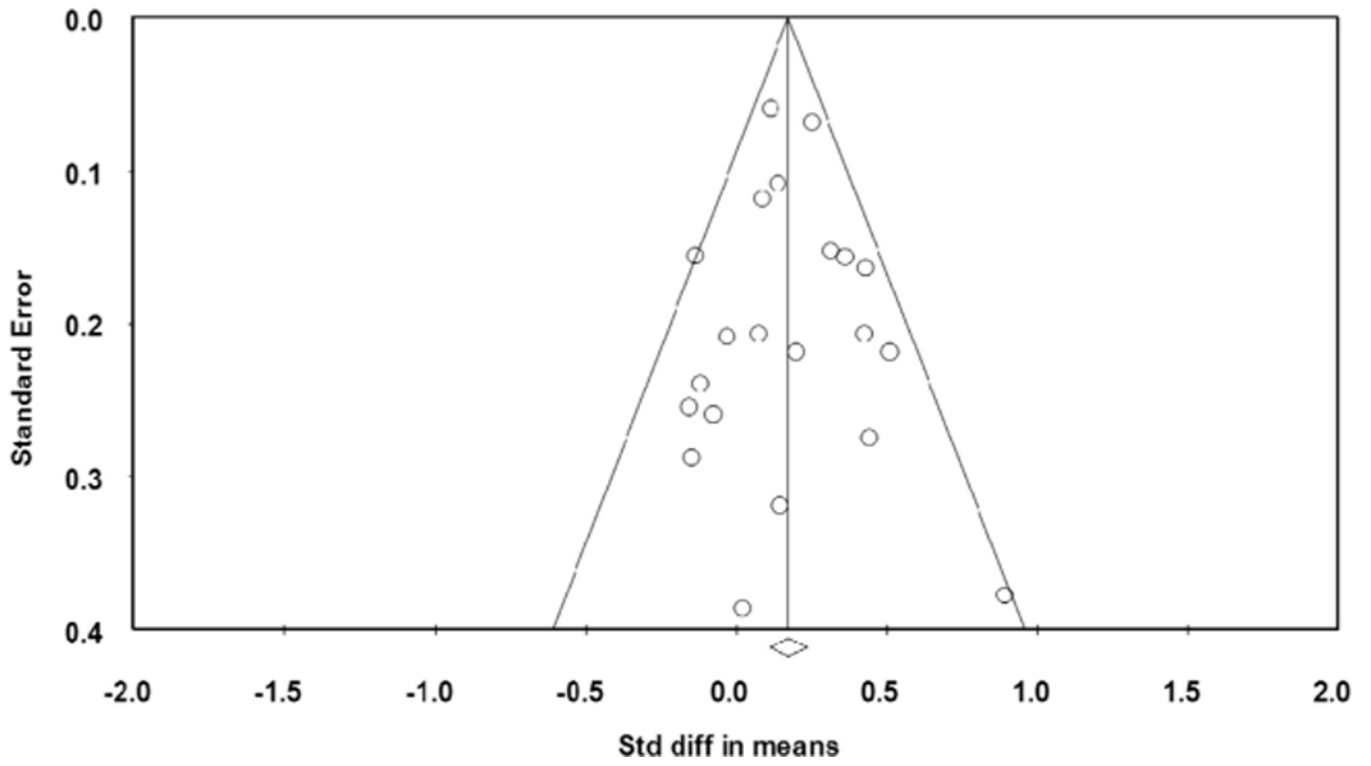


Fig. 4.
Funnel plot for reflection analysis.