

BRIEF REPORT

Co-Rumination Predicts the Onset of Depressive Disorders During Adolescence

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The tendency to co-ruminate, or frequently discuss and rehash problems with peers, may serve as one mechanism in the dramatic rise in depression observed during adolescence, particularly among adolescent girls. In the current study, our goal was (a) to test the hypothesis that adolescents' levels of co-rumination would predict the onset of clinically significant depressive episodes over a 2-year follow-up and (b) to determine whether levels of co-rumination would mediate gender differences in risk for depression onset. Both hypotheses were supported. Results of survival analysis revealed that adolescents with higher levels of co-rumination at the initial assessments exhibited a significantly shorter time to depression onset. Levels of co-rumination also mediated the gender difference in time to depression onset. These results were maintained even when adolescents' baseline levels of depressive symptoms and rumination were covaried statistically. Finally, co-rumination also predicted the course of illness in terms of episode severity and duration. Results suggest that co-rumination contributes a unique risk for the development of depression in adolescents.

Keywords: adolescent depression, peer relations, gender differences

Adolescence is a critical developmental period for the onset of depression, when prevalence rates increase as much as sixfold (for a review, see Avenevoli, Knight, Kessler, & Merikangas, 2008). Adolescence is also the time during which the 2:1 gender ratio in depression first emerges, with up to 28% of girls and 14% of boys expected to have experienced a depressive episode by the end of adolescence (Hankin et al., 1998). Addressing this significant public health problem requires understanding the factors that increase risk for depression during adolescence, particularly for adolescent girls.

One particularly salient domain of influence during adolescence is peer relations, as friendships provide an important source of

social support during this developmental period (e.g., Furman & Buhrmester, 1992). It is notable that adolescent girls report more intimate or supportive friendships (Rose & Rudolph, 2006) yet also exhibit higher rates of depression (Hankin et al., 1998), suggesting that peer support is either unrelated to, or an insufficient buffer against, this risk. Alternatively, certain aspects of peer friendships may actually increase risk for depression. Specifically, Rose (2002) reasoned that when peers base the majority of the friendship around negatively focused discussion, they are in effect engaging in an interpersonal form of rumination and together are socially *co-ruminating*.

Co-rumination is defined as an extremely negative form of self-disclosure that involves discussion focused on problems and emotions to the exclusion of other activities or discourse (Rose, 2002). Consistent with Rose's hypothesis, a growing body of evidence has shown that levels of co-rumination are related to current symptoms of depression in children and adolescents (Rose, Carlson, & Waller, 2007; Star & Davilla, 2009). There is also evidence that co-rumination predicts prospective changes in adolescents' depressive symptom levels (Hankin, Stone, & Wright, 2010; Rose et al., 2007; but see Starr & Davilla, 2009). Finally, data from a recent retrospective study suggest that youths with currently elevated levels of co-rumination are more likely to have a past history of depressive disorders than youths with lower levels of co-rumination (Stone, Uhrlass, & Gibb, 2010). However, given the study's retrospective design, we could not determine whether co-rumination was a cause or consequence (*scar*; cf. Lewinsohn,

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Steinmetz, Larson, & Franklin, 1981) of depressive episodes. Therefore, although co-rumination has shown to be associated with a past history of clinically significant depressive episodes, prospective research is necessary to demonstrate whether co-rumination is truly a risk factor for future depressive diagnoses, including first onsets.

Our primary goal in the current study was to determine whether co-rumination predicts the onset of clinically significant depressive episodes during adolescence (i.e., diagnoses of major or minor depression). We hypothesized that adolescents with a higher tendency to co-ruminate would report greater risk for depression onset during a 2-year prospective follow-up than adolescents with a lower tendency to co-ruminate. To provide a more stringent test for the role of co-rumination, we also examined whether it would uniquely predict depression risk even after covarying for related constructs that are themselves strong risk factors for depression—baseline depressive symptoms and levels of rumination (see Klein, Shankman, Lewinsohn, & Seeley, 2009; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Both of these variables are associated with co-rumination in youths (e.g., Hankin et al., 2010; Rose, 2002). Therefore, to the extent that the predictive effects of co-rumination are maintained once the influence of depressive symptoms and rumination are covaried, it would provide stronger support for our hypothesis regarding the specific role of co-rumination in adolescents' risk for depression.

Our secondary aim in this study was to test the hypothesis that co-rumination may help to account for the emergence of gender differences in depression, starting in adolescence. The 2:1 gender difference in rates of depression first emerges during adolescence (Hankin et al., 1998) and is then maintained across the life span. During adolescence, girls' friendships typically involve dyads with high levels of self-disclosure, whereas boys' group friendships tend to be based on companionship activities (for a review, see Rose & Rudolph, 2006). Therefore, Rose (2002) hypothesized that the tendency to co-ruminate would be more prevalent among adolescent girls and mediate the gender difference in adolescent depression. Providing preliminary support for this hypothesis, Rose (2002) found that co-rumination mediated the gender difference in internalizing symptoms in children and adolescents but did not focus on depressive symptoms specifically. In the current study, we hypothesized that adolescent girls would report higher levels of co-rumination at the initial assessment and that this gender difference in co-rumination would mediate the gender difference in depression onsets during the follow-up. We should also note that although the majority of research has focused on the potential mediating role of co-rumination in the gender difference in depression, there is some suggestion for moderation with the association between co-rumination and depression being stronger among girls than boys (Rose et al., 2007; but see also Hankin et al., 2010; Stone et al., 2010).¹ Given this, we also tested whether gender would moderate the impact of co-rumination on prospective onsets of depressive disorders.

Our third goal in the study was to determine whether adolescents' levels of co-rumination predicted phenomenological characteristics of depressive episodes. Therefore, in addition to examining risk for depression onset, we also examined episode severity and duration. This examination builds from the response styles theory of depression (Nolen-Hoeksema, 1991) in which rumination is hypothesized to predict not only the de-

velopment but also the maintenance of depression. Rumination has indeed been found to predict onset and exacerbation of depression, although findings are mixed regarding duration of depressive episodes (Nolen-Hoeksema et al., 2008). To the extent that the two constructs are correlated (Rose, 2002) and co-rumination reflects an interpersonal form of rumination, we predicted that it would have similar effects on adolescents' depression severity and duration.

Method

Participants

Participants were recruited from a major midwestern city in the United States through ads in local newspapers as well as through ads placed throughout the greater community seeking participants for a study on adolescent development. The final sample consisted of 106 early adolescents (62% girls, 38% boys). Adolescents' ages at the initial assessment ranged from 11 to 15 years old, with a median age of 13. In terms of adolescents' race, 55% were European American, 29% were African American, 10% were Hispanic, 4% were Asian, and 2% were Native American.

Procedure

Phase 1 of the study involved an initial laboratory assessment. Two research assistants met with one adolescent–parent pair at a time. Parents completed a consent form for themselves and their child; the adolescent completed an assent form. A research assistant verbally administered questionnaires aloud to the adolescent while the adolescent followed along and responded to questions using his or her own copy. A diagnostician interviewed the adolescent and parent separately to ascertain the adolescent's current and past depressive symptoms using the Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime Version (K-SADS-PL; Kaufman, Birmaher, Brent, Rao, & Ryan, 1996).

Phase 2 of the study involved a series of telephone follow-up assessments. At 6-, 12-, 18-, and 24-month follow-up assessments, a diagnostician obtained information regarding the adolescent's depressive symptoms during the previous 6 months from both the parent and the adolescent using the K-SADS. Parents and adolescents were compensated \$200 for their participation.

In the current study, we utilized baseline measures of co-rumination, rumination, depressive symptoms, and K-SADS, as well as information obtained via the K-SADS at the 6-, 12-, 18-, and 24-month follow-ups to assess for onset of new depressive episodes. Of the 106 families: 76%, 89%, 74%, and 99% completed the 6-, 12-, 18-, and 24-month follow-ups, respectively. If a family missed a follow-up assessment, the following KSADS assessment focused on the entire time since the previous com-

¹ Although Rose et al. (2007) reported that co-rumination predicted prospective depressive symptom changes among girls but not boys, we should note that the Gender \times Co-Rumination interaction was a non-significant trend. Therefore, the extent to which gender may moderate the link between co-rumination and depression risk remains unclear.

pleted assessment. For example, if a family missed the 6-month assessment, the 12-month assessment focused on any episodes occurring since baseline. Therefore, complete data were available over the full 2 years for all but one family.

Measures

Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1996). The K-SADS-PL is a semistructured clinical interview designed to aid clinicians in arriving at diagnoses based on *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV* American Psychiatric Association, 1994) criteria. The K-SADS is administered separately to both adolescent and parent. A summary diagnosis is based on both sets of information. The K-SADS has been shown to yield reliable diagnoses of depressive disorders and is frequently used in clinical studies of depression in youths (Klein, Dougherty, & Olino, 2005). In the current study, we assessed both current and past history of clinically significant depressive episodes (major and minor depression). We used information obtained during the K-SADS interview to determine depressive episode duration (number of weeks the adolescent was depressed) and episode severity (number of *DSM-IV* depressive symptoms endorsed).

Diagnostic interviewers completed an intensive training program for administering the K-SADS and for assigning *DSM-IV* diagnoses. The training program consisted of attending approximately 80 hr of didactic instruction, listening to audiotaped interviews, conducting practice interviews, and passing regular exams (85% or above). The second author (Dr. Hankin) held weekly supervision sessions for the interviewers. Confirmation of the presence or absence of a diagnosis was made through review of interviewers' notes and tapes. Discrepancies were resolved through consensus meetings and best-estimate procedures. The best-estimate approach has been shown to be a reliable and valid approach to integrating data from different informants (Klein et al., 2005). Interrater reliability for the K-SADS, based on 20% of the sample interviews ($n = 20$), was good ($\kappa = .87$).

Child Depression Inventory (CDI; Kovacs, 1981). The CDI is a 27-item self-report questionnaire that measures depressive symptoms during the previous 2 weeks. Items are scored from 0–2; higher scores indicate greater symptom severity. CDI scores have been shown to be reliable and valid (Klein et al., 2005). Internal consistency was adequate ($\alpha = .91$).

Co-Rumination Questionnaire (Rose, 2002). The original measure used to assess co-rumination included 27 items that measure the extent to which youths typically co-ruminate with same-sex friends. The items focus on assessing a more extreme form of discussing problems beyond mere self-disclosure, (e.g., "When we talk about a problem that one of us has, we usually talk about that problem every day even if nothing new has happened"). For the present study, nine items (one for each of nine content areas; see Rose, 2002) were used to assess co-rumination at baseline. This decision was based on evidence that the 27-item measure was unifactorial, and the nine items chosen were listed as having the highest factor loading (A. Rose, personal communication, April 2005). A factor analysis of these nine items used in the present study similarly revealed a single factor (Hankin et al., 2010). Internal consistency in this sample was satisfactory ($\alpha =$

.89). Adolescents responded to the items using a 5-point Likert scale, and scores were the mean rating of the nine items. Rose and colleagues (2007) reported excellent internal consistency, good test-retest reliability, and validity (see also Hankin et al., 2010, for reliability and validity of this nine-item version).

Children's Response Styles Questionnaire (CRSQ; Abela, Brozina, & Haigh, 2002). The Rumination subscale of the original 25-item CRSQ was used. The CRSQ-Rumination subscale includes 13 items describing responses to depressed mood that are self-focused (e.g., "Think about how alone you feel"). For each item, children indicate how often they respond in this way when they are feeling sad (*almost never* = 0, *sometimes* = 1, *often* = 2, or *almost always* = 3). Scores range from 0 to 39, with higher scores indicating a greater tendency to ruminate in response to depressed mood. The CRSQ has been shown to exhibit adequate reliability and validity (Abela et al., 2002; Hankin, 2008). Internal consistency was .89 in this study.

Results

Thirty-four adolescents reported at least one depressive episode during their lifetime or across the 2-year assessment period. Of these, four adolescents were depressed at baseline, and seven others reported a past depressive episode that occurred prior to the baseline assessment. Thus, analyses concerning onset of "prospective episodes" were limited to the 102 adolescents not currently depressed at baseline (30 of whom had an onset during the follow-up and 72 who did not). Analyses of first onsets of depression were limited to the 95 adolescents without a lifetime history of depression at baseline (23 of whom had an onset during the follow-up and 72 who did not). Focusing first on potential demographic differences (gender, age, ethnicity) on the predictor variables among all 106 participants, we found that adolescent girls reported significantly higher levels of co-rumination than boys, $t(104) = 3.14$, $p = .002$, $r_{effect\ size} = .30$. We also found that older adolescents reported higher levels of co-rumination, $r = .20$, $p = .05$, and rumination, $r = .20$, $p = .05$. Although we also explored Age \times Gender interactions for predictor variables, none was significant. Regarding associations between predictor variables, co-rumination was not significantly correlated with depressive symptoms, $r = .05$, $p = .64$. The correlation with rumination was a nonsignificant trend, $r = .18$, $p = .07$. Rumination was positively correlated with depressive symptoms, $r = .46$, $p < .001$.

Next, we examined prospective onsets of depressive episodes among the 102 participants who were not depressed at baseline. Focusing first on co-rumination, rumination, and depressive symptoms in separate survival analyses, we found that each predicted a shorter time to depression onset—co-rumination: Wald statistic = 10.67, $p = .001$, odds ratio (*OR*) = 1.08; rumination: Wald statistic = 7.73, $p = .005$, *OR* = 1.61; and depressive symptoms: Wald statistic = 10.21, $p = .001$, *OR* = 1.67. We then conducted the survival analysis again, entering all three predictors simultaneously to determine if co-rumination would demonstrate a unique effect beyond the two covariates. Supporting our hypothesis, co-rumination remained significant, Wald statistic = 9.03, $p = .003$, *OR* = 1.07. In this analysis, depressive symptoms also remained significant, Wald statistic = 6.53, $p = .01$, *OR* = 1.65, but

rumination did not, Wald statistic = .43, $p = .51$, $OR = 1.13$.² These results suggest that adolescents with higher levels of co-rumination had a significantly greater risk for depression during the 2-year follow-up, and this effect was not due simply to concurrent levels of depressive symptoms or rumination. The survival curve for high versus low co-ruminators (defined with a median split) is presented in Figure 1. The unique effect of co-rumination, while the effects of rumination and depressive symptoms were covaried, remained significant even when we limited our analyses to adolescents with first onsets of depression during the follow-up ($n = 95$), Wald statistic = 8.05, $p = .005$, $OR = 1.07$.

We next tested the hypothesis that co-rumination would mediate gender differences in time to prospective depression onset ($n = 102$), using procedures first outlined by Baron and Kenny (1986). Three conditions must apply for the mediation hypothesis to be supported. First, there must be significant gender differences in co-rumination. As reported earlier, we found that girls reported significantly higher levels of co-rumination than boys. Second, there must be a significant gender difference in depression risk. This survival analysis was significant, Wald statistic = 3.70, $df = 1$, $p = .05$, $OR = 2.21$, with girls exhibiting a significantly shorter time to onset of depression than boys. Third, co-rumination must continue to predict time to depression onset while the influence of gender is covaried. To test this final step, we simultaneously entered co-rumination and gender in the survival analysis as predictors of time to onset for depressive episodes. Co-rumination continued to be a significant predictor of depression onset, Wald statistic = 7.88, $p = .005$, $OR = 1.07$, but the effect of gender was reduced to nonsignificant, Wald statistic = 1.32, $p = .25$, $OR = 1.64$. Co-rumination remained significant in this analysis, even when rumination and depressive symptoms were covaried, Wald statistic = 6.66, $df = 1$, $p = .01$, $OR = 1.07$. Providing support for the mediation hypothesis, the test of the indirect effect (see MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) was significant, $z' = 2.07$, $p < .05$, even after baseline depressive symptoms and rumination were covaried ($z' = 1.99$, $p < .05$). We also examined whether gender would moderate the association between co-rumination and time to depression onset. The Gender \times Co-Rumination interaction was not significant, Wald statistic = .92, $p = .34$, $OR = 0.95$.

Finally, we also examined whether co-rumination would predict characteristics of adolescents' depressive episodes, specifically episode severity or duration. In order to reduce the likelihood of Type 2 errors due to sample size, we included all 34 adolescents who experienced any lifetime depressive episode in these analyses. Co-rumination was significantly associated with episode severity, $r = .49$, $p = .003$, and duration, $r = .34$, $p = .05$, such that adolescents exhibiting higher levels of co-rumination reported longer and more severe episodes. When the effects of rumination and depressive symptoms were covaried, co-rumination remained significantly related to episode severity, $r_p = .50$, $p = .004$, but not episode duration, $r_p = .29$, $p = .11$.

Discussion

Our primary aim in this study was to determine whether co-rumination predicts the onset of clinically significant depressive diagnoses during adolescence. As hypothesized, we found that adolescents' baseline levels of co-rumination predicted time to

depression onset over the 2-year follow-up such that higher levels of co-rumination were associated with a shorter time to onset. Co-rumination continued to predict depression risk even when we limited analyses to first onsets.

Results from the current study are also consistent with Rose's (2002) hypothesis that co-rumination may serve as one mechanism for adolescent girls' heightened risk for depression. Specifically, levels of co-rumination mediated the gender difference in risk for depression onset, even when the effects of rumination and depressive symptoms were covaried. We should also note that although we also explored whether gender moderated the impact of co-rumination on depression onset, we failed to obtain evidence for gender moderation (cf. Hankin et al., 2010; Stone et al., 2010).

In addition to predicting depression onset, we also examined whether co-rumination predicted the phenomenology of adolescents' depressive episodes (duration and severity). Among the 34 adolescents who experienced a depressive episode during the follow-up, we found that higher levels of co-rumination were associated with longer, more severe episodes. The link between co-rumination and episode severity was maintained even after rumination and depressive symptoms were covaried. Although the positive association to episode duration no longer met statistical significance after covariates were including, the effect size remained moderate ($r_{effect\ size} = .29$, $p = .11$) and may replicate in larger samples. Conclusions regarding these findings must remain tentative pending replication, but it appears that co-rumination may contribute unique effects to both the development and maintenance of depression.

The current results provide strong support for the hypothesis that co-rumination is indeed a risk factor for the development of depression during adolescence and may serve as one mechanism in girls' heightened risk for depression during this period. Specifically, this study extends prior research showing that co-rumination predicts prospective changes in depressive symptoms (Hankin et al., 2010; Rose et al., 2007) as well as youths' history of depressive disorders (Stone et al., 2010). The current results were maintained even after baseline depressive symptoms and rumination were covaried, suggesting that the influence of co-rumination is not simply due to its relation with these other variables. This said, we recognize that Type 1 error rates are inflated in analyses of partial variance, particularly when the covariate is correlated with the independent variable and/or measured with error (Zinbarg, Suzuki, Uliaszek, & Lewis, 2010), and it is possible that the effects attributed to co-rumination may be due to some unmeasured third variable. However, the fact that co-rumination was a significant predictor of depression risk both before and after the inclusion of the covariates (depressive symptoms and rumination) in the survival analyses suggests that the significant effect of co-rumination was not due simply to the inclusion of other covariates in the

² Analyses were also conducted with logistic regressions to predict the presence or absence of depression onsets during the follow-up. Co-rumination (Wald statistics = 9.63, $p = .002$, $OR = 1.11$), rumination (Wald statistics = 7.20, $p = .007$, $OR = 1.78$), and depressive symptoms (Wald statistic = 7.76, $p = .005$, $OR = 1.77$) were each significant predictors when examined individually. Co-rumination remained significant even when rumination and depressive symptoms were added as covariates (Wald statistic = 8.28, $p = .004$, $OR = 1.11$).

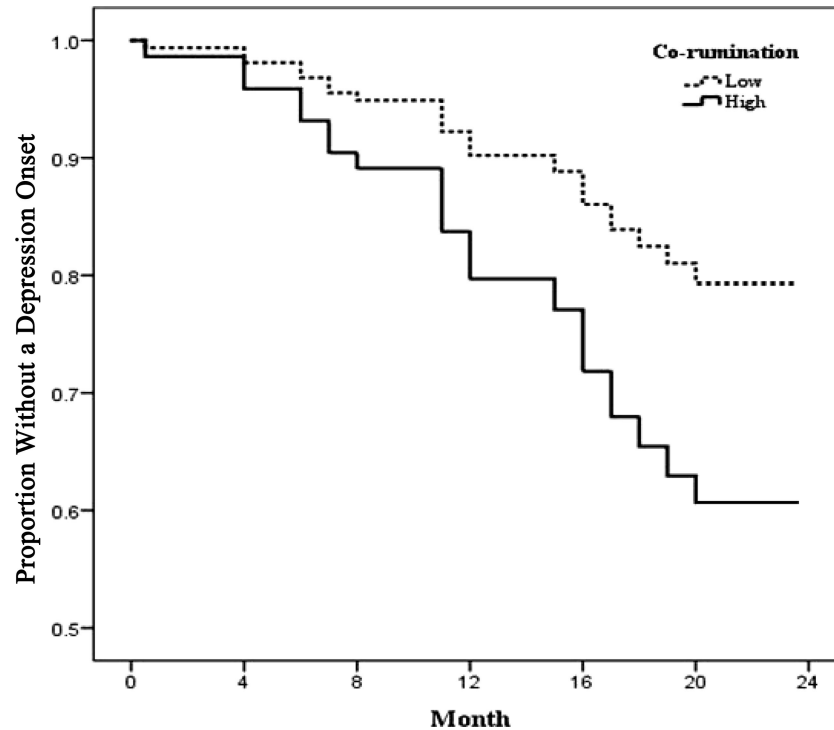


Figure 1. Results of survival analysis of time to depression onset for adolescents reporting high versus low levels of co-rumination.

model. Furthermore, since we also found that co-rumination predicted first onsets of depression, the association between co-rumination and episode onset cannot be attributed to a history of depression or to current mood. This supports the hypothesis that co-rumination is a true risk factor for depression; not merely a correlate to or consequence of prior depression. It is also noteworthy that co-rumination remained a significant predictor of depression onset even after rumination was included as a covariate. Indeed, given results suggesting that the link between co-rumination and depression may be attributed to rumination (Rose, 2002), it was important to confirm that co-rumination demonstrated a unique effect. Despite the wealth of research supporting rumination as an established risk factor to depression (Nolen-Hoeksema et al., 2008), co-rumination was a stronger predictor of depression risk in this study. In future research, investigators should continue to explore whether interpersonal versus intrapersonal forms of rumination are stronger predictors of vulnerability in adolescents.

A crucial clinical implication of the current results is that what appears to be a socially rewarding process with peers may not only fail to buffer teens from distress but actually increase risk if sought via maladaptive means. Indeed, what is contradictory about co-rumination is that, as a negative form of self disclosure, it is also associated concurrently (Calmes & Roberts, 2008; Rose, 2002; Starr & Davila, 2009) and prospectively (Rose et al., 2007) with higher friendship quality and closeness. In turn, friendship quality and closeness have also been found to predict increases in co-rumination (Rose et al., 2007). These findings suggest that co-rumination has socially reinforcing effects, which may perpetuate

or maintain the tendency to engage in co-rumination and thus increase vulnerability. Traditionally, social support has been found to be a protective factor from emotional distress, yet if sought via maladaptive means, youths who report higher friendship satisfaction may still be at heightened risk for depression. Since peers are an important source of social support in adolescence, clinicians may consider interventions that specifically provide opportunities to practice more adaptive forms of self-disclosure with adolescent clients. Alternatively, prevention programs that teach adolescents adaptive interaction styles may also prove more fruitful for avoiding this particular risk factor for depression.

The current study benefits from several strengths including the multiwave prospective design and inclusion of diagnostic interviews, which allowed us to examine for the first time whether co-rumination predicts the onset of clinically significant depressive episodes in adolescents. However, there are also limitations with the current study that provide important avenues for future research. First, given the relatively low base rate of major depressive episodes during the follow-up, analyses focused on major or minor depression. Therefore, the question of whether co-rumination predicts the onset of major depression specifically remains to be determined in future research. Second, the study focused on risk for the development of depression, and future research is needed to determine whether co-rumination is a risk factor specific to depression or whether it also increases risk for other forms of psychopathology (e.g., anxiety disorders). A third limitation was that the assessment of co-rumination was based upon adolescents' self-report. In future research, investigators should seek to augment self-report assessments with other methods

that may be less subject to response or recall biases (e.g., interaction tasks that allow for coding of peers' conversations; Rose, Schwartz, & Carlson, 2005).

In summary, results support the hypothesis that co-rumination increases risk for the development, severity, and potential maintenance of clinically significant episodes of depression in adolescents. Co-rumination also mediated the gender difference in depression risk, suggesting that it may be a particularly important mechanism for the emerging gender difference in depression during adolescence. It is important to note that the effects of co-rumination were at least partially independent of adolescents' history of depressive diagnoses and current levels of depressive symptoms and rumination. These findings extend prior research in suggesting co-rumination is indeed a risk factor for depression and not merely a correlate or consequence of prior episodes.

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