

# Relationship Quality Buffers Association Between Co-rumination and Depressive Symptoms Among First Year College Students

João F. Guassi Moreira<sup>1</sup> · Michelle E. Miernicki<sup>1</sup> · Eva H. Telzer<sup>1</sup>

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**Abstract** Co-rumination, the tendency to dwell on negative events and feelings with a relationship partner, is an aspect of relationships that has been associated with socioemotional adjustment tradeoffs and is found to be associated with depressive symptoms. However, depending on the context in which it occurs, co-rumination is not necessarily associated with detriments to mental well-being. Differences in relationship quality within certain relationships may explain why co-rumination is not always associated with depressive symptoms. In the current study, we utilized self-report measures in an ethnically diverse sample (53.5 % non-White) of 307 first term college students (65 % female) in order to elucidate how co-rumination between roommates may be associated with depressive symptoms. We found that the association between co-rumination and depressive symptoms was moderated by relationship quality such that co-rumination in a high quality relationship was not associated with depressive symptoms whereas the opposite was true in low quality relationships. Moreover, we found moderated mediation, such that the variance in the association between co-rumination and depressive symptoms was explained via self-

esteem, but only for those co-ruminating within a low quality relationship. These results suggest that relationship quality may impact the extent to which co-rumination is associated with depressive symptoms among first year college students.

**Keywords** Co-rumination · Depression · Relationship quality · Self-esteem · Adolescence

## Introduction

Relationships present individuals with a conduit for support, which is consistently associated with well-being (Brown 2004; Chu et al. 2010). Yet, just as relationships carry the potential to confer benefits, they may also be detrimental (Rudolph 2002; Snyder et al. 1986; Waller and Rose 2010). Co-rumination, the tendency to dwell on negative events with a relationship partner, has been identified as one aspect of relationships that is linked to adjustment tradeoffs, particularly among youth (Rose 2002). For instance, co-rumination is associated with emotional distress and internalizing symptoms, but also with heightened subjective relationship quality in children, adolescents, and adults (Byrd-Craven et al. 2011; Schwartz-Mette and Rose 2012; Waller and Rose 2010). In contrast to other facets of peer relationships, the literature on co-rumination remains comparatively sparse and its study may lead to a better understanding of both the benefits and detriments of peer relationships. In the present investigation, we examined links between co-rumination and depressive symptoms among roommates during the college transition to better understand the conditions under which co-rumination may be associated with maladjustment.

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✉ Eva H. Telzer  
ehtelzer@illinois.edu

João F. Guassi Moreira  
jmoreir2@illinois.edu

Michelle E. Miernicki  
miernic1@illinois.edu

<sup>1</sup> Department of Psychology, University of Illinois, Urbana-Champaign, 603 East Daniel St., Champaign, IL 61820, USA

## Co-rumination and Adjustment

Co-rumination refers to the conversational act of repetitively rehashing one's problems and focusing on negative affect within a dyadic relationship (Rose 2002). Conceptually, it sits at the nexus of two constructs: rumination and self-disclosure (Rose 2002; Rose et al. 2007). Rumination, described as a response to distress in which one broods and repetitively dwells on negative feelings and their consequences (Nolen-Hoeksema 1991; Nolen-Hoeksema et al. 2008), is similar to co-rumination, yet the former is a solitary, cognitive process, while the latter requires a partner and is conversational. Thus, co-rumination is an inherently social process. With respect to self-disclosure, co-rumination can be considered an act of disclosure, although the content discussed is uniquely in the context of discussing personal problems and is typically characterized by focus on negative affect and non-productivity (Rose 2002). Despite its considerable overlap, prior studies have confirmed that co-rumination is a distinct construct from both rumination and self-disclosure (Calmes and Roberts 2008; Rose et al. 2007). Co-rumination is associated with emotional distress and depressive symptoms, but also with heightened subjective relationship quality in children, adolescents, and adults (Byrd-Craven et al. 2011; Schwartz-Mette and Rose 2012; Waller and Rose 2010). Accordingly, co-rumination leads to socioemotional tradeoffs with regard to adjustment outcomes (Rose et al. 2007).

Despite significant advances in our understanding of co-rumination, we have identified two lacunae in the relevant literature. First, it remains largely unknown what psychological variables may account for the association between co-rumination and depressive symptoms. Secondly, it remains unknown why co-rumination is maladaptive in some contexts but not others. For example, several studies have found co-rumination among best friends dyads to be associated with depressive symptoms (e.g., Rose et al. 2007; Schwartz-Mette and Rose 2012), whereas co-rumination between adolescent girls and their mothers (Waller and Rose 2010) or between college roommates (Calmes and Roberts 2008) is not associated with depressive symptoms. In the current study, we address these concerns in order to better understand the association between peer relationships, co-rumination, and adjustment outcomes in first year college roommates.

### Understanding Co-rumination and Depressive Symptoms in a Framework with Self-Esteem and Relationship Quality

#### *Explaining the Association Between Co-rumination and Depressive Symptoms with Self-Esteem*

It is necessary to identify potential psychological constructs that may account for the relationship between co-

rumination and depressive symptoms. Self-esteem may be implicated in a broader, mechanistic explanation of the association between co-rumination and depressive symptoms. The repetitive and unrestrained focus on negative affect that typically accompanies both co-rumination and rumination (Nolen-Hoeksema 1987, 1991; Rose 2002) may lead to inflated perceptions of individuals' problems. Subsequently, individuals may make internal attributions to explain such problems, thereby impinging self-esteem by causing them to believe they are ineffective in handling their problems and that they are no good (Metalsky et al. 1993; Whisman and Kwon 1993). Indeed, adolescents and adults who engage in higher levels of rumination report lower self-esteem (Broderick 1998; Ciesla and Roberts 2002; Kuster et al. 2012), and lower self-esteem is linked with depressive symptoms (Ormel et al. 2004; Orth et al. 2008; Sowislo and Orth 2013). Thus, self-esteem may explain, in part, why co-rumination results in greater depressive symptoms.

#### *Understanding Contexts in Which Co-rumination is Maladaptive: The Role of Relationship Quality*

Differences in relationship quality may help explain why co-rumination is deleterious for some but not others. Whereas having a strong, cohesive relationship with one's co-ruminator may serve to offset potential detriments to well-being that would be otherwise induced by co-ruminating, co-rumination in low quality relationships may adversely affect self-esteem and depressive symptoms. Co-rumination with a low quality relationship partner may be comparatively more repetitive and negative, contain more problem talk, and feature a greater focus on negative affect. Moreover, co-rumination in the context of a low quality relationship may be marked by excessive reassurance seeking, which is associated with subsequent rejection and greater depressive symptoms (Starr and Davila 2008).

In contrast, co-rumination in the context of a high quality relationship may be characterized by more effective social support, subsequent attempts at problem solving, and fewer statements that elongate problem talk, and may therefore be relatively more productive (Rose et al. 2014). Given that social relationships offer a source of social support (Chu et al. 2010), and social support is related to good health (Cacioppo and Cacioppo 2014), the positive quality of the relationship may stymie potential associations with depressive symptoms. Co-ruminating with a close compared to a distant or conflictual confidant may therefore be a positive form of self-disclosure and may act as a buffer in the face of adverse life experiences (Brown et al. 1986). Therefore, the association between co-rumination and depressive symptoms via self-esteem may be conditional upon relationship quality.

## Current Study

In the current study, we focus on co-rumination among first-year college roommates. Because most college roommates usually do not select each other, there will likely be greater variability in their relationship quality than among best-friends, for which the majority of co-rumination research has focused (Schwartz-Mette and Rose 2012; Starr and Davila 2009), thereby lending statistical strength to our investigation. Importantly, college students are capable of forming close relationships before the end of their first term (Buote et al. 2007). The college transition comes at a time when students report insecurities about various aspects of their lives and often turn to their new friends for support, despite having known them for a short amount of time (Buote et al. 2007). Given this, individuals will develop close relationships with their roommates that will vary in relationship quality. Moreover, focusing on college roommates controls for selection effects present in dyadic friendships, particularly best-friend pairs. High functioning individuals are more likely to form a close friendship with another high functioning individual, whereas maladjusted individuals are more prone to associate with depressed and rejected individuals (Hogue and Steinberg 1995; Van Zalk et al. 2010). Because most roommates do not select one another and were previously unacquainted prior to entering college, we avoid potential confounds brought about by selection effects. In addition, separation from parents and close friends during the college transition and living with an individual other than one's family member for the first time creates an ideal environment for roommates to bond.

We propose that the link between co-rumination and depressive symptoms via self-esteem is conditional upon relationship quality (Fig. 1). We hypothesized that co-rumination would be associated with low self-esteem and higher depressive symptoms but only in low-quality relationships. Specifically, we expect the direct effect of co-rumination on depressive symptoms (path *c*) to be moderated by roommate relationship quality, such that co-rumination occurring in the context of a high quality relationship would be less likely to be associated with depressive symptoms than among low-quality relationships. In addition, we predicted that self-esteem would account for significant variance between co-rumination and depressive symptoms. However, the association between co-rumination and self-esteem (path *a*) and the subsequent association between self-esteem and depressive symptoms (path *b*) would be conditional upon levels of roommate relationship quality, such that low relationship quality may exacerbate the deleterious effects of co-rumination on depressive symptomatology through self-esteem.

## Methods

### Participants

Participants included 307 ( $M_{age} = 18.39$  years,  $SD = .36$ ; 65 % female) first year college students from a large, public university in the Midwestern United States who participated in two time points. Time 1 occurred just before arriving on campus for their first semester, and Time 2 occurred 2 months after the start of their first semester. With respect to race, 40 % identified as White, 4 % as African American, 22.5 % as Asian, 7.5 % as Latino, 5.5 % as other, 14 % as mixed race, and 6.5 % declined to respond. All participants provided consent in accordance with the University's Institutional Review Board's policies and guidelines.

### Procedure

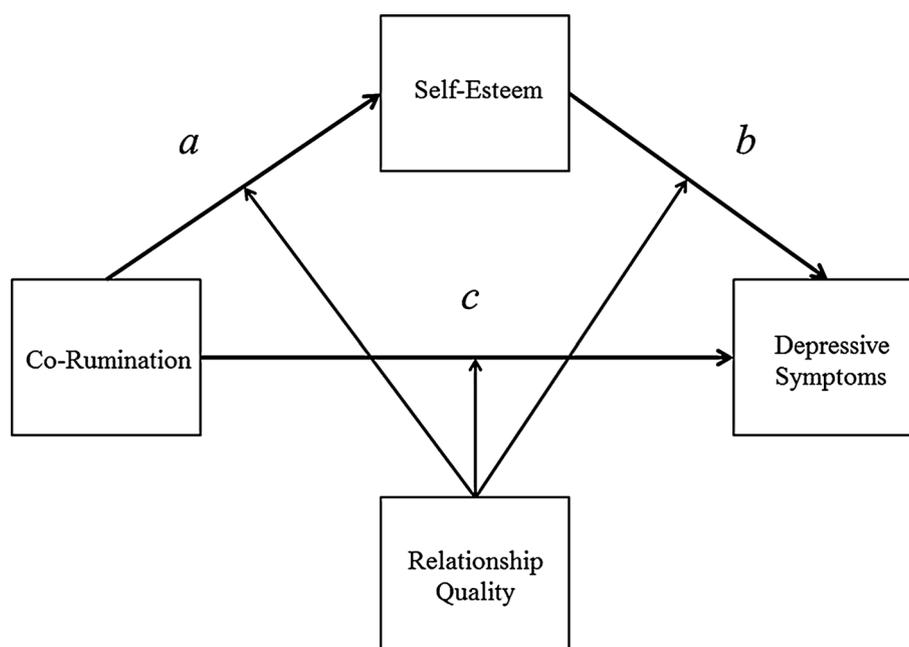
Incoming first year college students were contacted by their university email before and during the fall semester with an invitation to participate in a questionnaire study via an online survey. Participants were told the goal of the study was to better understand the dynamics of first year roommate pairs during the college transition. Participants were given 10 days from the time they were contacted to complete both questionnaires. Only students living in dorms with one roommate were contacted. Students with 2 or more roommates were not eligible nor were participants living in off campus housing. Those interested in participating were able to do so by clicking a unique link to the survey contained in the email. Upon completion of both surveys, participants were mailed product vouchers to a local business and were entered into a drawing to win \$100 (USD). Participants completed the first survey before moving to university and meeting their roommate. Prior to completing the second survey, participants had been living with their roommate for 2 months. Of the initially contacted students, 991 total students participated in at least one time point, with 764 at Time 1 and 515 at Time 2. Analyses reported in the current study include those with data at both time points ( $N = 307$ ).

### Measures

#### *Co-rumination*

At Time 2, co-rumination was assessed with a modified version of the Co-Rumination Questionnaire (Rose 2002). The measure has been widely used among both adolescents and young adults and has been associated with internalizing symptoms (Starr and Davila 2009; Stone et al. 2011).

**Fig. 1** Mediation of co-rumination and depressive symptoms via self-esteem as moderated by relationship quality



Traditionally, the measure asks about the respondent's tendency to co-ruminate with a same-sex best friend. We amended the items to ask about the respondent's roommate. Using a 5-five point scale (1 = "Not at all true" to 5 = "Really true"), participants answered 26 items assessing co-rumination with their roommate (e.g., "When I have a problem, my roommate always tries to get me to tell every detail about what happened" "If one of us has a problem, we will spend our time talking together about it, no matter what else we could do instead"). The items assess nine content areas: frequency of problem discussion, discussing problems instead of engaging in other activities, encouragement by the co-ruminator of the focal individual's discussing problems, encouragement by the focal individual of the co-ruminator's discussing problems, discussing the same problem repeatedly, speculation about the causes of problems, speculation about the consequences of problems, speculation about parts of the problem that are not understood, and focusing on negative feelings. Participants' responses were averaged into a single mean score, with higher values indicating a greater propensity to co-ruminate with one's roommate ( $\alpha = .98$ ).

#### Depressive Symptoms

To assess depressive symptoms, participants completed the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977) at Time 1 and Time 2. The scale is appropriate for use in adolescent and young adult samples (Radloff 1991). Participants completed the measure prior to attending college and at Time 2, allowing us to control for prior symptoms in our analyses. Participants responded to

20 items indicating the frequency of depressive symptoms experienced during the previous week using a 4-point scale (0 = "Rarely or not at all" to 3 = "Most or all of the time"). Example items include "I did not feel like eating; my appetite was poor" and "I thought my life had been a failure." Responses to the measure are summed yielding a score ranging from 0 to 60 (Time 1  $\alpha = .89$ ; Time 2  $\alpha = .91$ ). According to established cutoffs, a score  $>16$  indicates moderate depression whereas as a score  $>27$  indicates severe depression (Zich et al. 1990).

#### Relationship Quality

At Time 2, participants completed the Inventory of Peer Attachment, originally developed for use in college samples, which measures relationship quality between participants and their roommates (Armsden and Greenberg 1987). Although the measure traditionally assesses adolescents' peer relationships, we modified the measure to ask about their relationship with their roommate. Participants used a 5-point scale (1 = "Almost never or never" to 5 = "Almost always or always") to answer 18 items about the quality of their relationship with their roommates (e.g., "When we discuss things, my roommate considers my point of view" "I trust my roommate"). Scores were computed to yield a single, mean score ( $\alpha = .97$ ).

#### Self-Esteem

Measurements of self-esteem were measured at both Time 1 and Time 2 with the Rosenberg Self-Esteem Inventory (1965). The measure has been used extensively in samples

of all ages (see Gray-Little et al. 1997), including college students (Robins et al. 2001). Responses to the 10 item measure were answered using a 4-point scale (1 = “Strongly disagree” to 4 = “Strongly agree”). Example items include “I am able to do things as well as most other people” and “I feel that I’m a person of worth, at least on an equal plane with others.” All items, once reverse scored where appropriate, were averaged into a single score (Time 1  $\alpha = .90$ , Time 2  $\alpha = .92$ ).

## Results

### Analysis Plan

To examine the relationships of interest, we ran the following analyses to test our key questions: (1) In order to measure the extent to which the association between co-rumination and depressive symptoms is conditional upon relationship quality, we conducted a standard moderation analysis following the guidelines of Aiken et al. (1991); (2) Next, we performed a test of moderated mediation following the methods of Preacher et al. (2007). This test included the mediation model described in Fig. 1 and specified relationship quality as the moderating variable. In consideration of the robust findings of gender differences in the co-rumination literature (Rose 2002), as well as gender differences in depression (Rudolph 2002), self-esteem (Kling et al. 1999), and relationship quality (Cyranski et al. 2000), we controlled for gender in all our analyses (coded as male = 0, female = 1). Additionally, we controlled for depressive symptoms prior to arriving at university at Time 1.

### Descriptive Statistics and Gender Differences in Study Variables

Means and standard deviations for all study variables are presented in Table 1. Males and females did not differ in depressive symptoms at Time 1 or Time 2 ( $t(305) = -0.33, -1.16$  ns). Males reported higher self-esteem at both time points (T1:  $t(305) = 2.30, p < .05$ ; T2:

$t(305) = 1.98, p < .05$ ). At T2, females reported higher levels of co-rumination ( $t(305) = -2.38, p < .05$ ) and relationship quality ( $t(305) = -2.78, p < .01$ ). Bivariate correlations are reported in Table 2. Relationship quality was significantly correlated with all study variables. While co-rumination was strongly correlated with relationship quality, co-rumination was not significantly correlated with depressive symptoms or self-esteem. Depressive symptoms were associated with lower self-esteem at both time points.

### Relationship Quality Moderates Association Between Co-rumination and Depressive Symptoms

In our first analysis, we examined whether relationship quality moderates the association between co-rumination and depressive symptoms. We first centered co-rumination and relationship quality scores and created an interaction term by multiplying the two terms together. We entered the interaction term, along with the centered co-rumination and relationship quality variables, into a regression model to predict T2 depression. Gender, T1 self-esteem and T1 depressive symptoms were included as covariates. As shown in Table 3, the interaction term was significant. In order to probe the interaction, we divided our sample into high and low roommate relationship quality according to methods specified by Aiken et al. (1991). As shown in Fig. 2a, co-rumination within a low quality relationship is associated with depressive symptoms ( $B = 3.34, SE = 1.47, \beta = .17, p < .05$ ), whereas co-rumination within a high quality relationship is not associated with depressive symptoms ( $B = 0.13, SE = 1.13, \beta = .01$  ns).

In addition, we conducted exploratory analyses to examine gender differences in this moderation. To test this, we computed a three-way interaction term (Gender  $\times$  Co-Rumination  $\times$  Relationship Quality). This term was entered into the same model along with the original two-way interaction terms as well as two-way interaction terms with gender (Gender  $\times$  Co-Rumination, Gender  $\times$  Relationship Quality). The only significant interaction term to emerge was the original two-way interaction term (Co-Rumination  $\times$  Relationship Quality), suggesting the conditional effect of relationship quality on co-rumination and depressive symptoms is similar for both males and females. Given none of the interaction terms with gender were significant, we conduct all subsequent analyses with gender as a covariate.

### Relationship Quality Moderates Association Between Co-rumination and Depressive Symptoms Via Self-Esteem: Moderated Mediation

Next, we examined if the indirect effect of co-rumination on depression via self-esteem is significant and whether

**Table 1** Descriptive Statistics

Variable	Time 1		Time 2		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1. Depressive symptoms	13.77	9.28	17.10	10.37	-6.71***
2. Self-esteem	2.99	0.58	2.91	0.63	2.94**
3. Co-rumination	-	-	2.11	0.95	-
4. Relationship quality	-	-	3.30	0.99	-

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**Table 2** Bivariate correlations of all study variables

Variable	1	2	3	4	5	6
1. T1 depressive symptoms	1					
2. T2 depressive symptoms	.61***	1				
3. T1 self-esteem	-.62***	-.48***	1			
4. T2 self-esteem	-.56***	-.69***	.74***	1		
5. Co-rumination	.08	.04	.02	-.02	1	
6. Relationship quality	-.13*	-.19**	.06	.09	.67***	1

T1, T2 denote Time 1 and Time 2, respectively

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**Table 3** The association between co-rumination and depression as moderated by relationship quality

	B (SE)	$\beta$
T1 depressive symptoms	0.52 (0.07)	0.46***
T1 self-esteem	-2.89 (1.02)	-0.16**
Relationship quality	-2.68 (0.65)	-0.26***
Co-rumination	1.85 (0.65)	0.18**
Gender	1.64 (0.99)	0.08
Co-rumination $\times$ relationship quality	-1.53 (0.52)	-0.13**

T1 denotes time 1. Co-rumination and relationship quality variables above reflect centered scores. Gender coded as male = 0, female = 1  
\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

this pathway is moderated by roommate relationship quality. To examine this, we used the PROCESS macro for SPSS (Hayes 2013). Co-rumination and depressive symptoms were entered into the model as the independent and dependent variables, respectively, along with self-esteem as the mediator and roommate relationship quality as the moderator. Gender and T1 depressive symptoms were entered as covariates. PROCESS allowed us to estimate direct and indirect effects using bootstrapping with 10,000 samples and a 95 % bias-corrected confidence interval (CI) was created for the indirect effect.

As we hypothesized, the paths between co-rumination and self-esteem (path *a*:  $B = 0.08$ ,  $SE = 0.03$ ,  $p < .01$ ) as well as between self-esteem and depressive symptoms (path *b*:  $B = 1.24$ ,  $SE = 0.56$ ,  $p < .05$ ) were both moderated by roommate relationship quality. That is, the relationship between co-rumination and self-esteem is conditional upon levels of roommate relationship quality, as is the relationship between self-esteem and depressive symptoms. To unpack these significant interactions, we followed the guidelines of Aiken et al. (1991) and probed the significant interactions by examining low and high relationship quality roommates. In a linear regression model with gender entered as a covariate, co-rumination was associated with lower self-esteem, but only for individuals reporting low relationship quality with their roommates (Fig. 2b; High quality:  $B = -0.01$ ,  $SE = 0.06$ ,

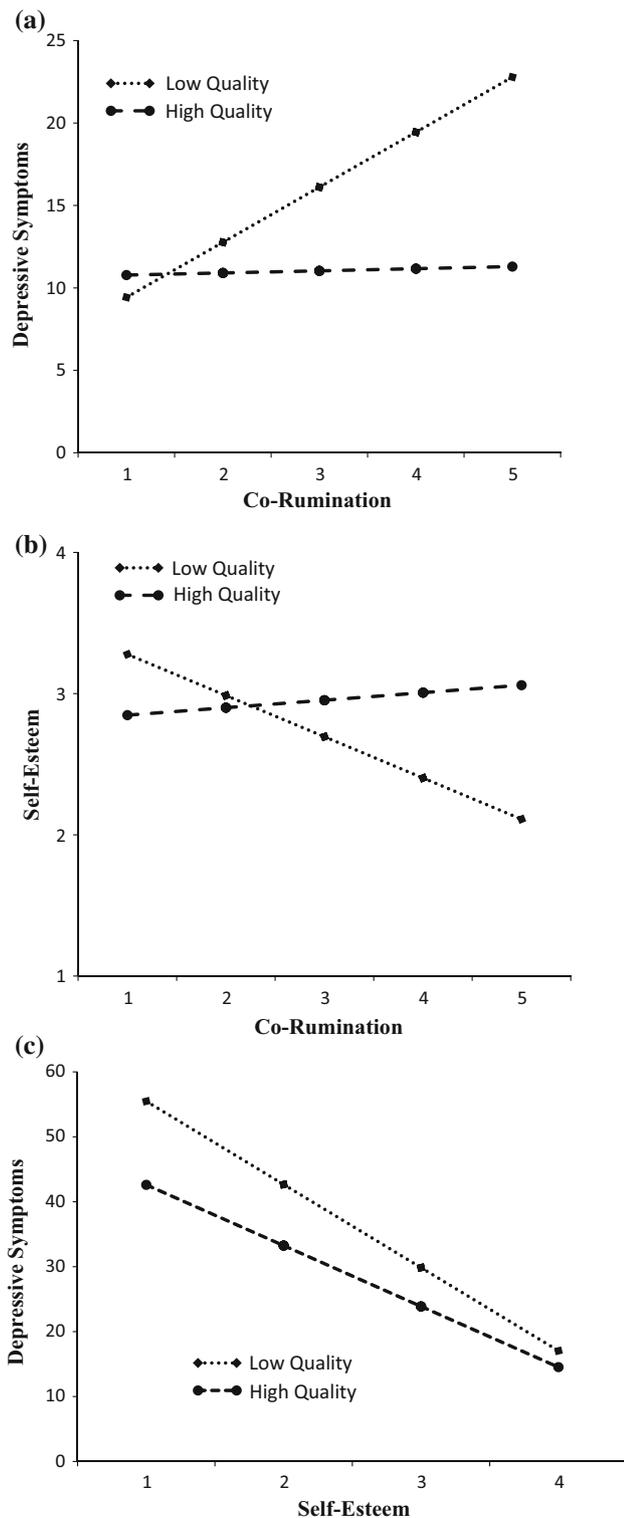
$\beta = -0.02$  ns; Low quality:  $B = -0.18$ ,  $SE = 0.07$ ,  $\beta = -0.15$ ,  $p < .05$ ). Similarly, low self-esteem was linked more strongly to depressive symptoms for those reporting low relationship quality with their roommates, even when controlling for prior depressive symptoms (Fig. 2c; High quality:  $B = -9.75$ ,  $SE = 1.83$ ,  $\beta = -0.65$ ,  $p < .001$ ; Low quality:  $B = -12.00$ ,  $SE = 1.56$ ,  $\beta = -0.70$ ,  $p < .001$ ).

Next we explored the indirect pathway of co-rumination on depressive symptoms via self-esteem. With self-esteem entered into the model, the direct effect of co-rumination on depressive symptoms was no longer moderated by relationship quality (path *c*:  $B = -0.79$ ,  $SE = 0.47$  ns). The indirect effect of co-rumination on depressive symptoms through self-esteem was significant for individuals who reported low relationship quality (95 % CI: [0.41, 3.03];  $B = 1.58$ ,  $SE = 0.67$ ). The confidence interval does not include zero, consistent with statistically significant mediation. Thus, the indirect effect of co-rumination and depressive symptoms via self-esteem is conditional upon relationship quality.

Finally, for exploratory purposes, we examined differences between participants reporting low and high relationship quality. Participants reporting low quality relationships reported higher levels of depressive symptoms on average (High quality:  $M = 14.52$ ,  $SD = 9.60$ ; Low quality:  $M = 18.64$ ,  $SD = 11.78$ ;  $t(207) = 2.77$ ,  $p < .01$ ) as well as significantly higher levels of co-rumination (High quality:  $M = 2.88$ ,  $SD = 0.73$ ; Low quality:  $M = 1.38$ ,  $SD = 0.59$ ;  $t(207) = -16.47$ ,  $p < .001$ ). There were no significant differences between the groups in self-esteem (High quality:  $M = 3.00$ ,  $SD = 0.64$ ; Low quality:  $M = 2.88$ ,  $SD = 0.68$ ;  $t(207) = -1.38$  ns).

## Discussion

In the current study, we show that co-rumination between college roommates is associated with depressive symptoms, but only for those who report low relationship quality with their roommate. These results contribute to the notion



**Fig. 2** **a** Association of co-rumination and depressive symptoms as moderated by relationship quality. **b** Association of co-rumination and self-esteem as moderated by relationship quality. **c** Association of self-esteem and depression as moderated by relationship quality

that co-rumination is not necessarily associated with depressive symptoms (Calmes and Roberts 2008; Starr and Davila 2009). Instead, it appears that co-rumination may be a risk factor that contributes to depressive symptoms in the presence of other contextual stressors, such as low cohesion roommate relationships.

Little work has identified a psychological construct by which the association between co-rumination and depressive symptoms could be explained (Byrd-Craven et al. 2011). Moreover, most studies investigating co-rumination focus on studying best friend pairs of early and mid-adolescents. In our study, we examined co-rumination in an understudied context (e.g., college roommate pairs) during an important transition period when youth are leaving their homes and moving to college. We found that self-esteem accounts for significant variance in the association between co-rumination with a roommate and depressive symptoms, but only for individuals who reported low levels of subjective relationship quality. Higher levels of depressive rumination, a component of co-rumination, has also been linked to lower self-esteem in adolescents (Ciesla and Roberts 2002; Broderick 1998). Low self-esteem, in turn, is a potent risk factor for depressive symptoms (Orth et al. 2008; Sowislo and Orth 2013). Interestingly, participants who reported low levels of relationship quality with their roommate co-ruminated less compared to those who reported high relationship quality, yet nonetheless reported more depressive symptoms in the face of co-rumination. This is significant because it defies the notion that individuals with poor roommate relationships are more depressed simply because they co-ruminate more. Our results support the growing belief that co-rumination is not necessarily maladaptive (Calmes and Roberts 2008; Starr and Davila 2009). As others have previously proposed (Calmes and Roberts 2008), co-rumination across different contexts may be qualitatively different. With respect to our sample of college roommates, co-ruminating within the context of a high quality relationship may be different from co-ruminating within the context of a low quality relationship. High quality co-ruminators may display more concern and empathy for one another than their low quality counterparts (Rose et al. 2014). Due to this, one may view co-ruminating as an outlet for personal concerns and issues where they will be heard and understood. Prior work in clinical settings has found that clients who report feeling heard and empathically understood are not perturbed when discussing troubling issues (Myers 2000) and report better feelings of self-understanding (Shattell et al. 2006). Thus, co-ruminating with a high quality relationship partner may be viewed as a productive response to stress that does not

confer risk for depression, suggesting that co-rumination is not deleterious across all contexts.

It is worth noting that co-ruminating with a lower quality relationship partner may not necessarily be characterized with hostility or animosity, yet a simple lack of perceived support may allow for a disproportionate focus on negative affect (Rose et al. 2014). The subsequent focus on negative affect may erode one's self-esteem. Dwelling on negative problems and feelings may lead one to question their own self-worth and ability to effectively deal with personal issues (Mor and Winqvist 2002). In the face of significant stressors, they do not have a strong roommate relationship, a factor that may have allowed them to effectively cope with that stressor. Further, the quality of one's existing social relationships have been found to be correlated with one another (Connolly et al. 2000), indicating that such individuals may not have social support available from other peer networks or relationships. Although our sample avoids selection effects, the extent to which one bonds with a new roommate may be indicative of general friendship skills that are used when establishing other new relationships. Indeed, the lack of a strong roommate relationship may be indicative of increased loneliness, isolation, and lack of social support that are also related to poor adjustment (Cacioppo and Hawkey 2009; Brissette et al. 2002). Co-ruminating within low relationship quality contexts may place someone at risk for depressive symptoms in part because they may not have other social support or because the immediate need for social support may not be met.

Our research extends upon other work that suggests that the social role of one's co-ruminating partner matters with respect to the induction of depressive symptoms (Calmes and Roberts 2008; Waller and Rose 2010). Co-ruminating with one's best friend is consistently associated with depressive symptoms, whereas co-ruminating with another individual, such as romantic partners (Calmes and Roberts 2008) or mothers (Waller and Rose 2010) is not associated with depressive symptoms. The influence of relationship quality on the co-rumination—depression association may therefore depend on qualitative differences in emotional intimacy found in a given relationship. Best friends may be more likely to disclose personal information to one another that is highly stressful and disconcerting (Smetana et al. 2006; Steinberg and Morris 2001). Roommates, on the other hand, may discuss issues that are bothersome, but may refrain from sharing their most troubling problems. These differences may affect the extent to which co-rumination is associated with depressive symptoms. Future work should examine the differences and similarities in co-rumination among roommates, best friends, and romantic partners and whether the content of the disclosure differs across different relationship partners. In the current study,

we did not study co-rumination in a broader context. Although we were able to contribute a more detailed understanding to the association between co-rumination and depressive symptoms within roommate pairs, it is possible that participants had high relationship quality with others, such as close friends and family, while experiencing low relationship quality with their roommate. Future research should examine how differences in relationship quality across different relationship partners may differentially impact the association between co-rumination and depressive symptoms.

The current study has several limitations. Specifically, it is most appropriate to conduct mediation analyses with three time points. However, because there is still much to be understood about co-rumination, our findings are worthwhile insofar that we have identified a potential pathway by which co-rumination may influence depressive symptoms. To date, very little work has focused on identifying psychological constructs which may explain variability in the association by which co-rumination may influence depressive symptoms. Additionally, self-esteem consistently predicts depressive symptoms whereas the inverse has received less support (Sowislo and Orth 2013). In addition, prior longitudinal work has found that co-rumination predicts depressive symptoms (Hankin et al. 2010; Rose et al. 2007). Together, this suggests that the directionality of our model and results is consistent with prior work. Nonetheless, future studies should utilize multiple time points to better pinpoint directions of causality in the proposed model. A second limitation is that 65 % of our sample was female. Although we controlled for gender in all analyses, and we did not find that our effects were moderated by gender, future studies should further explore gender differences in the links between co-rumination and adjustment, an area marked by conflicting findings that could benefit from clarification (Rose 2002; Schwartz-Mette and Rose 2012).

## Conclusion

Our goal was to study co-rumination in populations (e.g., college students) and relationships (e.g., roommates) that have received little attention (Calmes and Roberts 2008; Starr and Davila 2009; Byrd-Craven et al. 2011). Our findings help clarify how the nature of the relationship between co-ruminators affects the likelihood that co-rumination may be associated with depressive symptoms thereby contributing to the growing literature that suggests co-rumination is not necessarily maladaptive. Our findings underscore that co-rumination, in the context of high-quality relationships, may be a relatively benign form of self-disclosure. Further, our results are among the first to

identify one avenue by which co-rumination may affect depressive symptoms. This is noteworthy because much work has not focused on the manner co-rumination may contribute to depressive symptoms.

Notably, the participants in our sample had lived with their roommates for 2 months, yet they were still significantly affected by their roommates. This provides compelling evidence that roommate relationships are important to first year college students beyond helping them establish a novel social network. The roommate relationship holds the potential to serve as a source of support to first year students, and high quality relationships may help bolster their mental health. These findings may contribute to methods for encouraging healthy roommate relationships such as offering programs that promote bonding and trust, thereby contributing to the well-being of first year students.

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**Authors' Contributions** JFGM designed, developed and implemented the study in addition to performing statistical analyses, interpreting results and drafting the manuscript. MEM aided in the development of the study, provided critical input on statistical analysis and interpretation, and helped to draft the manuscript. EHT supervised the design, development and implementation of the study, provided critical input on statistical analyses and interpretation, and made critical edits to the manuscript. All authors read and approved the final manuscript.

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**João F. Guassi Moreira** is an undergraduate student at the University of Illinois. He is broadly interested in adolescent well-being and the extent to which close relationships play a role in such.

**Michelle E. Miernicki** is a graduate student at the University of Illinois. She received her Bachelor's and Master's from the University of Illinois. She is interested in researching how adolescent social relationships confer risk for internalizing disorders.

**Eva H. Telzer** is an Assistant Professor at the University of Illinois. She received her Doctorate in developmental psychology from the University of California, Los Angeles. She is interested in studying the social, emotional, and cognitive development from childhood to adulthood and how such development affects well-being.