

The Relationship between Co-rumination and Internalizing Problems: A Systematic Review and Meta-analysis

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Co-rumination refers to the process of engaging in repeated discussion of personal problems in dyadic relationships. The current systematic review and meta-analysis provided an evaluation of the relationship between co-rumination and internalizing problems in children, adolescents and young adults, along with an investigation of potential moderator variables. Studies were eligible for inclusion if they quantitatively assessed the relationship between co-rumination and depression, anxiety and/or internalizing problems using validated measures. An electronic search was conducted in PsycINFO, PsycARTICLES, Medline, Scopus and the Cochrane Library database of systematic reviews for studies published since 2002. In addition, unpublished studies were located by contacting authors in the field and by online searches of dissertation databases. Thirty-eight studies were deemed eligible for inclusion comprising a total of 12 829 community-based participants. A random-effects model was employed in the analysis, and effect sizes were obtained exclusively from cross-sectional data. Small to moderate effect sizes were found across four outcomes representing internalizing problems (mean corrected correlation range 0.14 to 0.26), with no significant variability across these variables. Female participants were found to score significantly higher on measures of co-rumination compared with males ($d = -0.55$). Moderator analyses revealed mixed findings. No significant effects were found for age, gender or publication status. A significant effect was found for co-rumination questionnaire version used ($p = 0.05$), and a marginal effect found for co-rumination partner (same-sex best friend versus other confidants; $p = 0.08$). These findings indicate that co-rumination may have a modest but significant association with internalizing problems. The implications of these findings and directions for further research are discussed. Copyright © 2016 John Wiley & Sons, Ltd.

Key Practitioner Message:

- Co-rumination has maladaptive (repetitive, unproductive discussion of problems) components, but also shows an association with friendship satisfaction.
- The current review found that co-rumination has small-moderate association with depression and anxiety.
- Practitioners should be aware of the way in which people discuss affective distress with others.

Keywords: Co-rumination, Depression, Anxiety, Meta-analysis

INTRODUCTION

Depressive rumination involves repetitive, unproductive thought about the causes and consequences of one's negative affective state (Nolen-Hoeksema, 1991). Although rumination may be considered a normal response to distress, it can become counterproductive if uncontrolled (Hilt & Pollak, 2013). In the Response Styles Theory, Nolen-Hoeksema (1987) proposed that women engage in depressive rumination more than men and that a

tendency to ruminate maintains or worsens depressive symptoms. A significant body of work supports these initial hypotheses in that rumination has been associated with increased risk of depressive symptoms (Muris, Fokke, & Kwik, 2009; Muris, Roelofs, Meesters, & Boomsma, 2004) with higher rates of rumination found amongst women (Johnson & Whisman, 2013; Jose & Brown, 2008; Rood *et al.*, 2009). Meta-analytic studies, such as Rood *et al.* (2009), have found moderate to large effect sizes on depression in child and adolescent samples.

Work on rumination has proliferated over recent decades and has been linked to psychological problems other than depression, such as anxiety (Michl, McLaughlin, Shepherd, & Nolen-Hoeksema, 2013).

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Rumination has been conceptualized amongst a wider group of constructs similarly characterized by self-focussed repetitive thought such as worry, negative automatic thoughts and obsessional thinking (Mor & Winquist, 2002). Specification of these phenomena has prompted a wider debate around what constitutes maladaptive and adaptive forms of repetitive thought. From this work it has been proposed that rumination involves both maladaptive 'brooding' and the more adaptive practice of 'reflection' (Rood *et al.*, 2009).

The broadening focus of rumination-related phenomena has extended to the interpersonal domain. Co-rumination has been construed as an interpersonal manifestation of rumination and has been proposed as a potential factor explaining observed gender differences in the occurrence of depression, particularly during adolescence and young adulthood. Rose (2002) developed the co-rumination construct and defined it as 'extensively discussing personal problems within a dyadic relationship and is characterized by frequently discussing problems, discussing the same problem repeatedly, mutual encouragement of discussing problems, speculating about problems and focussing on negative feelings' (p. 1830). Rose stated that co-rumination occurs in dyadic relationships, and research to date has concentrated on interactions in pairs. Excessive discussing of personal problems can presumably occur in larger groups. However, there is an absence of research conducted on this, at least under the co-rumination construct.

Watkins (2008) considered the consequences of repetitive thinking more broadly and also the potential conditions under which repetitive thought might be more or less constructive, distinguishing between moderating factors of thought valence, context and construal level (abstract or concrete). For example, Watkins noted that although worry is negative in valence, it might be a constructive process when the construal level is concrete as opposed to abstract. Importantly, Watkins' analysis indicated that repetitive thought of varying kinds can have beneficial effects on problem solving or can lead to internalizing problems. Similarly, co-rumination is proposed to yield both adaptive and maladaptive outcomes. Specifically, there is a potential trade-off between the anticipated positive effects on social and emotional well-being of confiding dyadic relationships and the negative effects of a repeated unproductive focus on problems (Rose, Carlson, & Waller, 2007). In developing the construct, Rose (2002) drew on the literature indicating that self-disclosure is associated with increased perceived friendship quality and proposed that since co-rumination is typified by intense emotional conversations, then it is likely to enhance feelings of relationship closeness. Rose further supported this position by drawing on the friendship literature suggesting that positive effects of disclosure on relationship quality can be produced regardless of whether conversations

focus on positive or negative topics. In terms of the proposed negative effects of co-rumination, Rose drew attention to the conceptual overlap between co-rumination and rumination in that both involve a negative unproductive focus on problems. In support of these hypotheses, Rose (2002) reported a positive relationship between measures of the two constructs ($r = 0.46$), a finding that was subsequently replicated by Jose, Wilkins, and Spendelov (2012) when measuring both constructs at three different time points ($r = 0.46$ to 0.53). Other research supports that rumination and co-rumination are related but distinct concepts (Calmes & Roberts, 2008).

In the first empirical study of co-rumination Rose (2002) posited that (1) co-rumination would be positively correlated with depression and anxiety (2) co-rumination would be positively related to disclosure and friendship quality, (3) girls would report more co-rumination than boys. Rose found support for each of these predictions with co-rumination positively correlated with internalizing symptoms ($r = 0.20$, $p < 0.001$), self-disclosure ($r = 0.61$, $p < 0.001$) and self-reported friendship quality and closeness ($r = 0.45$, $p < 0.001$). Higher rates of co-rumination were also found in older girls. Furthermore, Rose found a weaker relationship between co-rumination and internalizing problems compared with rumination and internalizing problems ($r = 0.59$, $p < 0.001$), and a negative relationship between co-rumination and internalizing problems when rumination and co-rumination were entered into a regression analysis (rumination was a significant positive predictor). Rose interpreted this last finding as representing the effect of the positive support-seeking aspects of co-rumination on internalizing problems once the negative effects of rumination had been controlled.

Subsequent non-experimental studies have provided support for Rose's (2002) initial findings that co-rumination is related to depression concurrently (Calmes & Roberts, 2008; Rose *et al.*, 2007; Starr & Davila, 2009) and that it predicts depression onset (Stone, Hankin, Gibb, & Abela, 2011). All four of these studies utilized community samples, and two studies reported a minority of participants meeting clinical threshold according to the respective depression scale cut-off score (28% of participants in Starr & Davila, 2009; 24% in Stone *et al.*, 2011). These data indicate that findings are based on range of depression severity scores with an emphasis on sub-threshold depression. There have been conflicting findings regarding the magnitude of these effects. For instance, Bouchard and Shih (2013) reported a correlation of 0.08 (NS) between co-rumination and depression, whilst Stone *et al.* (2011) found a correlation of 0.49 ($p = 0.003$). One potential explanation for this variability is that clinical status might act as a moderator of affective distress outcomes.

Studies of co-rumination have provided further information on potential moderator variables, such as age

and type of co-rumination partner. Regarding age, Schwartz-Mette and Rose (2012) studied peer-to-peer contagion of internalizing problems and found that co-rumination mediated peer-to-peer contagion within adolescent dyads but not child dyads. This raises the question of developmental differences in the relationship between co-rumination and internalizing problems. The effect of co-rumination partner (same-sex best friend, as in Rose's original paradigm versus other relationship dyads) has also been evaluated in some studies. For example, Calmes and Roberts (2008) investigated co-rumination with four different co-rumination partners but found that only co-rumination with same-sex best friend was consistently associated with internalizing problems.

The Co-Rumination Questionnaire (CRQ; Rose, 2002) was developed to operationalize the occurrence of co-rumination within close same-sex friendships in childhood and adolescence. The original scale comprises 27 items rated on a 5-point Likert scale (1—'Not at all true' to 5—'Really true'). The 27 items are said to represent nine content areas each marked by three items. Although comprising nine content areas, exploratory factor analysis in Rose's original paper yielded a single factor (Cronbach's alpha 0.96; all loadings > 0.45). Since publication of the original CRQ, a number of shortened versions of the original CRQ have been used in the literature (e.g., Hankin, Stone, & Wright, 2010).

The foregoing discussion suggests that the study of co-rumination represents a potentially important contribution to understanding the onset and exacerbation of internalizing problems in youth. A systematic review and synthesis of previous research are required to summarize extant research and identify future research priorities. The main objective of the current review was to quantify the relationship between co-rumination and internalizing problems. A second objective was to assess the role of potential moderators of this relationship as identified through previous research. These variables were age, co-rumination partner and gender. In addition, other potential moderator variables were analysed in the current review including CRQ version (Rose's (2002) original versus subsequent modified versions), publication status (published versus unpublished).

METHOD

Eligibility Criteria

Studies assessing the relationship between co-rumination and internalizing problems in children, adolescents and young adults were eligible for inclusion in the current review. Studies were required to have used Rose's (2002) CRQ or a modified version. We set this criterion because the CRQ is the most frequently used method of operationalizing co-

rumination quantitatively in the literature, and we considered it useful for clinicians in practice to know if the modified self-report version might yield different effect sizes estimates to the original version. Studies also needed to have utilized a recognized and well-validated measure of depression, anxiety and/or internalizing problems. There was no restriction on study duration, sampling strategies used or study geographical location/cultural context. Studies utilizing both clinical and non-clinical participants were also eligible. Studies with participants diagnosed with learning disabilities and alcohol or substance use were not eligible for inclusion.

Search Strategy

The following electronic databases were searched in May 2015: PsycINFO, PsycARTICLES, Medline, Scopus and the Cochrane Library database of systematic reviews. The search was conducted with no language restriction on studies conducted from 2002 to 2015. The year 2002 was selected because this was the year of Rose's original paper on co-rumination. Search terms were built from a preliminary review of the literature. The search utilized the following terms: *co-rumination* or *corumination*, *depress** or *mood* or *dysthymi**, *anxi** or *stress* or *worry* or *phobia*, *psychiatric* or *psychopatholog** or *mental disorders* or *internalizing*. Further online searches using Google and Google Scholar were conducted to locate additional unpublished studies not listed in the above databases. Several published authors in the field of co-rumination were also directly contacted to identify any unpublished datasets.

After duplicate papers were removed, titles and abstracts of remaining papers were screened. Full-text review of each of the remaining papers was conducted whereby publications were either excluded or included in the current review. Two of the study authors (JS & LS) independently screened all published papers following the removal of duplicates. Selection/exclusion results were then compared, and any discrepancies were resolved through discussion, but no formal inter-rater reliability statistic was calculated based on the small number of objective inclusion criteria used for the review.

Data Extraction

Data extracted from each paper included (1) sample characteristics including age, gender, ethnicity, and population (clinical, non-clinical); (2) study location and study design details; (3) study measures for co-rumination, depression, anxiety and/or internalizing symptoms; (4) co-rumination partner; (5) reported effect size data quantifying the association between internalizing problems and co-rumination (depression, anxiety and composite internalizing problem measures); and (6) psychometric data on the co-rumination measurement instrument used. Regarding

effect sizes for co-rumination, only data for total CRQ scores were extracted. This approach was adopted to retain consistency with effect size calculations, given the majority of included studies reported only effect sizes on the total CRQ score. In addition, effect size calculations were made based only on cross-sectional data. This was performed in order to maintain sample independence.

For the moderation analyses, five dichotomous variables were constructed for age, co-rumination measure, co-rumination partner, publication status and gender. The variable 'age group' was constructed to represent studies with younger (age range from 8 to 19 years and mean age below 18) or older (mean age over 18 years) (Table 1) participants. Although this dichotomization does not illuminate potential differences in the relationship between co-rumination and internalizing problems across childhood and adolescence, studies of co-rumination were not located that focussed solely on children. Those studies that recruited children and adolescents mostly did not report the relationship between co-rumination and internalizing problems by age group. Although the dichotomization of age as operationalized here results in a loss of information, we considered that the analysis would nevertheless give useful information regarding potential differences in the relationship between co-rumination and internalizing problems in childhood/adolescence versus late adolescence/early adulthood. 'Co-rumination partner' was comprised of same-sex best friend in one category and any other co-rumination partner (e.g., parent and roommate) in the other (Table 2). 'CRQ version' referred to studies using either the original, CRQ or any modified version of this measure (Table 3). The variable 'publication status' was constructed to represent whether an included study was sourced from the published or unpublished literature.

Coding and Effect Size

All analyses were run using Comprehensive Meta-Analysis software (Borenstein & Rothstein, 1999). The correlation coefficient (r statistic) was the focus of the current study. All studies reported the effect size r with one exception (Stone, Uhrlass, & Gibb, 2010), where the odds ratio and confidence intervals reported were transformed into the r statistic. All correlations were transformed using the Fisher's z transformation (Hedges & Olkin, 1985), and analyses were performed using this index before converting back into correlations for results. Hunter and Schmidt (1990, 1994) outline a variety of effect size adjustments for meta-analysis (e.g., unreliability of variables). However, due to insufficient and inconsistent information reported across and within studies, it was deemed appropriate to leave all effect sizes unadjusted with the aim of keeping effect sizes more comparable. Thus, effect sizes were corrected for sampling error but for no other

artefacts. Distributions of effect sizes were examined to determine the presence of any outliers of which none were identified which warranted removal or adjustment according to the procedure of Hedges and Olkin (1985).

Meta-analysis assumes that effect sizes are statistically independent (Glass, McGaw, & Smith, 1981). In order to maintain sample independence, if a study reported correlations between co-rumination and the same outcome (e.g., depression) across multiple time points then only the first time point was used. Also, if a study used measures of co-rumination with multiple 'any other' partners (e.g., Calmes & Roberts, 2008) then these correlations were averaged yielding one single effect size. Furthermore, some studies reported more than one co-rumination-outcome correlation (e.g., reported correlations for co-rumination with both anxiety and depression). Given that it was partly of current interest to explore the difference in effect sizes across outcomes, it was decided that rather than treating each outcome as a separate unit, a synthetic effect size for each study which reported multiple outcome data was calculated as the unit of analysis. This 'combined' outcome variable represents the difference between effect sizes in a single study with a variance that takes account of the correlation among the different outcomes measured (Borenstein, Hedges, Higgins, & Rothstein, 2011). Similarly, one study (Whitton & Kuryluk, 2013) for example reported effect sizes only by gender, and in this case a mean effect size for the study was computed (thus, analyses were conducted with study as the unit of analysis). One exception to meeting the assumption of independence was the inclusion of two effect sizes from the same study sample that offered representation of different moderator variables (i.e., co-rumination partner or gender). It was decided given the centrality of investigating different moderator variables in the current work that the information lost with the aim of avoiding statistical dependence here would even further limit results.

Once a final set of effect sizes was achieved, sample-weighted mean effect sizes and confidence intervals around the mean effect sizes were calculated. Confidence intervals were based on the standard error of the mean in question and a critical value from the z distribution which represents the desired confidence level (Hunter & Schmidt, 2004). For all current meta-analytic analyses, the desired confidence level was set at 95%. Any confidence intervals which included 0 were interpreted as a non-significant effect. Homogeneity analyses to address hypotheses were tested using the Q statistic, which is distributed as a chi-squared with $k - 1$ degrees of freedom, where k is the number of effect sizes (Hedges & Olkin, 1985). A significant Q was taken as indication of systematic variance among effect sizes highlighting the presence of moderator variables. In order to investigate whether mean correlations differ as a function of the key moderator variables in question,

Table 1. Details of included studies

Study	Age range	Mean sge (SD)	<i>n</i>	Male	Female	Population	Country	% White/Caucasian
Abraibesh (2010)*	17–23	19.46 (1.24)	56	0	56	University	USA	75
	17–22	19.15 (1.16)	63	0	63	University	Ecuador	11
Arroyo (2013)*	-	20.15 (1.39)	239	0	239	University	USA	74
	-	20.48 (4.36)	239	0	239	University	USA	72
Barstead, Bouchard, and Shih (2013)	18–25	19.49 (1.22)	283	115	168	University	USA	90
Bastin <i>et al.</i> (2014a)	9–15	11.72	368	136	232	School	Belgium	-
Bastin <i>et al.</i> (2014b)	-	11.73 (1.10)	371	137	234	School	USA	-
Bergeron (2013)*	17–42	19.09 (2.3)	597	297	300	University	USA	90
Bouchard and Shih (2013)	18–25	19.66 (1.25)	364	156	208	University	USA	90
Calmes and Roberts (2008)	18–45	19.7 (3.1)	345	125	220	University	USA	56
Dam <i>et al.</i> (2013)	12–15	13.8 (0.7)	233	117	116	School	Netherlands	95
Davidson <i>et al.</i> (2014)	-	19.9 (2.8)	362	120	242	University	USA	84
Davila <i>et al.</i> (2012)	18–46	20.22 (2.90)	384	123	261	University	USA	44
	18–34	19.44 (2.05)	334	127	207	University	USA	41
Dombrowski (2014)*	-	18.27 (0.59)	303	92	211	University	USA	76
Doyle (2013)*	-	18.71 (1.01)	441	0	441	University	USA	73
El Ramahi (2010)*	18–57	22***	353	106	246	University	USA	78
Felton (2011)*	10–15**	-	363	157	206	School	USA	87
Gelb (2013)*	-	M: 20.58 (4.53)	178	40	138	University	USA	25
	-	F: 21.75 (6.00)						38
Hankin <i>et al.</i> (2010)	11–17	14.5 (1.40)	350	150	200	School	USA	53
Jose <i>et al.</i> (2012)	13–16	-	575	197	378	School	New Zealand	81
Larsen (2011)*	18–24	19 (-)	131^^	56	73	University	USA	73
Lloyd (2014)*	-	14.7 (1.88)	92	41	51	School	Canada	80
Mathieson (2013)*	10–15	13.4	499	246	253	School	USA	81
Nicolai <i>et al.</i> (2013)	14–19	16.4 (1.33)	111	31	80	School	USA	75
Peterson (2012)*	18–25	-	31	0	31	University	USA	72
Rose (2002)	8–16	-	608	286	322	School	USA	87
Rose <i>et al.</i> (2007)	8–16	-	813	397	416	School	USA	86
Rudiger and Winstead (2013)	18–35	20 (3.07)	203	0	203	University	USA	62
Schwartz-Mette and Rose (2012)	8–16	-	548	260	288	School	USA	86
Smith-Schrandt (2014)*	18–54	20.62 (3.80)	601	127	474	University	USA	58
Starr and Davila (2009)	11–15	13.45 (0.68)	83	0	83	School	USA	89
Stone and Gibb (2015)	-	14.16 (.44)	192	-	-	School	USA	-
Stone <i>et al.</i> (2010)	9–14	11.35 (1.41)	81	34	47	Community	USA	79
Stone <i>et al.</i> (2011)	11–15	-	106	40	66	Community	USA	55
Tompkins, Hockett, Abraibesh, and Witt (2011)	14–19	16.84 (1.09)	146	45	101	School	USA	75
Tompkins & Tang (2011)*	-	19.6	102	46	56	University	USA	80
Waller and Rose (2010)	10–18	-	516	239	277	School	USA	86
Waller and Rose (2013)	10–18	-	393	173	220	School	USA	87
White and Shih (2012)	18–25	-	288	99	189	University	USA	89
Whitton and Kuryluk (2013)	18–25	19.13	484	126	358	University	USA	86

- Data not reported.

*Unpublished study.

^Two participant groups ('student' and 'friend').

**Age range estimated from student grade level information.

***Median age.

^^Two participants did not provide gender data.

weighted least squares ANOVAs for categorical variables were run (Hedges & Vevea, 1998). This approach partitions the total homogeneity statistic *Q* into the portion explained by the categorical variable of interest (*Q_b*) and the residual pooled within groups portion

(*Q_w*). A significant *Q_b* indicates that the magnitude of the effects differs between the categories of the coded moderator variable; i.e., the moderator variable provides a significant contribution to the variance in the set of effect sizes.

Table 2. Study design and co-rumination measurement

Study	Design	Measure of mood / anxiety	Co-rumination partner	CRQ variation	Reliability
Abraibesh (2010)	CS	BDI-II	CSS		α 0.93 and 0.97
Arroyo (2013)*	CS	CES-D sf	CSS	9 items, highest-loading from each of the 9 original factors	α 0.91 student; 0.91 friend
Barstead <i>et al.</i> (2013)	CS	BDI-II	BF; CC		α 0.95
Bastin <i>et al.</i> (2014a)	L	CDI	CSS		α 0.95
Bastin <i>et al.</i> (2014b)*	L	CDI	CSS	11 items, based on author identification of 'co-brooding' and 'co-reflection' items	-
Bergeron (2013)	CS	BDI-II	CSS		α 0.97
Bouchard and Shih (2013)	L	BDI-II	CSS		α 0.96
Calmes and Roberts (2008)*	CS	BDI-II, BAI	BF; PA; PAR; RM	16 items based on unpublished factor analysis data, 4 versions (CR with same-sex friend, romantic partner, parent and roommate)	α 0.94 to 0.98
Dam <i>et al.</i> (2013)	CS	BDI-II	CSS		α 0.96
Davidson <i>et al.</i> (2014)	CS	CES-D, PSWQ	CSS		α 0.94, 0.85 and 0.85
Davila <i>et al.</i> (2012)	CS	BDI-II	CSS		α 0.96
	L	CES-D	CSS		
Dombrowski (2014)	CS	BDI-II, BAI, PSWQ	CSS		α 0.96
Doyle (2013)*	CS	STAI	CSS	9 items, modified wording to tap discussions about weight, eating and body image	α 0.90
El Ramahi (2010)	CS	BDI-II	CSS		α 0.96
Felton (2011)	L	CDI, CES-D, SMFQ	CSS		α 0.96 and 0.97
Gelb (2013)*	CS	BDI-II, BAI, DASS-21	CSS	16 items, two items with highest factor loadings from each sub-scale	α 0.95
Hankin <i>et al.</i> (2010)*	L	MASQ, CDI	CSS	9 items, one for each of the 9 content areas identified in original CRQ	α 0.89 to 0.91; retest 0.22 (5 m)
Jose <i>et al.</i> (2012)*	L	SAS-A	CSS	9 items, highest-loading from each of the 9 original factors	α 0.91 to 0.92; retest 0.70 to 0.73 ³
Larsen (2011)	CS	CES-D, BAI	CSS		-
Lloyd (2014)	CS	CES-D	CSS		α 0.96
Mathieson (2013)*	CS	CDI modified	CSS	9 items, modified wording to tap when participants discuss being bullied	α 0.91
Nicolai <i>et al.</i> (2013)*	L	CDI, CDI-S	CSS	3 items from the original CRQ, detail of how items were selected not reported	α 0.87 to 0.94; retest 0.18 to 0.49 ⁴
Peterson (2012)	L	CES-D, SIAS	CSS		α not reported; retest 0.67–0.80
Rose (2002)	CS	CDI, RCMAS (composite)	CSS		α 0.96 and 0.96
Rose <i>et al.</i> (2007)	L	CDI, RCMAS-R	CSS		α 0.97 ¹ ; retest 0.54 ²
Rudiger and Winstead (2013)*	CS	CES-D	CSS	Original version with modified wording to tap CR related to eating and body image	α 0.97
Schwartz-Mette and Rose (2012)	L	CDI, CMAS	CSS		α 0.97
Smith-Schrandt (2014)*	CS	DASS, SIAS	CSS	9 items, highest-loading from each of the 9 original factors with minor wording changes	α 0.94
Starr and Davila (2009)	L	CES-D, SAS-A	CSS		α 0.95

(Continues)

Table 2. (Continued)

Study	Design	Measure of mood /anxiety	Co-rumination partner	CRQ variation	Reliability
Stone and Gibb (2015)	L	CDI modified	CSS		α 0.86 and 0.80; retest 0.25 (6 m)
Stone <i>et al.</i> (2010)	CS	K-SADS-PL, CDI	CSS		α 0.97
Stone <i>et al.</i> (2011)*	L	CDI	CSS	9 items, highest-loading from each of the 9 original factors	α 0.89
Tompkins <i>et al.</i> (2011)	CS	YSR	CSS		α 0.96
Tompkins & Tang (2011)	L	BDI-II, AMAS-C	CSS		α 0.90; retest 0.52 (12 m)
Waller and Rose (2010)*	CS	YSR	PA	16 items, 8 items with the highest loadings from Rose (2002) presented as two scales to reflect mother-child CR ⁵	α 0.91 and 0.94 ⁶
Waller and Rose (2013)*	CS	YSR	BF; PA	Waller and Rose's (2010) version, 4 scales each with 8 items ⁷	α 0.91–0.98
White and Shih (2012)*	L	POMS-sf (daily mood score), BDI-II	CC	Original CRQ modified to tap trait (typical CR with closest confidant), and 11 of the original 27 items chosen to tap daily CR	α not reported; retest 0.21 (7 days)
Whitton and Kuryluk (2013)	CS	CES-D	CSS		α 0.94 men; 0.96 women

¹At both time points.

²Interval denoted as 'fall' and 'spring'.

³Three administrations at 3-monthly intervals.

⁴Baseline followed by 8-weekly administrations and 4-week follow-up.

⁵One scale for child's problems as the focus of CR and one for the mother's problems as the focus.

⁶Child's problems as focus and mother's problems as focus, respectively.

⁷Four scales represent CR with mother adolescent's problems, CR with mother mother's problems; CR with friend adolescent's problems, CR with friend friend's problems; 6 m = 6 months; 12 m = 12 months; 5 m = 5 months.

*CRQ = Modified Co-Rumination Questionnaire.

CRQ = Co-Rumination Questionnaire (Rose, 2002); CR = co-rumination; BF = best friend; CSS = close same-sex friend; PA = parent; PAR = partner; RM = roommate; BDI-II = Beck Depression Inventory II (Beck *et al.*, 1988); BAI = Beck Anxiety Index (Beck *et al.*, 1988); SAS-A = Social Anxiety Scale for Adolescents (La Greca & Lopez, 1998); CDI = Children's Depression Inventory (Kovacs, 1981); CDI modified (suicidality items excluded); CDI-S = Children's Depression Inventory- short form (Kovacs, 1992); PSWQ = Penn State Worry Questionnaire (Meyer *et al.*, 1990); RCMAS = Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 1978); CES-D = Center for Epidemiological Studies-Depression Scale (Radloff, 1977); CES-D sf = Centre for Epidemiological Studies-Depression Scale Short Form (Zhang *et al.*, 2012); YSR = Youth Self-Report; anxious/depressed subscale (Achenbach & Rescorla, 2001); POMS-sf = Profile of Mood States Short Form (Shacham, 1983); AMAS-C = Adult Manifest Anxiety Scale (Lowe *et al.*, 2005); MASQ (anxiety subscale, Watson *et al.*, 1995); STAI = Spielberger Trait Anxiety Inventory (Spielberger *et al.*, 1970); SMFQ = Short Mood and Feelings Questionnaire (Angold *et al.*, 1995); SIAS = Social Interaction and Social Phobia Scale (Mattick & Clarke, 1998); DASS & DASS-21 = Depression Anxiety Stress Scale (Lovibond & Lovibond, 1995).

RESULTS

Description of Included Studies

Thirty-eight studies met review inclusion criteria from a pool of 105 retrieved from the initial study search. Refer to Figure 1 for a flow chart of the study screening process. Details of included studies can be found in Table 1. Studies included in the current review were published between 2002 and 2015. The total sample size across all included studies was 12 829 participants. Of the included studies, 27 reported mean age and this ranged from 11.35 to 21.75. In most studies, female participants outweighed male participants, and participants identified themselves as White/Caucasian in the majority of studies. In 18 studies, this ethnic category constituted over 80% of

the sample. Seventeen studies obtained samples from schools, 19 from universities and two from the general community. The majority of studies were conducted in the USA.

Information regarding design of included studies can be found in Table 2. Cross-sectional designs were employed in 23 studies. Experimental designs were not utilized in any of the included studies. In longitudinal designs, study duration ranged from 1 week to 2 years. As specified in the search strategy, all studies utilized either the original CRQ (23 studies) or a modified version of this instrument (15). The most common measures of depression were the Children's Depression Inventory (Kovacs, 1981), the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) and the Center for Epidemiological Studies-Depression Scale (Radloff, 1977). Other

Table 3. Mean effect sizes

	<i>k</i>	<i>n</i>	<i>ρ</i>	<i>SDρ</i>	95% Lower	95% Upper	<i>Z</i>	<i>p</i>	<i>Q</i>	<i>p</i>
Outcome <i>Qb</i> (3) = 2.85, <i>p</i> = 0.41										
Anxiety	2	1016	0.26	0.04	0.14	0.37	4.11	<0.001	1.83	0.18
Depression	24	6951	0.16	0.09	0.12	0.20	7.80	<0.001	81.59	<0.001
Internalizing	4	1333	0.16	0.05	0.06	0.25	3.17	0.002	5.51	0.14
Combined	11	3520	0.14	0.07	0.09	0.20	4.82	<0.001	31.54	<0.001

Note. *k* = total number of effect sizes in analysis; *n* = total sample size across studies; *ρ* = mean of corrected correlation; *SDρ* = standard deviation of corrected correlation; 95% *Lower* = lower bound of 95% confidence interval; 95% *Upper* = upper bound of 95% confidence interval; *Z* = z-value of test for significant effect size (with *p* value); *Q* = Cochran’s 91 954 measure of homogeneity (with *p* value); *Qb* = ANOVA between groups sum of squares.

instruments used are listed in Table 2 (each used in one study only). Several anxiety measures were used across studies, but each was used only once. The Youth Self-Report (Achenbach & Rescorla, 2001) was used in three studies to measure internalizing symptoms via the anxious/depressed sub-scale on this measure. Table 2 also shows that 34 of the included studies asked participants to consider co-rumination with a ‘close same-sex friend’ only, in line with instructions provided in the original CRQ. In the remaining studies, co-rumination was measured with a variety of other partners (e.g., ‘best friend’ and ‘parent’).

Co-rumination Measurement

Amongst the studies included in the current review, nine used the original unmodified CRQ, whilst 15 used a modified version. Table 2 presents details of modifications plus psychometric data for the CRQ in all studies reviewed. Modifications to the CRQ typically comprised shortened versions based on the factor loadings from Rose’s (2002) initial study (loadings not reported in the original paper) or alterations to co-rumination partner (e.g., co-rumination with a parent versus same-sex friend). This sometimes resulted in the derivation of several indices of co-rumination from the same respondent.

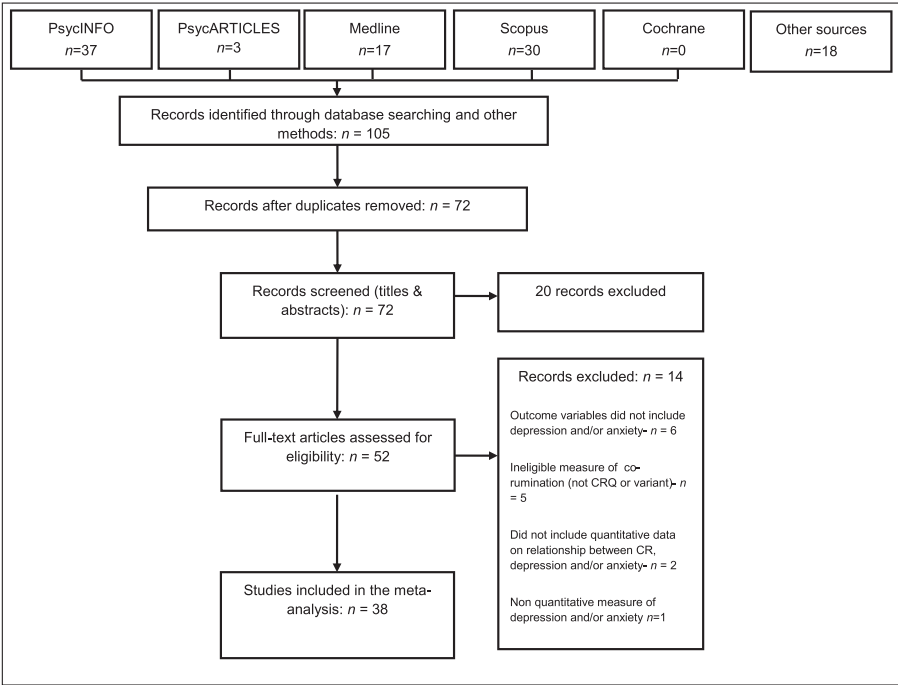


Figure 1. Study selection process flow chart

Of the studies reviewed that used the CRQ or a modified version subsequent to Rose's (2002) initial study, one (Dam, Roelofs, & Muris, 2013) presented a factor analysis of the CRQ. This study reported a 3-factor solution accounting for 65% of the variance. The three sub-scales were labelled 'comprehension' (focussed on understanding the problem), 'frequency' (amount of time spent co-ruminating) and 'detailed discussion' (tendency to dwell on problems). Sub-scale inter-correlations were 0.62 to 0.66. Of note, all sub-scale correlations with depression were small but highest for comprehension (0.22 versus 0.10 with frequency and 0.12 with tendency to dwell). All other studies have assumed a uni-factorial structure to co-rumination. A consistent finding is that Cronbach's alpha analysis across the studies produces very high internal reliability estimates. Whilst this perhaps indicates a degree of item redundancy, this may also be a function of the scale's length (Tavakol & Dennick, 2011). Temporal stability of the CRQ measures is highly variable (0.18 to 0.80). Data reported in Table 2 suggest that this variability is not related to time interval.

Meta-analytic Findings

All meta-analyses were conducted using a random effects model. The final data set consisted of a total of 71 effect sizes. However, the number of effect sizes reduced to 41 once adjustments described above in the *Coding and Effect Size* section had been applied. For the gender moderator analysis, there were 34 effect sizes because not all studies reported findings by gender groups. Frequency analyses for the moderator variables of Age Group, CRQ Version, Co-rumination Partner and Publication Status revealed that 62% of the effects represented older samples, 59.2% of the effects represented the original CRQ Version, 93% of the effects represented the original co-rumination partner paradigm (i.e., same-sex best friend) and 47.9% of the effects represented published data.

Overall analyses grouped by the outcome variables were performed (Anxiety, Depression and Internalizing). Importantly, given that a summary effect size for each study was calculated as the unit of analysis (only for those studies which reported multiple outcome data) (Borenstein *et al.*, 2011), a new outcome category 'Combined' was created, which included 11 summative effect sizes. A summary of the overall relations between co-rumination and the different outcomes is presented in Table 3. Mean effect sizes for each of the four outcomes were significant indicating that co-rumination scores appear to be related to all four outcomes, represented by small to medium effect sizes (Cohen, 1988). However, the number of independent observations, on which these estimates were based, is low for all outcomes except depression. Importantly, there was no significant variability across these outcome effects, ($\chi^2[3] = 2.85$,

$p = 0.41$), suggesting that the relationship of co-rumination scores with each of these outcomes is similar.

Moderator Analyses

It was not possible to run moderator analyses separately for each outcome of interest. This was because, if done so, there would be many moderator categories with less than four study correlations to analyse and in some cases moderator categories not even represented. Thus, moderator analyses were run on all effect sizes collectively, using the synthetic effect size as the unit of analysis (the *Combined* outcome) for studies which reported multiple outcome data. Importantly, homogeneity analyses on the collective set of effect sizes indicated that there was significant variation in effect sizes ($\chi^2[40] = 132.69$, $p < 0.001$), indicating there to be scope for investigation of moderator variables. All moderator analyses are reported in Table 4.

For age group no significant moderation was found. Results showed that younger ($\rho = 0.18$) relative to older participant groups ($\rho = 0.14$) ($\chi^2[1] = 1.29$, $p = 0.26$) explain no excess variability among effect sizes. For the variable of CRQ Version, significant moderation was found with results showing that use of the original CRQ Version ($\rho = 0.18$) relative to use of a revised CRQ Version ($\rho = 0.13$) produces significantly larger effect sizes ($\chi^2[1] = 3.67$, $p = 0.05$). For co-rumination partner a marginal effect was found, with use of the original same-sex best friend paradigm ($\rho = 0.17$) producing (marginally) significantly larger effects than use of other co-rumination partner combinations ($\rho = 0.09$) ($\chi^2[1] = 3.06$, $p = 0.08$). In Table 4 it can be seen that greater variability exists for the 'other' group on the confidence interval for the mean corrected correlation. For gender, results showed that whether the effect size was derived from male ($\rho = 0.06$) or female ($\rho = 0.10$) participants did not act as a significant moderator ($\chi^2[1] = 0.156$, $p = 0.69$). Finally, for Publication Status, results showed that whether a study was from the published literature ($\rho = 0.16$) or unpublished literature ($\rho = 0.16$), it did not act as a significant moderator ($\chi^2[1] = 0.006$, $p = 0.94$).

Gender Analyses

It was also of current interest to explore the extent of gender differences in co-rumination scores.^{1 2} In order to run these analyses, rather than the r statistic, the standardized mean difference between two comparison groups formed the focus of these analyses, the d statistic (Cohen,

¹Co-rumination scores explored in this analysis included both original and revised CRQ version scores. Where a single study provided both an original and revised CRQ score, an average was taken allowing for a single effect size per study to be included in the analysis.

²Only a subset of the original 71 effect sizes included came from studies which provided relevant gender data; thus, this gender analysis was based on a smaller number of effect sizes ($k = 20$).

Table 4. Moderator analyses

	<i>k</i>	<i>n</i>	ρ	<i>SD</i> ρ	95% Lower	95% Upper	<i>Z</i>	<i>p</i>	<i>Q</i>	<i>p</i>
Age <i>Qb</i> (1) = 1.29, <i>p</i> = 0.26										
Younger	19	6118	0.18	0.09	0.14	0.22	7.95	<0.001	69.45	<0.001
Older	22	6684	0.14	0.07	0.10	0.18	7.04	<0.001	55.92	<0.001
CRQ version <i>Qb</i> (1) = 3.67, <i>p</i> = 0.05										
Original	24	7477	0.18	0.04	0.15	0.22	9.56	<0.001	36.56	0.04
Revised	17	5325	0.13	0.10	0.09	0.17	5.87	<0.001	76.81	<0.001
Co-rumination partner <i>Qb</i> (1) = 3.06, <i>p</i> = 0.08										
Same-sex friend	36	11 376	0.17	0.08	0.14	0.20	10.57	<0.001	119.74	<0.001
Other partners	5	1426	0.09	0.04	0.005	0.17	2.06	0.04	5.67	0.22
Gender <i>Qb</i> (1) = 0.156, <i>p</i> = 0.69										
Male	17	1691	0.06	0.08	0.02	0.10	2.95	0.003	30.65	0.015
Female	17	2642	0.10	0.08	0.06	0.13	5.69	<0.001	35.37	0.004
Publication status <i>Qb</i> (1) = 0.006, <i>p</i> = 0.94										
Unpublished	14	4049	0.16	0.10	0.11	0.21	5.95	<0.001	71.77	<0.001
Published	27	8753	0.16	0.06	0.12	0.20	8.40	<0.001	60.28	<0.001

Note. *k* = total number of effect sizes in analysis; *n* = total sample size across studies; ρ = mean of corrected correlation; *SD* ρ = standard deviation of corrected correlation; 95% Lower = lower bound of 95% confidence interval; 95% Upper = upper bound of 95% confidence interval; *Z* = z-value of test for significant effect size (with *p* value); *Q* = Cochran's (1954) measure of homogeneity (with *p* value); *Qb* = ANOVA between groups sum of squares.

1988; Hedges & Olkin, 1985). Effect sizes were computed using group means, standard deviations and sample size.³ Importantly, in all cases, male scores were compared with female scores, with effect size direction coded as negative (higher co-rumination scores for women relative to men). Results are reported in Table 5. Analyses indicate a medium, mean effect size ($d = -0.55$) with women scoring significantly higher in co-rumination relative to men.

DISCUSSION

The primary aim of the current review was to assess the relationship between co-rumination and internalizing problems. The meta-analytic findings suggest a small to moderate association between co-rumination and internalizing problems. Findings also indicated that the size of the effect does not differ significantly across measures of internalizing problems employed in the meta-analysis (i.e., anxiety, depression, internalizing and combined). However, the analysis only included two effect sizes for anxiety as an outcome variable. The analysis included more effect sizes for depression as an outcome (24 effect

sizes) and anxiety and depression combined (11 effect sizes). Therefore, this aspect of the analysis is currently limited, and conclusions regarding the relative effect of co-rumination on depression, anxiety and internalizing problems more generally are premature until further studies have estimated the effect of co-rumination on anxiety. Furthermore, it is important to reiterate that effect size calculations were made on cross-sectional data, and inferences about directionality between co-rumination and psychological distress can only be hypothesized (but have been reported in longitudinal data; e.g., Davila *et al.*, 2012). Notwithstanding the limited data for anxiety, these findings have clinical importance since they suggest that engaging in repetitive, unproductive problem-focussed discussions within close relationships may promote affective distress and that those with affective distress might attempt to manage it by engaging in problem-focussed discussions that actually exacerbate this distress. Therefore, clinical intervention might focus both on the interpersonal strategies that those with anxiety and/or depression utilize to manage distressing situations and also to help those with affective distress to consider that the ways in which they deal with problems might be counterproductive. Although, as Rose (2002) noted, there are potential positive outcomes from co-rumination, such as greater relationship closeness and satisfaction, the repetitive and unproductive

³With the exception of Stone and Gibb (2015), where *r* was provided.

Table 5. Gender analyses

	<i>k</i>	<i>n</i>	<i>d</i>	SE	95% Lower	95% Upper	<i>Z</i>	<i>p</i>	<i>Q</i>	<i>p</i>
Co-rumination scores	20	7558	−0.55	0.06	−0.68	−0.43	−8.64	<0.001	135.83	

Note. *k* = total number of effect sizes in analysis; *n* = total sample size across studies (3049 male; 4509 female); *d* = mean effect; SE = standard error; 95% Lower = lower bound of 95% confidence interval; 95% Upper = upper bound of 95% confidence interval; *Z* = z-value of test for significant effect size (with *p* value); *Q* = Cochran's 91 954) measure of homogeneity (with *p* value).

nature of co-rumination might produce detrimental effects that outweigh these positive outcomes. Rose (2002) demonstrated that the relationship between co-rumination and internalizing problems was in fact negative after partialling out rumination scores, thus supporting the idea that there is a component to co-rumination that enhances well-being. However, as has been observed by others (e.g., Watkins, 2008) repetitive thinking is not uniformly counterproductive and depends on context and construal level. The understanding of co-rumination would be enhanced if different and potentially more adaptive variants of repetitive thought were operationalized within studies. That is, there might be forms of co-rumination, in which the actual repetitive thought itself produces beneficial effects or, at least, is not a detriment to well-being.

Given the preceding discussion, the fact that the summary effect sizes for the association between co-rumination and internalizing problems contrast with data reported previously for rumination is to be expected. For instance, medium to large effect sizes have been found for the relationship between co-rumination and depression amongst children and adolescents (Rood *et al.*, 2009). The current findings suggest that co-rumination has a more modest association with internalizing problems. However, these comparatively smaller effect sizes were predicted by Rose (2002) given that, as noted, co-rumination is construed as comprising maladaptive components (perseverative thinking on negative outcomes) but that it has potentially adaptive outcomes (increased intimacy and relationship satisfaction). Subsequent researchers have highlighted the importance of elucidating the conditions under which co-rumination might be associated with more negative outcomes. The current review has attempted to shed further light on this question through exploring possible moderator effects. We now turn to a discussion of findings from this moderator analysis.

The analysis indicated that effect sizes did not vary by participant age, gender or by publication status. In contrast, co-rumination questionnaire version was a significant moderator, and a marginal effect was found for co-rumination partner. Age was investigated as a potential moderator based on Schwartz-Mette and Rose's (2012) finding that co-rumination-mediated peer-to-peer depression contagion within adolescent dyads but not child dyads. This raises the interesting question as to whether the relationship between co-rumination and internalizing problems might vary by

developmental stage. However, for the purposes of the current meta-analysis, we were only able to constitute a dichotomous age variable representing younger (under 18) versus older (over 18) participants. Age was dichotomized in this way because those studies that recruited children and adolescents mostly did not report the relationship between co-rumination and internalizing problems by age group. This precluded a more fine-grained operationalization of the age moderator variable. Therefore, although the current moderator analysis suggests that age, as has been conceptualized in this study, is not a significant moderator the analysis lacks sensitivity. The younger age group comprised participants ranging in age from 8 to 18 years, thus encompassing a broad developmental span. As a result, whilst the current analysis is arguably useful given that it is the first to present an analysis of effect sizes by age group and also indicates that the co-rumination and internalizing problem association might not be stronger in younger people, the current analysis does not directly address the possibility, identified by Schwartz-Mette and Rose (2012), that the relationship between co-rumination and internalizing problems differs between childhood and adolescence (i.e., within our younger age group in this analysis). Further studies are required that allow the relationship between co-rumination and internalizing problems to be estimated within specific age groups or developmental stages. This would carry clinical as well as theoretical implications as it may identify specific periods of development, in which discussion of interpersonal problems might produce more negative effects on emotional well-being.

The current analysis suggests that there is some evidence that co-rumination partner moderates the relationship between co-rumination and internalizing problems with co-rumination in same-sex friendships producing larger effect sizes. This had been previously suggested by Calmes and Roberts (2008), who speculated that co-rumination with same-sex best friends might be qualitatively different to co-rumination in other relationships. For example, the former may be a more enmeshed relationship with a passive focus on more severe or intractable problems leading to higher levels of emotional distress. A limitation with the current moderator analysis is, however, that a number of different co-rumination partners comprised the comparison against same-sex best friend, given the small number of studies studying other co-rumination partners. The effect of co-ruminating within specific other types of relationships may therefore be

similar to that which occurs within same-sex best friend relationships. The current analysis is unable to address this possibility. Given the likelihood that problem discussions vary depending on the relationship with the discussion partner, additional studies are needed that estimate the effect size of co-rumination on internalizing problems with different types of co-rumination partner.

In the current study it was also of interest to explore whether the version of the CRQ utilized across studies explained variability in effect sizes. It might be anticipated that shortened versions of the CRQ might serve to attenuate the relationship between co-rumination and internalizing problems (e.g., sampling of a more restricted content area of co-rumination or reducing content validity). Given that several different shortened CRQ versions have been used in the literature, the moderator analysis compared all studies that had utilized any shortened version against studies that used the original 27-item version. The results of this analysis indicated that effect sizes did vary by CRQ version used such that larger effect sizes were derived when the original, longer version was used. However, the difference in effect sizes was modest. Therefore, and given that internal reliability estimates for the longer CRQ are very high (most exceeding 0.95), researchers might elect to choose shortened versions given the potential for item redundancy (as one potential explanation for high internal reliability) and participant burden in longer versions, particularly if investigating co-rumination with multiple partners or longitudinally (i.e., studies that require the respondent to complete the CRQ multiple times).

Significant gender differences were found with women reporting higher rates of co-rumination than men. This finding supports Rose's (2002) theoretical propositions and is similar to meta-analytic findings of gender differences in rumination. Gender differences in rates of co-rumination in favour of women might reflect greater self-disclosure in women found across several studies (Rose & Rudolph, 2006), which may result in more opportunity to co-ruminate. This gender difference in co-rumination is a consistent finding across studies and replicates similar patterns found for rumination. However, relatively few studies have investigated whether gender acts as a moderator of the relationship between co-rumination and internalizing problems. As such, this possibility was investigated in the current study albeit with the smaller subset of studies that had presented effect sizes stratified by gender. The current analysis indicates that effect sizes did not differ by gender, suggesting that the implications of co-rumination on affective well-being might be similar for men and women. This is an important finding as it suggests that even though there are consistent gender differences in the magnitude of co-rumination itself in favour of women, the effects of it may not be more detrimental to them.

Several limitations of the studies included in this review have been identified. The lack of experimental studies limits the extent to which causality can be established in the co-rumination-affective distress relationship. "Whilst there is a conceptual assumption that co-rumination predicts depression and anxiety, further experimental studies are needed to test this further, along with accounting better for possible confounds. Most of the included studies were conducted in the USA, which raises concerns of generalization and external validity. Further studies should be conducted outside the USA to assess the strength and direction of the relationship between co-rumination and internalizing problems as there may be variables which moderate this relationship (e.g., collectivist orientation). More heterogeneous samples should be sought to address generalizability given the over-representation of particular groups in the current review sample (e.g., women and students in higher education).

Caution is needed in the interpretation of moderator effects for CRQ version and co-rumination partner because of potential overlap between these variables. All but one study utilizing the original CRQ focussed on co-rumination between close same-sex friends. Whilst most studies utilizing a modified version of the CRQ did focus on close same-sex friends (11 of 15 studies), the remainder focussed on different co-rumination partners. Put another way, all but one of the small number of studies focussing on co-rumination partner other than close same-sex friend used a modified version of the CRQ. Methodological decisions are likely the reason for this. Those studies that focus on co-rumination with partners other than close same-sex friends have investigated multiple co-rumination partners and, therefore, have required the use of shortened versions, presumably to reduce participant burden. There is a need for greater measurement consistency across studies of different co-rumination partners so that the influence of measure version and co-rumination partner can be disambiguated.

Limitations

The current review specifically sought studies that explicitly used the term co-rumination. As others have discussed (e.g., Watkins, 2008), various other forms of repetitive thought have been characterized in the literature. The co-rumination search concept was not broadened in order to help ensure that the current analysis was not confounded through the inclusion of related but separate forms of repetitive thought. Research should be conducted to further characterize co-rumination in the context of similar constructs, and therefore the appropriateness of retaining co-rumination as a distinct concept.

The current review only included self-report measures of co-rumination based on Rose's (2002) CRQ. This was in order to retain clarity in the outcomes of the review

and to maximize clinical applications of findings through a focus on self-report measurement. Future studies should look to compare different co-rumination measures once sufficient studies exist, including methods other than self-report, to permit such analysis. A further limitation was that effect size calculations were made based only on cross-sectional data. This was to retain independence of samples, but does limit the discussion of important issues such as directionality between co-rumination and psychological distress.

In searching for studies that meet review inclusion criteria, known authors in the field of co-rumination were contacted to obtain additional/unpublished datasets. Whilst the authors believe the search strategy for this review was robust, direct contact with researchers does not guarantee that the list of included studies was an exhaustive one.

The current review also did not calculate a formal quantitative inter-rater reliability statistic at the study screening stage. This was due to a small number of objective core inclusion criteria used. Whilst this represents a methodological limitation, this is not believed to have led to any significant inclusion/exclusion of studies.

Implications and Recommendations

The most obvious implication of the current review is that more effect size estimates are needed of the relationship between co-rumination and internalizing problems and potential moderators of this relationship, particularly age/developmental stage and type of co-rumination partner. Relative to depression, anxiety has been assessed in fewer studies of co-rumination, and as a result, conclusions about the relative effect of co-rumination on anxiety compared with depression are currently limited. In their research on contagion of internalizing problems between peers, Schwartz-Mette and Rose (2012) make the point that co-ruminating with others is likely a risk for anxiety as well as depression for the co-rumination partner. By extension, it is likely that a repeated focus on troubling problems confers a risk for anxiety as well as depression in those experiencing distressing problems. The findings of the current review do not indicate that the size of the effect differs by internalizing measure used. However, the data at present are limited and require expansion. Specifically, relatively few studies in this review assessed the relationship between co-rumination and internalizing problems whilst controlling for comorbid issues. Therefore, the current analysis focussed only on zero-order correlations. However, Starr and Davila (2009) found a negative correlation between social anxiety and co-rumination when partialling out depression, thus underlining the importance of future studies measuring both anxiety and depression.

Similarly, although the moderator analyses in the current study contribute to the understanding of the potential conditions under which co-rumination is more strongly associated with negative outcomes, the current analyses are limited by the dichotomous approach taken to constitute moderator variables. More sensitivity in this analysis can only be gained by accumulating effect sizes on the effects of co-rumination by age and co-rumination partner. The current analysis also indicates potentially useful extensions to the current evidence base. For example, little attention has been paid to the gender or developmental stage congruence of the co-ruminating dyad and if these factors moderate the co-rumination-internalizing problems relationship. Calmes and Roberts (2008) raised the question of whether co-rumination in same-sex best friend relationships was qualitatively different to that in other relationships. For example, whether disclosure in such relationships focusses on more severe problems. In a related vein, Nicolai, Laney, and Mezulis (2013) focussed on the type of problem that was the focus of co-rumination and found this to be a critical factor in predicting magnitude of depression. Specifically, co-ruminating about problems that adolescents considered were in their control (e.g., causing a problem through forgetting to do something) had a stronger relationship with depressive symptoms than co-ruminating on something that was perceived as someone else's responsibility. A stronger relationship was also found when participants co-ruminated about social as opposed to non-social events. These observations might be consistent with Watkins' (2008) proposal that context and construal level are important in whether repetitive thought has beneficial or detrimental outcomes.

Taking these observations together with the preceding discussion of potential moderator effects indicates that future research might vary factors such as the developmental stage of the co-ruminating partners, type of co-rumination partner and type of problem co-ruminated about. Such studies might also include expectations about, or perceived quality of, disclosing relationships since this might have an impact on the experience of positive effects of disclosure within different relationships. Co-rumination research to date has focussed on dyadic interactions. Future research could investigate this phenomenon as it occurs in larger groups of individuals. This could permit an investigation of several potentially useful questions such as whether group size moderates the effect of co-rumination on internalizing problems.

The current evidence base relies on self-report. As an alternative, diary studies might be utilized to ask participants to record problem discussions over time (type, length and partner) to see if these variables predict changes in internalizing problems over time. The current review was limited to self-report of co-rumination, and future research with alternative measures of co-rumination (e.g., behavioural observation) will permit the impact of

measurement method on effect sizes. As has been observed by other authors, observational studies would be useful to assess transactions in co-rumination partners in more naturalistic settings to put to the test some of the hypotheses above, e.g., that the problems discussed between specific co-rumination partners differs from others in type, intensity and intractability.

Further work in this area might also focus on assessing whether the CRQ has discernible subcomponents and whether these have differential relationships with internalizing problems. To date, a small number of studies (e.g., Bastin, Bijttebier, Raes, & Vasey, 2014b; Dam *et al.*, 2013; Davidson *et al.*, 2014) have assessed the factor structure of the CRQ since Rose's initial publication of the measure. Dam *et al.*'s analysis suggested three distinct factors although, unusually, in the context of very high internal reliability (α 0.96). The current analysis indicates very high internal reliabilities when the full version of the CRQ is used. These reliabilities remain high even when much shorter versions of the CRQ are used. The findings of the current review indicate that shortened versions of the CRQ produce different effect sizes compared with the use of the full version although this effect was marginally significant. It is difficult to judge the composition of these shortened versions relative to the full CRQ; however, as in most studies the specific items utilized are not stated. However, the current findings point to the need for future studies to assess item redundancy and to explore the factor structure of the CRQ.

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