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Gender differences in sleep problems: The mediating role of co-rumination and depressive symptoms

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ABSTRACT

Co-rumination is a dyadic tendency in which two members excessively discuss and revisit problems while focusing on negative feelings. Co-rumination is more prominent among female friends than male friends, which helps to account in part for gender differences in depressive symptoms. The current study adopted a socioemotional perspective to examine whether gender differences in sleep problems could be mediated by co-rumination in friendships and depressive symptoms. A sample of 172 young adults ($M_{age} = 19.15$) participated in a self-report study. Mediation analysis showed that females reported higher co-rumination and depressive symptoms, both of which were related to more sleep problems. Moderated mediation analysis further revealed that the mediational role of depressive symptoms between co-rumination and sleep problems was stronger for females compared to males.

1. Introduction

Young adults (e.g., 18 to 30 years old) often experience insufficient sleep quantity (fewer than 8 h of sleep) and poor sleep quality, and are at a high risk for sleep disorders (Lund, Reider, Whiting, & Prichard, 2010; Nadorff, Nazem, & Fiske, 2011; Petrov, Lichstein, & Baldwin, 2014; Tsai & Li, 2004). Research has also found that females (compared to males) tend to report more sleep problems (e.g., low sleep efficiency, insomnia; Lund et al., 2010; Petrov et al., 2014; Tsai & Li, 2004). Based on a *socioemotional model* (Rose, 2002; Rose & Rudolph, 2006), we examined whether gender differences in sleep problems could be explained by females' tendency to engage in *co-rumination* with their friends (Rose, 2002) and their increased depressive symptoms (Hyde, Mezulis, & Abramson, 2008). We further examined whether the link between co-rumination and sleep problems through depressive symptoms would be more prominent in females than males.

According to Rose and Rudolph's (2006) socioemotional model, the emergence of gender differences in emotional distress (e.g., depression) could partially be explained by the nature of peer relationships (e.g., social support and coping processes). For example, some support processes between friends may bear emotional costs, such as *co-rumination* (Rose, 2002). Co-rumination refers to dyadic communication tendencies in which two members extensively discuss and revisit problems, focusing on negative feelings (Rose, 2002). While co-rumination is related to closer friendship quality among adolescents and young adults, it is also related to greater emotional disturbances, including depression and anxiety (Byrd-Craven, Granger, & Auer, 2011; Rose, 2002; Rose, Carlson, & Waller, 2007). Longitudinal studies have also shown that co-rumination and internalizing problems (depressive and anxiety symptoms) were reciprocally related over time (Rose et al., 2007; Stone, Hankin, Gibb, & Abela, 2011).

Female relationships (compared to male) are more intimate in nature; therefore, it is not surprising that co-rumination is more commonly observed in female friendships (Rose, 2002; Rose & Rudolph, 2006). Gender differences in co-rumination, indeed, serve as an important mechanism accounting for gender differences in emotional difficulties. Building upon research on co-rumination, we further propose that gender differences in sleep problems could potentially be mediated through the same pathway. Unfortunately, despite previous research efforts that demonstrate the link between co-rumination and negative affect (Byrd-Craven, Geary, Rose, & Ponzi, 2008; Byrd-Craven et al., 2011; Rose, 2002), the implications of co-rumination on physical health outcomes, including sleep problems, have not attracted much research attention. Thus, the possible mediating roles of co-rumination and depressive symptoms between gender and sleep problems is still unknown. Nevertheless, previous research has shown that depressive symptoms are related to more sleep problems (Allgöwer, Wardle, & Steptoe, 2001; Lustberg & Reynolds, 2000; Simor, Krietsch, Köteles, & McCrae, 2015). Furthermore, longitudinal research suggests that being female and having more depressive symptoms are both associated

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with the development and persistence of sleep problems (Patten, Choi, Gillin, & Pierce, 2000).

Summarizing across past literature on co-rumination, depression, and sleep (Allgöwer et al., 2001; Rose, 2002; Simor et al., 2015), an integrative model has been proposed (see Fig. 1). This model proposes that females are more likely to engage in co-rumination and, subsequently, may experience more depressive symptoms and sleep problems. In other words, gender differences in sleep problems are mediated by co-rumination and depressive symptoms (simple mediation model). Because co-rumination and depressive symptoms are more prominent among females, the effects of co-rumination on sleep problems through depressive symptoms might be stronger for females than males. Thus, an alternative model has been proposed (see Fig. 2). Specifically, it is possible that the mediating effect of depressive symptoms between co-rumination and sleep problems is moderated by gender (moderated mediation model).

2. Method

2.1. Procedure and participants

A sample of young adults attending a Midwestern public university was collected. Participants received research credits as a partial requirement for their psychology courses. Upon their enrollment in the study, participants were provided with an online survey. Informed consent was obtained online before the survey was administered. This protocol was approved by the university's IRB. A total of 172 young adults participated in the study. Participants' age ranged from 18 to 22 years (M = 19.15; SD = 1.15), with 50% female. A majority of the participants were Caucasian (90.7%), followed by Asian (4.1%), African-American (2.3%), Hispanic/Native-American (1.2%), and Others (1.7%).

2.2. Measures

2.2.1. Co-rumination

Participants' tendency to co-ruminate with a self-identified best friend was measured using the Co-Rumination Questionnaire (27-item CQ; Rose, 2002). For example, one item reads: "When we talk about a problem that one of us has, we spend a long time talking about how sad or mad the person with the problem feels." Participants rated how well each statement describes their interactions with their self-identified best friend using a 5-point Likert scale, ranging from 1 (not at all true) to 5 (really true). Co-rumination items were averaged to form a composite score (Cronbach's $\alpha = 0.96$).

2.2.2. Depressive symptoms

Participants completed the 6-item depression subscale of the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) to measure their depressive symptoms. Participants read a list of problems and complaints and decided how often they are bothered or distressed by that problem (e.g., "Feeling no interest in things") on a scale ranging from 1 (almost never) to 4 (almost always). The BSI items were averaged to form a composite score (Cronbach's $\alpha = 0.86$).

2.2.3. Sleep problems

Participants completed the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), a 19-item measure that captures 7 components of sleep quality: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each subscale has a score ranging from 0 to 3. A global score was computed by summing across the 7 components (Cronbach's $\alpha = 0.64$).

3. Results

3.1. Preliminary analyses

Descriptive statistics are presented in Table 1. Independent t-tests revealed that females were more likely to engage in co-rumination than males, $t(170) = -3.18$, $p < 0.01$. Also, females suffered from higher depressive symptoms $t(170) = -2.15$, $p < 0.05$, and more sleep problems $t(170) = -2.45$, $p < 0.05$, compared to males. Individuals who engaged in more co-rumination suffered from more depressive symptoms ($r = 0.25$, $p < 0.01$) and more sleep problems ($r = 0.21$, $p < 0.01$). Individuals with more depressive symptoms reported more sleep problems ($r = 0.42$, $p < 0.01$).

3.2. Simple mediation model

The theoretical model presented in Fig. 1 was examined with a path model implemented in *Mplus* 6.11 (Muthén & Muthén, 2011). This model had a null chi-square and degrees-of-freedom; therefore, no fit indexes were reported. Unstandardized coefficients and standard errors are presented in Fig. 1. To examine the indirect effects, bootstrapped 95% confidence intervals ($N_{bootstraps} = 5000$) were computed. Consistent with our hypothesis, the indirect effect of gender on sleep problems was also found to be significant ($CI_{95} = 0.04$ to 0.25). Specifically, females were more likely to engage in co-rumination, which in turn was related to more depressive symptoms and sleep problems.

3.3. Moderated mediation model

The theoretical model presented in Fig. 2 was examined with a moderated mediation model implemented in *Mplus* 6.11 (Muthén & Muthén, 2011). This model tested whether the effect of co-rumination on sleep problems through depressive symptoms would be stronger for females than males. In order to achieve this goal, a multi-group path model was specified in *Mplus* such that all the paths from co-rumination to sleep problems through depressive symptoms were estimated independently for males and females. Then, we constrained each of the direct paths to be equal across gender in 3 separate models. It was found that when the path from depressive symptoms to sleep problems was

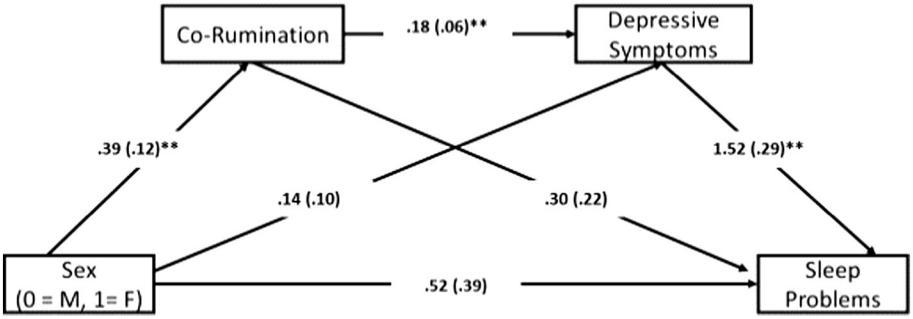

Fig. 1. Path model depicting the simple mediation model. Unstandardized coefficients are presented, with standard errors in the parentheses. $^{**}p < 0.01$.

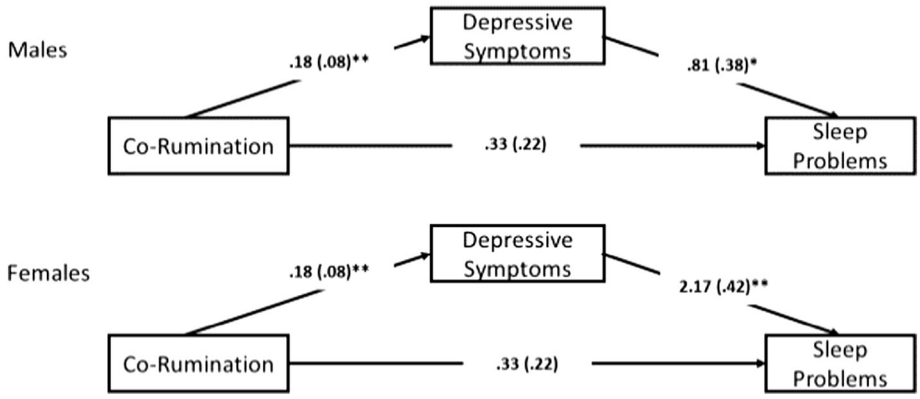

Fig. 2. Path model depicting the moderated mediation model in which the indirect effect from co-rumination to sleep problems through depressive symptoms was moderated by gender. Unstandardized coefficients are presented, with standard errors in the parentheses. $^{*}p < 0.05$; $^{**}p < 0.01$.

constrained to be equal across gender, the model fit reduction was significant, $\Delta\chi^2(1) = 5.89$, $p = 0.02$. In contrast, constraining the paths from co-rumination to depressive symptoms to be equal across gender did not lead to a significant change in the model fit, $\Delta\chi^2(1) = 0.07$, $p = 0.80$. Constraining the paths from co-rumination to sleep problems to be equal across gender also did not lead to a significant change in the model fit, $\Delta\chi^2(1) = 0.001$, $p = 0.97$. Therefore, subsequent mediation analysis was based on the model in which the paths from co-rumination to depressive symptoms and paths from co-rumination to sleep problems were both constrained to be equal across gender. The final model has an excellent fit, $\chi^2(2) = 0.07$, $p = 0.97$, TLI = 1.00, CFI = 1.00, RMSEA = 0.00. Unstandardized coefficients and standard errors are presented in Fig. 2.

Based on the constrained model, we computed the bootstrapped 95% confidence intervals ($N_{bootstraps} = 5000$) for the indirect effects independently for males and females. Results showed that the indirect effect from co-rumination to sleep problems through depressive symptoms was significant for males ($CI_{95} = 0.03$ to 0.34) and females ($CI_{95} = 0.15$ to 0.73). However, the difference between males' and females' indirect effects was significant ($CI_{95} = -0.59$. to -0.05), suggesting that the mediation path was stronger for females than males.

4. Discussion

Female friendships, compared to male friendships, are more intimate and marked by more emotion-oriented interactions (Maccoby, 1990), including co-rumination (Rose, 2002). Ironically, although females have close friendships, the way that they discuss their problems and validate each other's negative emotions also exposes them to an increased risk for depressive symptoms (Rose, 2002). The current study expanded previous models and research on co-rumination by demonstrating that females who engaged in more co-rumination with their best friend also experienced more depressive symptoms and had more sleep problems. Nolen-Hoeksema and Girgus (1994) have proposed that although factors that predict depression can be similar across males and females, when one or more of these factors (e.g., co-rumination) is more prevalent for females than males, it may lead to more depression among females. This proposition is supported by the simple mediation model analysis.

Due to prominent gender differences in both co-rumination and depressive symptoms (Rose, 2002), a moderated mediation model is highly possible. Specifically, the mediation pathway from co-rumination to sleep problems through depressive symptoms might be stronger for females compared to males. This proposition has been supported by the current findings. We found that although the mediation pathway from co-rumination to sleep problems through depressive symptoms was significant for both males and females, the strength of the mediation effect was significantly stronger for females than males. The difference in the indirect effects across gender was attributable to the difference in the path between depressive symptoms and sleep problems.

When integrating the simple mediation and moderated mediation models, it appears that females are more likely to engage in co-rumination than males, which partially explains their experience of increased depressive symptoms. Depressive affect, however, may have a stronger impact on sleep problems for females than males. Therefore, the mediation pathway from co-rumination to sleep problems was more prominent among females than males, not due to their higher engagement in co-rumination but their vulnerability to the negative impact of depressive symptoms. Our analyses offer a complex description of the role gender plays in the associations among co-rumination, depressive symptoms, and sleep quality.

4.1. Limitations and future directions

The current cross-sectional design precludes us from determining the causal influence of co-rumination on depressive symptoms and subsequently experiencing more sleep problems. It is certainly possible that individuals who had poor sleep quality might experience more depressive symptoms (Brand et al., 2016; Lovato & Gradisar, 2014). Furthermore, depressive symptoms and/or sleep problems may increase the likelihood of co-rumination. Thus, future research should utilize a longitudinal design that might be better at detangling the complex associations among co-rumination, depressive symptoms, and sleep problems. Second, the current study relied solely on self-report data. Individuals' subjective report of sleep problems might be biased by their depressive symptoms. Thus, future research may include a multimethod approach (e.g., physiological measure of sleep) when investigating the proposed model. Third, the current study did not include rumination as a covariate, making it difficult to determine whether the mediation process is due to co-rumination rather than rumination. Therefore, future studies should consider rumination and co-rumination simultaneously. Fourth, the composition of the current sample was rather homogeneous with regard to ethnicity (mainly Caucasian)

Table 1
Descriptive statistics and correlations.

	1	2	3
1. Co-rumination	–		
2. Depressive symptoms	0.25**	–	
3. Sleep problems	0.21**	0.42**	–
Males *M* (*SD*)	2.55 (0.85)	1.75 (0.63)	7.67 (2.11)
Females *M* (*SD*)	2.94 (0.76)	1.96 (0.65)	8.63 (2.94)
t-tests (*df* = 170)	−3.18**	−2.15*	−2.45*

Notes.
* $p < 0.05$.
** $p < 0.01$.

and age (young adult). Thus, future research should consider including a broader range of ethnic and age groups to increase its external validity.

4.2. Conclusion

The current study adopted a socioemotional perspective to examine gender differences in sleep problems in the context of co-rumination and depressive symptoms. Dyadic interactions in friendships appear to partially explain gender differences in sleep problems. Because co-rumination appears to be an important correlate of sleep problems, especially in females, interventions that target this sequence of maladaptive social support could potentially inhibit the unfolding of this process by facilitating the use of more effective coping strategies (e.g., problem-focused coping).

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