Effects of Rumination and Co-Rumination on the Relationship Between Self-Efficacy and Depressive Symptoms

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EFFECTS OF RUMINATION AND CO-RUMINATION ON THE RELATIONSHIP
BETWEEN SELF-EFFICACY AND DEPRESSIVE SYMPTOMS

by

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ABSTRACT

Depressive symptoms have far-reaching and negative implications on both an individual and societal level, with college students generally considered to be a particularly vulnerable population in terms of risk for depressive symptoms. Two internal cognitive processes, self-efficacy, and rumination, as well as the interpersonal form of rumination, co-rumination, have all been uniquely linked to depressive symptoms. The literature linking these four constructs is not nearly as extensive as it is with any of the constructs uniquely relating to depressive symptoms. Rumination is related to lower levels of self-efficacy, but the interaction of self-efficacy and co-rumination as well as the effects of rumination and co-rumination on the relationship between self-efficacy and depressive symptoms have yet to be explored to the same extent. The current study assessed students enrolled in undergraduate psychology classes at a medium-sized public university in New England (N=222) involving five self-report survey assessments. Results indicated that rumination predicted self-efficacy over and above co-rumination. Interestingly, co-rumination but not rumination moderated the association between self-efficacy and depressive symptoms. Clinical and educational implications of these findings and directions for future research are discussed.
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INTRODUCTION

Depression and depressive symptoms pose significant issues for both individual and societal functioning. Given that college students are a particularly vulnerable population, it is important to understand the interplay of risk factors for depressive symptoms in order to better identify prevention and intervention targets (Gress-Smith et al., 2012; Jaycox et al., 2009). Self-efficacy and rumination are two internal cognitive factors; both are implicated as unique risk factors in depression, but whether they interact to create exacerbated risk is unclear and warrants further research. To date, research has yet to examine how these risk factors may extend into an interpersonal context (e.g., whether self-efficacy may be linked with co-rumination in predicting depressive symptoms). The current study addresses these gaps in the literature by examining how cognitive and interpersonal ways of responding to low mood (rumination and co-rumination) may impact the link between self-efficacy and depressive symptoms in college students.

Depression and Depressive Symptoms

In part due to its complex nature, depression is operationally defined through the number of symptoms and persistence of symptoms that are agreed upon and outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013). The concept of affect is particularly important and helpful to define and diagnose depression. Affect, categorized as either positive or negative, is used to describe the valence of one’s emotions, expressions, and general attitudes. Positive affect refers to things such as cheerfulness and pride, and negative affect refers
to things such as sadness and distress. Decreased positive affect serves as a key feature of depression. Along with decreased positive affect, a range of symptoms are used to identify depression (Ibrahim et al., 2013). These symptoms can be emotional (e.g., feelings of sadness or hopelessness), cognitive (e.g., trouble concentrating or suicidal ideation), physical (e.g., changes in appetite or sleep disturbances), and behavioral (e.g., loss of interest in pleasurable activities) (NCCMH, 2010).

When talking about depression, there is an important distinction to be made between depressive symptoms and diagnosable depression (NCCMH, 2010). Depressive symptoms vary in number and severity depending on the individual and circumstances, and, for some individuals, the severity of depressive symptoms can warrant a clinical diagnosis of depression (i.e., depressive disorder). The two main types of depressive disorders are dysthymia (i.e., persistent depressive disorder) and Major Depressive Disorder (MDD). Criteria for both dysthymia and MDD are based on the number and intensity of depressive symptoms according to DSM IV, and categorization of depressive episodes range from moderate to severe.

Estimates for lifetime prevalence of depression diagnosis varies. Global estimates often fall between 4 and 10% for MDD and 2.5 and 5% for dysthymia (NCCMH, 2010; Kessler et al., 2003; World Health Organization, 2017). Some individuals may experience depressive symptoms at a subclinical level, without fully meeting the criteria to be diagnosed with one of the aforementioned depressive disorders. Estimates for prevalence of depressive symptoms are even higher than depressive diagnoses (Merikangas et al., 2010). For the purposes of this study and given the measures used,
data on depressive symptoms (rather than formal depression diagnoses) was collected and analyzed.

**College Students as a Vulnerable Population**

For many students, college is a period of transition in older adolescence that often involves moving, living independently, managing new courses and workloads, and creating new social networks. Transitions in general serve as stressors, and since college is a time of accumulating transitions in personal, work, and academic contexts, these culminating factors may render this particular period of time quite intense. College students are generally considered a particularly vulnerable population in terms of risk for depressive symptoms (Jaycox et al., 2009).

The prevalence of depressive disorders at the transition to college (e.g., age 17-18 years) is alarming at 15.4%, and the rate of depressive symptoms in college-aged students is even higher, at 30.6% (Ibrahim et al., 2013; Merikangas et al., 2010). More recently, a meta-analysis of anxiety and depressive symptoms in college students during COVID-19 found the prevalence of depressive symptoms to be 34% (Chang, 2021).

Depressive symptoms can impact many aspects of a college student’s life, including but not limited to decreases in perceived social support, school functioning, grades, and physical health (Jaycox et al., 2009). Because of the far-reaching and negative impacts of depressive symptoms on both individuals and society, researchers aim to better understand depression, what contributes to it, and how to effectively treat it. The following section will detail the impact of depressive symptoms and briefly address some of the literature aiming to understand its etiology.
The Costs of Depression and Depressive Symptoms

Depression is a prominent issue, both on an individual level and on a societal level (Murray & Lopez, 2013). In terms of individual experience, depressive disorders can be debilitating as they are related to increases in disability and comorbidity with chronic illnesses (Cassano & Fava, 2002). Comorbid depressive symptoms, when experienced in tandem with physical health problems, can exacerbate pain, distress and disability (NCCMH, 2010). In severe cases, depression poses an increased risk for suicide, and almost two-thirds of people who die by suicide experience depression (Cassano & Fava, 2002; Sartorius & Angst, 2001). In a larger context, depression is among the top ten causes for burden of disease in the United States, leading to a global total of Years Lived with Disability greater than 50 million in 2015 (Murray & Lopez, 2013; World Health Organization, 2017). Depression disproportionately affects low and middle-income countries, and researchers have also found gender differences, as depressive symptoms are more common in female-identifying individuals than in male-identifying individuals (NCCMH, 2010; World Health Organization, 2017; Zung et al., 1993).

On a larger scale, societal costs associated with depression can be related to incurred healthcare and treatment costs as well as issues of workplace absenteeism and unemployment (Cassano & Fava, 2002; NCCMH, 2010; Ibrahim et al., 2013; Mccaron et al., 2016; Murray & Lopez, 2013). Since depressive symptoms pose issues for both individual and societal functioning and because college students are particularly vulnerable to experiencing these symptoms, it is important to understand the development of depressive symptoms in order to better prevent and treat them.
There are various risk factors for the development of depressive symptoms. Some known risk factors are biological (e.g. sex differences or family history) or circumstantial (e.g. financial condition or environmental stressors) (Liu et al., 2018). Other risk factors may be emotional, such as a general attitude style of an individual or a lack of close relationships in which an individual can feel comfortable providing self-disclosure (Liu et al., 2018; NCCMH, 2010). One possible way to better understand depressive symptoms is to examine risk factors for depression, such as cognitive and interpersonal processes.

The Role of Self-Efficacy in Depressive Symptoms

One cognitive variable that has been extensively researched and implicated in relation to risk for depression is self-efficacy. The concept of self-efficacy is defined as “beliefs about one’s capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura, 1977; Bandura, 1994, p.1). Similar to self-esteem, self-efficacy is related to one’s perception of self. What distinguishes self-efficacy is its task-oriented nature. Self-efficacy is related to one’s belief in their ability to perform in prospective situations. Thus, individuals with higher self-efficacy are more likely to set higher goals, seek and accept challenges, and persist and adapt through those challenges.

Similar to depression, the construct of self-efficacy has particular relevance for older adolescents at the transition to and early in college, predicting student’s motivation, learning, cognitive engagement, and goal setting (Bandura, 1994; Schunk, 1989; Zimmerman et al. 1992). Self-efficacy is thought to be related to depressive symptoms, since feeling as though one does not have the agency to change one’s own mood may exacerbate low moods, increase feelings of helplessness, and worsen risk for depressive
symptoms. As such, examining links between self-efficacy and depressive symptoms has been a focus of many adolescent studies.

Researchers have found a significant negative correlation between self-efficacy and depressive symptoms in adolescents, meaning lower levels of self-efficacy are related to higher levels of depressive symptoms and vice versa (Ahmad et al., 2013; Ehrenberg et al., 1991). Specifically, higher self-efficacy is related to lower levels of distress, negative affect, and thoughts of hopelessness, all of which are core features of depression (Ahmad et al., 2013; Luszczynska et al., 2009). High self-efficacy can serve as a protective factor against psychopathologies, but low self-efficacy can increase risk for depressive symptoms (Ahmad et al., 2013; Luszczynska et al., 2009). Consider, for example, a situation where someone is given a task at work that is outside of their area of expertise. An individual with high self-efficacy may be excited about a new challenge and feel confident in their ability to be resourceful and complete the task. On the other hand, an individual with low self-efficacy may try to avoid the task, perceive themselves as incapable of rising to the challenge, and expect an unsuccessful outcome. Consistently feeling as if one can (or cannot) meet expectations, demands, and responsibilities may significantly impact mood, which can then mitigate (or exacerbate) risk for developing mental distress, such as depressive symptoms.

The Role of Rumination in Depressive Symptoms

In addition to self-efficacy, another key cognitive risk factor for depressive symptoms has to do with how individuals respond to their low mood. Rumination is one such response style that individuals may enact when they notice they are feeling depressed. Engaging in a ruminative response style involves focusing on negative
symptoms and worrying about potential causes and consequences of those symptoms (Nolen-Hoeksema, 1991). Researchers have distinguished between subtypes of rumination: self-reflection and brooding (Burwell & Shirk, 2007). Although some forms of self-reflection may have positive effects for some individuals (e.g., problem solving), brooding does not involve active problem solving and focuses on one’s emotional state rather than potential distractions or solutions (Burwell & Shirk, 2006; Treynor et al., 2003). Rumination is related to feelings of hopelessness, pessimism, negative cognitive styles, and self-criticism (Nolen-Hoeksema, 1991).

Researchers have identified strong connections between ruminative response styles and depressive symptoms. Theory proposes that repetitively dwelling on thoughts about how sad or bad one feels in response to a low mood increases risk for depressive symptoms (Nolen-Hoeksema et al., 2008). Empirical evidence supports this assertion. For example, individuals who ruminate while distressed experience longer periods of depressive symptoms, and ruminative response styles are very common in individuals with diagnosed depression (Kim et al., 2012; Nolen-Hoeksema et al., 2008). This relationship between rumination and depressive symptoms has been conceptualized as cyclical and mutually informative (Lyubomirsky & Nolen-Hoeksema, 1993; Nolen-Hoeksema et al., 2008). In other words, depressive symptoms can lead to increased rumination, and rumination can lead to increases in depressive symptoms. Unfortunately, ruminating in response to depressed mood can lead individuals to feel they are gaining a greater understanding of their problems and feelings. This, in turn, can make individuals less likely to seek activities that could distract from and lift their low moods (Lyubomirsky & Nolen-Hoeksema, 1993).
Co-Rumination as an Interpersonal Manifestation of Rumination

Another way individuals may respond to low or depressed moods is via co-rumination. This newer construct is a social form of rumination in which friends frequently and excessively discuss their problems (Rose, 2002). Co-rumination is characterized by excessive negative problem talk, speculation about a problem, rehashing the problem, dwelling on negative affect, and mutual encouragement of problem talk (Rose, 2002).

Co-rumination is hypothesized to be linked with depressive symptoms, since talking with friends about how sad or bad you feel could increase risk for depressive symptoms. In the literature, co-rumination has been found to be associated with internalizing problems, specifically with depressive symptoms (Calmes & Roberts, 2008; Spendelow et al., 2017). The perseverative focus on negative topics can lead to emotional difficulties for individuals (Rose, 2002). In a study of female college students, higher levels of co-rumination with one’s closest friend was associated with higher levels of depressive symptoms (Calmes & Roberts, 2008). Additionally, under certain conditions, co-rumination can even contribute to depression contagion, or an increase in depressive symptoms for both conversation partners (Schwartz-Mette & Smith, 2018).

Past studies of co-rumination suggest that it is a construct with socioemotional tradeoffs, involving both adaptive and maladaptive aspects (Felton et al., 2019; Rose, 2002; Rose et al., 2007). Specifically, co-rumination has been found to be related to higher levels of depressive symptoms, but also friendship benefits. Since co-ruminative interactions involve self-disclosure, the sharing of personal thoughts and feelings has the potential to enhance reported friendship quality which is a known protective factor.
against internalizing issues (Schwartz-Mette et al., 2021). Indeed, in a study of first year college students, researchers found that co-rumination was related to depressive symptoms, but only in high-quality relationships and not low-quality relationships (Guassi Moreira et al., 2016).

Similar to gender differences observed in depression, researchers have found gender differences in co-rumination, as female-identifying individuals engage in co-rumination at higher levels than male-identifying individuals (Calmes & Roberts, 2008; Rose, 2002). Additionally, as noted above, co-rumination is linked with self-disclosure, and research shows a traditional feminine gender orientation is related to engaging in more self-disclosure and, subsequently, higher friendship quality (Bowman, 2008). Rose (2002) found that girls reported higher levels of internalizing symptoms, co-rumination, and friendship quality. Studies of college populations also have documented socioemotional tradeoffs of co-rumination, with females reporting higher levels of co-rumination that predicted higher levels of both depressive symptoms and friendship satisfaction (e.g., Calmes & Roberts, 2008).

**Linking Constructs: Depressive Symptoms, Self-Efficacy, and (Co-)Rumination**

As discussed above, research indicates that self-efficacy, rumination, and co-rumination are each associated with depressive symptoms. This raises the question, is there a way these constructs come together in some way that can help us better understand risk for depressive symptoms? Though the literature linking these four constructs is not nearly as extensive as it is with any of the constructs related to depressive symptoms, we know a bit about the link between self-efficacy and rumination, specifically that rumination is related to lower levels of self-efficacy (Gilliam, 2006). The
two constructs are similar, as both are internal cognitive processes related to goal setting, self-blame, and reduced self-confidence in overcoming obstacles (Adams, 1992; Nolen Hoeksema, 2008). Perhaps when one ruminates on a low or depressed mood, the persisting negative thoughts contribute to a feeling of being unable to succeed at a task. For example, if an athlete is ruminating about a recent loss and perseverating on negative aspects of the game and negative emotions, they may consequently have less confidence in their ability to succeed in future games.

Although there is existing research on the relationship between self-efficacy and rumination, less is known about the link between self-efficacy and co-rumination. To date there are no studies looking at the relationship between these two variables, but there are theoretical reasons to expect they may be connected, particularly in relation to depressive symptoms. Co-rumination is conceptualized as a social form of rumination, and indeed the two constructs are correlated (Rose, 2002). Additionally, it has been found that co-rumination has an indirect effect on depressive symptoms through brooding rumination (Bastin et al., 2020).

Thus, given links of rumination with co-rumination, co-rumination may likewise be associated with self-efficacy. Perhaps lower levels of self-efficacy cause people to respond to low moods by seeking external social support. For example, consider a student who is experiencing a depressed or low mood in response to feeling overwhelmed by their academic workload. If this person has low self-efficacy, they may believe themselves to be unable to catch up and complete the work, and they may subsequently seek a friend to talk to about this problem since they feel ineffective in dealing with their situation on their own.
Taken together, the theoretical and empirical literature suggests that low self-efficacy may be linked with higher levels of both rumination and co-rumination. Both rumination and co-rumination, then, may exacerbate self-efficacy’s impact on depressive symptoms. These potentialities are addressed in the current study.

Considering Potential Impacts of the Coronavirus

An important factor to consider when looking at these factors is the context in which the data was collected. The current study took place during the 2020-2021 academic school year. During this time, the Coronavirus had an acute impact on a variety of aspects of what was previously considered “normal” life. There were exacerbating factors impacting diverse populations, specifically college students (Chang et al., 2021). During this time, the public university where participants for the current study were recruited from was holding classes primarily online. Given the uncertainty and dynamism of learning conditions during this time, combined with already existing risk factors for depression associated with college students, it is important to consider the potential impact of the Coronavirus on depressive symptoms and related constructs. To address this, the use of scores from a Coronavirus Anxiety Scale as a covariate are discussed further below.

The Current Study

The current study aims to explore this possibility by examining a series of models to better understand the relationship between these constructs. Specifically, the study will test hypotheses regarding whether self-efficacy is linked more strongly to rumination or co-rumination and whether rumination and/or co-rumination moderate links between self-
efficacy and depressive symptoms. Research questions and hypotheses for this aim are as follows:

**Question 1:** Does rumination or co-rumination relate more strongly to self-efficacy?

**Hypothesis 1:** It was hypothesized that both rumination and co-rumination would be negatively related to self-efficacy. The association between rumination and self-efficacy was expected to be stronger than the association between co-rumination and self-efficacy.

**Question 2:** Does the association between self-efficacy and depressive symptoms depend on the level of rumination?

**Hypothesis 2:** It was hypothesized that rumination would moderate the relationship between self-efficacy and depressive symptoms, such that the association between self-efficacy and depressive symptoms would be significant only at higher levels of rumination.

**Question 3:** Does the association between self-efficacy and depressive symptoms depend on the level of co-rumination?

**Hypothesis 3:** It was hypothesized that co-rumination would moderate the association between self-efficacy and depressive symptoms, such that the association between depressive symptoms and co-rumination would be significant only at higher levels of co-rumination.
METHOD

Participants

Data were collected as part of a larger project investigating the role of cognitive and social cognitive deficits in maladaptive interpersonal behaviors associated with depressive symptoms. Participants were students enrolled in undergraduate psychology classes at a medium-sized public university in New England. The mean age of the sample was 19.32 (SD = 2.62) years. Of the 222 participants, 52.7% of the sample identified as female. Additionally, 6.3% of participants identified as Hispanic/Latino, 0.5% of the sample identified as American Indian/Alaskan Native, 2.3% identified as Asian, 0.5% identified as Native Hawaiian/Other Pacific Islander, 4.1% identified as Black or African American, 86.9% identified as White, and 6.1% identified as more than one race.

Procedure

All study procedures were reviewed and approved by the University of Maine Institutional Review Board (IRB) (See Appendix C). A description of the study was posted on SONA, a platform used by the University of Maine Psychology Department to manage study recruitment, participation, and credit awards. Undergraduate students who were 18 years of age or older at the time of recruitment were eligible to sign up through the SONA website and complete the study using any device with internet access. Qualtrics survey software was used to administer online surveys.

All participants were at least 18 years old and provided informed consent prior to participating in the study. Participants were presented with a consent form, after which they were given the option to continue and participate in the study or to discontinue.
Participants were informed that they had the right to skip any questions or withdraw from the study at any point.

Once participants provided consent, they were prompted to complete a series of questionnaires via Qualtrics survey software on a personal computer. Credits on SONA were awarded to participants who completed the study. Partial credit was awarded for students who completed a portion of, but did not complete, the study.

**Measures**

**Demographics.** Participants provided their names, emails, mobile phone numbers, DOB, age, gender, race, and ethnicity. All personal data was de-identified. Contact information was utilized to notify participants of additional follow-up assessments, which were not a focus of the current study.

**Depressive symptoms.** The Center for Epidemiologic Studies Depression Scale was used to assess depressive symptoms (CES-D; Radloff, 1977). Participants responded to 20 items and rated each on a 4-point Likert scale ranging from 0 (“Rarely or none of the time; less than 1 day”) to 3 (“Most or all of the time; 5-7 days”), reflecting the degree to which participants were experiencing depressive symptoms in the past week. Sample items include: “I felt that I could not shake off the blues even with help from my family and friends” and “I felt that people dislike me.” This measure was designed for the general population and has been used with college student populations (Gress-Smith et al., 2015). Internal consistency in this sample was excellent ($\alpha = .92$).

**Rumination.** The Ruminative Response Scale was used to assess ruminative tendencies (RSS; Nolen-Hoeksema & Morrow, 1991). Participants responded to 22 items and rated each on a 4-point Likert scale of 1 (“almost never”) to 4 (“almost always”),
reflecting the degree to which participants engage in ruminative-type responses to feeling
down, sad, or depressed. With instructions to “indicate what you generally do, not what
you think you should do” in response to depressed moods, sample items include: “go
away by yourself and think about why you feel this way” and “think about how angry
you are with yourself.” This measure has been used with college student populations
(Horibe & Hasegawa, 2020). Internal consistency in this sample was excellent (α = .96).

Co-rumination. The Co-rumination Questionnaire was used to assess participants’
tendency to co-ruminate (Rose, 2002). Participants responded to 27 items and rated each
on a 5-point Likert scale from 1 (“not at all true”) to 5 (“really true”), reflecting the
degree to which they generally co-ruminate with friends. Items assess rehashing
problems, speculating about problems, focusing on negative affect, and mutually
encouraging sustained problem talk. A sample item is: “When we see each other, if one
of us has a problem, we will talk about the problem even if we had planned to do
something else together” and “When we talk about a problem that one of us has, we talk
about all of the reasons why the problem might have happened.” This measure has been
used with college populations (Guassi Moreira et al., 2016). Internal consistency in this
sample was excellent (α = .96).

Self-efficacy. The General Self-Efficacy Scale was used to assess belief in one’s
ability to achieve specific goals (GSE; Schwarzer & Jerusalem, 1995). Participants
responded to 10 items and rated each on a 4-point Likert scale ranging from 1 (“not at all
true”) to 4 (“exactly true”), reflecting the degree to which participants are able to cope
with and problem-solve for daily hassles. Sample items include: “Thanks to my
resourcefulness, I know how to handle unforeseen situations” and “If I am in trouble, I
can usually think of a solution.” This measure has been used with college student populations (Wang & Lu, 2020). Internal consistency in this sample was good (α = .88).

**Coronavirus Anxiety.** The Coronavirus Anxiety Scale was used to assess anxiety related to COVID-19 (CAS; Lee, 2020). Participants responded to five items on a 5-point Likert scale ranging from 1 (“not at all”) to 5 (“nearly every day over the last two weeks”), reflecting the degree to which participants experienced anxiety related to COVID-19. A sample item is: “I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus.” This measure is relatively new but has been used with college populations (Di Giacomo et al., 2021). Internal consistency in this sample was excellent (α = .93).
RESULTS

Descriptive Statistics

Means and standard deviations were calculated for all study variables. These descriptive statistics are presented in Table 1. Participant age ranged from 18 to 42 years, with an average age of 19.32 years. A range of depressive symptom scores from the CESD were observed, with a mean of 19.94, which is above the clinical cutoff score of 16 that is often used for adult populations (Roberts et al., 1990). Of the 222 participants, 125 (56.3%) had depressive symptom scores of 16 or higher, indicating that more than half of the sample reported depressive symptoms that are consistent with a clinical cutoff that has been recommended for adults (Roberts et al., 1990). Coronavirus anxiety scores were relatively low in this sample.

Scores from the Co-Rumination Questionnaire measuring participants’ general tendency to co-ruminate with friends ranged from 1.00 to 4.93 with a mean consistent with past findings, including those reported for college aged students (e.g., Guassi Moreira et al., 2016). Rumination scores measuring engagement in ruminative-type responses to low mood ranged from 22.00 to 83.00, with an observed mean falling in between those observed in past studies of clinical (e.g., Kim et al., 2012) and community populations (e.g., Roelofs et al., 2006). The level of rumination was relatively high in this sample, which is likely related to the relatively high level of depressive symptoms that was also observed. Scores from the General Self-Efficacy Scale measuring belief in one’s ability to achieve specific goals ranged from 13.00 to 40.00 with a mean comparable to those found in past studies of college students (e.g., Renshaw & Bolognino, 2016; Wang & Lu, 2020).
Correlations

Correlations among all study variables are presented in Table 2. Depressive symptoms were positively and significantly associated with both co-rumination and rumination. Additionally, depressive symptoms were negatively and significantly associated with self-efficacy. Co-rumination was positively and significantly associated with rumination. Self-efficacy was negatively and significantly associated with rumination, but it was not significantly related to co-rumination.

Data Analysis Approach

In order to test primary hypotheses, a series of multiple linear regression models were tested using SPSS version 27.0. In the model testing Research Question 1, self-efficacy was the dependent variable. In the models for Research Questions 2 and 3, depressive symptoms was the dependent variable. Each model is described in greater detail below. In all models predicting depressive symptoms (Research Questions 2 and 3), coronavirus anxiety scores were used as a covariate to control for the potential impact of COVID-related anxiety symptoms.

Research Question 1

*Does rumination or co-rumination relate more strongly to self-efficacy?*

Regression was used to test whether rumination and co-rumination were unique predictors of self-efficacy and, if so, which was the stronger predictor. Specifically, a multiple linear regression model in which rumination and co-rumination predicted self-efficacy was tested. The main effect of rumination on self-efficacy was significant (b = -0.14, p < .001), indicating that higher levels of rumination were related to lower levels of self-efficacy. The main effect of co-rumination on self-efficacy was not significant (b =
.51, \( p = .19 \), indicating that there was not a significant association of co-rumination with self-efficacy in this sample.

**Research Question 2**

*Does the association between self-efficacy and depressive symptoms depend on the level of rumination?*

Prior to testing potential moderation of the association between self-efficacy and depressive symptoms by rumination, a preliminary model examining the direct effect of self-efficacy on depressive symptoms was tested. Coronavirus anxiety scores were controlled. The main effect of coronavirus anxiety was significant (\( b = .52, \ p < .05 \)), indicating a positive association between coronavirus anxiety and depressive symptoms. The main effect of self-efficacy also was significant (\( b = -1.14, \ p < .001 \)), indicating that lower levels of self-efficacy predicted higher levels of depressive symptoms.

To test whether rumination moderated the association between self-efficacy and depressive symptoms, a multiple regression model in which the main effect of rumination, the main effect of self-efficacy, and the interaction of self-efficacy and rumination predicted depressive symptoms was tested. Coronavirus anxiety was added to the model as a control. Neither the main effect of coronavirus anxiety (\( b = .24, \ p = .15 \)) nor the main effect of self-efficacy (\( b = -.29, \ p = .38 \)) was significant, but the main effect of rumination was significant (\( b = .65, \ p < .05 \)). The interaction between self-efficacy and rumination was not significant (\( b = -.00, \ p = .59 \)). This suggests that the association between self-efficacy and depressive symptoms does not depend on rumination.
**Research Question 3**

*Does the association between self-efficacy and depressive symptoms depend on the level of co-rumination?*

To test whether co-rumination moderated the association between self-efficacy and depressive symptoms, a multiple regression model in which the main effect of self-efficacy, the main effect of co-rumination, and the interaction of self-efficacy and co-rumination predicted depressive symptoms was tested. Coronavirus anxiety was again included as a covariate. Neither the main effect of coronavirus anxiety ($b = .43, p = .06$) nor the main effect of self-efficacy ($b = -.25, p = .58$) was significant, but the main effect of co-rumination was significant ($b = 14.33, p < .01$). The interaction between self-efficacy and co-rumination was also significant ($b = -.35, p < .05$). This suggests that the association between self-efficacy and depressive symptoms does depend on co-rumination.

To probe the significant interaction, simple slopes were tested. At low levels of co-rumination (-1 SD), the main effect of self-efficacy was significant ($b = - .90, p < .001$). At high levels of co-rumination (+ 1 SD), the main effect of self-efficacy was also significant and was stronger ($b = -1.45, p < .001$). This suggests that the inverse association between self-efficacy and depressive symptoms was exacerbated by co-rumination in this sample and that the link between self-efficacy and depressive symptoms was strongest at higher levels of co-rumination.
DISCUSSION

The current study aimed to investigate the relationships among self-efficacy, rumination, co-rumination, and depressive symptoms in a college student sample in order to better understand the nature of depressive symptoms. With the alarming prevalence of depressive symptoms, particularly among college students experiencing a period of significant stress, better understanding the correlates of depressive symptoms can aid in the development of more effective treatments (Ibrahim et al., 2013; Merikangas et al., 2010).

The first research question aimed to examine whether the cognitive process of rumination or its interpersonal form, co-rumination, was more strongly related to self-efficacy. Results indicated that only rumination had a unique association with self-efficacy. That is, when simultaneously examining rumination and co-rumination as predictors of self-efficacy, the main effect of rumination was significant while that of co-rumination was not, indicating that rumination predicted self-efficacy over and above co-rumination. This is consistent with the fact that correlations showed rumination to be negatively and significantly correlated with self-efficacy, while there was no significant relationship between co-rumination and self-efficacy.

The bivariate association between rumination and self-efficacy observed in the current study is consistent with past findings (Gilliam, 2000; Seggelen-Damen & Dam, 2016), and findings from this study extend this work by documenting a unique association of rumination with self-efficacy, over and above co-rumination. Another novel aspect of this research was the opportunity to examine the relationship between co-rumination and self-efficacy. There was no bivariate association observed between the
two constructs, and co-rumination did not predict self-efficacy over and above rumination’s effect. Perhaps co-rumination did not predict self-efficacy as rumination did, because co-rumination is behavioral, whereas rumination and self-efficacy are intrapersonal, cognitive processes. Future research should replicate these findings in order to have confidence in study results.

The current study also aimed to determine whether rumination and/or co-rumination impacted the association between self-efficacy and depressive symptoms. Interestingly, although the interpersonal construct of co-rumination did not have a significant bivariate relationship with self-efficacy and was not a unique predictor of self-efficacy when considered alongside rumination, the interaction between self-efficacy and co-rumination did significantly predict depressive symptoms. Specifically, results showed that the association between self-efficacy and depressive symptoms was exacerbated both at low and high levels of co-rumination. The impact of self-efficacy on depressive symptoms was most pronounced at higher levels of co-rumination, which makes sense given that high levels of co-rumination are related to higher levels of depressive symptoms (Calmes & Roberts, 2008; Spendelow et al., 2017). If an individual has low self-efficacy, they may feel incapable of handling problems on their own. Subsequently, this may make them especially likely to turn to friends or other individuals for support in coping with problems and negative feelings in co-ruminative conversations. Given that, on a bivariate level, both low self-efficacy and co-rumination are linked with depressive symptoms, it may not be surprising that these two constructs in combination produced the stronger effect on depressive symptoms.
It is perhaps less obvious why low self-efficacy was associated with higher depressive symptoms under conditions of low co-rumination. It may be that self-efficacy is so strongly linked to depressive symptoms that any amount of co-rumination (even low levels) combined with low self-efficacy would predict greater depressive symptoms. Another potential explanation is related to the fact that co-rumination is suggested to be a tradeoff construct with both adaptive and maladaptive aspects (Felton et al., 2019; Rose, 2002; Rose et al., 2007). It could be that at lower levels of co-rumination individuals are missing the adaptive part of co-rumination that relates to self-disclosure and friendship quality, which may further exacerbate depressive symptoms. Future studies could examine these interactions while also accounting for friendship quality to help better illuminate the nature of this moderated association.

Surprisingly, and in contrast to findings with co-rumination, rumination did not moderate the association between self-efficacy and depressive symptoms. Given that both self-efficacy and rumination are strongly linked with depressive symptoms, this result was unexpected. It may be that the bivariate relationships of both self-efficacy and rumination with depressive symptoms are already so strong, there was potentially a ceiling effect, whereby rumination did not magnify the impact of self-efficacy on depressive symptoms, because it was already so strong. Future research should replicate this finding in order to engender confidence in these results.

Limitations and Future Directions

Despite its potential contributions, the current study had limitations that warrant discussion and point to additional future directions for research. First, although sufficiently powered to detect significant effects in primary models, replicating the results
from this study with a larger sample size would further enhance confidence in findings. Another limitation is the lack of diversity in the sample population. With data being collected from a medium-sized northeast public university and involving a predominately White sample, replicating the study with more diverse populations would help us to understand if results are generalizable to different racial and ethnic identities.

Moreover, only one time point of data collection was used for analyses. Longitudinal data could help shed additional light on the ways rumination and co-rumination may impact the relationship between self-efficacy and depressive symptoms over time. It is possible that the relationships between rumination, self-efficacy, and depressive symptoms, as well as co-rumination, self-efficacy, and depressive symptoms function differently over time, as opposed to when the constructs are assessed concurrently. Perhaps, rather than rumination or co-rumination acting as moderators that interact with self-efficacy to exacerbate depressive symptoms, these processes could be mediators of the relationship between self-efficacy and depressive symptoms. Thus, longitudinal data could be used to test the potential for lower levels of self-efficacy to lead to greater rumination and/or co-rumination, which then predict increases in depressive symptoms over time.

Since rumination was found to be a unique predictor of self-efficacy, longitudinal data could be used to test if this relationship holds true over time. Perhaps this could also provide more information on the relationship between co-rumination and self-efficacy since these constructs have not been examined together in the literature thus far. It may be that the impacts of co-ruminating about negative problems impact an individual's self-efficacy and sense of agency to solve problems over time rather than concurrently.
An additional limitation of the study is that the data were all collected in the form of self-report measures. Though helpful in understanding symptoms and experiences of participants related to the given constructs, self-report measures have limitations, as some participants could have knowingly or unknowingly provided skewed or inaccurate answers. This could be due to social desirability or lack of introspection and self-awareness into their own thoughts and behaviors. Future studies could also include an experimental task related to self-efficacy (e.g., completing impossible math problems) or a dyadic co-rumination task (e.g., talking about problems) in addition to the self-report measures to examine whether results are similar, especially considering the task-oriented nature of self-efficacy and interpersonal nature of co-rumination when compared to other constructs.

Another limitation to consider is the context of the time when participants completed self-report measures. Data was collected during the 2020-2021 academic year when the University all the participants attended was fully remote due to COVID-19. The nature of fully remote classes during the middle of a pandemic could have implications for participant responses, particularly the high levels of depressive symptoms that were found.

Despite the limitations of the current study, the current findings do provide insight into possible implications for addressing high levels of depressive symptoms in college students. If an individual is experiencing low self-efficacy they may be inclined to turn to others if they feel incapable of dealing with low moods on their own. Unfortunately, seeking social support may not actually be helping if it ends up being this negatively
focused form of co-rumination, since low self-efficacy in combination with high levels of co-rumination can exacerbate depressive symptoms.

Based on this, it may be important to consider intervention to address low self-efficacy and tendencies toward excessive co-rumination. Perhaps cognitive therapy could provide tools and strategies for the ways individuals perceive and deal with a lack of confidence in one’s own abilities. With more positive support and reinforcement, individuals could develop higher self-efficacy and be better equipped to manage low moods. It could also be helpful to have therapeutic interventions that also target co-rumination and give individuals different strategies for seeking support. It could also be helpful to encourage students to use their friendships to do fun activities or engage in solution focused conversations rather than using friendships to focus on negative feelings.

Beyond specific therapeutic intervention, it could be beneficial to consider the environment of this specific population of college students. Given the prevalence of depression and depressive symptoms of this population, these results could help inform ways to better support college students in the campus environment, since that is often where students spend much of their time. Perhaps findings could inform the development or modification of mental health support services on college and university campuses.

At a deeper systemic level, it could be important to consider the use of social emotional learning in education systems. Teaching people at a young age how to identify, process, and express their emotions can lead to better interpersonal communication and overall mental health. Perhaps part of this social emotional learning could be teaching children how to use the adaptive parts of co-rumination and seek support from friends in
a healthy way while avoiding the maladaptive parts of co-rumination that encourage dwelling on negative feelings and experiences. Integrating this into education could set a precedent for its importance and set a foundation of healthy friendship habits that can be taken into college.
REFERENCES


### APPENDIX A: TABLE 1

Table 1: Descriptive Statistics of Study Variables

<table>
<thead>
<tr>
<th>Study Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18</td>
<td>42</td>
<td>19.32(2.62)</td>
</tr>
<tr>
<td>Depressive Symptoms</td>
<td>0.00</td>
<td>53.00</td>
<td>19.94(11.88)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>13.00</td>
<td>40.00</td>
<td>29.72(4.66)</td>
</tr>
<tr>
<td>Rumination</td>
<td>22.00</td>
<td>83.00</td>
<td>47.34(15.11)</td>
</tr>
<tr>
<td>Co-Rumination</td>
<td>1.00</td>
<td>4.93</td>
<td>2.73(.77)</td>
</tr>
<tr>
<td>Coronavirus Anxiety</td>
<td>5.00</td>
<td>25.00</td>
<td>6.49(3.04)</td>
</tr>
</tbody>
</table>
APPENDIX B: TABLE 2

Table 2: Correlations Among Primary Study Variables

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Depressive Symptoms</td>
<td></td>
<td>-</td>
<td></td>
<td>-.49**</td>
<td>.78**</td>
</tr>
<tr>
<td>2. Self-Efficacy</td>
<td></td>
<td>-</td>
<td>-.43**</td>
<td>-.04</td>
<td>-.29**</td>
</tr>
<tr>
<td>3. Rumination</td>
<td></td>
<td></td>
<td>.29**</td>
<td></td>
<td>.23**</td>
</tr>
<tr>
<td>4. Co-Rumination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.09</td>
</tr>
<tr>
<td>5. Coronavirus Anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* **p ≤ .01.
APPENDIX C: IRB APPROVAL

From: Paula Portalatin <paula.portalatin@maine.edu>
Date: Tue, Sep 1, 2020 at 7:46 AM
Subject: IRB # 2020-08-08 - Approval
To: Eliot Fearey <eliot.fearey@maine.edu>
CC: Rebecca Schwartz-Mette <rebecca.schwartzmette@maine.edu>

Application #: 2020-08-08
Title: Friends and Emotion Regulation
PI: Eliot Fearey
Approval Period End Date: 8/31/2021

Dear Eliot,

The Institutional Review Board for the Protection of Human Subjects (IRB) reviewed the above referenced application in expedited review and approved it on 9/1/2020. We will contact you in August 2021 to check with you if the application should be closed.

Attached is the approved copy of the application. The approved informed consent form must be duplicated and used when enrolling subjects.

Please remember that each subject must be given a copy of the informed consent document. Any unanticipated problems or injury to the subject must be reported to the IRB. Any proposed changes to the research must be approved by the IRB prior to implementation. If you require a modification in the future please visit our website for instructions.
Please contact me if you have any questions. Thank you.

Best regards,
Paula

Paula Portalatin, M. Ed., CPIA
Research Compliance Officer III
University of Maine
Alumni Hall Room 311
(207) 581-2657

https://umaine.edu/research-compliance/
Evie Clement was born in Portland, ME and raised just a town over in Falmouth, ME. Evie graduated Suma Cum Laude from Falmouth High School in 2017. After taking a year off the academic treadmill to work in Southern Maine and make time to travel, she accepted the Maine Top Scholars Award to attend the University of Maine in Orono, ME. Majoring in Communication, Evie has minors in Psychology and Communication Sciences and Disorders as she is interested in the intersection between speech and language disorders and mental health. During all four years of her undergraduate career Evie has been a research assistant in the NIH funded Peer Relations Lab (primary investigator Rebecca Schwartz-Mette, PhD).

Beyond the academic sphere, Evie is the treasurer for the University of Maine chapter of the National Student Speech Language Hearing Association, a member of the Outing Club. She is also a menace on the frisbee field as a captain and president of University of Maine Women’s Ultimate Frisbee Team and an athlete on Maine’s first professional sports team for female, transgender, non-binary, genderqueer, and gender-fluid people. Following her undergraduate graduation Evie aims to find joy in outdoor spaces and open-minded communities and eventually pursue a career in mental health, speech pathology, or another helping profession. Evie loves worms.