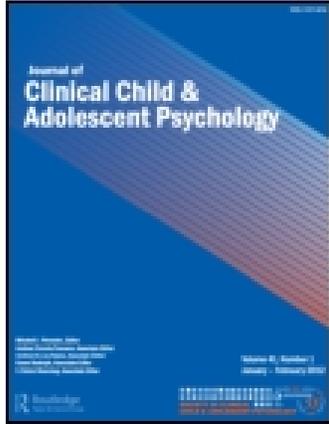


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Does Social Anxiety Predict Rumination and Co-Rumination Among Adolescents?

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Social anxiety in adolescence is manifested by anxiety about and avoidance of social interactions. The present study examined whether social anxiety predicts higher levels of both rumination and co-rumination over time. Rumination and co-rumination were studied as possible outcomes because the cognitive content of these processes often involves interpersonal concerns. A three-wave longitudinal study of 575 adolescents (aged 13–16 years old) was conducted over 6 months. Adolescent girls reported higher levels of social anxiety, rumination, and co-rumination than boys. Structural equation modelling analysis showed that social anxiety directly predicted higher levels of rumination and indirectly predicted higher levels of co-rumination over time. A gender difference was noted in that these relationships were more robust for girls than for boys.

Social anxiety “involves feelings of apprehension, self-consciousness, and emotional distress in anticipated or actual social-evaluative situations” (Leitenberg, 1990, p. 1). This concern about others’ opinions may lead to higher levels of two theoretically related psychological phenomena: rumination and co-rumination. The current study examined whether social anxiety would be predictive of higher levels of ruminative and co-ruminative processes in adolescents over time.

SOCIAL ANXIETY

Social anxiety involves distress experienced in social or performance situations, where the focus of concern involves potential embarrassment and/or negative evaluations by others (APA, 2000). At clinical levels of severity, significant distress and functional impairment can result, as can avoidance of anxiety-provoking situations. Social anxiety occurs more frequently in female individuals, and this difference emerges in early adolescence (DeWit et al., 2005). In one large community sample of 12- to 14-year-olds, point prevalence rates of

6.6% were reported among adolescent girls and 1.8% among boys (Gren-Landell et al., 2009).

RUMINATION

Ruminative activity has been represented as a maladaptive response style associated with depressed mood (Nolen-Hoeksema, 1987, 1990, 1991). Nolen-Hoeksema defined rumination as a way of responding to distress that involves repetitively and passively focusing on symptoms of distress and its possible causes and consequences (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Some researchers (e.g., Rieffe, Oosterveld, Miers, Terwogt, & Ly, 2008) have noted that socially anxious individuals report elevated levels of ruminative thought. Gender differences have also been found, with female individuals ruminating more than male (Nolen-Hoeksema & Jackson, 2001).

CO-RUMINATION

Co-rumination is a new construct that involves “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

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problems, and focusing on negative feelings” (Rose, 2002, p. 1830). Co-rumination and rumination are distinguishable in that rumination is defined as an intrapsychic process of thinking about one’s problems (Nolen-Hoeksema, 1990), whereas co-rumination is defined as an interpersonal process of discussing problems with others. Rose (2002) identified a gender difference in co-rumination and showed that levels of co-rumination in pre- and early adolescence were significantly correlated with internalizing symptoms and rumination. A follow-up study by Rose, Carlson, and Walker (2007) found similar relationships longitudinally.

RELATIONSHIPS AMONG SOCIAL ANXIETY, RUMINATION, AND CO-RUMINATION

Theoretical models of social phobia (Clark & Wells, 1995; Rapee & Heimberg, 1997) have proposed that socially anxious individuals engage in postevent evaluation that perpetuates anxiety, and although researchers have given various names to this process, Wong and Moulds (2009) grouped these terms under the category of “rumination.” Thus, co-rumination might be usefully categorized with these retrospective ruminative evaluations as well. Examples of co-rumination provided by Rose (2002) are “talking at length about whether the ambiguous behavior of a boyfriend or girlfriend is signaling the demise of the relationship or whether a perceived slight by a high-status classmate was intended or not” (p. 1830). If a teenager is socially anxious, then he or she may be more likely to review and negatively evaluate their social performance (i.e., postevent rumination) and/or seek a friend’s opinions about the ways they and others have behaved (i.e., co-rumination). Socially anxious individuals have been found to ruminate more about social events (Field & Cartwright-Hatton, 2008; Kocovski & Rector, 2007; Mellings & Alden, 2000; Rachman, Grüter-Andrew, & Shafran, 2000; Vassilopoulos, 2008), and it is possible that they would also engage in co-ruminative discussions.

A recent study of adolescents by Starr and Davila (2009) found a nonsignificant correlation between social anxiety and co-rumination ($r = .02$, *ns*). However, the result was based on cross-sectional data obtained from a small ($N = 83$), age-specific (13 years), and exclusively female sample. The social anxiety to co-rumination hypothesis needs to be evaluated with a large mixed-gender adolescent sample followed over time.

HYPOTHESES

Our first hypothesis, replicating previous work, was that girls would report higher levels of social anxiety, rumination, and co-rumination than boys. This prediction

is based on previous research and theory showing that girls are more socially sensitive and work more than boys to understand and anticipate behavior within the context of social relationships (Nolen-Hoeksema, 1987, 1990; Rudolph, 2002). The second hypothesis was that social anxiety would predict higher levels of both rumination and co-rumination over time and was based on existing models that incorporate postevent ruminative thought (Clark & Wells, 1995). The third hypothesis was that these relationships would be more robust for girls than boys.

METHOD

Participants

Consent forms were sent out to about 900 youth, and although consent was obtained and data were collected on a total of 735 participants aged 13 to 16 years old, a subset ($N = 575$) of participants with usable data from all three waves of collection were examined in these analyses. Most individuals were dropped because they were absent on at least one time of measurement, but a few others were dropped because they manifested too much missing or nonsensible (i.e., obviously made-up) data. For the remaining individuals, about 1% of data was missing completely at random, and it was imputed with regression. The resulting sample included 266 13-year-olds, 136 14-year-olds, 83 15-year-olds, and 90 16-year-olds. The gender makeup was 65.7% girls and 34.3% boys.

A repeated measures multivariate analysis of variance (MANOVA) was conducted to determine whether there were any significant differences between those participants who dropped out after Wave 1 and those who remained in the study to its completion. Univariate analysis of the measured variables showed that drop-outs reported slightly higher co-rumination (partial $\eta^2 = .005$). The ethnic breakdown, socioeconomic status, and family living arrangements of the participants were found to be typical of the general New Zealand population.

Measures

Co-rumination. A nine-item shortened version of the full Co-Rumination Scale (Rose, 2002), created for this study, was used. Use of a short form of this scale was necessitated by the brief amount of time allowed for data collection in the schools. The item with the highest factor loading for each of the nine content areas (based on Rose, 2002) was chosen to represent each area. A sample question is, “If one of us has a problem, we will spend our time together talking about it, no

matter what else we could do instead.” Participants were asked to think about the way they usually behave with their best or closest friend of the same gender. Items were scored on a 5-point Likert scale from 1 (*not at all true*) to 5 (*really true*). The Cronbach’s alpha showed high internal reliability at all three waves of data collection: Wave 1 = .92, Wave 2 = .91, and Wave 3 = .92.

Rumination. The Rumination subscale of the Response Styles Questionnaire (Nolen-Hoeksema, Morrow, & Fredrickson, 1993) was used to measure ruminative coping styles. This shortened subscale consisted of 17 items, 11 of which measured ruminative thinking (e.g., “I think, ‘Why do I always react this way?’”) and 6 of which measured ruminative actions (e.g., “I listen to sad music”). It has been used extensively in past research. Responses are measured on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). The Cronbach’s alpha for this scale at each time point were .85 at Wave 1, .87 at Wave 2, and .89 at Wave 3.

Social anxiety. Social anxiety was assessed with the Social Anxiety Scale for Adolescents (La Greca & Lopez, 1998). This 18-item scale includes items such as, “I worry about doing something new in front of others.” Participants were asked to rate each item as to how they feel most of the time on a 5-point Likert scale from 1 (*not at all*) to 5 (*all of the time*). The Cronbach’s alpha was high across all three waves: .90 at Wave 1 and .92 at Waves 2 and 3.

Procedure

The questionnaires were completed by individuals in small groups in the students’ classroom with either one or two researchers and a teacher attending at three time points throughout the year, each time point separated

by 3 months. Only those students who returned signed parental consent forms and assented to the study themselves were allowed to participate. The School of Psychology Ethics Committee approved the study before students were recruited for the present study.

RESULTS

The three dependent variables at all three time points were transformed by square root due to a moderate positive skew (Tabachnik & Fidell, 2000).

Replication of Gender Findings

MANOVA analysis. A one-way (gender) repeated measures MANOVA with socioeconomic status as a covariate was conducted to estimate mean group differences for measures of co-rumination, rumination, and social anxiety. Pertinent to Hypothesis 1, a significant multivariate main effect was found for gender, Wilks’s $\lambda = .68$, $F(3, 503) = 80.80$, $p < .001$, $\eta^2 = .33$. The univariate results indicated statistically significant differences for gender on social anxiety, rumination, and co-rumination, $F_s(1, 505) = 16.50, 79.03, \text{ and } 235.88$, $p_s < .001$, $\eta^2_s = .03, .14, \text{ and } .32$ respectively. Consistent with Hypothesis 1, girls reported higher levels for all three variables (girl $M_s = 6.55, 6.39, \text{ and } 4.97$; boy $M_s = 6.27, 5.70, \text{ and } 3.92$, respectively).

Examination of Predictive Relationships Among Variables Over Time

Correlations between all variables at each wave of data collection are shown in Table 1. As expected, significant correlations were identified between all variables concurrently and across waves of data. The next step was to investigate the predictive relationships among

TABLE 1
Intercorrelations of Variables Measured at Each Wave of Data Collection

Variable	1	2	3	4	5	6	7	8	9
1. Co-rum1		.73**	.70**	.46**	.41*	.41**	.22**	.20**	.18**
2. Co-rum2			.73**	.41**	.52**	.46**	.21**	.26**	.21**
3. Co-rum3				.44**	.48**	.53**	.27**	.25**	.32**
4. Rum1					.68**	.67**	.47**	.41**	.39**
5. Rum2						.79**	.45**	.56**	.46**
6. Rum3							.44**	.51**	.57**
7. Soc Anx1								.72**	.67**
8. Soc Anx2									.74**
9. Soc Anx3									
<i>M</i>	4.66	4.59	4.49	6.11	6.07	6.02	6.5	6.4	6.37
<i>SD</i>	0.91	0.9	0.9	0.85	0.87	0.93	0.91	0.91	0.93

Note. All (observed) variables have been square root transformed to correct for skewness. Co-rum = co-rumination; Rum = rumination; Soc Anx = social anxiety. * $p < .05$. ** $p < .01$.

variables over time, so we used the AMOS SEM program (Arbuckle, 2009) to conduct path analyses on latent variables. Each construct was represented by three parcels, composed of a random sample of items from the measure, as is recommended practice (Little, Cunningham, & Shahar, 2002). The model specified autocorrelation of the parcels across time (T1 to T2, T2 to T3, and T1 to T3) to allow for better model fit. The initial models were fully saturated, namely, they included the longitudinal stability of the constructs as well as all cross-lag paths between different constructs across time. If the saturated model was found to be poorly fitting, pruning of nonsignificant links would then be made to obtain a good fitting model (Hoyle, 1995). Model pruning is considered to be an exploratory process, rather than confirmatory.

Social anxiety, rumination, and co-rumination model. Hypothesis 2 was examined next, namely, that social anxiety would predict subsequent rumination and co-rumination. The fully saturated model was initially run, but it fit the data poorly. The resulting path model after pruning is presented in Figure 1. Model fit was found to be very good, $\chi^2(276)=484.2$, root mean square residual = .029, adjusted goodness of fit index = .92, normed fit index = .97, and root mean square error of approximation = .036. In partial support of the hypothesis, social anxiety at both T1 and T2 significantly predicted subsequent rumination. However, social anxiety was not found to directly predict co-rumination scores. Instead, social anxiety exerted a weak indirect effect on co-rumination, mediated by rumination (i.e., T1 social anxiety predicted T2 rumination, which in turn predicted T3 co-rumination).

The obtained pattern suggests that adolescents high in social anxiety are subsequently more likely to ruminate, and those who ruminate at high levels are more likely to engage in co-ruminative discussions with their best friend. Notable is that co-rumination did not predict either rumination or social anxiety, and it seems that someone who ruminates at a high level is not more likely 3 months later to be more socially anxious. Social anxiety seemed to be the starting point for this sequence of emotion regulation processes, not the end point.

The third hypothesis suggested that the relationships among these three variables would be found to be more robust for girls. A two group run was performed in AMOS (Byrne, 2010) using an equality constraint for the four cross-lag paths identified in Figure 1 to determine whether boys and girls manifested the same strengths in these estimated parameters. A significant difference was obtained, $\chi^2\text{diff}(4)=8.3$, $p < .05$, and subsequent probing showed that girls yielded stronger relationships for three paths (T1 Rumination to T2 Co-rumination; T2 Rumination to T3 Co-rumination; and T1 Social anxiety to T2 Rumination) than boys (girls' β s = .08; .14, and .10; boys' β s = .01, .01, and .01 respectively). No gender difference was noted for the T1 Social anxiety to T2 Rumination path. In general, girls manifested a more robust sequence of maladaptive emotion regulation strategies following from social anxiety.

DISCUSSION

The results of the present study (a) supported the hypothesis that girls would report higher levels of social anxiety, rumination, and co-rumination; (b) partially

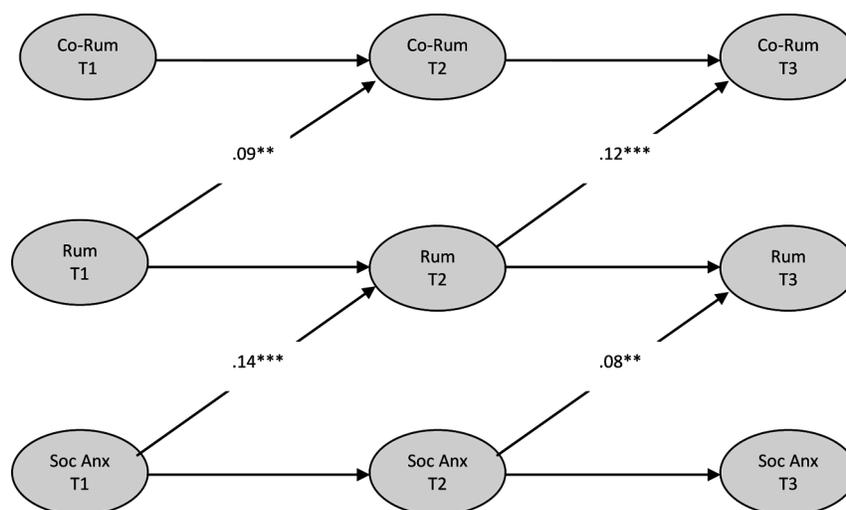


FIGURE 1 Relationships between social anxiety, rumination (rum), and co-rumination (co-rum) over time for the overall sample. *Note.* All stability coefficients were statistically significant, but their beta weights were omitted for ease of reading. ** $p < .01$. *** $p < .001$.

supported the hypothesis that social anxiety would predict increased rumination and co-rumination over time; and (c) supported the hypothesis that relationships among these variables would be more robust for girls. The obtained gender differences are consistent with findings reported in previous literature (Jose & Brown, 2008; Rose, 2002). Gender role intensification during adolescence may adversely affect girls in that they become anxious about identity formation, peer reputation, and regulation of their negative affect (Wichstrom, 1999).

Consistent with other authors (Clark & Wells, 1995; Rapee & Heimberg, 1997), social anxiety was shown in this study to predict higher levels of subsequent rumination, and it also seemed to exert a weak indirect effect on co-rumination. As Wong and Moulds (2009) have shown, socially anxious individuals seem to be inclined to use ruminative dynamics as coping strategies to deal with ambiguous and/or distressing social situations. Socially anxious people have been shown to be hypersensitive to social cues concerning others' perceptions of themselves, and they are more likely to judge themselves by external standards (Hart & Thompson, 1996; Rudolph, 2002). They may repetitively ruminate in their minds how they reacted and what they should do in the future, and they may seek others' opinions on these matters within co-ruminative discussions. Socially anxious people have been found to be more likely to ruminate (Mellings & Alden, 2000), and it appears that they may also tend to engage in more ruminative discussions with others.

Our findings in this area are inconsistent with those obtained by Starr and Davila (2009), who used cross-sectional data from a small single-sex sample. These methodological differences between studies might explain the contrasting findings. These authors argued that their findings were explained by low self-disclosure rates and poverty of friendships among the socially anxious. It is possible that their sample constituted more extremely socially anxious individuals than in the present study. Our participants did not seem to have difficulty reporting on discussions with their "best friend." We feel that when assessing social anxiety in a normative population, as we did with our present study, socially anxious individuals probably still have some friends with which to interact.

Limitations

First, the sample was not randomly selected. The students who participated had parental consent, and they had to assent to the study as well. Consequently the sample may have been skewed toward higher functioning adolescents, and attrition probably exacerbated this trend. Although studying the effects of variables in a normal population has its merits, the present findings

may not generalise to those with clinical levels of social anxiety. We did not study equal numbers of boys and girls, so our obtained path model gender differences may have been partially the result of unequal sample sizes. Another limitation of the study design was the use of self-report measures. Additional measures of these variables in the form of teacher or parent reports or interviews with participants would add to the validity of the current findings. Last, by using a nonexperimental design in this study, questions of causality could not be answered conclusively. As no variables were manipulated here, the research can only suggest predictive effects. Future research should explore to what extent interventions exert a discernible causal effect on the variables studied here.

Implications for Research, Policy, and Practice

Rose et al. (2007) have argued that parents, teachers, and mental health professionals typically focus on the socially isolated adolescent and may leave maladaptive coping processes, such as rumination or co-rumination, undetected. Our findings illustrate the need for increased awareness of the co-rumination dynamic between adolescent friends, and the need for more research to understand the conditions under which intensive discussion of problems can be harmful.

The chief finding of the present study is that adolescents who experience high levels of social anxiety are more likely to engage in the internal process of ruminating about their social performance, and this ruminative process, in turn, seems to precipitate co-ruminative discussions with friends as well. Interventions that target this sequence of maladaptive responses (Clark & Wells, 1995) could short-circuit the unfolding of this maladaptive process. For example, mindfulness-based psychotherapy represents an example of an attempt to modify such maladaptive cognitive processes. This therapeutic approach has developed over recent years, and it attempts to address affective distress, such as anxiety, through nonjudgemental awareness of internal processes (Hofmann, Sawyer, Witt, & Oh, 2010).

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