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ADOLESCENT DEPRESSIVE SYMPTOMS, CO-RUMINATION, AND
FRIENDSHIP: A LONGITUDINAL, OBSERVATIONAL STUDY

by

Raegan V. Harrington

A Thesis Submitted in Partial Fulfillment
of the Requirements for a Degree with Honors
(Psychology)

The Honors College

University of Maine

May 2020

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ABSTRACT

Depressive symptoms and positive friendship quality are typically inversely correlated across numerous past studies, with most studies involving only two time points. At the same time, co-rumination (Rose, 2002), the mutually encouraged, speculative, repetitive, and negatively focused discussion of problems between friends, has been linked to increased depressive symptoms and increased friendship quality concurrently and over time (Calmes & Roberts, 2008; Rose et al., 2007, 2014). Yet unclear is how co-rumination impacts associations of depressive symptoms and friendship quality over time and the nature of these relations over more than two time points. Additionally, understudied are observations of co-rumination, with only one published study presenting observed co-rumination data. The current study assessed 93 same-gender friendship dyads ($N = 186$) involving three self-report survey assessments (baseline, 3 months, 6 months) and one observed dyadic interaction task. Results indicated that initial friendship quality is predictive of increased depressive symptoms, which then predict increased friendship problems over time for both boys and girls. Interestingly, co-rumination did not impact depressive symptoms or friendship quality when self-reports were considered, but observed co-rumination mediated longitudinal relations of positive friendship quality and depressive symptoms over 3 and 6 months, specifically for boys. Clinical implications of these findings and directions for future research are discussed.

ACKNOWLEDGMENTS

My thesis endeavor has been an extremely rewarding experience that has been characterized by overcoming challenges, a great support network, and a deepened passion for research. My thesis has been made possible by many who have propelled me in this journey whether that be refining my research ideas and writing, funding my research, or simply offering words of kindness and support.

I extend my deepest and most sincere thanks to Dr. Rebecca Schwartz-Mette, my fearless mentor and thesis advisor. Dr. Schwartz-Mette's mentorship has been nothing short of extraordinary, providing constant support, insight, and opportunity throughout my thesis process. She has been fully committed to the cultivation of my research skill set and knowledge, which both have lent themselves well to my thesis work. I am incredibly thankful for the many invaluable thesis meetings, rounds of edits, and words of advice that she has graciously allotted time for. Undeniably, Dr. Schwartz-Mette's aid has been the backbone to the crafting of my thesis.

I would also like to earnestly thank the rest of my thesis committee, Dr. Cynthia Erdley, Dr. Emily Haigh, Dr. Laura Rickard, and Dr. Jordan LaBouff. These committee members have provided unwavering guidance and support. I am most thankful for their suggestions and reviews, insightful questions, and dedication of time put forth. Their support has been central to the development of my thesis.

In addition, I owe a prodigious thanks to the Center for Undergraduate Research (CUGR) and Honors College for their financial support to both conduct and present my thesis project. Through the CUGR I was awarded a summer fellowship which allowed me to start my thesis work early and fully develop my ideas. I was graciously awarded travel

funding through the Honors College Leitch Travel Fund Award for means of presenting my thesis work at a national conference. Both of these establishments afforded me the financial opportunity for increased research experience and thesis formation.

Lastly, but most certainly not least, I am thankful for the part my friends, family, and significant other, Kyle, have played throughout the creation of my thesis. During times that were marked by stress and uncertainty, they listened and provided compassion. Most importantly, they reminded me to be compassionate towards myself during my thesis undertaking. They are the cornerstone to my success and character as a whole. I am forever grateful to have their support and guidance throughout this journey.

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INTRODUCTION

Theory and research have paid due attention to associations between relationship functioning and depressive symptoms (e.g., Coyne, 1976) and particularly so during adolescence (e.g., Prinstein, Borelli, Cheah, Simon, & Aikins, 2005) when friendships take on increased salience (Glick & Rose, 2011) and risk for depression is high (Twenge & Nolen-Hoeksema, 2002). However, most studies examining these associations are limited to two time points, precluding testing of transactional models involving three or more waves of assessment. Moreover, recently developed constructs with ties to both friendship functioning and depressive symptoms (e.g., co-rumination; Rose, 2002) have not yet been fully integrated into such transactional models, further limiting our understanding. The current study addressed gaps within the literature by analyzing transactional relations among depressive symptoms, positive friendship quality, and co-rumination over 3 time points. Additionally, a subset of participants contributed observational co-rumination data, enabling a richer examination of the construct in this regard.

Peer Relationships and Depressive Symptoms

As children transition into adolescence, they desire and gain autonomy from caregivers, placing an increased importance on their social networks and peer relationships. These peer relationships often become more intimate and serve as a mechanism for obtaining emotional support and companionship (Furman & Buhrmester, 1992; Hartup & Stevens, 1999) and for learning social skills that may be utilized in other interpersonal relationships later in life (e.g., romantic relationships, colleague

relationships; Berndt, 1982). What is more, friendship in adolescence serves as an apparatus for disclosure where youth digest, solve, and understand problems (Bagwell & Schmidt 2011; Glick & Rose, 2011; Hartup & Stevens, 1999). Importantly, when friendships are nonexistent, poor in quality, and/or conflictual they can have significant negative costs for social development and emotional adjustment (Erdley, Nangle, Newman, & Carpenter, 2001; Kingery, Erdley, & Marshall, 2011; Rubin, Wojslawowicz, Rose-Kransor, Booth-LaForce, & Burgess, 2006).

Concurrently, adolescence is also marked by an increased risk for the development of internalizing symptomatology (e.g., depressive symptoms), most notably in females (e.g., Twenge & Nolen-Hoeksema, 2002). Indeed, results from the National Survey on Drug Use and Health indicate that, in 2016, 3.1 million (12.8%) adolescents in the United States had experienced a Major Depressive Episode (MDE) within the past year. Moreover, 2.2 million (9%) adolescents had a MDE accompanied by severe impairment. These data reflect significant increases in prevalence, implying a steady rise in depressive symptoms in the adolescent population (Ahrnsbrak, Bose, Hedden, Lipari, & Park-Lee, 2017). Although multiple etiological factors impacting adolescent risk for depression have been documented (e.g., biological, cognitive, emotional; Dobson & Dozois, 2008) the transactional impacts of adolescents' friendship functioning and depressive symptoms have received increased attention in recent decades (Gotlib & Hammen, 1992; Oppenheimer & Hankin, 2011; Rudolph, Flynn, & Abela, 2008; Rudolph, Hammen, & Burge, 1994).

Theory and research support associations between friendship functioning and depressive symptoms in adolescence. Traditional peer relations research has drawn upon

Sullivan's Interpersonal Theory of Psychiatry (1953) in examining how friendship functioning may impact subsequent emotional adjustment. As discussed, friendships become central in adolescence providing continued companionship, support, sense of belonging, and validation. When this is the case, friendships are usually viewed in a positive context, thought to aid adolescent adjustment and buffer against effects of internalizing symptoms (Laursen, Bukowski, Aunola, & Nurmi, 2007; Schmidt & Bagwell, 2007). Intimacy and self-disclosure processes become increasingly important as youth navigate the complexities of relationship and family conflict, identity discovery, and self-reflection. Conversely, when friendship does not provide these supports, it can be linked to adolescent maladjustment such as increased depressive symptoms (Rudolph et al., 2008; van Lier & Koot, 2010). More specifically, lower quality friendship may impede an adolescent from typically developing in the areas of social skills and identity, and thus lead to poorer emotional adjustment (Aseltine, Gore, & Colten, 1998; Berndt, 1982; Conway, Rancourt, Adelman, Burk, & Prinstein, 2011; Parker & Asher 1987; Rose et al., 2007; Schwartz-Mette & Rose, 2012).

Other theoretical perspectives have influenced more recent peer relations research examining the impact of adolescents' emotional adjustment on subsequent friendship outcomes. In particular, the Interpersonal Theory of Depression, first developed by Coyne (1976) and elaborated by other scholars (e.g., Prinstein et al., 2005; Rudolph et al., 2008), posits that depressed individuals engage in maladaptive interpersonal behaviors that lead to rejection by others and increased depressive symptoms. In recent decades, empirical research has supported these ideas, finding that depressed youth engage in maladaptive social behavior (e.g., excessive reassurance seeking, conversational self-

focus), which is associated with friendship problems (Joiner et al., 1999; Schwartz-Mette & Rose, 2009, 2016; Windle, 1994). These findings fit with other research showing that depressed youth engage in less mutuality and collaboration, and that they have more negative interactions with their peers as compared to non-depressed youth (Altmann & Gotlib, 1998).

With the advent of developmental psychopathology (Cicchetti & Cohen, 1995; Sroufe, 1990), divisions between developmental psychology (which has traditionally examined impacts of friendship functioning on emotional adjustment) and child clinical psychology (which has traditionally examined impacts of emotional adjustment on friendship functioning) have become less clear, which signifies the importance of understanding the reciprocal and transactional nature of these variables, as well as highlights the interplay between youth and their social context. Developmental psychopathology aims to understand outcomes as a product of adaptive or maladaptive interplay between a person and their context, such that it is a complex bidirectional or transactional relationship (Sameroff & Emde, 1989). Utilizing a transactional model ensures that equal emphasis is placed on both the child and their social environment, capturing the complex system of relationships between the two (Sameroff & Mackenzie, 2003). Increasing attention has been paid to transactional relationships between friendship quality and internalizing symptoms within adolescence (Hammen & Shih, 2014; Hankin, Stone, & Wright, 2010; Shapero, Hankin, & Barrocas, 2013; Van Lier & Koot, 2010).

To date, however, few studies have utilized a transactional model to directly test which direction of effect has the strongest empirical support. The primary reason for this

is that most longitudinal research examining associations between friendship functioning and depressive symptoms have nearly exclusively involved only two time points. To simultaneously examine both directions of effect requires at least three time points (Mackinnon, 2008). Longitudinal studies of this nature are rare in peer relations research (c.f., Kamper & Ostrov, 2013; Oppenheimer & Hankin, 2011; Prinstein et al., 2005), presumably due to the resources involved in collecting such data.

The Role of Co-Rumination

In addition to examining transactional associations between friendship functioning and depressive symptoms, researchers are increasingly interested in the mechanisms that may link these constructs, both concurrently and over time. One such example is the construct of co-rumination (Rose, 2002), defined as excessive and negative discussion of problems with a conversation partner. Co-rumination is characterized by rehashing the problem or parts of the problem, speculating about the causes and consequences of the problem, focusing on negative affect that results from the problem, and mutual encouragement of problem talk. In particular, co-rumination has been shown to be more common and impactful in female friendships' as compared to males' (Calmes & Roberts, 2008; Hankin et al., 2010; Rose, 2002; Rose et al., 2007; Rose et al., 2014).

Co-rumination is uniquely important to the transactional associations of depressive symptoms and friendship quality, such that it has socioemotional trade-offs. Specifically, co-rumination has been linked to positive outcomes such as increased positive friendship quality concurrently and over time (Rose, 2002; Rose et al., 2007; Rose, Schwartz-Mette, Glick, Smith, & Luebke, 2014). This relationship may exist due to

intimate disclosure processes that could serve as a function of emotional support and cause adolescents to view their relationship as progressively closer. Additionally, co-rumination is linked with negative emotional outcomes such as increased depressive symptoms concurrently and over time (Rose, 2002; Rose et al., 2007, 2014). Given the extended, intense, and excessively negative problem talk marked by co-rumination, it is conceivable that problems become more salient or meaningful and lead to further depression. These socioemotional trade-offs are most typically observed in female friendships and less commonly observed in male friendships. For example, Rose and colleagues (2007) found that female friendships were associated with the mentioned socioemotional trade-offs, but that male friendships characterized by co-rumination were associated with only increased positive friendship quality and not increased depressive symptoms. Additionally, co-rumination has even been shown to predict onset of a depressive episode (Stone, Hankin, Gibb, & Abela, 2011). Thus, it is plausible that co-rumination may play a role in the transactional cascade in which friendship quality and depressive symptoms are linked and that there may be gender differences within results.

Co-rumination is an intriguing construct to examine in the context of transactional relations between depressive symptoms and friendship quality because of its strong links with increased depression, but also *increased* friendship quality (Rose, 2002; Rose et al., 2007, 2014). These socioemotional trade-offs associated with co-rumination slightly contradict that of traditional theories of depressive symptoms and friendship quality such that links are found between higher depressive symptoms and *lower* friendship quality (Coyne, 1976; Sullivan, 1953). It is unclear if friendships characterized by co-rumination are linked with increased depressive symptoms and positive friendship quality initially

and also indefinitely, or contrastingly, it could be that friendship quality begins to suffer when co-rumination's links are assessed over the longer-term assessment.

Comprehension of the longer-term, 3 (or more)-time-point assessment would avail a clearer understanding of the true transactional nature of these variables.

Additionally, although co-rumination literature has proliferated in recent decades (see Spendelov, Simonds, & Avery, 2017 for review), the literature on co-rumination and its correlates is further limited in two important ways. First, longitudinal studies of co-rumination in adolescent friendships have only utilized two time points (e.g., Rose et al., 2007; 2014; Starr & Davila, 2009; Stone et al., 2011). These findings result in only speculative conclusions about the longer-term implications of co-rumination for friendships and emotional adjustment past an initial follow-up assessment. Analyzing friendship quality, depressive symptoms, and co-rumination over at least 3 waves of assessment would allow for a clearer understanding of the transactional relationship that may be present and co-rumination's role, if any, in these later associations. Second, the literature has focused virtually exclusively on self-report measures, despite repeated calls for collection of observational data on co-rumination (e.g., Calmes & Roberts 2008; Rose, 2002; Rose et al., 2007; c.f., Rose et al., 2014). Observational data would allow for objective co-rumination assessment, enabling researchers to further assess the true nature of co-rumination in its natural context and would aid convergent validity of self-report data and avoid risk of false reporting (Starr & Davila, 2009).

The current study aimed to address the gaps in the extant literature by testing transactional associations among depressive symptoms, positive friendship quality, and co-rumination in a large sample of adolescents over 3 waves of assessment. Additionally,

observational data were coded for a subset of adolescents to test whether observed co-rumination mediated the impact of initial depressive symptoms and positive friendship quality on later emotional and friendship outcomes.

Specifically, the current study addressed two primary aims. **Aim 1** was to examine how self-reported depressive symptoms, positive friendship quality, and co-rumination interact over 3 waves of assessment, each spaced 3 months apart. Research questions for this aim were as follows:

1. *Does co-rumination predict increased depressive symptoms and positive friendship quality after 3 months and after 6 months, over and above the impact of depressive symptoms on positive friendship quality (and the impact of positive friendship quality on depressive symptoms)?* It was hypothesized that co-rumination would predict depressive symptoms and positive friendship quality over the longer-term assessment over and above pathways originating from depressive symptoms and positive friendship quality.
2. *Are links of co-rumination with positive friendship quality stronger than links of co-rumination with depressive symptoms, and does the strength of these associations change over time?* Given that past research has noted stronger positive correlations between positive friendship quality and co-rumination as compared to the positive associations between depressive symptoms and co-rumination (Rose, 2002; Rose et al., 2014), it was hypothesized that co-rumination's initial associations with depressive symptoms and positive friendship quality would be strong, but that over time co-rumination would be

more strongly linked with positive friendship quality as compared to with depressive symptoms.

Aim 2 was to incorporate observations of co-rumination within adolescent friendship dyads in testing whether observed co-rumination mediated associations of initial depressive symptoms and positive friendship quality with later depressive symptoms and positive friendship quality. Research questions for this aim were as follows:

1. *Do depressive symptoms and positive friendship quality predict observed co-rumination?* It was hypothesized that higher levels of depressive symptoms and positive friendship quality would predict higher levels of observed co-rumination (see Rose et al., 2007 for similar self-report results).
2. *Does observed co-rumination mediate longitudinal associations of depressive symptoms and positive friendship quality over time?* It was hypothesized that observed co-rumination would mediate longitudinal associations of increased depressive symptoms and positive friendship quality over 3 and 6 months.

Multiple group comparisons for gender were used to test whether the hypothesized models tested for each research question in Aims 1 and 2 differed as a function of adolescents' self-reported gender identity. Considering the aforementioned past research that has shown co-rumination is more common and impactful in girl friendships, it was hypothesized that relations in both models would be stronger for adolescent girls as compared to adolescent boys.

METHOD

Participants

Data for the current study were drawn from the *Maine Adolescent Peer Project* (MAPP; primary investigator Rebecca Schwartz-Mette, PhD). Antecedent to data collection, the University of Maine Institutional Review Board reviewed and approved the project (#2015_10_01). Adolescents, ages 13 through 19, were recruited from towns surrounding the University of Maine. After, 93 same gender friendship dyads ($N = 186$; $M = 15.86$ years; 69% identified as female) participated in the study. In reference to racial and ethnic identity, participants self-identified as follows: 87.6% White/Caucasian, 4.3% Black/African American, 3.2% Asian/Pacific Islander, and 1.6% American Indian/Alaskan Native, 3.2% Hispanic or Latino(a). Participants were able to select as many choices as relevant for the race/ethnicity item, resulting in sum percentages that did not equal 100%.

Procedure

This sample consisted of what were referred to as target youth and their friends. Target youth were recruited from local postings of fliers, online platform postings (e.g., Facebook, Instagram, and Twitter) and in person at local community events (e.g., festivals, sport outings, summer camps). Each target youth was then asked to identify a same-gender friend with whom they wanted to participate. This chosen friend was required to be within two years of the target's age. Target youth and their friends provided the research team with contact information for the purposes of contacting their parents/guardians to obtain consent and for scheduling lab visits.

Before commencing any study procedures, youths under the age of 18 were required to have their parent(s) or guardian(s) sign an informed consent form granting the youth permission to participate. Youth who were recruited whilst being 17 years of age but who turned 18 before entering the study were able to provide their own informed consent to participate.

Once informed consent was obtained from the parents of both target youth and friends (or from the youth themselves if they were at least 18 years of age), dyads were scheduled to attend a lab session on the campus of the University of Maine, Orono. Upon arrival to the lab, the target youth and their friend youth were led into separate rooms where they each then sat at a computer. Each youth read a child assent form, asked any applicable questions of research staff, and gave their assent to participate.

Youth next completed an online survey in their separate rooms. The survey consisted of several self-report measures regarding demographics, friendship functioning and quality, emotional adjustment, and interpersonal behavior (see Measures section below for those pertaining to the current study). After the completion of these self-report measures, both participants in the dyad were asked to join one another in a new room where observational tasks would be assigned. The room contained a table, two chairs, and video recording equipment.

Regarding the observational tasks, the dyad first was asked to complete a warm-up task to plan a party that would be fun to have. The dyad planned their party for about 5 minutes until the experimenter entered the room to stop them. Youth were escorted back to their individual rooms. Next, youth completed a brief self-report measure about their current mood and a self-report measure in which they identified a current problem that

they had. The problem was not required to be on any particular topic. The experimenter privately asked each participant if they were comfortable discussing their chosen problem with their friend. If either youth said they were not comfortable discussing their problem, they were asked to identify a new problem that they were comfortable discussing with their friend. When both youths indicated they were comfortable with their chosen problem, they were escorted back into the observational task room.

Once in the observational room, the adolescents were asked to sit at the table where a puzzle was now placed on top of the table. Participants were asked to discuss their chosen problems with each other for about 15 minutes until the experimenter came back into the room. Youth were told they could discuss any aspects of the problem for as long as they wanted. Also, they were instructed that it did not matter who went first, as long as each person's problems were discussed. If they finished before the 15 minutes had concluded, they were told they could discuss anything they wanted in addition to work on the puzzle if desired. Once these instructions were given and if the participants had no questions, the experimenter left the room and recording of this observational task began. Lab staff monitored the audio and video of the observational task simultaneously to its recording in a remote room. After approximately 15 minutes, the experimenter reentered the room and ended the task and the recording. Each youth was then escorted back to their individual room and instructed to sit at the computer where their final surveys were administered. During this last part of the lab visit, each participants' responses to particular self-report measures (depression, non-suicidal self-injury, and

suicidality¹) were reviewed. Youth whose scores on these measures indicated they were at clinical risk on any of the three indices were met with privately prior to leaving the lab, and a follow-up risk assessment was performed to determine if there was any imminent risk for suicide. All youth were given a handout including crisis hotline numbers and contact information for local support services (e.g., counseling). Parents/guardians of any youths with elevated scores of depression, non-suicidal self-injury, or suicidality were notified by Dr. Schwartz-Mette and given additional resources (e.g., referral information).

Regardless of level of risk or outcomes of the risk assessment, all participants were asked if they had any questions or concerns about the study and were given a community resource list if they wished to seek help for themselves or others. Participants were kindly thanked for taking part in the study. Prior to departing from the lab, each youth was given \$40 and a UMaine water bottle. Copies of consent and assent forms were provided upon request (paper or electronic copy). Finally, they were reminded about the two follow-up assessments of the study. Roughly 3 and 6 months after the initial lab visit, target adolescents and their friends were emailed or texted an online link to the follow-up assessment. These self-report questionnaires took about 1 hour to complete and included the same measures administered during their initial lab visit (with the exception of questionnaires related to the observational segment and basic demographic items). Upon completion of each follow-up assessment youth were compensated for their time and efforts with an additional \$10.00 in Amazon credit.

¹ Measures of non-suicidal self-injury and suicidality were not utilized in the current study.

Measures

Demographics and Basic Information. Items gathered information regarding age, gender identity, date of birth, racial and ethnic identity, friendship status (i.e., whether the friend accompanying them to the lab was a best friend, a close friend, just a friend, or not a friend), household members, and occupation/employment level of parent(s)/guardian(s).

Depressive Symptoms. Participants responded to the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). Items assessed how often within the last week youth experienced different affective, somatic, interpersonal, cognitive, and behavioral symptoms of depression. An example item is, “I was bothered by things that usually don’t bother me.” Items were scored on a 4-point Likert scale ranging from 0 (“Less than 1 Day”) to 4 (“Most or ALL of the Time”). Internal consistency of CES-D items was good at each time point (Time 1 $\alpha = .90$, Time 2 $\alpha = .92$, Time 3 $\alpha = .93$).

Friendship Quality. Participants responded to 18 items of the revised version of the Friendship Quality Questionnaire (Rose, 2002, revision of Parker & Asher, 1993). Three of these items analyze six qualities of friendship (e.g., companionship and recreation, conflict resolution, help and guidance, intimate exchange, validation and caring, and conflict). Another seven items assessed emotional closeness, while an additional two items measured relationship satisfaction. An example item is as follows: “[Friend’s name] and I often help each other with things so we can get done quicker.” Items were scored on a 5-point Likert scale ranging from 0 (“Not at all true”) to 5

(“Really true”). Internal consistency of FQQ items was good at each time point (Time 1 α = .92, Time 2 α = .96, Time 3 α = .96).

Co-rumination. Participants scored the 27-item Co-Rumination Questionnaire (Rose, 2002), assessing the amount of co-rumination that occurs between themselves and their friends. Items assess sub-aspects of co-rumination including rehashing problems, speculating about problems, focusing on negative affect, and mutually encouraging problem talk. An example item is, “When we talk about a problem that one of us has, we usually talk about that problem every day even if nothing new has happened.” Items were scored on a 5-point Likert scale ranging from 1 (“Not at all true”) to 5 (“Really True”). Internal consistency of CRQ items was good at each time point (Time 1 α = .96, Time 2 α = .97, Time 3 α = .98).

Observational Coding of Co-Rumination

Problem talk between friends was coded for co-rumination based on a reliable coding scheme (Rose et al., 2014) in a subset of dyads ($n = 30$; 15 female, 15 male). As a unit, each dyad was rated on a Likert scale ranging from *not at all/very little (1)* to *very much (5)* regarding the extent to which they displayed four different aspects of co-rumination. First, dyadic rehashing of problems (i.e., discussing a problem or part of a problem repeatedly) was scored. Next, the degree to which the dyad speculated (i.e., discussion of pieces of the problem not understood and potential causes/consequences of problem) about their problems was assessed. Third, dwelling on negative affect related to problems was scored. Lastly, the amount of mutual encouragement (i.e., encouraging each other to discuss more about the problem) within the problem talk was evaluated.

In addition, the length or amount of problem discussion within each dyad was timed. To do so a reliable coder identified and highlighted problem discussion within the dyad. Problem discussion could be focused on either persons' problem(s). Length of time was operationalized in minutes and seconds.

Interrater reliability was established through a process of training and evaluation. First, the primary investigator and three coders (one undergraduate student, two graduate students) viewed sample problem talk interactions and associated transcripts to discuss aspects of co-rumination that were observed. Then, each coder independently reviewed the video recording and transcript of problem talk between additional dyads, and the primary investigator provided feedback on submitted codes and ways to resolve disagreements. Next, the group of four (three coders and primary investigator) coded approximately 25% of the video recordings ($n = 8$), and intraclass correlation coefficients (two-way, mixed random) were calculated to examine the concordance of coder ratings. ICCs were as follows: rehashing ICC = 0.83, speculating ICC = 0.84, negative affect ICC = 0.82, encouragement ICC = 1.00, timing ICC = 0.99. Finally, each of the five co-rumination scores was standardized and then averaged to create an overall co-rumination score for each dyad.

Data Analysis Approach

Some of the 186 participants who participated at Time 1 had missing data at Time 2 or Time 3. Specifically, 140 (75.3%) of the 186 participants at Time 1 completed the Time 2 assessment, and 110 (59.1%) of the 186 Time 1 participants completed the Time 3 assessment. We used Little's test to determine whether data were missing completely at random (MCAR). Data were MCAR, $\chi^2(95) = 107.79, p = .17$. Using multiple

imputation is favored over pairwise deletion or mean substitution, because it accounts for an unbiased natural variability in the missing data (Kang, 2013). As such, any missing data from the full dataset of 186 participants were imputed using multiple imputation in Mplus. The first set of primary hypotheses involving data from all three self-report survey assessments (Time 1, 2, and 3) were tested using a cross-lagged panel model in Mplus. The second set of primary hypotheses involving the observed co-rumination data were tested using a mediation model in Mplus. Chi-square, root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI) were used to assess model fit. Smaller values of chi-square and RMSEA paired with larger values of CFI and TLI signified a better fit (Hu & Bentler, 1995; Bryne, 2010).

RESULTS

Descriptive Statistics and Correlations

Means, standard deviations, and correlations were calculated for all study variables: self-reported depressive symptoms, positive friendship quality, and co-rumination at Times 1, 2, and 3 and observed co-rumination from the lab visit. See Table 1 (Appendix A). Self-reported depressive symptoms, positive friendship quality, and co-rumination were stable across the three time points. Relatively small, positive correlations between depressive symptoms and self-reported co-rumination at each time point were observed, and the correlation between Time 1 depressive symptoms and Time 1 co-rumination in addition to the correlation between Time 2 depressive symptoms and Time 2 co-rumination was significant. The majority of correlations between depressive symptoms and positive friendship quality were small to moderate in size, negative, and significant. The majority of correlations between self-reported co-rumination and positive friendship quality were small to moderate in size, positive, and significant. In terms of associations of study variables with total observed co-rumination, observed co-rumination was only significantly associated with self-reported depressive symptoms at Time 2 and Time 3, while also significantly associated with self-reported positive friendship quality at only Time 1. Additionally, total observed co-rumination was not significantly associated with self-reported co-rumination at any of the three time points.

Mean-Level Gender Differences

We tested whether mean levels of any study variables differed as a function of participants' gender identity. See Table 2 (Appendix B). In terms of depressive symptoms, females reported significantly higher depressive symptoms scores than males

at Time 1, and the gender difference in Time 2 scores was marginally significant. No significant mean-level gender difference was observed for Time 3 depressive symptoms. At Time 1, 2, and 3 females had significantly higher self-reported positive friendship quality scores when compared to males. Females at Time 1 self-reported marginally higher co-rumination scores than males, but there were no mean-level gender differences for Time 2 or 3 co-rumination. In terms of observed co-rumination, females were observed to have significantly higher total observed co-rumination scores as compared to males. At Time 1, 2, and 3 females had significantly higher self-reported positive friendship quality scores when compared to males.

Longitudinal Associations of Self-Reported Depressive Symptoms, Positive Friendship Quality, and Co-Rumination

A cross-lagged panel model was used to evaluate the associations among self-reported depressive symptoms, positive friendship quality, and co-rumination across 3 time points, each spaced 3 months apart over a 6-month summed time period. See Figure 1 (Appendix C). This model included stability paths from the Time 1 variable to the Time 2 variable and from the Time 2 variable to the Time 3 variable. Additionally, all possible covariances among the three variables assessed at each of the time points were included. Finally, all possible cross paths (e.g., between Time 1 depressive symptoms and Time 2 positive friendship quality and Time 2 co-rumination) were included. This model had good fit [$\chi^2(9) = 16.96, p = 0.05, RMSEA = 0.07, CFI = 0.98, TLI = 0.94$].

Depressive symptoms, positive friendship quality, and co-rumination each were stable across the 3 time points. Specifically, depressive symptoms were stable from Time 1 to Time 2 (SPE = 0.63; $p < 0.0001$) and from Time 2 to Time 3 (SPE = 0.79; $p <$

0.0001). Positive friendship quality was also stable from Time 1 to Time 2 ($SPE = 0.74; p < 0.0001$) and from Time 2 to Time 3 ($SPE = 0.78; p < 0.0001$). Lastly, co-rumination was stable from Time 1 to Time 2 ($SPE = 0.66; p < 0.0001$) and from Time 2 to Time 3 ($SPE = 0.78; p < 0.0001$). Additionally, significant associations among all three variables were observed at Time 1. Co-rumination was related to both depressive symptoms ($SPE = 0.18; p < 0.01$) and positive friendship quality ($SPE = 0.42; p < 0.0001$), and depressive symptoms were also related to positive friendship quality ($SPE = -0.15; p < 0.01$) at Time 1. At Time 2, there was a positive correlation between co-rumination and positive friendship quality ($SPE = 0.24; p < 0.01$), but there was no significant covariance between co-rumination and depressive symptoms or between depressive symptoms and positive friendship quality. Again, at Time 3, there was a positive association between co-rumination and positive friendship quality ($SPE = 0.32; p < 0.01$), but there were no significant associations between co-rumination and depressive symptoms or between depressive symptoms and positive friendship quality.

In terms of the cross paths of interest, co-rumination at Time 1 did not significantly predict increased depressive symptoms or positive friendship quality at Time 2. Similarly, Time 2 co-rumination did not significantly predict increased depressive symptoms or positive friendship quality at Time 3. Time 1 depressive symptoms did not significantly predict increased positive friendship quality or co-rumination at Time 2. Time 2 depressive symptoms did not predict increased co-rumination at Time 3, and Time 2 positive friendship quality did not predict Time 3 increases in either depressive symptoms or co-rumination. However, lower levels of Time 1 positive friendship quality predicted increases in depressive symptoms at Time 2

(SPE = -0.18; $p < 0.05$), which in turn predicted decreases in Time 3 positive friendship quality (SPE = -0.15; $p < 0.05$). The indirect effect of Time 1 positive friendship quality on Time 3 positive friendship quality via Time 2 depressive symptoms was significant, [IE = .69 (95% CI: .57, .81), $p < .01$].

A series of multiple group comparisons next tested whether the model differed by gender identity. An unconstrained model, in which all aspects of the model are allowed to vary across gender, was compared to a series of increasingly constrained models including a structural intercepts model (all parameters allowed to vary except intercepts), a structural means model (means also constrained), and a structural residuals model (all parameters constrained to be equal across gender). Results indicated that the structural intercepts model best fit the data, $\Delta\chi^2(6) = 8.85$, $p = .70$. This means that only the intercepts in the models varied significantly by gender, with girls exhibiting higher levels of depressive symptoms, co-rumination, and positive friendship quality than did boys. All cross paths of interest were equivalent across gender.

Observed Co-Rumination as a Mediator of Longitudinal Associations Among Depressive Symptoms and Positive Friendship Quality

Next a model was tested that included observed co-rumination in place of self-reported co-rumination. Associations across 3 months were first considered. Because observed co-rumination was assessed at only one time point, the model included Time 1 and Time 2 values of depressive symptoms and of positive friendship quality, with observed co-rumination as a potential mediator. The initial covariance between Time 1 depressive symptoms and positive friendship quality was modeled, as were the stability paths between the Time 1 and Time 2 values of depressive symptoms and positive

friendship quality. Cross paths were then added from the Time 1 variables to observed co-rumination and from observed co-rumination to the Time 2 variables. A path from Time 1 positive friendship quality to Time 2 depressive symptoms was also added to improve model fit, based on modification indices obtained from initial analyses. Modification indices did not suggest that adding a path from Time 1 depressive symptoms to Time 2 positive friendship quality would improve fit; as such, this parallel cross path was not added. See Figure 2, Panel A (Appendix D).

This model had good fit [$\chi^2(1) = 0.75, p = .39$, RMSEA = .00, CFI = 1.00, TLI = 1.00]. Depressive symptoms (SPE = .73, $p < .001$) and positive friendship quality (SPE = .80, $p < .001$) were stable over 3 months. Time 1 positive friendship quality significantly predicted increased depressive symptoms at Time 2 (SPE = -.22, $p < .05$). Depressive symptoms (SPE = .21, $p = .09$) and positive friendship quality (SPE = .23, $p = .06$) each marginally predicted observed co-rumination, and observed co-rumination predicted increased depressive symptoms after 3 months (SPE = .24, $p < .01$). However, observed co-rumination did not significantly predict increases in positive friendship quality over 3 months. The indirect effect of Time 1 positive friendship quality on Time 2 depressive symptoms via observed co-rumination was significant [IE = .06 (95% CI: .00, .13), $p < .05$].

Multiple group comparisons next tested whether the model with observed co-rumination differed by gender. Results indicated that an unconstrained model in which all parameters were allowed to vary across gender best fit the data, $\Delta\chi^2(6) = 17.07, p = .01$. The unconstrained model fit well [$\chi^2(2) = 0.15, p = .93$, RMSEA = .00, CFI = 1.00, TLI = 1.14]. In the female model, Time 1 positive friendship quality did not significantly

predict increased depressive symptoms at Time 2. Neither Time 1 depressive symptoms nor Time 1 positive friendship quality predicted observed co-rumination. Observed co-rumination predicted marginally significant increases in depressive symptoms after 3 months ($SPE = .20, p = .07$), but did not predict increased friendship quality. There were no significant indirect effects in the female model. See Figure 2, Panel B (Appendix E).

In the male model, however, Time 1 positive friendship quality predicted increased depressive symptoms at Time 2 ($SPE = -.32, p < .001$). Time 1 depressive symptoms ($SPE = .47, p < .01$) and Time 1 positive friendship quality ($SPE = .38, p < .05$) each predicted observed co-rumination, which in turn predicted increases in depressive symptoms ($SPE = .30, p < .01$) and decreases in positive friendship quality after 3 months ($SPE = -.18, p = .06$). The indirect effects of Time 1 positive friendship quality on Time 2 depressive symptoms [$IE = .11$ (95% CI: .02, .26), $p < .01$] and of Time 1 depressive symptoms on Time 2 positive friendship quality [$IE = -.08$ (95% CI: -.22, -.02), $p < .05$] each were significant. See Figure 2, Panel C (Appendix F).

A second set of models tested associations over 6 months. These models were identical to the models that tested associations over 3 months, except that the Time 3 depressive symptom and Time 3 positive friendship quality variables were used in place of the Time 2 variables. This model had good fit [$\chi^2(1) = 0.75, p = .39$, RMSEA = .00, CFI = 1.00, TLI = 1.02]. Results for this model indicated that depressive symptoms ($SPE = .65, p < .001$) and positive friendship quality ($SPE = .80, p < .001$) were stable over 6 months. Time 1 positive friendship quality predicted increased depressive symptoms at Time 3 ($SPE = -.23, p < .01$). As before, observed co-rumination was marginally predicted by Time 1 depressive symptoms ($SPE = .21, p = .09$) and by Time 1 positive

friendship quality ($SPE = .23, p = .06$). Observed co-rumination then marginally predicted depressive symptoms at 6 months ($SPE = .16, p = .09$), although it did not significantly predict positive friendship quality at 6 months. The indirect effect of Time 1 positive friendship quality on Time 3 depressive symptoms via observed co-rumination was not significant. See Figure 3, Panel A (Appendix G).

Again, multiple group comparisons tested whether the model with observed co-rumination differed by gender. Results specified that an unconstrained model in which all parameters were allowed to vary across gender best fit the data, $\Delta\chi^2(6) = 17.30, p = .01$. The unconstrained model had good fit [$\chi^2(1) = 0.75, p = .39$, RMSEA = .00, CFI = 1.00, TLI = 1.02]. Regarding the female model, Time 1 positive friendship quality did not significantly predict Time 3 depressive symptoms. Time 1 depressive symptoms and Time 1 positive friendship quality were not found to significantly predict observed co-rumination. Results indicated that observed co-rumination neither predicted increased depressive symptoms or positive friendship quality after 6 months. There were no significant indirect effects in the female model. See Figure 3, Panel B (Appendix H).

Contrastingly, the results from the male model displayed that Time 1 positive friendship quality predicted increased depressive symptoms at Time 3 ($SPE = -.52, p < .001$). Time 1 depressive symptoms ($SPE = .47, p < .01$) and positive friendship quality ($SPE = .38, p < .05$) both significantly predicted increased observed co-rumination, and observed co-rumination significantly predicted increased depressive symptoms ($SPE = .40, p < .01$) at 6 months. Observed co-rumination also marginally predicted decreased positive friendship quality ($SPE = -.18, p = .07$) at 6 months. See Figure 3, Panel C (Appendix I). The indirect effects of Time 1 positive friendship quality on Time 3

depressive symptoms [IE = .15 (95% CI: .02, .40), $p < .01$] and of Time 1 depressive symptoms on Time 3 positive friendship quality [IE = -.08 (95% CI: -.22, -.02), $p < .05$] each were significant.

Finally, multiple group comparisons were planned to compare youth friendships who were intact at Time 2 and Time 3 versus those friendships that dissolved at Time 2 and Time 3. Interestingly, only one youth reported having a dissolved friendship at Time 2, but by Time 3 this person reported the friendship to be intact once again. Similarly, only one youth reported a disbanded friendship at Time 3. Thus, with only one adolescent at Time 2 and Time 3 reporting dissolved friendship, it was not possible to run multiple group comparisons.

DISCUSSION

Adolescence is a transitional period distinguished by increases in risk for depressive symptomatology and in the importance placed on friendships. Past studies have been limited by incorporation of only two waves of assessing these variables, precluding a clear understanding of whether depressive symptoms or friendship functioning may drive transactional relations hypothesized by theory. What is more, only a handful of studies have incorporated potentially relevant interpersonal processes such as co-rumination in testing these relations. To address these gaps, the first aim of the present study was to examine relations among self-reported depressive symptoms, positive friendship quality, and co-rumination over three waves of assessment. The second objective was to examine whether observed co-rumination mediated associations among depressive symptoms and positive friendship quality over time.

Regarding the first aim, it was yet unclear from the literature whether friendship problems precede depressive symptoms or vice versa, given that most studies involve only two time points. The present study demonstrated that initial lower levels of positive friendship quality led to increased depressive symptoms, which then predicted further decreases in positive friendship quality. These findings are in line with Sullivan's Interpersonal Theory of Psychiatry (1953) and past research demonstrating that problems in friendship functioning lead to increased depressive symptoms (e.g., Aseltine et al., 1998; Parker & Asher, 1987; van Lier & Koot, 2010). This relationship may be explained by youth receiving less social or emotional support from low quality friendships, thus leading to increased loneliness and depressive symptoms (Prinstein, Cheah, & Guyer, 2005). What is more, high quality adolescent friendships provide emotional support,

companionship, validation, and aid navigation of family and friend conflict, all of which help to buffer against depressive risk (Schmidt & Bagwell, 2007). If positive qualities of friendship are lacking, there likely will not be the same buffering effect, thus creating increased depressive risk. For example, Hodges and Colleagues (1999) found that victimization, physical and verbal, predicted elevations in internalizing problems only for participants who did not have a mutual friend or had a low-quality friendship. This suggests that having higher quality friendships do indeed help youth navigate the challenges of adolescence and protect against internalizing problems.

Interestingly, adolescents' initial depressive symptoms did not predict increased friendship problems over time. This finding is in contrast to hypotheses stemming from Coyne's Interpersonal Theory of Depression (1976) and other studies that have found this effect. Notably, the current study utilized a community sample where initial levels of depressive symptoms were relatively low, which may have limited the consecutive impacts of depressive symptoms on later friendship quality. Perhaps if this model was tested within a clinical population, we might have observed higher baseline depressive symptoms that, in turn, may have had stronger negative impacts on friendship quality over time. Future research could test the current model again in a community sample but also in a clinical sample for purposes of replication and to compare results across samples.

As previously mentioned, and worth expanding on, increased depressive symptoms at the second assessment predicted decreased friendship quality at the third and final assessment within the present study. Recall, that these findings were preceded by initial lessened positive friendship quality predicting the increased depressive

symptoms at the second assessment, which then predicted decreased positive friendship quality at the final assessment. While these findings were interpreted as largely supportive of hypotheses in line with Sullivan's Interpersonal Theory of Psychiatry (1953), they do not completely rule out the validity of Coyne's (1976) Interpersonal Theory of Depression. Specifically, Coyne's theory posits that elevated depressive symptoms lead to worsened friendship functioning, which can be compared to the second step within the current cross-lagged panel model. Results may suggest that Sullivan and Coyne's work move in tandem within the transactional relationship between increased depressive symptoms and friendship problems, but the cycle begins with friendship problems. Prior to concluding that these results support one set of theories or the other, future research must again test such models with more than two time points.

Regarding the role of co-rumination, as in past research, data from the present study has demonstrated that co-rumination is concurrently linked to increased depressive symptoms and positive friendship quality (e.g., Calmes & Roberts, 2008; Rose, 2002; Rose et al., 2007, 2014; Stone et al., 2011). However contrary to our hypotheses, co-rumination did not significantly predict depressive symptoms or positive friendship quality over time. What is more, neither initial depressive symptoms nor initial positive friendship quality predicted later co-rumination. Co-rumination may not have predicted socioemotional outcomes over and above either positive friendship quality or depressive symptoms because its relations with these constructs are weaker than their relations with one another. That is, depressive symptoms and friendship quality are typically negatively related, while co-rumination is linked with heightened depressive symptoms and increased positive friendship quality. As a result, co-rumination could have served as a

confounder variable in this particular model (Meinert & Tonascia, 1986). It could be that other interpersonal behaviors that have exclusively negative impacts on depressive symptoms and on positive friendship quality (e.g., excessive reassurance seeking; conversational self-focus; Joiner et al., 1999; Schwartz-Mette & Rose, 2016) would perform better in this model, given that their associations with depressive symptoms and with positive friendship quality are both negative. Future research would benefit from testing alternative (e.g., strictly aversive) interpersonal behaviors in similar models with depressive symptoms and positive friendship quality over time.

Co-rumination also may not have been found to be a significant predictor due to the research design. Masten and Cicchetti (2010) note that if assessment windows are too closely spaced and if correlations among variables within time points are observed, cross paths may be obscured. Perhaps if assessments were spaced farther apart (e.g., 6 or 9 months), the impact of co-rumination would be more accurately captured. Indeed, the current study reflects one of the shorter longitudinal studies of co-rumination to date (Spendelov et al., 2017). Rose and colleagues (2007) mention similar reasoning, such that in such models, co-rumination is pitted against two very stable variables making it hard to predict impacts above and beyond that of depressive symptoms and positive friendship quality. Extending research beyond the 6-month time frame might serve to destabilize the variables and elucidate to a different longitudinal direct of effect (Rose et al., 2007). Specifically, lessened stability in variables may show increased and unaccounted for variance at a later assessment that may be predicted from an initial assessment. Extending the current longitudinal model over a longer period of time would help to determine if co-rumination merely stands as a small portion of dyadic behavior

(reflective of present results) or if the true longitudinal direction of effects within these variables does in fact involve co-rumination more strongly.

The second aim was to examine how a subset of observed co-rumination data related to self-reported depressive symptoms and positive friendship quality over time. To date, this study is only the second project to present data on observed co-rumination (see also Rose et al., 2014), thus addressing a significant gap within the literature. Specifically, the observational data in the current study provides opportunity to examine convergent validity with self-report data, helps to avoid risks of false self-reporting, and enables a window into a more natural context of assessment. Results demonstrated that, in the whole sample, initial depressive symptoms and positive friendship quality were marginally predictive of increased observed co-rumination scores, which then predicted increased depressive symptoms at the 3-month follow-up (and marginally predicted increased depressive symptoms at the 6-month follow-up). Future research should test this model using a larger sample of observational data, as marginally significant results may become significant with more statistical power. Although these results were not incredibly robust, it does appear that observed co-rumination had stronger relations with depressive symptoms and positive friendship quality than did self-reported co-rumination. It could be that an observed co-rumination measure is better able to capture co-rumination tendencies than the self-report data. This may also be reflected in the finding that observed co-rumination was not significantly associated with self-reported co-rumination. Future research should examine whether and why observed co-rumination may be an advantageous assessment of the construct, as compared to self-reports.

As noted, the subset of observed co-rumination data were not significantly associated with self-reported co-rumination and represents an important place for discussion. Observed co-rumination may capture a different conceptualization of co-rumination such that it concentrates on co-rumination tendencies within one specific friendship. However, the self-reported co-rumination questionnaire captures co-rumination behavior more generally between a participant and their collective friends. Youths' more general co-rumination behavior within their friend group might look much different than their co-rumination habits within one specific and closer friendship. The present study's null results for self-reported co-rumination impacts compared to the significant observed co-rumination impacts might hint at differences in the two assessments' conceptualization of co-rumination. It could be that friendship specific co-rumination tendencies are more impactful than broader (within multiple friendships) co-rumination behavior. Understanding which co-rumination measure better captures the construct and its consecutive impacts will be important within future research.

A discussion of gender is warranted. Consistent with past research, the current study supported mean-level gender differences such that girls self-reported higher levels of depressive symptoms, positive friendship quality, and co-rumination as compared to boys (Rose et al., 2007, 2014; Twenge & Nolen-Hoeksema, 2002). Girls are thought to report higher levels of positive friendship quality and co-rumination because they put greater emphasis on their friendships and engage in more self-disclosure than do boys (Rose & Rudolph, 2006). Elevated self-reported depressive symptoms in females is reflective of girls' greater biological, cognitive, and emotional vulnerability as compared to boys (Rudolph, 2009). Despite these mean-level gender differences, the cross-lagged

panel model did not differ significantly for boys and girls, suggesting initial friendship problems contribute to elevated depressive symptoms (and then later increased friendship problems) similarly for boys and girls. It may be that friendship problems, no matter how interpersonally oriented one is, contribute equally to boys' and girls' feelings of loneliness and subsequent negative affect associated with depressive symptoms.

However, gender differences were strikingly evident in the observed co-rumination models. Interestingly, there was very little action for girls' observed co-rumination data, mirroring the findings from self-reported co-rumination. For boys, on the other hand, observed co-rumination appeared to be a mechanism by which depressive symptoms increased and positive friendship quality decreased over both 3 month and 6 months. Most research on co-rumination has found that girls reap the typical trade-offs of co-rumination (i.e., increased depressive symptoms and positive friendship quality) significantly more than do boys using self-reported data. Potentially for boys, however, the current data suggest that co-rumination may not have such tradeoffs, as observed co-rumination predicted only negative outcomes (viz., increased depressive symptoms and decreased positive friendship quality) over time in this study. Contrastingly, past literature has displayed that boys' self-reported co-rumination is linked with only positive outcomes (i.e., positive friendship quality), but not negative outcomes (i.e., increased depressive symptoms) (Rose et al., 2007). Given past research, it is perplexing why there were no negative outcomes in the present data for female friendships but negative outcomes only for male friendships. Observational methodology might be better equipped to capture boy co-rumination behavior such that they do not accurately self-report their co-rumination tendencies. In addition, observed co-rumination in girls might

elicit significant results with a full data set that would allow for more statistical power. Again, utilizing a larger observational dataset would be important to understanding the nuanced gender effects that might be present and how these might more accurately compare to past research findings.

The current study had several limitations. First, positive friendship quality was only assessed with self-report data and would have benefitted from friend-reports of positive friendship quality. Gaining data from both sides of the friendship would help researchers understand the friendship and how it is impacted over time more holistically. Second, observational data were assessed with only a subset of the data ($n = 30$), and a larger sample will be necessary to enhance confidence in initial findings. In addition, observational data were collected within a lab setting, which is not a natural context for adolescents. A more natural setting such as a school environment may be more comfortable for adolescent participants, eliciting true observed co-rumination tendencies. It is also true that self-report data were collected over 3 time points, while observational data were collected at only one time point. Obtaining multiple assessments of observed co-rumination would aid objectivity of the data and convergent validity of self-report data over time. Multiple assessments of observed co-rumination will be an important next step within the literature. Lastly, the sample was not very diverse. The current sample in the self-reported data was predominantly White or Caucasian and largely identified as female. Similarly, in the observed data, participants were predominantly White or Caucasian. These limitations in data combined, hindered the generalizations of the data to the broader population including males and gender minority or non-conforming youth.

It will be important for future research to prioritize understanding why self-reported co-rumination did not predict depressive symptoms or positive friendship quality over the longer-term assessment. In this vein, co-rumination may represent only a small portion of dyadic behavior. Apart from conversational behaviors thought only to have negative effects (e.g., excessive reassurance seeking, conversational self-focus), other behaviors may have similar socioemotional tradeoffs. In fact, Smith and Rose (2011) found that social perspective taking is involved in a similar trade-off relationship as co-rumination, being linked to increased positive friendship quality and increased empathetic distress. What is more, researchers found that co-rumination served as a partial mediator between social perspective taking and its elevated correlates, positive friendship quality and empathetic distress (Smith & Rose, 2011). It could be that co-rumination acts in tandem with other constructs to explain associations with social and emotional outcomes over time.

As noted, future research should also seek to clarify the impacts of co-rumination via observational studies. The findings related to observed co-rumination make a strong argument that co-rumination may better function as a mediator between positive friendship quality and depressive symptoms, rather than an initiator. Future studies should utilize observed co-rumination data over an even longer-term assessment and at more than one time point coupled with assessments of depressive symptoms, positive friendship quality, and other variables. Multiple assessments of observed co-rumination alongside other variables will help understand the mediating role of co-rumination more directly.

What is more, future observational research would do well to examine the different aspects of co-rumination (i.e., rehashing, speculating, dwelling of negative affect, mutual encouragement) within observed co-rumination and how these observed components may relate to depressive symptoms and positive friendship quality. Past research has declared that certain components of co-rumination (i.e., dwelling on negative affect) relate only to internalizing symptoms but not friendship quality, while other components (i.e., rehashing, speculating, mutual encouragement) relate only to friendship quality (Rose et al., 2014). Replicating these findings would be useful such that it may confirm or elaborate upon past results. In addition, if most components of co-rumination link more strongly with positive friendship quality than depressive symptoms, this could help explain the longer-term impacts of co-rumination.

In terms of clinical implications, current findings from the cross-lagged panel model do not strongly support the notion that targeting co-rumination within intervention would result in effective or significant impacts on depressive symptoms or on friendship quality for all youth. Instead, the present study demonstrated that targeting improvement of friendship quality, perhaps within the context of existing interventions for depressive symptoms, may prevent increased depressive symptoms and put youth in an upward cycle of fewer depressive symptoms and improved friendship quality over time. For example, utilizing empirically validated and interpersonally focused interventions (i.e., Interpersonal Psychotherapy for Depression; Markowitz & Weissman, 2004), focusing on the resolution of interpersonal problems and social skill development, might be effective in combating the development of depressive symptoms within the youth population.

Indeed, Interpersonal Psychotherapy has been found to be associated with lessened depression in adolescents (Spence, O'Shea, & Donovan, 2016).

Results from the small-sample observational data do suggest that co-rumination in the context of lower quality friendships may present a particular risk for increasing depressive symptoms (and decreased friendship quality for boys). It may be that co-rumination's excessive focus on the emotional impact of problems is not well-tolerated in boys' friendships, which on average are characterized by lower levels of emotional intimacy and disclosure. As such, if these findings are replicated using larger samples, boys with friendship problems may benefit from being steered toward more adaptive self-disclosure processes that could have larger benefits for their relationships and mental health.

Despite its limitations, the current findings advance researchers' understanding of the longitudinal direction of effects that may be present in associations among depressive symptoms, positive friendship quality, and co-rumination. In addition, it is only the second project to examine observed co-rumination in existence, and the study did provide novel results regarding co-rumination tendencies and impacts within male population which has been difficult to capture with self-reported data. The present study expands upon the current state of the literature, aiming to further understand why depressive symptoms may increase in adolescence and how this notion might be combatted most effectively.

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APPENDICES

APPENDIX A: TABLE 1

Table 1: Descriptive Statistics and Correlations

	<i>M</i> (<i>SD</i>)	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
<i>Variable</i>																
1. CES-D Time 1	12.44(9.33)	-	.71**	.74**	.18*	.16*	.16*	.17	.15	.26*	.19	.21	.22	-.14	-.16*	-.18*
2. CES-D Time 2	12.99(10.47)		-	.87**	.14	.16*	.11	.19	.28*	.36**	.37**	.35**	.35**	-.25**	-.23**	-.34**
3. CES-D Time 3	11.92(10.60)			-	.13	.17*	.09	.08	.20	.25*	.26*	.30*	.25*	-.21**	-.23**	-.32**
4. CR Time 1	2.79(.86)				-	.75**	.74**	.09	.20	.01	.11	-.005	.09	.41**	.30**	.18*
5. CR Time 2	2.60(.90)					-	.85**	.00	.04	.03	-.007	-.03	.007	.38**	.38**	.26**
6. CR Time 3	2.52(.95)						-	.11	.17	.07	.09	.03	.11	.35**	.34**	.32**
7. Obs CR Rehashing	2.45(1.14)							-	.76**	.63**	.85**	.82**	.91**	.40**	.28*	.30*
8. Obs CR Speculation	2.25(1.14)								-	.59**	.77**	.70**	.86**	.26*	.21	.24
9. Obs CR Negative Affect	2.29(.99)									-	.64**	.61**	.78**	.15	.11	.11
10. Obs CR Encouragement	2.83(1.08)										-	.92**	.94**	.16	.06	.12
11. Obs CR Time (minutes)	7.69(4.55)											-	.91**	.12	-.01	.02
12. Obs CR Total Score	0.00(1.00)												-	.25*	.15	.18
13. FQQ Time 1	4.14(.58)													-	.78**	.67**
14. FQQ Time 2	3.80(.79)														-	.86**
15. FQQ Time 3	3.76(.78)															-

Notes. * $p < .05$. ** $p < .01$. CES-D = Center for Epidemiological Studies Depression Scale. CR = Co-rumination. Obs = Observed. FQQ = Friendship Quality Questionnaire (positive score). Observed co-rumination is a standardized score, reflecting the average of each of the five standardized components of co-rumination; as such, its mean is 0 and standard deviation is 1.

APPENDIX B: TABLE 2

Table 2: Mean-Level Gender Differences

<i>Variable</i>	Females (n = 130)		Males (n = 55)		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1. Time 1 CES-D	13.49	9.31	9.74	8.74	2.62**
2. Time 2 CES-D	13.87	9.94	11.26	9.37	1.70+
3. Time 3 CES-D	13.35	9.02	10.97	9.43	1.59
4. Time 1 CR	2.84	.85	2.61	.81	1.73+
5. Time 2 CR	2.65	.84	2.48	.82	1.32
6. Time 3 CR	2.62	.82	2.45	.82	1.31
7. Obs CR Rehashing	2.80	.96	2.00	1.20	2.81**
8. Obs CR Speculating	2.54	1.09	1.88	1.12	2.30*
9. Obs CR Negative Affect	2.68	.99	1.77	.75	4.09****
10. Obs CR Encouragement	3.20	.93	2.37	1.11	3.11**
11. Obs CR Time	8.82	3.99	6.22	4.87	2.25*
12. Obs CR Total Score	.30	.77	-.39	.86	3.29**
13. Time 1 FQQ	4.25	.48	3.86	.68	3.88****
14. Time 2 FQQ	3.92	.67	3.48	.78	3.64****
15. Time 3 FQQ	3.84	.65	3.53	.74	2.71**

Notes. + $p < .10$. * $p < .05$. ** $p < .01$. **** $p < .0001$. CES-D = Center for Epidemiological Studies Depression Scale. CR = Co-rumination. Obs = Observed. FQQ = Friendship Quality Questionnaire (positive score).

APPENDIX C: FIGURE 1

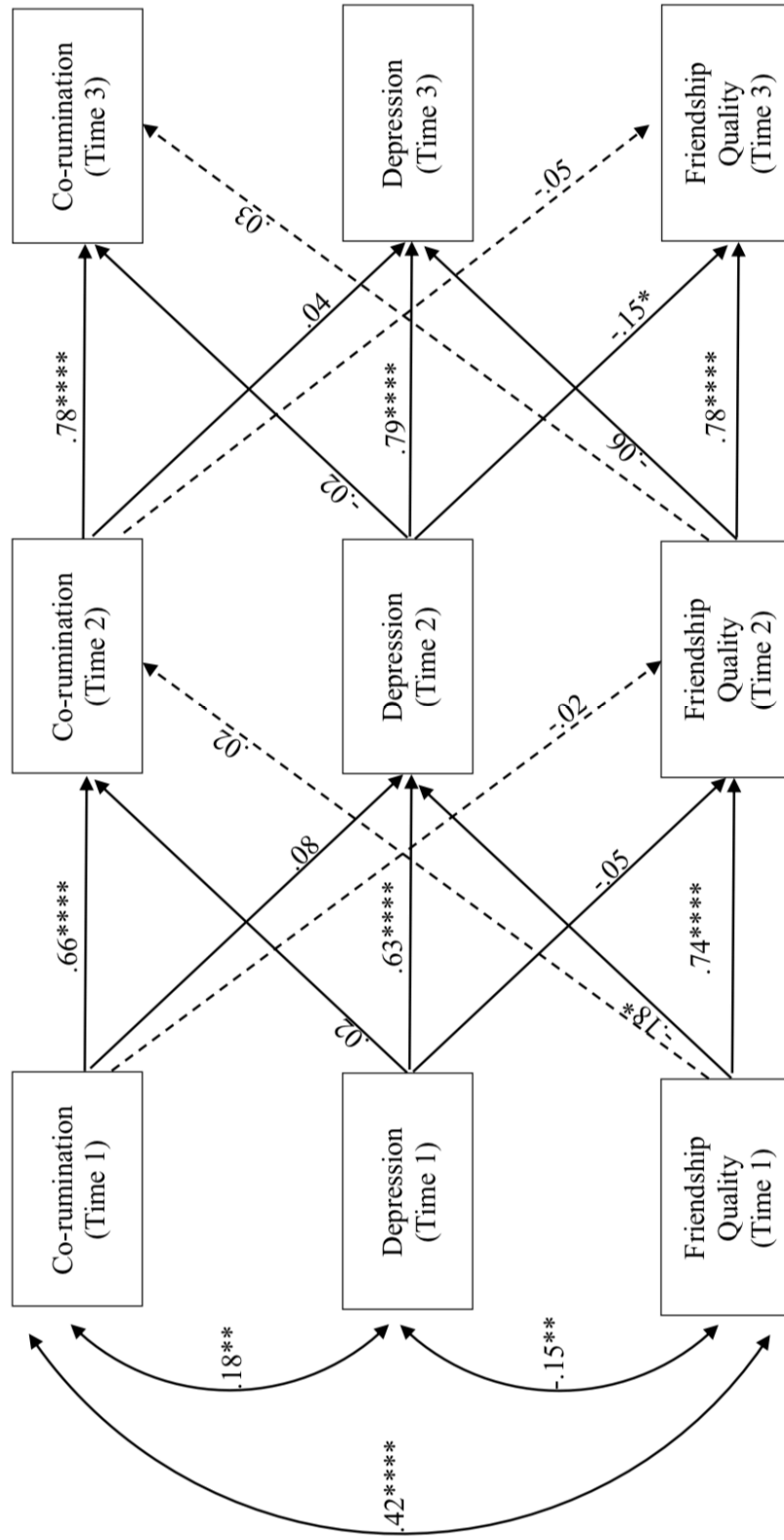


Figure 1: Cross Lagged Panel Model over six months.
 $*p < .05$. $**p < .01$. $***p < .001$. $****p < .0001$.

Covariances among variables within Time 2 and Time 3 not pictured for ease of readability.

APPENDIX D: FIGURE 2, PANEL A

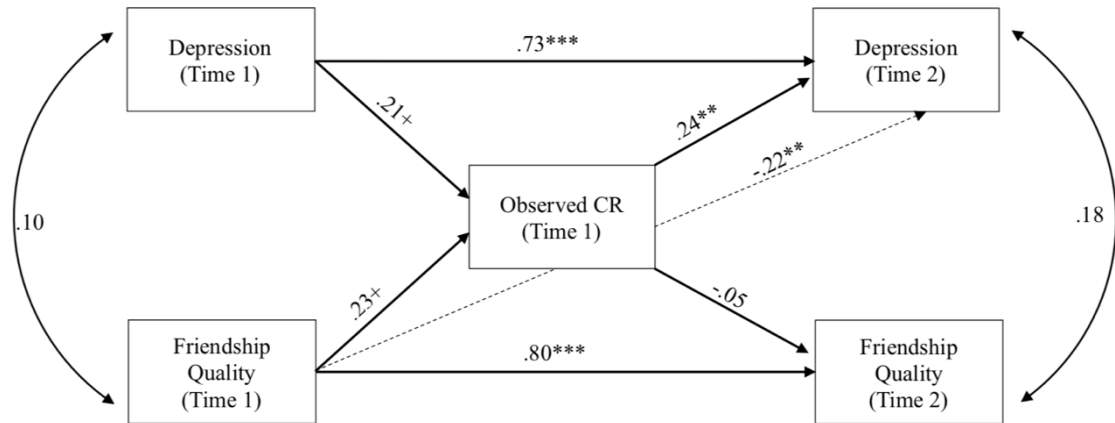


Figure 2, Panel A. Mediation model over 3 months. + $p \leq .09$. ** $p < .01$. *** $p < .001$.

APPENDIX E: FIGURE 2, PANEL B

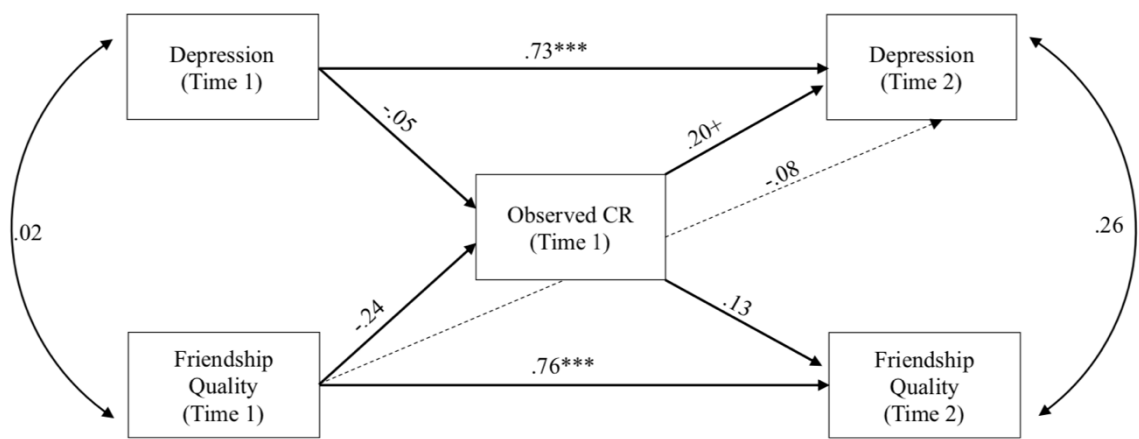


Figure 2, Panel B. Mediation model (Girls) over 3 months. $+p = .07$. $***p < .001$.

APPENDIX F: FIGURE 2, PANEL C

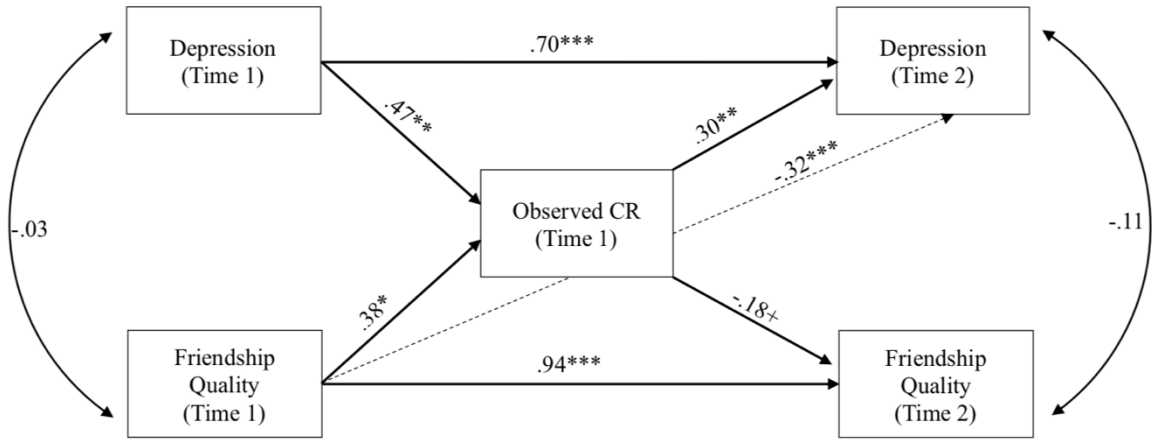


Figure 2, Panel C. Mediation model (Boys) over 3 months. $+p = .06$. $^{**}p < .01$. $^{***}p < .001$.

APPENDIX G: FIGURE 3, PANEL A

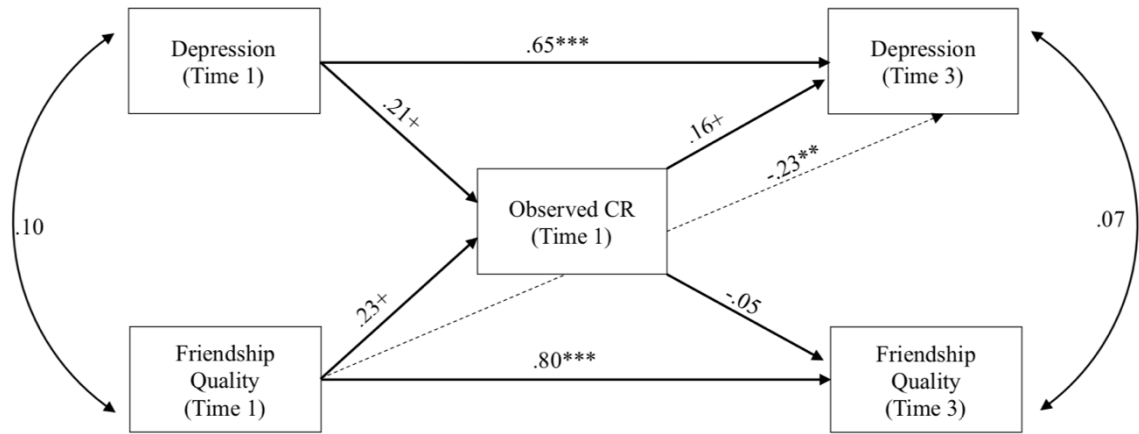


Figure 3, Panel A. Mediation model over 6 months. $+p \leq .09$. $**p < .01$. $***p < .001$.

APPENDIX H: FIGURE 3, PANEL B

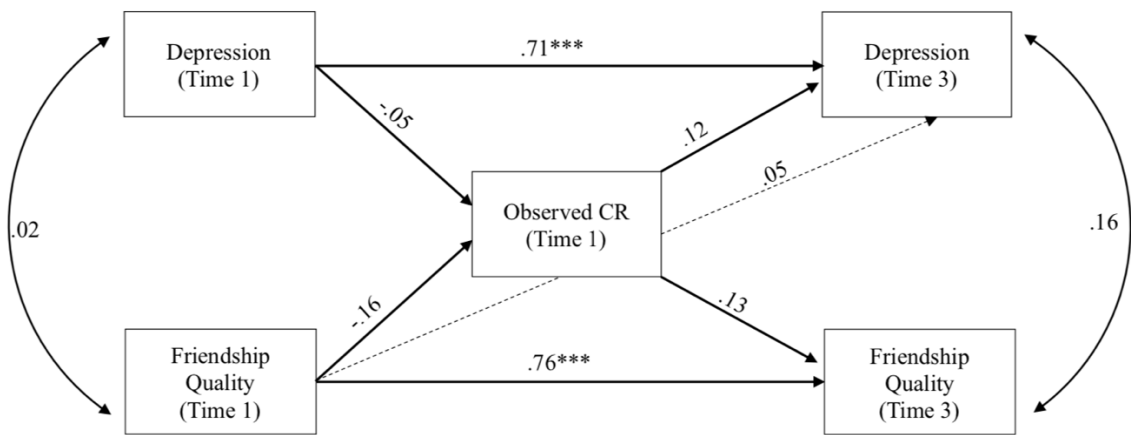


Figure 3, Panel B. Mediation model (Girls) over 6 months. *** $p < .001$.

APPENDIX I: FIGURE 3, PANEL C

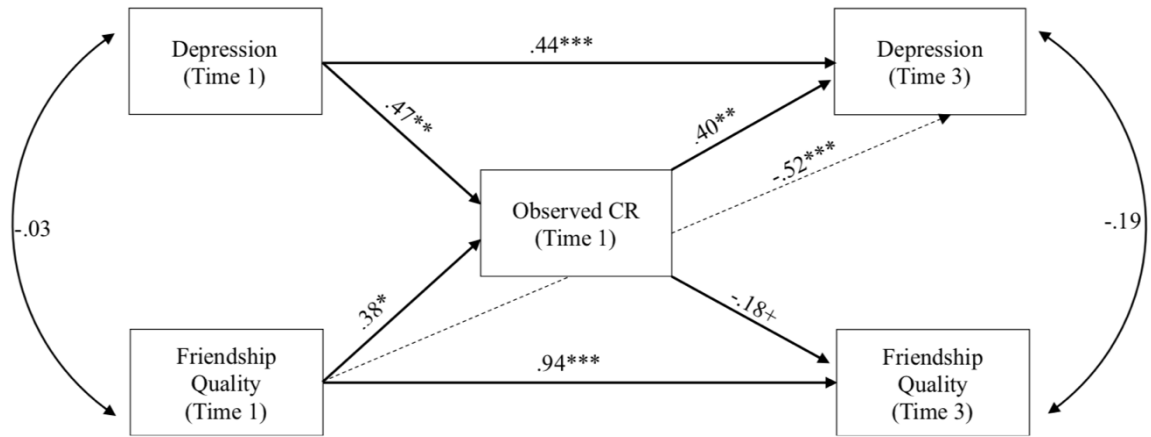


Figure 3, Panel C. Mediation model (Boys) over 6 months. $+p = .07$. $p^* < .05$. $^{**}p < .01$. $^{***}p < .001$.

APPENDIX J: IRB APPROVAL

IRB Approval Letter

Application #: 2015-10-01

Title: Maine Adolescent Peer Project

PI: Rebecca Schwartz-Mette

Approval Period End Date: 9/10/2019

The Institutional Review Board for the Protection of Human Subjects (IRB) conducted its continuing review of the above referenced project in an expedited review on 9/11/2018. The IRB approved renewal, and the new approval period end date is noted above. The next continuing review of this project must be conducted by the IRB before the end of the approval period. Although you will receive a request for review information approximately 6-8 weeks before that date, it is your responsibility to submit review information before the approval period expires.

Given that you indicated data collection has been completed, a consent for the new approval period was not approved. If you later decide you would like to recruit additional participants, please contact the IRB.

Please remember that any proposed changes to the research must be approved by the IRB prior to implementation. If you require a modification in the future, please follow these instructions.

Please contact me if you have any questions. Thank you.

Website for the Office of Research Compliance: <https://umaine.edu/research-compliance/>

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Gayle M. Jones

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AUTHOR'S BIOGRAPHY

Raegan V. Harrington was born in Bangor, Maine on August 19th, 1997. She was raised in various areas of Maine throughout her life. Raegan graduated in the top ten of her class from Maranacook High School in 2016. She went on to attend the University of Maine, Orono where she obtained her Bachelor of Arts degree in Psychology at the top of her class in May 2020. Raegan has been an undergraduate research assistant in the Peer Relations Lab (primary investigator Rebecca Schwartz-Mette, PhD) for all four years of her undergraduate career. She helped manage the research lab, its undergraduate research assistants, and its projects as an undergraduate Lab Coordinator in addition to assisting with various publications along the way.

Following her undergraduate graduation, Raegan has been accepted into and will attend the Doctoral Training Program in Clinical Psychology at the University of Maine beginning in September 2020 and mentored by Rebecca Schwartz-Mette, PhD. Raegan will continue her current line of research as she obtains her doctorate and will maintain a child clinical emphasis. Regarding long term goals, Raegan's training will result in a career as a clinical psychologist where she would like to be involved in a combination of teaching, clinical, and research work to some degree.