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Social Media and Maladaptive Friendship Processes During COVID-19: Examining Unique Psychosocial Vulnerabilities

Emily Scarpulla Raymond
University of Maine, emily.scarpulla@maine.edu

SOCIAL MEDIA AND MALADAPTIVE FRIENDSHIP PROCESSES DURING COVID-19: EXAMINING UNIQUE PSYCHOSOCIAL VULNERABILITIES

By

Emily Scarpulla

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Advisory Committee:

Cynthia A. Erdley, Professor of Psychology, Chair

Emily A. P. Haigh, Associate Professor of Psychology

Jordan LaBouff, Associate Professor of Psychology

Mollie Ruben, Assistant Professor of Psychology

Rebecca Schwartz-Mette, Associate Professor of Psychology

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Dissertation Advisor: Dr. Cynthia A. Erdley

An Abstract of the Dissertation Presented
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The current study sought to examine the various psychosocial vulnerabilities to depressive symptoms experienced by older adolescents with a particular focus on maladaptive interpersonal processes, social media use, and exposure to COVID-19-related stressors. Participants (*N*=471 undergraduate students) completed self-report measures examining interpersonal behaviors, quality and quantity of time spent on social media, exposure to COVID-19-related stressors, and depressive symptoms. A subset of participants (*n*=304) were iPhone users with the Screen Time application tracking their social media use on their phone. These participants specifically reported time spent on social media on their phones, which was used to examine hypotheses specific to time spent on social media.

Numerous findings reported in the previous literature regarding the relationship of friendship processes and depression as well as the relationship among maladaptive social media behaviors were replicated in the present study. In addition, there were several novel findings, including time spent on social media strengthening the relationship between high levels of excessive reassurance seeking and depressive symptoms as well as strengthening the relationship between being a woman and depressive symptoms. Additionally, there were novel findings about COVID-19 social stressors, along with excessive reassurance seeking, as well as these stressors

and social media addiction predicting depressive symptoms. These results suggest that COVID-19 may have led to new vulnerabilities to depressive symptoms for adolescents. The current study sheds light on the additional psychosocial vulnerabilities experienced by current older adolescents that may be increasing risk for depression.

DEDICATION

To my husband Aaron Raymond, we have built a life together that is so full of love and has helped me grow every day. To my parents, Mom, I know you would be proud of who I have become because of your work inspiring me to help people just like you did and, Dad, thank you for supporting me in every step of the process since 12-year-old me decided this was my life plan. I am so lucky to have the supports to accomplish this milestone.

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CHAPTER 1: INTRODUCTION

Overview

Peer relationships during adolescence serve important functions in development, and the relative success of these relationships can have lifelong consequences. Adolescents place a high value on interpersonal relationships as they move away from basing their identity on their family relationships and move towards basing their identity and social needs on peers (Buhrmester & Fuhrman, 1987). While positive friendship interactions provide companionship and increase skills in emotional intimacy (Bakken & Romig, 1992), experiencing unsuccessful social functioning has the potential to lead to mental health difficulties both concurrently and over time. It is important to understand the positive interpersonal processing in adolescence to promote better well-being while minimizing the effects of maladaptive friendship processes. Interpersonal relationships take on new life in the current age of social networking communication, which has changed the social landscape for adolescents. Adolescents now have access to peer communication throughout the day beyond what was traditionally confined to school hours and after school activities (Nesi, Choukas-Bradley, & Prinstein, 2018). The accessibility of constant communication, along with the multitude of different platforms for adolescents to learn social competency, has led to significant changes in the ways that friendship interactions are carried out. The importance of friendships during adolescence in particular creates a crucial need to examine the ways in which friendship processes function in relation to online experiences. Furthermore, the context of the COVID-19 pandemic, particularly during the height of the pandemic beginning in March 2020 and continuing throughout 2021 and into 2022, led to many social changes for adolescents, as in-person socializing became less available, and overall levels of stress increased (Czeisler et al., 2020). Research on interpersonal relationships during

adolescence needs to adapt to the nuances of modern communication and the context of the COVID-19 pandemic to best understand how friendship experiences interact with mental health.

Previous literature has examined the ways in which interpersonal processes during adolescence are important to psychosocial wellbeing. In particular, the development of depression in adolescence plagues an increasing number of individuals each year (CDC, 2021; U. S. Census Bureau, 2020), with nearly 2 million adolescents (3.2% of all adolescents) in the United States being diagnosed with depression in 2020 alone. While there are many factors that contribute to increasing levels of depression in adolescence, one of the primary factors in determining the trajectory of adolescent mental health is the quality of their peer relationship experiences (Buhrmester & Furman, 1987). Rates of depression reach a peak during late adolescence, which is a time when those who go on to college may experience more social challenges as they must navigate forming new friendships at college while also maintaining friendships with old friends (Roberts et al., 2014; Spear, 2010). The current study specifically examined late adolescence with a sample of college students due to their greater vulnerability to developing depression. The overall success of adolescent social functioning can be a key factor in maintaining positive mental health. Thus, it is important to investigate the ways in which interpersonal processes contribute to the quality of adolescents' friendship experiences and, in turn, relate to the risk of developing depression.

The study of maladaptive interpersonal processes is still in its early stages, gaining traction over the past few decades. Two interpersonal processes in particular that have shown a relationship with the development of depressive symptoms are excessive reassurance seeking and co-rumination (Joiner, 1999; Rose, 2002). Excessive reassurance seeking is a form of interpersonal feedback seeking in which individuals elicit positive feedback from a peer over and

over again for validation (Starr & Davila, 2008). At first, the person is likely able to obtain that positive feedback, but over time peers stop validating and eventually reject the person for the excessive reassurance seeking behavior, which can become annoying. Co-rumination is another interpersonal process that has maladaptive elements and is defined as excessively discussing problems with a friend in a negative manner, focusing on the problem and not solutions (Rose, 2002). Co-rumination actually promotes intimacy among friends as they are providing validation, but it is also related to the development of depressive symptoms because of its focus on negative content and emotions. Adolescent girls are particularly vulnerable to the negative effects of co-rumination, given that they engage in this process at a higher rate than boys and appear to be more likely to internalize the negativity from these conversations (Rose et al., 2007). Co-rumination is a dyadic process while excessive reassurance seeking is primarily one-sided, yet both have consequences for relationships and emotional adjustment. Excessive reassurance seeking and co-rumination both have seemingly positive premises of promoting connection and encouragement, but as a prolonged process these interaction strategies can lead to mental health difficulties over time. Looking at these processes together provides a more nuanced examination of multiple maladaptive interpersonal processes in adolescent social interactions. Additionally, it is important that the literature in this area be replicated and extended in relation to different social contexts.

A newly developed area of study focuses on the interpersonal use of social media, which has become a primary modality for socializing over the past two decades, particularly for adolescents. Initial research on social media use employed the conceptualization of a mirroring effect of social media, which is the idea that social media use reflects and continues similar functions as in-person interpersonal communication (Mikami et al., 2010). However, recent

literature (Nesi et al., 2018) has taken a more nuanced approach, called the transformation framework, of considering the unique context of social media and how these features may contribute to different outcomes, particularly for adolescents who use social media very frequently. In the context of this framework, there have been limited studies related to maladaptive interpersonal processes, especially as they might operate in a different way as a function of high and/or problematic levels of social media use. The current investigation utilized the transformation framework conceptualization to examine how interpersonal processes (i.e., excessive reassurance seeking and co-rumination) and social media use time and behaviors relate to the risk for depressive symptoms in adolescents.

The climate of the COVID-19 pandemic provided a unique opportunity for this study to examine how the contextual factors related to the pandemic were associated with adolescent interpersonal processes and social media use. One of the primary factors determining mental health outcomes during the height of the pandemic was the ability to maintain some form of interpersonal connectivity (Shanahan et al., 2020). This indicates that there was a clear importance of effective interpersonal relationships during this time. As the ability to maintain connectivity was challenged by the pandemic, it comes as no surprise that preliminary research on the pandemic revealed a surge of internalizing disorders, such as depression and anxiety (Czeisler, 2020). The trajectory of the pandemic was characterized by many unknowns during the period in which the current study was conducted, as restrictions varied, and several COVID-19 variants emerged with various degrees of severity. During the onset of the pandemic, adolescents spent increased time utilizing technology for many aspects of functioning, including their academic and social lives. In addition, they experienced the added stressors related to health and safety impacting most people during this time (Fisher et al., 2020; Giuntella et al.,

2021). As a result, adolescents were a particularly vulnerable group during the pandemic and required special attention when it came to their interpersonal functioning and mental health. This time period provided a critical point for studying the experiences of adolescents in the pandemic.

The current study examined some of the potential key differences in the associations of adolescents' use of social media with interpersonal processes and depressive symptoms during the unique world context of the COVID-19 pandemic. Moreover, a noted gap in the social media literature is a lack of data regarding the relationship that high use and maladaptive behaviors have with maladaptive interpersonal processes (Nesi et al., 2018). The integration of these areas provides a novel contribution to the literature. Additionally, this study contributes to the literature by examining different aspects of social media use as distinct from in-person interactions using the transformation framework (i.e., attention-seeking behavior and social media addiction; Nesi et al., 2018). Lastly, the current study had the unique opportunity to investigate specifically late adolescent college students during the peak of the COVID-19 pandemic. This was examined by looking at different stressors experienced by adolescents as a result of the pandemic. The current study sheds light on each of these areas to further our understanding of the relation of modern contextual factors to adolescent interpersonal functioning and risk for depressive symptoms.

To provide the background and rationale for this study, first the context of the adolescent period of development will be discussed. Then, broad areas of vulnerability to depression for adolescents will be considered, including the increased risk for depression, especially in women. Next, the function of friendships for adolescents will be reviewed, and the maladaptive friendship processes that can contribute to the development of depression will be highlighted. The use of social media will also be examined, considering both its positive and negative

relations to adolescent functioning. Lastly, the context of the COVID-19 pandemic will be discussed in order to establish some unique differences that were related to social functioning and mental health during that time. The purpose of the current study is to better understand risk for depression in adolescents, with a particular focus on interpersonal processes (i.e., excessive reassurance seeking and co-rumination) that adolescents are engaging in and whether the association between interpersonal processes and depressive symptoms is stronger for heavy and maladaptive users of social media. In addition, the current study examines the differences in depressive symptoms, interpersonal processes, and social media use in the context of COVID-19-related social and health stressors.

Adolescence

Adolescence is a period of significant change for individuals as they transition between childhood and adulthood. This period is marked by shifts including puberty, identity development, and social changes that research has been working to understand, particularly in regard to mechanisms determining the trajectory of adaptive and maladaptive outcomes. The period of adolescence is relatively specific to culture, as many societies have previously considered childhood to directly transition into adulthood, with adulthood beginning earlier than is currently defined in Western society (Cravens, 2006; Valentine, 2003). The timeline of adolescence has been debated, with the period undergoing societal extensions in recent decades as the milestones of adulthood, such as marriage and parenting, have become further delayed (Arnett, 2000). Broadly, the age range for adolescence has been considered to begin with puberty (sometimes as early as 8 years old) and to end as late as 25 years old (Steinberg, 2020). It is important for research to examine the variety of changes that occur across this span of

development. Adolescence is a critical developmental period, encompassing biological, cognitive, and social changes that contribute to the unique importance of this time.

The current study examined specifically late adolescence, a period considered to range from approximately ages 18-25 years (Steinberg, 2020). While there has been some debate as to when adolescence technically reaches its completion, marking adulthood, a separate transitional stage has been proposed called "emerging adulthood," which is characterized as a time in which individuals are living independently for the first time, but they are still not entirely at the level of independence marked in adulthood (Arnett, 2000; Koepke & Denissen, 2012). Developmental transitions are continuing, with important changes in psychosocial functioning (e.g., prioritizing peer influence and developing individual identity around chosen peers) that more closely align with adolescent development. As a result, for the purposes of this study, this age group is referred to as "late adolescence." This developmental period is of particular interest for the present investigation, given that it is during this time that the highest rate of mental health difficulties, especially depression, occurs (Lewinsohn, Duncan, Stanton, & Hautzinger, 1986; Spear, 2010).

As mentioned earlier, adolescence is characterized by many changes in functioning as individuals experience numerous biological, cognitive, and social transitions. Adolescents are going through rapid physical development as a result of the onset of puberty, and they are also facing environmental changes, including shifts in social expectations (e.g., greater responsibility and independence). The successful navigation of these changes provides a framework for long-term psychosocial adjustment as adolescents gain independence from the family unit and develop individual identity. While these areas of development provide adolescents with more tools to transition into adulthood, pitfalls can occur while adjusting to these changes. Therefore, this

developmental period is particularly important to examine for individual differences in interpersonal processes and mental health outcomes. The variety of developmental changes occurring in adolescence stem from the beginning of puberty, typically starting in the 8- to 13-year-old range (Archibald, Graber, & Brooks-Gunn, 2003), and extend through the early 20s. A summary of the biological, cognitive, and social changes is provided in the following sections.

Biological Changes

Adolescence is characterized by a variety of biological changes, primarily as a result of the onset of puberty. Puberty is marked by significant physical changes as the body grows and a paradox occurs in which physical development is at its peak and psychosocial development is particularly vulnerable (Dahl, 2004; Steinberg, 2008). Normative pubertal development for girls begins at about 10-1/2 years of age but can start as early as 8 years old. Physical changes include the development of breasts, axillary hair, and pubic hair, with a significant growth spurt around age 10 and menarche at about 12-1/2 years of age (for review, see Berenbaum, Beltz, & Corley, 2015). Boys' puberty comes somewhat later, beginning at about 12-1/2 years of age, but can start as early as 9 years old. Physical changes begin with testicular growth onset. A significant growth spurt starts at about the age of 12 years, the voice changes at around age 14, and other developments, such as facial hair growth, continue into later adolescence. Adolescence is marked by significant changes in the limbic system in which there are decreases in serotonin and dopamine (Peper & Dahl, 2013). As a result, adolescents are more sensitive to stress and less responsive to rewards, providing a pathway to the development of depression. The prefrontal cortex is also growing during this time, reaching full development by 25 years old (Siddiqui et al., 2008). This growth enables adolescents to engage in more sophisticated problem solving and abstract reasoning. The ability to engage in abstract thinking allows for heightened self-

awareness and more complex exploration of hypothetical situations, which can increase risk for the development of depression due to greater self-evaluation and criticism (Baldwin & Holmes, 1987). These issues will be addressed more extensively in the following section on cognitive development. The physical changes seen during puberty are near completion by the time of late adolescence, but the social implications are continued, making puberty still a significant factor in understanding the context of individuals (ages 18 – 25 years) in the current study. These biological changes are important in understanding the unique context of adolescence for the trajectory of mental health.

Cognitive Changes

Adolescents are also experiencing dramatic changes in cognitive development. Brain development during adolescence leads to increased maturation and advancements in cognitive functioning (Alberts, Elkind, & Ginsberg, 2007; Gogtay et al., 2004). This allows for some positive changes in functioning, including more abstract reasoning and sophisticated problem-solving abilities. This time is marked by increased executive function and self-regulation that continues into late adolescence. By the time adolescents reach college-age, they are expected to be capable of independent functioning as they typically move away from the home. The success of this can be largely influenced by the ability to self-regulate, defined as being able to adapt behavior to be appropriate for the given situation (Barkley, 1997; Moilanen, 2007; for review, see Farley & Kim-Spoon, 2014). While there are these areas of cognitive growth during adolescence, there are also some cognitive pitfalls that can occur during this time.

The increased abstract reasoning during adolescence can contribute to personal fable and imaginary audience thinking (Elkin & Bowen, 1979; Somerville, 2013; Vartanian, 2000). The personal fable is defined as adolescents believing that they are invincible and unique, which is

related to increases in risk-taking behavior (Alberts et al., 2007). When adolescents feel as though they cannot be harmed, they are more likely to take risks, particularly when these risks may bring about immediate rewards (Peper & Dahl, 2013). This can lead to impulsive behavior that can result in potential negative consequences (e.g., contracting a sexually transmitted infection following unprotected sex). The extent of the risk-taking behavior and the severity of the consequences can contribute to individual differences in the development of mental health difficulties. Another aspect of personal fable thinking that can increase risk of depression is the idea that adolescents believe that their experiences are unique, and no one can understand them (Goossens et al., 2002). This can lead to isolation and detachment from others during adolescence.

Adolescents' abstract reasoning also contributes to the development of an imaginary audience. The imaginary audience emerges as a result of adolescents' increased understanding that others have a unique perspective but occurs as adolescents have a tendency to believe that others' focus is primarily on them (Elkind & Bowen, 1979; Ryan & Kuczkowski, 1994). The idea of others' focus being on the adolescent leads to increased self-evaluation as the adolescent becomes more concerned with how they are perceived. This sense of being constantly evaluated can result in vulnerabilities to an adolescent's self-view and increase the risk for subsequent mental health difficulties. These cognitive changes, coupled with adolescents' desire for confirmation from others that their social behavior is acceptable, increase the likelihood of adolescents engaging in excessive reassurance seeking and co-rumination. Thus, whereas adolescents' increased perspective taking abilities can be viewed as an advancement, they may also be considered as a liability, given that they may increase adolescents' vulnerability to implementing maladaptive interpersonal processes and developing depressive symptoms.

Social Changes

Adolescence is marked by a social shift from relying primarily on caregivers for emotional support to depending on peers as youth develop independence from the family unit (Bukowski et al., 2011; Kingery, Erdley, & Scarpulla, 2020). The beginning of this shift is typically met with conflict in the family unit as parents set new rules, and adolescents start to push boundaries (Branje, van Doorn, van der Valk, & Meeus, 2009). These conflicts emerge as expectations related to autonomy and responsibilities do not align between the parents and adolescent and function to help adolescents in their individuation from parents (Smetana, 2002; Steinberg, 2001). Throughout adolescence, these conflicts either resolve with clarity surrounding boundaries or escalate into more long-term difficulties in the parent-child relationship (for review, see Laursen, Coy, & Collins, 1998). Sustained conflict, particularly with the mother, can lead to the development of internalizing disorders, such as depression (Timmons & Margolin, 2015). In late adolescence, parental relationships continue to play a vital role in successful adjustment to transitioning into adulthood (Hair et al., 2008). During this time, adolescents are typically moving out of their parents' homes and living with more independence, overall spending increased time with peers.

Adolescents begin to desire greater autonomy from parents as they seek clarity on their identity, with peers increasingly contributing to this process. During the adolescent period, peers begin to play an even greater role in fulfilling the functions of companionship and intimacy (Buhrmester & Furman, 1987). Adolescents tend to focus on developing close friendships with same-gender peers with similar interests, though with only moderate stability as they explore relationships with different types of people (Brown & Larson, 2009). Over time, some of these close friendships are maintained, and adolescent friendships become more intimate,

characterized by self-disclosure and emotional support (Wilkinson, 2008). Particularly for women, these relationships provide a basis for individual self-worth and identity development (Robinson, 1995). As a result, these relationships hold significant weight for individuals and create vulnerability to the development of internalizing disorders if navigated in maladaptive ways, such as engaging in co-rumination and excessive reassurance seeking behaviors (Rose, Carlson, & Waller, 2007). Those who experience low quality friendships, characterized by low support, poor conflict resolution, and lack of validation, are at increased risk of developing depression (Waldrip et al., 2008). Friendship quality will be discussed further in a later section on friendship functioning. Overall, it is clear that adolescent friendships play an important role in the trajectory of adjustment and mental health.

The progression of peer relationships during adolescence begins with almost exclusively same-gender friendships and shifts towards more mixed-gender friendships and the development of romantic relationships. While the majority of friendship research focuses on same-gender friendships, mixed-gender friendships begin to emerge in adolescence (Poulin & Pedersen, 2007). Mixed-gender friendships create a new area of social competency with different expectations than same-gender friendships. One study (Felmlee, Sweet, & Sinclair, 2012) found that women in particular hold stricter boundaries and have higher expectations than men for these friendships. This indicates that mixed-gender friendships may be perceived differently depending on gender and could serve different functions than same-gender friendships. Mixed-gender friendships, particularly with heterosexual adolescents, may require more communication to maintain these relationships as platonic rather than romantic (Leenders, 1996; McDougall & Hymel, 2007). Individuals who begin mixed-gender friendships earlier in development are more likely to initiate romantic relationships earlier in adolescence (Savickaite et al., 2020). This

indicates that mixed-gender friendships may be a catalyst for the development of heterosexual romantic relationships. During early adolescence, some individuals engage in dating activity, which predicts continued interest in romantic relationships throughout adolescence (Connolly, Craig, Goldberg, & Pepler, 2004). This means that once an adolescent decides to begin having romantic relationships, they tend to continue seeking romantic relationships throughout their adolescent years. Romantic relationships play an important role in social development in adolescence as they can provide companionship but can also increase stress for adolescents (for review, see Collins, Welsh, & Furman, 2009). Success in these romantic relationships can support adjustment into adulthood. However, low quality romantic relationships, particularly for early adolescents, can lead to poor adjustment impacting academic performance, mental health, and future interpersonal relationships. The full extent of romantic relationships' impact on adolescent social development is beyond the scope of this review, but these relationships are important to consider as a contributing factor to the multitude of interpersonal stressors experienced during adolescence.

Friendships can play a key role as older adolescents transition to independent living (Kuttler & La Greca, 2004). College students in particular benefit from positive friendships as these relationships have been shown to promote positive social and academic adjustment (Buote et al., 2007). Adolescents rely on peers for success in these transitions and for support as they continue through development (Bierman et al., 2010; Bukowski et al., 2011). The multitude of important relationships with same-age peers is vital for healthy adjustment during these transitions. Considering the relation of social success to positive outcomes, it is not surprising that poor interpersonal skills tend to be associated with social rejection and can contribute to the development of depressive symptoms (Hames, Hagan, & Joiner, 2013; Segrin & Rynes 2009).

Clearly, positive social functioning across adolescence is a key component of successful adjustment. Thus, the current study examined the positive and negative aspects of social functioning in late adolescence and their relations to depressive symptoms.

Depression in Adolescence

The increase in the risk for depression during adolescence is rooted in escalations in biological, cognitive, and social vulnerabilities, making this developmental period a key time for studying depression. Depression generally involves the experience of low mood, anhedonia, hopelessness, and a loss of interest in previously enjoyable activities. Functional changes, including changes in appetite and sleep difficulties, are also characteristics of depression. Although some individuals develop depression during childhood, there is a significant increase in the incidence of depression during adolescence (Powers & Casey, 2015), with a spike occurring during late adolescence (Lewinsohn et al., 1986; Spear, 2010). It is estimated that 13.3% of adolescents have experienced at least one depressive episode (CDC, 2021; U. S. Census Bureau, 2020). A variety of factors contribute to the increase of depression during the adolescent period, with adolescent girls being especially at risk. Adolescent depression is a key area in need of further research, particularly in regard to mechanisms impacting individual differences in onset and trajectory, with a clear gender gap emerging across biological, cognitive, and social development contributing to this stark difference in vulnerability.

Biological Vulnerabilities

During adolescence, individuals experience hormonal dysregulation through the hypothalamic–pituitary–adrenocortical (HPA) axis and proinflammatory cytokines, which can contribute to the development of depressive symptoms. The HPA axis regulates the production of glucocorticoids, specifically cortisol, which is considered the primary biological component of

stress reactivity (Carnevali et al., 2017; Marin et al., 2007). In situations of high stress, cortisol production increases, and this predicts the onset of depression (Rudolph & Hammen, 1999). Proinflammatory cytokines, such as interleukin-6 and C-reactive proteins, are also shown to be related to the development of depression under stress through the microbiota-gut-brain axis (Liang et al., 2018; Wong et al., 2016). In particular, individuals with depression typically have difficulties with digestion-related problems, such as appetite and metabolic difficulties that are exacerbated as a result of inflammation. This creates a feedback pathway related to the HPA axis that together serves to biologically maintain depression. There are also decreases in the levels of the neurotransmitters serotonin and dopamine that may leave adolescents more vulnerable to depression. Adolescent serotonin transporters (5-HTT) and dopamine transporters are at a sensitive period in which alterations of reuptake and modulation via stressors have lasting impacts through adulthood (Garcia-Garcia et al., 2017; Yu et al., 2014). The effects of stress are not seen to be as impactful prior to adolescence or in adulthood, indicating that adolescence is a unique period in which these biological factors play a critical role in mental health. The lower levels of dopamine and serotonin relative to baseline levels during adolescence have been shown to be related to difficulties with internalizing disorders, such as depression (Eley et al., 2004; Yu et al., 2014). Biological dysregulation of hormones and neurotransmitters during the critical period of adolescence can lead to increased vulnerability to depression.

Puberty is directly the result of significant and rapid hormonal changes, some of which affect mood, leaving adolescents at greater risk for the development of depression. The onset of puberty has been shown to be impacted by stress and related to the development of depressive symptoms, particularly for girls experiencing depressive symptoms after early menarche (Culpin, Heron, Araya, & Joinson, 2015; Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997). For boys,

on the other hand, later onset of puberty is predictive of the development of depressive symptoms (Graber et al., 1997). One of the differentiations between girls and boys during this time is how society views the physical changes that occur during puberty. While boys are developing more muscle mass, a desirable characteristic in current society, girls are developing more body fat, which can be met with ridicule by peers (Archibald et al., 2003). As a result, delays in puberty for girls are seen as more desirable, whereas earlier puberty is preferred for boys. This divergence poses a threat to adolescent mental health, with particular impacts on girls as development continues. The onset of puberty sets the stage for a variety of biological vulnerabilities to depression that continue across development, activated by social and environmental stressors.

There is also a clear genetic component to the vulnerability of developing depression. Studies involving twins have found that genetics provide a risk factor for the development of depression, especially when individuals are exposed to increased environmental stressors (Kendler et al., 2001; Wichers et al., 2007). Adolescents in particular are shown to have an increased genetic risk for the development of depression when compared to childhood-onset depression (Franic, Middledorp, Dolan, Ligthart, & Boomsma, 2010). This observation is consistent with the diathesis stress model, which proposes that genetic vulnerabilities interact with environmental risk factors to increase the risk for depression (Colodro-Conde et al., 2018; Eberhart & Hammen, 2010). Polygenetic vulnerabilities have been found to contribute to depression risk in situations of high life stress, supporting this theory. There is also evidence that persons assigned female at birth have more genetic vulnerability to the development of depression (Colodro-Conde et al., 2018; Kendler, Gatz, Gardner, & Pedersen, 2006). Overall, research indicates that various biological factors, including hormonal changes, decreases in

neurotransmitter levels, and genetics, play an important role in the development of depression during the adolescent period.

Cognitive Vulnerabilities

Adolescents experience a variety of cognitive changes that can also make them more vulnerable to developing depression. As discussed earlier, adolescence is marked by an increase in abstract reasoning and perspective-taking abilities. While these abilities have the benefit of improving appropriate social behavior and empathy, they also enable adolescents to engage in higher levels of social comparison (Hu et al., 2021). Social comparison can lead to vulnerabilities to depression for adolescents if cognitive biases towards negative comparisons develop. Cognitive biases to view the self negatively when compared to others can reinforce a negative self-concept as well as increase maladaptive interpersonal behaviors (Bazner, Bromer, Hammelstein, & Meyers, 2006; Irons & Gilbert, 2005). For example, those with a negative self-concept may be more likely to engage in excessive reassurance seeking. These behaviors may increasingly alienate their social interaction partners, leading to them providing negative feedback and contributing to higher levels of depression in the adolescent.

A primary cognitive vulnerability to depression comes from attribution style. Individuals with depression are more likely to have a negative attribution style in which the individual believes that negative things are likely to happen due to internal faults (for review, see Joiner & Wagner, 1995). Negative attribution style can develop through experiences with negative life events influencing views on future events such that individuals see stressors as internal, global, and stable (Hankin & Abramson, 2001). For example, an adolescent who gets a bad grade on a math test may be biased to think that this means that they are bad at math (internal), possibly bad at all things related to school (global), and they will never improve their math skills (stable). This

can then lead to increased problems with school and maintenance of the negative attribution style. While there is mixed evidence as to when attribution style develops, it has been found that negative attribution tends to increase in severity over time for individuals with depression, maintaining the depressive symptom of hopelessness (Hollon, Kendall, & Lumry, 1986). Negative attribution style can be developed in adolescents through peer contagion as the emphasis on interpersonal relationships during adolescence makes individuals more susceptible to negative influences from peers (Hammen & Brennan, 2001; Stevens & Prinstein, 2005). The reinforcement of negativity from peers supports a fixed mindset towards stressors in the future and can be maintained through selective attention towards negative aspects of life events (Lyon, Startup, & Bentall, 1999; Wilkowski, Robinson, Gordon & Troop-Gordon, 2007). Negative attribution style may also be a contributing factor to gender differences in depression, given that women experience higher rates of negative attribution (Hankin & Abramson, 2001). The negative attribution style leads individuals to selectively attend to information that confirms their negative self-view and discounts positive experiences (McCarty, Vander Stoep, & McCauley, 2007). This indicates that attribution style plays an important role in the maintenance of depressive symptoms, particularly under peer influences.

Another cognitive change developing during adolescence is the presence of rumination. Rumination is defined as extensive focus on negative thoughts and depressed mood in negative cognitive schemas (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Adolescents in particular are in a sensitive period to develop ruminative cognitions in response to stressors due to difficulties with cognitive control (Stewart et al., 2013). Adolescents are more likely to have challenges avoiding focus on negative aspects of life events, leading to increased likelihood of rumination. This style of thinking is directly related to the development and

maintenance of depression, as negative thought patterns reinforce negative emotional responses. Rumination is characterized by being past-focused in an attempt to find greater meaning behind past events and the potential negative implications for future events (Lyubomirsky et al., 1998). This creates negativity surrounding thoughts of past, present, and future - a primary diagnostic feature of depression. Women are more likely to engage in ruminative thinking, which exacerbates the gender gap seen in depression (Grant et al., 2004; Nolen-Hoeksema et al., 2008). Engagement in rumination and stress reactivity to adverse life events accounts for a significant amount of the gender difference in depression, with the initial development of these differences emerging in adolescence (Jose & Brown, 2007). In summary, adolescence is marked by cognitive vulnerabilities that are related to improved abstract reasoning abilities and greater focus on self-concept. These changes can lead to increases in social comparison, negative attribution bias, and rumination that, in turn, can contribute to the development and maintenance depressive symptoms.

Social Environmental Risk Factors

The development of depression during adolescence has strong ties to the social environmental risk factors present during this time. As previously stated, adolescence is a key period in social development in which individuals begin relying on peers for emotional support, moving away from parental influence (Bukowski et al., 2011; Kingery et al., 2020). This factor puts increased pressure on the success of adolescent friendships for psychosocial wellbeing and creates a difficult balance for adolescents to maintain. In situations in which these friendships are not developed appropriately, the interpersonal stress and dysfunction predict the onset of depressive symptoms, with increased rates occurring during adolescence (Buhrmester & Furman, 1987; Segrin & Rynes 2009). The development of internalizing disorders during adolescence can

also be linked to childhood adversity and negative life events throughout development (Hazel, Hammen, Brennan, & Najman, 2008). This constitutes potential environmental risk factors for depression. Both social and environmental risk factors play an important role in the developmental trajectory of depression during adolescence.

Consistent with the diathesis stress model, individual differences in the amount of environmental stress experienced can contribute to the development of depression. Environmental stress can be designated into two categories: episodic and chronic stressors. Episodic stress is acute in onset and duration, typically occurring a single time with no expectation of reoccurrence, whereas chronic stress is more consistently present for the individual (Marin et al., 2007; Vrshek-Schallhorn et al., 2015). Adolescents may experience a variety of episodic stressors, particularly those of an interpersonal nature, such as ending a romantic relationship or fighting with friends, that elicit negative emotions. While each individual experience may not directly lead to the development of depression, the experience of many episodic stressors can manifest in cognitive and biological changes that lead to the development of depression for adolescents (Daley et al., 1997; Starr et al., 2017). There is also potential for the experience of chronic interpersonal stress, such as experiencing repeated bullying and ongoing familial conflict, to have similar impacts as unresolved stressors accumulate in intensity and lead to more vulnerability to mental health concerns (Miller & Townsend, 2005; Timko, Moos, & Michelson, 1993). Stress, paired with the underlying biological and cognitive vulnerabilities described earlier, leads to individual differences in the development of depression in adolescents. Both episodic and chronic stress have been associated with the onset and maintenance of depression in adolescence and adulthood, with particular problems seen with interpersonal stressors.

One of the primary problems with interpersonal stressors is that a cycle can emerge with interpersonal stress generation. Historically, stress has been studied as the cause of depression onset, but more recently it has been debated if dependent stressors, stressors that the individual is somewhat responsible for, may actually be caused by depression (Daley et al., 1997; Hammen, 1991). Interpersonal stress generation theory poses that individuals who are experiencing depression may maintain their symptoms by creating more stress for themselves interpersonally, creating a maintenance cycle for depression (Kazdin & Kagan, 1994; Rudolph et al., 2000). This is consistent with a transactional model for exacerbation of symptoms. Interpersonal stress generation has a particularly strong relationship with the development of depression in adolescent girls (Davila et al., 1995; Hammen, 1991). This is likely due to the interpersonal emphasis during adolescence, particularly for girls, which is apt to lead to increased stress and depressive symptoms.

The course of depression is largely interpersonal in nature, with many direct implications for interpersonal functioning. The interpersonal theory of depression states that the interpersonal behavior of individuals experiencing depression leads to eventual social rejection (Coyne, 1976; Joiner & Metalsky, 1995). Individuals with depression tend to create negative affect in others around them which, in turn, leads to that rejection. The process by which this occurs is typically through worry that individuals are not good enough or truly cared about by loved ones. This leads to a cycle of constant questioning of worth from others that is continued until confirmation of their negative beliefs about themselves is confirmed by eventual rejection. These responses are being elicited through interpersonal feedback seeking (Hames, Hagan, & Joiner, 2013). Interpersonal feedback seeking falls into two categories, excessive reassurance seeking and negative feedback seeking. Excessive reassurance seeking involves individuals constantly

seeking reassurance that the people around them actually care for them, whereas negative feedback seeking involves looking for confirmation from others that their negative beliefs about themselves are true (Hames et al., 2013; Joiner, 1999). These conflicting areas of feedback create social and cognitive dissonance that is likely to lead to interpersonal rejection and the continuation of interpersonal stress generation. The generation of this stress among friends is the basis for depression contagion. Depression contagion develops when friends focus on negativity together, and one individual's depression leads to the development of depression in the other (Prinstein, 2007; Schwartz-Mette & Smith, 2018). There is clear evidence that the development of depression in adolescence has strong ties to interpersonal functioning. The function of friendship and its relationship to depression development in adolescence will be discussed in further detail in later sections.

Gender Gap

A gender gap in the incidence of depression, which is first evident during the adolescent period, has been long established in the depression literature. By late adolescence there is a significant gap in the rate of depression between men and women, with over 50% more women experiencing depression than men (NIMH, 2017). There is clear evidence of vulnerabilities that are specific to adolescent girls across domains. These vulnerabilities include biological factors, such as larger hormonal fluctuations, and social factors, such as greater engagement in maladaptive interpersonal behavior (e.g., co-rumination, excessive reassurance seeking). Notably, these problems begin to reach a peak in adolescence, partially due to gender role intensification during this time. These socialization factors put pressure on women to narrow their behavior to fit female-typical roles in society, including passivity, helplessness, and deriving self-worth through their relationships with others (Nolen-Hoeksema, 2009). Over time,

behavioral expectations become more pervasive in social interactions, highlighting the importance of peer relationships on identity development more prominently in women (Rose & Smith, 2018). Many of the key individual differences found in predicting depressive symptoms in adolescents can be attributed to interpersonal behavior that is more salient to women. This relationship is explored further in the following sections, detailing friendship processes in adolescence.

Friendship Functions

The many functions that friendships serve during adolescence are crucial in the overall psychosocial well-being of youth. As indicated in previous sections, there is a heightened emphasis on peer relationships during adolescence. As adolescents focus on developing autonomy from their parents, peer relationships are increasingly critical in providing social support, companionship, validation, intimacy, and a space to learn about the world and one's own identity (Buhrmester & Furman, 1987; Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2015). While younger children primarily rely on parents for social learning and emotional support, adolescents are able to experience these opportunities with peers and use this time to learn more about themselves and the social world around them (Bakken & Romig, 1992). From pre-adolescence through later adolescence, the definition of being socially competent changes as friendships have more advanced functions and skills (Parker et al., 2015). The success of these relationships is vital for the development of effective social skills and the maintenance of future relationships. While there are many functions of friendship, the current review will focus on companionship, validation, intimacy, and support in identity development.

Companionship

Adolescent friendships provide companionship and connectedness, which are important for social development. Companionship is a key desire at all ages, but it is especially important in adolescent peer relationships (Buhrmester & Furman, 1987). Adolescents are spending increased time with one another, both in person and virtually, and are engaging in shared interests, such as sports, music, and other extracurricular activities. Participating in shared interests provides a strong basis for adolescent companionship as peers are able to have positive interactions while doing things that they like (Schaefer, Simpkins, Vest, & Price, 2011). The need for companionship is expressed as highly valued by men and women, as they want to feel included and supported (Bakken & Romig, 1992). Spending time with peers also allows adolescents to receive social feedback and support in developing advanced social skills (e.g., perspective taking abilities, communication skills, conflict resolution strategies) into adulthood (Parker et al., 2015). This is important because the early success of peer relationships impacts adolescents' ability to make and maintain friendships later in life. Having these connections is helpful in promoting positive perceptions of social competence and the continuation of social skill building. Those with more advanced social skills throughout development will have better adjustment in later friendships as well as greater academic and career success as they enter adulthood (Devine, Holmbeck, Gayes, & Purnell, 2012; Parker et al., 2015; Savitz-Romer, Rowan-Kenyon, & Fancsali, 2015). This function allows for positive social interactions to create higher levels of self-worth and a sense of belonging, which are important for overall well-being.

Validation

Friendships during adolescence also provide validation. Validation is particularly important for adolescents as peers increasingly influence adolescent self-concept and identity

formation (Hay & Ashman, 2003). As adolescents have increased abstract reasoning abilities and a greater feeling that they are being evaluated by an imaginary audience, they are more vulnerable to feeling self-conscious and need reassurance that their behavior is socially desirable to their in-group (Sanders, 2013; Vartanian, 2000). Being chosen as a friend with similar interests as peers provides adolescents with the feeling that they and their interests are socially acceptable, which serves as a form of indirect validation (Youniss & Haynie, 1992). Peers also provide direct forms of validation through stating that they value one another's viewpoints and telling their friend that the friendship is important to them (Parker et al., 2015). These actions increase the intimacy of those friendships and can help improve positive adolescent self-view. Moreover, the self-worth gained from peer validation in adolescence helps individuals in their adult adjustment, particularly with regard to their social competence (Bagwell, Newcomb, & Bukowski, 1998). One study (Felsman & Blustein, 1999) found that adolescents who experience validating friendships, particularly in late adolescence, are more likely to successfully navigate career exploration. Overall, it appears that the validation that can be experienced within adolescent peer relationships is important in social and career adjustment heading into adulthood.

Intimacy

Intimacy and self-disclosure originally develop with family members but shift towards peers in early adolescence (Buhrmester & Furman, 1987). This function of friendship is largely developed through self-disclosure of feelings and personal information, such as likes, dislikes, and secrets. Adolescents in particular engage in more intimate interactions with peers due to an increased need for close friendships at this time (Selman, 1990; Shulman, Laursen, Kalman, & Karpovsky, 1997). These friendships are characterized by mutual trust, as well as more exclusivity. In addition, adolescent intimacy is considered more mature as a result of greater

complexity and responsiveness about shared interests as well as problem solving (Parker et al., 2005). This process aids in the development of in-group membership and creates a network of social support for adolescents that can continue through the transition into adulthood (Davies & Aron, 2016; Parker et al, 2015). Those with high-quality social relationships typically have greater intimacy, openness, and warmth that are all important in maintaining successful relationships, and they also enjoy higher self-esteem and overall life satisfaction (Bagwell, Kochel, & Schmidt, 2015; Hussong, 2000). Intimacy plays a key role in positive social development, especially during adolescence, through the creation of mature friendships that are more likely to be maintained into adulthood.

Identity

Adolescence marks a significant time for identity development, and peers play an important role in this process. The pillars of successful interpersonal relationships during adolescence provide a framework for identity development. Adolescents form smaller microsystems within peer groups that provide unique supports and stressors for individuals (Seidman et al., 1999). The in-group that an adolescent is a member of can play an important role in validating beliefs and attitudes that are part of the adolescent's overall identity (Davies & Aron, 2016). During adolescence, this group is responsible for the trajectory of social development and provides support in the process of an individual finding independent identity from their family unit. Adolescents are expected to engage in complex self-exploration including the determination of values, interests, sexuality, and general "place" in society (Xing et al., 2015). Peers support navigating this exploration by providing multiple perspectives on these areas of identity for individuals to incorporate in their self-conception. By choosing similarly identifying peers, adolescents are able to reinforce their identity through affiliation with specific

peer groups. Affiliation with a specific group of people impacts not only an adolescent's identity as they see it, but also how their behavior develops in accordance with these groups (Parker et al., 2005). The peers that adolescents affiliate with influence behavioral choices, such as engaging in prosocial behavior or participating in delinquent acts. Such behavior that is consistent with the peer group's values typically leads to prosocial feedback from peer group members, thereby maintaining that behavior (van Hoorn et al., 2016). This illustrates the importance of friendship choice in adolescence in the development of individual identity (e.g., as a prosocial person or as a delinquent). Overall, these findings indicate that adolescent friendships assist in the development of identity outside of family influence and increase peer affiliation.

Gender Differences

Notably, there are gender differences in how friendships are experienced by adolescents. Friendship for girls serves especially as a means to obtain emotional support, whereas adolescent boys typically focus on friendships to share activities. Girls practice more self-disclosure and express more peer affection than boys, which contribute to girls having more intimate friendships (Bagwell et al., 1998; Buhrmester & Furman, 1987). Greater intimacy in girls' friendships provides increased emotional support, which aides in social skill development through adolescence. Boys, on the other hand, report that their friendships are grown through shared activities rather than self-disclosure (McNelles & Connolly, 1999). These relationships tend to have less emotional support and prioritize increases in power as boys enter into late adolescence (De Goede, Branje, & Meeus, 2009). Research examining gender differences in gossip likewise demonstrates different priorities in the friendships of girls and boys. Specifically, Watson (2012) concluded that girls' friendships are formed with an emphasis on building close bonds and community, whereas boys are focused on achieving goals of self-promotion in their friendship

development. Thus, when studying adolescents' friendship experiences, it is important to consider gender differences in how much particular functions are valued.

Maladaptive Friendship Processes

While there are many positive aspects of peer relationships during adolescence, there are also negative aspects of these relationships that are important to consider when examining the role that interpersonal processes play in adolescent mental health. Indeed, there are interpersonal behaviors (e.g., excessive reassurance seeking, co-rumination) that adolescents engage in with friends that can contribute to negative socioemotional outcomes (Hames, Hagan, & Joiner, 2013). Additionally, there is some evidence that maladaptive interpersonal functioning can lead to social support being less impactful in psychosocial well-being (Boren, 2014). Although adolescent peer relationships can play a key role in promoting social development, when these peer interactions are maladaptive, they can contribute to problems with adolescent well-being, increasing risk for internalizing disorders, such as depression. Thus, it is important to understand how both positive and negative interpersonal processes are impacting development and mental health in adolescents. Individuals with depression tend to participate in fewer social interactions, and the social interactions that they do engage in tend to have negative consequences (Hames, Hagan, & Joiner, 2013). Adolescents experiencing depression often engage in co-rumination, tending to focus on the negative aspects of events when discussing them with peers and tending not to practice active problem-solving in these conversations (Burwell & Shirk, 2007). Similarly, adolescents experiencing depression also often engage in excessive reassurance seeking, leading to eventual rejection from peers. Frequent interpersonal feedback seeking can eventually lead social partners to begin to disengage, as they no longer wish to continue friendships with those who are trying to elicit this feedback. Loss of friendships and persistent engagement in

maladaptive interpersonal processes can contribute to individuals with depression experiencing a downward spiral of more negative well-being. While both of these friendship processes are seemingly positive at first, continuous engagement in these behaviors can lead to negative psychosocial outcomes. For this reason, the current study examined two specific maladaptive interpersonal behaviors, excessive reassurance seeking and co-rumination.

Excessive Reassurance Seeking

Interpersonal feedback seeking through excessive reassurance seeking is a maladaptive social behavior that can have negative consequences for adolescents. Excessive reassurance seeking happens when an individual is distressed and asks for positive feedback about themselves from peers to reassure them of good qualities about themselves (Hames, Hagan, & Joiner, 2013; Joiner et al., 1999). At first, this leads to comforting from peers that temporarily alleviates distress. However, when the individual feels distressed again, they will go back to seek out positive feedback once more. This cycle continues with shorter periods between needing this reassurance until the individual no longer receives positive feedback from their frustrated friends, who may begin to reject them. This experience then validates the negative feelings that the individual has about themselves and increases risk for depressive symptoms (Joiner, Metalsky, Gencoz, & Gencoz, 2001; Starr & Davila, 2008). A possible explanation for this behavior is that insecure attachment to parents might then lead the individual to seek assurance from peers in a manner similar to how they interact with parents (Abela et al., 2005). Adolescents engaging in excessive reassurance seeking are largely concerned about receiving validation regarding their development of identity and social skills primarily from their peers. Excessive reassurance seeking is a maladaptive interpersonal process that typically leads to rejection by peers, resulting in loneliness and increased vulnerability to depression.

Co-Rumination

Another maladaptive interpersonal process that can increase risk for depression is co-rumination. Co-rumination is defined as discussing problems with another person in a repetitive, symptom-focused manner (Rose, Carlson, & Waller, 2007). Adolescents, particularly girls, have a tendency to co-ruminate at a high rate (Rose, 2002; Rose & Rudolph, 2006), possibly because they have more intimate and supportive friendships during this period of their lives. This serves as a specific form of self-disclosure that has both positive and negative effects. Co-rumination has been shown to have a positive effect on the quality of close friendships, with those who co-ruminate at a high rate with a close friend feeling closer to that friend (Rose, Carlson, & Waller, 2007). This indicates that co-rumination functions as a means to engage in self-disclosure in a way that builds intimacy with peers which, theoretically, should have a positive impact on well-being. However, studies have also shown that, although relationships can strengthen as a result of co-ruminating (Rose, Carlson, & Waller, 2007), there are clearly negative effects on overall mental health translating primarily into depressive symptoms. This comes from a focus on and validation of negative thoughts, and a rehashing of these thoughts without focusing on ways that solutions can be found to the problems being discussed (Bastin et al., 2015). While there can be benefits to some of the co-reflecting (i.e., going over the events with a friend), there are problems with the co-brooding behavior (i.e., focusing on the negative feelings and catastrophizing; Bastin et al., 2015). This suggests that negativity is the component that contributes to the problematic consequences. While there are some positive aspects of co-rumination as a friendship process, it is questionable whether these are enough to outweigh the mental health consequences from the negativity sustained in the co-rumination process.

Co-rumination has been shown to be related to the development, maintenance, and progression of depression, particularly for adolescent girls (Rose, Carlson, & Waller, 2007; Stone, Hankin, Gibb, & Abela, 2011). One way that co-rumination can increase the risk for depression is through the process of interpersonal stress generation (Hankin, Stone, & Wright, 2010). One study (Hankin et al., 2010) found that the discussion of interpersonal dependent stressful events mediated the relationship between co-rumination and depression. This means that co-ruminating is leading to adolescents creating interpersonally stressful situations that are then contributing to the development of depressive symptoms. In other words, co-rumination may be creating interpersonal stress to further co-ruminate about, which results in a downward spiral leading to the exacerbation of depressive symptoms. In addition, those who co-ruminate at high levels are likely to experience contagion of internalizing symptoms (Schwartz-Mette & Rose, 2012). Specifically, a friend who focuses on depressive thoughts increases the depressive thoughts and feelings of the partner through exposure and validation of the negative content areas of self-disclosure. Self-disclosure in itself has not been shown to lead to depression contagion, which indicates that there are specific properties of co-rumination that contribute to the spread of depressive symptoms. This may be due to the differences in co-reflecting versus co-brooding behavior, suggesting that the negativity in co-brooding is driving this relationship (Bastin et al., 2015). Contagion via co-rumination is also seen specifically in adolescence, likely due to the emphasis on peer influences during this developmental period (Schwartz-Mette & Rose, 2012). This affirms the importance of adaptive friendship processes in the maintenance of well-being for individual adolescents and those in their peer group. Taken together, there is clear evidence that maladaptive interpersonal processes, including excessive reassurance seeking and co-rumination, are associated with the development of mental health difficulties in adolescence.

Interpersonal Processes and Gender

The effects of poor interpersonal skills have a particularly negative impact on adolescent girls. Since society puts a strong emphasis on social competence of girls, they tend to develop greater social-evaluative concerns and a higher need of approval from others regarding their social skills (Rose & Rudolph, 2006). This directly impacts feedback seeking behaviors for girls as they are more vulnerable to questioning themselves and feeling socially incompetent. As a result, adolescent girls are more likely to engage in excessive reassurance seeking to gain validation from peers, which leads to greater vulnerability to depressive symptoms (Prinstein, Borelli, Cheah, Simon, & Aikins, 2005; Starr & Davila, 2008). Adolescent girls use this social feedback to try to build relationships and use self-disclosure with the goal of increasing intimacy with friends (Rose & Smith, 2018). Co-rumination follows a similar developmental trajectory as self-disclosure, increasing in intensity for adolescent girls (Rose et al., 2007). This leaves girls more vulnerable to negative outcomes, such as depression contagion, as a result of engaging in co-rumination (Rose et al., 2007; Schwartz-Mette & Rose, 2012). The positive aspects of co-rumination are important for friendship development for girls (particularly in strengthening feelings of intimacy), but the negative consequences of dwelling on and validating negativity lead to more cognitive vulnerabilities to mental health difficulties (Rose & Rudolph, 2006). This results in tradeoffs of prioritizing friendships at the expense of mental health. Along with co-ruminating, adolescent girls are more likely to engage in interpersonal stress generation by contributing to negative interpersonal interactions (Hankin, Stone, & Wright, 2010). This causes a cycle of more co-rumination and more interpersonal stress generation. These areas highlight the variety of ways that girls are more at risk of engaging in maladaptive interpersonal processes and experiencing more robust negative consequences of these behaviors.

While there are many positive aspects of interpersonal relationships that promote adolescent well-being, the significant emphasis on social competence during this time leads to those without desired levels of competence facing problematic consequences. The primary consequence of poor interpersonal relationships during adolescence is the development of mental health difficulties that can be pervasive across the lifespan. In exploring adolescent peer relationships, we need to put particular emphasis on the mental health difficulties resulting from maladaptive friendship processes as well as the modern contextual factors being experienced by today's adolescents that create further challenges for their mental health. The current study conceptualizes co-rumination and excessive reassurance seeking at the trait level to understand the engagement in these processes across in-person and online communication. The other factors considered for the purpose of this study are social media and the COVID-19 pandemic impacting adolescent social communication and mental health.

The Role of Social Media

The relations of interpersonal processes to mental health consequences take on new life with the explosion of social media use among adolescents. Over the past two decades, social media and internet usage in general has increased. Indeed, by 2018, over 95% of adolescents reported that they use the internet for social interaction, with that number continuing to grow (Pew Research Center, 2018). Prior to the widespread availability of the internet, social interactions were limited to primarily in school and some after school activities, but social media provides a venue for almost constant communication at any time of day. There are also many different modalities of social networking online, including private text messaging, group text messaging, video chatting, and photo sharing, both publicly and privately (Nesi, Choukas-Bradley, & Prinstein, 2018). These types of social networking can be done on the computer,

smartphone, or tablet with a variety of different applications (e.g., iMessage, Facebook Messenger, Instagram, Snapchat). This provides a new landscape for friendship processes with many new skills required to be socially competent in a variety of environments (e.g., in-person and online platforms).

Social media communication has implications for face-to-face communication and functioning, showing similarities between in-person and online environments. This is what is considered the "mirroring" framework in which online communication mirrors offline social interactions (Mikami, Szwedo, Allen, Evans, & Hare, 2010). This framework indicates that online interactions are similar to in-person interactions, contributing to overall similar outcomes. The mirroring of impacts can be seen in the way in which social groups form based on similar beliefs, values, and interests (Allen, Ryan, Gray, Mcinerney, & Waters, 2014). Like in-person interactions, maladaptive interpersonal communication can lead to mental health difficulties, particularly depressive symptoms (Allen et al., 2014). For example, one study (Eichstaedt et al., 2018) found that language indicating sadness in Facebook posts predicted depression in medical records, showing the continuity of the nature of online social expression and real-life outcomes. This suggests that the nature of adolescent online interactions needs to be examined in the total social landscape being experienced. There are clear instances of similarity and continuity between online and offline peer interactions and their consequences.

Similar to in-person interactions, online social interactions provide opportunities for feedback seeking and support identity development. Peer relationships during adolescence are key in feedback seeking and identity development as individuals use social interactions to gauge socially acceptable behaviors as well as identify interests. Social media provides a powerful platform for this development (Allen et al., 2014). Specifically, social media offers opportunities

to find individuals with similar interests. In addition, there is a high availability of social feedback from a large audience, including peers from other towns, to as broad as peers from other countries, that helps in identity development and can promote social competency. Adolescents report that their reasons for using social media are similar to the reasons for traditional in-person social interactions. These reasons include experiencing intimacy, forming identity, and promoting peer relationships (Shapiro & Margolin, 2013). Furthermore, some evidence indicates similar psychosocial trajectories of mental health and friendship development playing out over social media (Shapiro & Margolin, 2013). Social media provides space for relationship building and self-disclosure that are also important in in-person interactions for successful social development. These similar functions offer an initial framework for understanding online friendship processes. While these similarities do exist between online and offline social interactions, there are also important differences to consider concerning both positive and negative outcomes as a result of online interactions for adolescents.

Positive Aspects of Social Media

Social media use has a variety of positive aspects, as it can promote interpersonal relationships and well-being during adolescence. Social networking provides increased opportunities for social interaction and support in the day-to-day lives of adolescents. There is a high availability of social interactions with constant communication possible on social media, which provides many opportunities for positive peer interactions (Nesi et al., 2018). Using social media modalities for peer relationships can also alleviate some anxiety related to in-person social interactions (Allen et al., 2014). This could be helpful for those experiencing social anxiety to have a slower-paced way to have social interactions without as many cues to navigate from social partners. Given that text-based communication is asynchronous, there is more time

for individuals with anxiety to decide what they are going to say while still being socially appropriate, whereas in-person interactions typically require immediate responses (Desjarlais & Willoughby, 2010). Using social networking can also serve as a form of rehearsal for in-person interactions and can help fine-tune some of the skills related to traditional peer interactions in a low-stakes environment (Campbell, Cumming, & Hughes, 2006). With so many sources of feedback online, adolescents can get feedback more quickly as to what they are doing right and wrong. Ideally, they can use this information to adjust their behavior and build their social competence. The internet can provide a learning environment for adolescents to gain more social skills (e.g., perspective taking abilities, communication skills, conflict resolution strategies) as well as more people to interact with for support.

The increased use of social networking provides more connectivity and validation for those who also have successful offline interpersonal relationships. The increased availability of social interactions leads those who are more successful offline to continue that success online in a rich-get-richer framework (Desjarlais & Willoughby, 2010). For people who are receiving validation and connection in their in-person social lives, online communication provides more modalities to show interpersonal competence and thus additional opportunities to receive positive feedback. This further improves well-being by creating a supportive and validating environment (Desjarlais & Willoughby, 2010). Those who are involved in social interactions online also have the opportunity to connect with people who have similar beliefs to them, which increases social gratification (Park, Kee, & Valenzuela, 2009). Moreover, having access to a large group of peers increases the probability of being able to connect with those who have similar interests. By creating strong social connections online with those who have similar interests, adolescents feel less lonely and more connected, both of which are important for

positive well-being. These connections may not have been possible with in-person interactions, particularly if interests are more niche (Shapiro & Margolin, 2013). Having these online relationships provides more opportunity for positive feedback to self-expression for adolescents, particularly when these individuals are successful with social skills offline that are translated to online contexts.

In a situation in which social skills are not well developed, online technology may provide a space in which social skills can be adapted to better function through the connectivity benefits of social media (Best, Manktelow, & Taylor, 2014). Effective exposure to positive online social connections could provide many of the benefits of in-person social interactions while giving individuals the opportunity to make mistakes with fewer real-world consequences (e.g., social rejection in school) while learning. Social skill practice needs to be applied in a structured and safe online environment in order to provide the benefit of supportive learning of skills. Particularly in older adolescents, online relationship building relates to improved social skills in offline relationships (Tsitsika et al., 2014). Social media can help those without well-developed social skills to benefit from the availability of connectivity and to have an opportunity to practice social skills in a validating environment.

In addition, social media provides the opportunity for adolescents to be more selective in self-presentation, allowing them to put their best foot forward in their online interactions. Having control of self-presentation enables adolescents to filter themselves both in conversations and with photo sharing (Shapiro & Margolin, 2013). Self-presentation can have specific boundaries (e.g., deciding exactly what content should be presented) in an online context that may not be as available with in-person interactions. In turn, the selectivity of presentation can alleviate anxiety related to unavoidable disclosures of things a person might be sensitive about, such as the way

the adolescent looks or awkward social skills. The choice of self-presentation also allows for more identity exploration with many sources of social feedback and different social networks available to find an individual's best fit (Allen et al., 2014). Furthermore, adolescents can find many different groups to affiliate with, giving a more diverse array of potential in-groups to be associated with online (Shapiro & Margolin, 2013). Group exploration allows an adolescent to identify with multiple interests without feeling forced to choose one social identity. While there are numerous potential positive impacts of social media usage on interpersonal relationships and well-being, there are also many potential negative effects of frequent social networking that can be damaging to adolescent mental health.

Negative Consequences of Social Media

For those who have less successful offline peer relationships, unfortunately the use of social networking typically serves to exacerbate the impact of negative interpersonal behavior. The negative interpersonal skills being used in face-to-face interactions are often being translated online such that problem behavior is seen in both domains (Mikami et al., 2010). Although problematic online interpersonal behaviors (e.g., impulsive behavior, risky sexual behavior) are more likely to be exhibited by adolescent boys than girls, the negative mental health consequences of engaging in these behaviors are more prevalent in girls (Jelenchick, Hawk, & Moreno, 2016). With more interpersonal connection online, there is greater opportunity for social feedback, and those who are using maladaptive social skills are at higher risk for receiving negative feedback (Allen et al., 2014). When adolescents receive negative feedback during online interactions, there is a decrease in overall well-being (Valkenburg, Peter, & Schouten, 2006). The use of social media makes this negative feedback more frequent and more permanent, particularly with text-based communication. The enduring nature of this feedback tends to

impact well-being in a more intensive way (Nesi et al., 2018). Individuals with poor offline peer relationships are also more vulnerable to being the victims of cyberbullying (Craig et al., 2020). Poor quality social media use serves as the strongest risk factor for being cyberbullied and further increases risk of developing internalizing disorders, such as depression and anxiety (Craig et al., 2020). If social networking for those with poor peer relationships was entirely problematic, the simple solution would be to eliminate social media usage for those who were struggling. However, there is evidence to suggest that lack of social media use can also lead to difficulties with current interpersonal functioning as social media has become an essential part of adolescent social interactions (Coyne, Padilla-Walker, Holmgren, & Stockdale, 2018). This indicates that a balance is required of using social media to some extent, but in a way that does not cause harm. This requires examination of the quality of social media use as well as the quantity to best minimize negative outcomes, such as internalizing disorders.

While there is evidence that social media use could alleviate social anxiety (Allen et al., 2014), there is also evidence that a high level of social media use (i.e., multiple hours per day) is related to anxiety in adolescents under situations of high stress (Vahedi & Saiphoo, 2018). This indicates that using social media when experiencing distress can serve to make the situation worse and increase anxiety. Heavy social media use has also been shown to relate to the development of depressive symptoms (Lin et al., 2016). While there may be more availability for virtual social interaction, these levels of social media use are actually serving to isolate individuals from their in-person interactions with friends and leading them to miss quality interactions that they could have been having if in person (Ahn, 2011). Additionally, when we consider interpersonal processes with depression, negative feedback is received more quickly online and can increase the speed at which depression is developed (Valkenburg, Peter, &

Schouten, 2006). Not surprisingly, those adolescents who engage in negative feedback seeking receive more negative feedback. Moreover, they are likely to receive diminishing returns from excessive reassurance seeking at a faster rate, particularly when this is coupled with negative feedback seeking. The same principles can be applied to the feedback being received during co-rumination. Negativity in interpersonal processes is related to mental health difficulties on a greater scale with online interactions because the increased number of interactions in general means that there are also more opportunities for the negativity to occur (Murdock, Gorman, & Robbins, 2015). These risks seem to be particularly pronounced for adolescent girls, who are more vulnerable to developing depressive symptoms due to interpersonal distress. The strong emphasis on girls' interpersonal competence, paired with the need to obtain interpersonal competence in both in person and online interactions, leads to an increased risk for developing depression (Nesi et al., 2018). Overall, there is evidence that maladaptive friendship processes are impactful in the development of mental health difficulties when using online communication.

With social networking being more constant than traditional in-person interactions, this also creates the potential for increased depressive symptoms. Traditionally, social interactions were not easily broadcasted and primarily served the purpose of individual relationships being built for companionship, intimacy, and connectedness (Buhrmester & Furman, 1987). The function of interpersonal relationships takes on new meaning with the larger peer group viewing social interactions in an online context. The social content available online allows for social comparison on a mass scale of seeing so many individuals posting about their daily activities. This experience contributes to the phenomenon "fear of missing out" (Oberst, Wegmann, Stodt, Brand, & Chamarro, 2017). Fear of missing out is a direct result of social comparisons to others' social competence and the individual feeling as though they are not engaging in enough of or the

best social activities to reach their own social competence expectations. This often occurs in adolescence because of the value placed on social competence, with many networking systems allowing for quantifiable comparison of success (e.g., likes, comments, favorites). The more this content is seen, the more likely adolescents are feeling as though they are missing out on social activities, and this creates an online environment of perceived exclusion (Allen et al., 2014). As a result, depressive symptoms appear to spread at a faster rate and to more people than in the case in traditional friendship processes when friends discuss their feelings about exclusion with one another (O'Keeffe & Clarke-Pearson, 2011). Overall, social media use seems to lead to greater levels of mental health difficulties, given that it promotes a higher tendency to engage in social comparison as well as the more rapid spread of negative feelings.

Self-esteem is developed in an online context with social compensation (i.e., gaining self-esteem from positive feedback online) that mirrors in-person peer relationships, but the effects of poor compensation may be more pronounced (Barker, 2009; Perloff, 2014). Women, in particular, use social networking sites to increase self-esteem via social compensation, similar to how adolescent girls would with traditional peer interactions (Barker, 2009). When the needs for self-esteem are not met online, there is an increased likelihood for the development of depressive symptoms (Nesi & Prinstein, 2015). The role of interpersonal interactions has especially high stakes in the online interactions of women due to the societal pressures for women to place a high value on interpersonal success (Allen et al., 2014). The impact of offline social skills on depressive symptoms has continued presence online as does the disproportionate impact of depressive symptoms on women through social media usage (Nesi & Prinstein, 2015). This shows that women's interpersonal skills are key in the protection against or the development of depression. When we consider standards of appearance for women in society, these same

standards, if not worse, apply to online socialization (Perloff, 2014). With photo sharing being a primary component of social media activity, the standards that apply for women's bodies are continued in the online context with those who fit the current beauty standards being more successful online (e.g., gaining praise and popularity) and those who do not fit the current standards being less successful (Perloff, 2014). These standards mirror societal standards for in-person interactions and perpetuate body image problems and, as a result, eating disorders particularly for adolescent girls.

The complexities associated with different modes of friendship (online, in-person, or both) also lead to personal difficulties with self-esteem and identity development. While in-person peer relationships during adolescence typically aid with identity formation, social media serves to create some barriers in the success of identity development (Barker, 2009). With lower quality relationship building, the identity exploration online is happening in a shallower context, which can create instability in identity development for adolescents (Allen et al., 2014). While there are more types of content and more groups to explore online, the lower quality relationship building, along with the selectivity of personal disclosure online, can make it challenging for adolescents to find authentic and deep connections that they can build their identity around. For those who are already vulnerable to low self-esteem, they may see these selected presentations of others as entirely reality that they are then comparing themselves to online (Perloff, 2014). This can create a downward spiral of adolescents presenting versions of themselves with increased social and literal filters to perpetuate distorted versions of themselves with the goal of looking like what society considers ideal (Perloff, 2014). The continuation of these standards being shared at high rates with more social communication makes the effects of this even worse as adolescents seek these unattainable standards (Shapiro & Margolin, 2013). A paradox arises here

in which adolescents know that they are not presenting their full-selves, but they are under the false assumptions that the people they see online are as seemingly perfect as they are presenting. This leads to poor mental health outcomes as adolescents feel that they may be failing in their social lives due to higher interpersonal sensitivity, along with increased symptoms of depression and anxiety (Lin et al., 2016). Those with already low self-esteem are especially impacted because of insecurities related to their self-concept, leading to more vulnerability with identity instability (Allen et al., 2014). These complexities of social media interaction are important in understanding the differences in the impact of friendship processes during adolescence.

Transformation Framework

When considering the positive and negative aspects of social networking on the functioning of adolescent peer relationships, we need to examine the underlying differences between face-to-face interactions and online interactions in a systematic way. One way we can do this is by implementing the recently developed transformation framework (Nesi et al., 2018). The transformation framework looks at the variety of differences that are seen in online friendship processes. This comes down to a few main differences in online functioning including asynchronicity, permanence, publicness, availability, cue absence, quantifiability, and visualness. These factors all exist in online friendships at different levels that have direct implications for interpersonal processes. Social media communication can encompass photo sharing, text messaging, and video calling, all of which can be done either privately or in a group/public setting. To consider group text messaging as an example, there are high levels of asynchronicity from potentially delayed responses from others in the group, so there are no direct or immediate reactions to each communication, giving room for differences in interpretation. These messages also have permanence, visualness, and quantifiability factors, given that they are in written form

so an individual can look back and perseverate on the messages that they sent and received and quantify those responses. These messages also have a more public component when compared to in-person communication because all of the group members have access to the messages and can easily share those messages with others outside of the group, creating room for greater social impact of this communication. Group texting has a high availability component because many people can be communicating at once in different groups, providing large amounts of feedback that could not exist in an in-person context. Most importantly, there is a cue absence that exists in which individuals cannot see nonverbal cues or hear tone or inflection in their conversation partners' voices in order to receive important feedback on functioning. This may lead individuals to continue with social behaviors that may be deemed as inappropriate in person because they are not receiving sufficient feedback as to what is acceptable in these contexts without direct confrontation. Altogether, there are many differences in online communication that need to be considered in understanding friendship processes in the modern communication landscape, and there are many gaps currently in our understanding of the differential functioning for online friendship processes during adolescence.

In the context of the transformation framework, social media use needs to be measured for quality and quantity. As indicated by the framework, the quality of social media interactions differs on a variety of domains. Social media interactions are more public, available, and quantifiable, which makes individuals susceptible to poor quality uses, such as social media addiction, attention seeking behavior, and stress related to being away from social media (Hawk et al., 2019). The unhealthy patterns that some adolescents develop in their use of social media creates a distinct vulnerability for poor interpersonal engagement online. These characteristics are important to consider when examining friendship processes as well as mental health

outcomes, such as depression. The transformation framework also indicates the need to examine the quantity of time spent on social media. With high availability and quantifiability of social media, time spent on social media is not only easily measured, but also an integral part of why social media has a pervasive impact on adolescents (Nesi et al., 2018). Adolescents spending more time on social media provides greater opportunities for poor-quality interpersonal engagement online. Previous studies have shown a relationship between heavy social media use (i.e., multiple hours per day) and poor-quality social media use (i.e., attention seeking behavior and social media addiction) together leading to increased depression (for review, see Huang, 2017). Thus, the current study examined the relations of quality of online interactions as well as the time spent on social media to depressive symptoms.

Considering co-rumination in particular, we can see that these differences in the online communication mode can directly impact the ways in which adolescents co-ruminate. Although co-rumination is associated with positive outcomes, such as higher quality friendships and greater intimacy (Rose, Carlson, & Waller, 2007), there are clear ways in which positive friendship quality can be lost online. Previous research (Keshishian, Watkins, & Otto, 2016) has revealed that the benefits of co-rumination were not observed when adolescents were using online communication, indicating the need for more research as to the effects of co-rumination via online communication on mental health. In the context of the transformation framework, the implications of this are extremely important when considering that there is an increase in availability and permanence of validated negative content, which can inundate adolescents with the negative aspects of co-rumination. Additionally, the cue absence in online interactions means less personal communication due to the overall lack of nonverbal cues. This decreases the interpersonal benefits (increased intimacy and support in friendships) of in-person co-

rumination. When communicating online, adolescents are able to engage in highly negative interactions in a larger context of many peers (Nesi et al., 2018), leaving more adolescents vulnerable to the negative effects of co-rumination, including depression (Schwartz-Mette & Rose, 2012). The general tendency to engage in co-rumination may put adolescents at particular risk when they are interacting in the online context. There is a lack of research specifically on how social media may increase vulnerability for depression in those who show a strong tendency to engage in co-rumination (Nesi et al., 2018). However, it seems that the cue absence and availability of negative content may lead to greater involvement in co-rumination with fewer interpersonal benefits. The current study examined the tendency to engage in co-rumination in general and how this may increase vulnerability to depressive symptoms for those participating in high levels of and/or poor quality social media use.

Co-rumination may look different online than in-person due to the ability to co-ruminate in a larger group setting rather than in dyads. Considering that co-rumination is primarily studied in dyads (Nesi et al., 2018; Rose, Carlson, & Waller, 2007), this would be a shift in the way we look at co-rumination as a friendship process. While in-person co-rumination typically occurs one-on-one, social media communication often includes more than one other person communicating, indicating a need for considering the total peer group (Nesi et al., 2018). One study (Murdock, Gorman, & Robbins, 2015) examined the role of co-rumination via cellphone (including texting, social media use, and chat programs) and found that co-rumination via cellphone but not in-person moderated the relationship between interpersonal stress and well-being such that those with high levels of interpersonal stress were experiencing lower levels of well-being when co-ruminating at high levels via cellphone. This indicates that online co-rumination may serve to exacerbate interpersonal stress more so than in-person co-rumination,

and it seems likely that higher frequencies and/or lower quality of online socializing could lead to higher rates of depressive symptoms. Continued research in this area to understand if this relationship is driven by frequency or the general tendency towards co-rumination would be important in establishing specific similarities and differences in the co-rumination/depression relationship in the online realm. To investigate this, the current study examined the general tendency to engage in co-rumination during peer interactions by looking at the general use of co-ruminative behavior rather than limiting this assessment to the individual's best friend. The general tendency to engage in co-rumination during peer interactions, paired with a consideration of the frequency and quality of social media use, could help us understand the ways in which availability and cue-absence are impacting the development of depressive symptoms. It is also important to continue to examine gender differences in co-rumination, given that traditional in-person co-rumination typically leaves women more vulnerable to negative mental health outcomes (Rose, 2002; Rose & Rudolph, 2006). In the context of social media, these outcomes could be exacerbated, leaving women at a disproportionate vulnerability to the development of depressive symptoms as a result of excessive co-rumination. Taken together, these factors as well as other interpersonal processes (e.g., excessive reassurance seeking, negative feedback seeking) are important to consider as future directions for research on online social communication.

Along with an increased investigation of co-rumination that occurs during online communication, other forms of maladaptive interpersonal communication should be studied in this context. There are many maladaptive interpersonal processes that have been found to interact in the development of depression, including excessive reassurance seeking and negative feedback seeking (Hames, Hagan, & Joiner, 2013). When we consider how these processes

interact with online communication, we can see that there is an increase in the availability of social interactions, but a lack of cues related to how the conversation partners are reacting to the social engagement. While this may lead to more comfort in engaging in these processes, similar to the hypothesis regarding co-rumination (Nesi et al., 2018), this lack of cues could also lead to an increase in social rejection and on a greater scale than for in-person communication. Without being able to assess the reactions of social partners, it may be more challenging to gauge what is considered "excessive" to the other person and, without that non-verbal feedback, those with a tendency to implement excessive reassurance seeking may go past appropriate thresholds more easily. One study (Nesi & Prinstein, 2015) found that women who were already struggling with in-person social success in particular were at risk for engaging in excessive reassurance seeking and online social comparison in a way that made them vulnerable to developing depressive symptoms. This illustrates the impact of gender differences and offline social interactions in the understanding of online interpersonal processes while highlighting the increased impact of maladaptive interpersonal functioning when using social media. Continued research regarding the nuances of online communication, particularly in a way that highlights inherent differences in the online context, are important in understanding what is most problematic in a general tendency to engage in maladaptive friendship processes in relation to using social media. It is clear that there are more than simple mirroring effects that are occurring online and, as a result, a more specific and complex framework should be applied to this line of research. To this end, the present study examined interpersonal processes in the context of the transformation framework to provide new insights into current adolescent functioning with the hope of future research moving towards the development of more effective interventions related to modern social skills in general.

Context of COVID-19 Pandemic

Beyond the initial concerns that high levels of involvement in online interpersonal relationships are associated with a greater risk for mental health difficulties in adolescents, the context of the COVID-19 pandemic during the time of data collection (i.e., Spring of 2021 and Spring of 2022) exacerbated that risk, with research indicating a near tripling of symptoms of depression and anxiety among the general population during the early stages of the pandemic (Czeisler, 2020). During this time, the vast majority of adolescents faced a variety of significant stressors including a shift to primarily online education and socialization. Adolescents spent increased time utilizing technology for both their academic and social lives and also experienced stressors related to the health and safety of themselves as well as their friends and family (Fisher et al., 2020; Giuntella, et al., 2021). The multitude of potential stressors faced are important to understand in the context of the already vulnerable developmental period of adolescence. While the amount of stress varied among adolescents due to individual differences in environmental factors, there were clear overarching changes that impacted adolescents' functioning, including changes in interpersonal processes, social media use, and mental health outcomes (for review, see Jones, Mitra, & Bhuiyan, 2021). As research on the effects of the pandemic on mental health is at the early stages, there are still many gaps in the understanding of adolescent functioning and the potential lasting impacts of the pandemic on these areas that need to be addressed.

While the pandemic resulted in a surge of mental health difficulties, there are adolescents who demonstrated resilience to the effects of the pandemic. Positive mental health during the pandemic has been shown to be associated with the implementation of appropriate coping skills (Shanahan et al., 2020; Zhou, MacGeorge, & Myrick, 2020). The coping behaviors that were found to be most effective for adolescents were engaging in activities that take one's mind off

the pandemic and reaching out for social support (Magson et al., 2021; Zhou et al., 2020). Social connection has been found to be a key moderator of positive outcomes for adolescents, indicating that interpersonal processes should be a primary focus for continued research on the pandemic experience. The implementation of mindfulness has also been shown to be related to positive outcomes in coping with the pandemic (Conversano et al., 2020). This further indicates that there are ways in which intervention can help with improving reactions to COVID-19-related stress. These initial findings are helpful in understanding ways in which adolescents can better cope with pandemic stressors.

On the other hand, there have been some vulnerabilities identified that were related to poor mental health during the height of the pandemic. One of the primary factors predicting poor mental health outcomes was the presence of stressors, such as personal health concerns, family loss, and financial burden (Starr et al., 2021; Zhou et al., 2020). These stressors have been shown to be related to negative mental health outcomes for adolescents. Furthermore, these initial studies have indicated a variety of moderators for COVID-related stress on mental health outcomes. One study (Magson et al., 2021) examined experiences before the pandemic and during the first months of the pandemic in order to determine the impact of pandemic-related stress on mental health in adolescents. This study found that adolescent girls in particular were vulnerable to the effects of pandemic stress, leading to higher ratings of depression. The authors suggested that this may be due to online education impeding girls' ability to use social interactions as a coping strategy for pandemic-related stress. They also found that higher levels of worry, interpersonal conflict, and difficulties with online learning were predictive of mental health problems during the pandemic. Other studies (Branje & Morris, 2021; Starr et al., 2021; Zhou et al., 2020) have determined that poor mental health outcomes have been related

specifically to maladaptive interpersonal processes, such as co-rumination. Together, these findings indicate that interpersonal relationships played a key role in the trajectory of mental health difficulties during the height of the pandemic. While not all individuals faced these stressors during the pandemic, many did, and initial evidence has shown that these stressors were related to increased rates of depression and anxiety across development not only early in the pandemic, but also past the initial stages of the pandemic.

As research on the impact of the pandemic on mental health has continued, there are clear gaps in our understanding of adolescents' interpersonal experiences during the pandemic. While initial research has shown increased negative interpersonal processes displayed by adolescents during this time (Starr et al., 2021; Zhou et al., 2020), understanding of the role that social media played during the height of the pandemic is limited. Given restrictions on in person interactions, there was an increased need for individuals to use social media for interpersonal communication, and it appears that the high levels of social media use have persisted, even as restrictions on in person interactions have been lifted (Bozzola et al., 2022). The same persistence needs to be examined in the context of poor mental health outcomes, specifically depressive symptoms, that have been shown to be related to excessive social media use in adolescence. As restrictions were lifted and adolescents began to return to more normal social functioning, the relationship between interpersonal processes and depression appears to be similar to during the pandemic for adolescents, maintaining the negative effects of the pandemic (Branje & Morris, 2021). However, a full understanding of the role of social media in adolescent socioemotional adjustment continues to be a gap in the literature. Therefore, the current study examined the role of social and health stressors specifically for adolescents, as these areas had strong impacts on socioemotional functioning during the pandemic. As previously stated, those who experienced

higher levels of stress due to the pandemic have shown initial differences in mental health that should be further examined. The present investigation can help in understanding stressors as they relate to interpersonal and mental health outcomes, such as maladaptive friendship processes and depressive symptoms, respectively.

The Present Study

It appears that adolescents who engage in maladaptive friendship processes and who are involved in maladaptive social media use (i.e., high quantity, poor quality) are more vulnerable to problems in adjustment, including increased depressive symptoms. With the development of social media being a relatively new component of adolescent interpersonal functioning, there is still much that we do not know about the ways in which it is impacting adolescents' peer relationships and socioemotional adjustment. While we can apply theories of face-to-face communication to online relationships, we also must acknowledge that there are fundamental differences in the ways that online communication functions. Applying the transformation framework to the study of online peer relationships can help us identify the similarities and differences in peer relationships relating to social media when compared to traditional face-to-face interactions (Nesi, Choukas-Bradley, & Prinstein, 2018). With a primary goal being to maximize the positive effects of social media use on peer relationships while minimizing the negative effects on mental health, we need to first understand the variety of ways that these platforms are relating to the overall social landscape of today's adolescents. With this goal in mind, increased knowledge is needed regarding the different maladaptive social media behaviors (e.g., attention seeking behavior, social media addiction) being exhibited by individuals to best examine intrapersonal factors contributing to time spent on social media (Hawk et al., 2019). There also needs to be a better understanding of the maladaptive friendship processes an

individual engages in more generally to identify how these may contribute to mental health problems in the context of heavy social media use. These processes can include co-rumination and excessive reassurance seeking, which can lead to higher rates of depressive symptoms over time (Hames, Hagan, & Joiner, 2013; Rose et al., 2007). Co-rumination and excessive reassurance seeking have a limited research base in relation to social media use (Nesi & Prinstein, 2015; Nesi et al., 2018). The context of the COVID-19 pandemic created yet another variable related to social media use and mental health that requires further examination to understand the larger picture of adolescent functioning during this time and the potential for lasting impacts. Taken together, the research on peer interactions that take place via social media needs to consider the unique consequences of in-person social processes being translated into a new medium to best understand the relationship with mental health functioning, with particular attention being given to the COVID-19 pandemic environment.

The current literature has identified a variety of modern problem areas that have a clear impact on friendship processes and depression. Previous studies (e.g., Hankins & Abramson, 2001; Rudolph & Hammen, 1999) have examined risk factors for the development of depression in adolescence, including gender and maladaptive social environments. A more recent body of literature has focused efforts on understanding the specific social mechanisms that are leading adolescents to have poorer outcomes, even with the presence of seemingly positive social relationships (Hames et al., 2013; Rose et al., 2007). Maladaptive friendship processes, such as co-rumination and excessive reassurance seeking, represent a darker side of adolescent peer relationships that requires further examination in a modern context. One identified gap in the literature has been how these maladaptive interpersonal processes are relating to the online context of social media (Nesi et al., 2018). While assumptions can be made that these processes

would function similarly in the online context (Mikami et al., 2010), little is known specifically about how the frequent use of social media may relate to them or about whether the consequences of these friendship processes for depression might be exacerbated or reduced in the context of social media use. During the COVID-19 pandemic, there was an alarming rise in mental health difficulties that are potentially related to interpersonal functioning, and this increase continues (Czeisler, 2020; Shanahan et al., 2020). With the pandemic research in its early stages, there are still many unknowns regarding functioning and long-term outcomes under these conditions.

Friendship Processes and Depression

This study examined a variety of friendship processes and their relationships with social media use and depressive symptoms. The three constructs investigated were social support, co-rumination, and excessive reassurance seeking. Social support is considered an adaptive friendship process, whereas co-rumination and excessive reassurance seeking, while both having some amount of social support as a component, largely serve as maladaptive processes as they relate to higher rates of depressive symptoms (Rose et al., 2007; Starr & Davila, 2008). Social support during the pandemic was shown to be a protective factor against pandemic-related stress (Magson et al., 2021; Zhou et al., 2020). This indicates that interpersonal connection, even though primarily being provided in an online modality, particularly in the early months of the pandemic (Czeisler, 2020), is related to positive outcomes. As a result, social support was considered as a protective factor in the relationship between social media use and depressive symptoms. Co-rumination has long been associated with depressive symptoms in adolescents, especially for girls (Rose, 2002; Rose et al., 2007). A major gap in the literature, however, is how engaging in co-rumination relates to social media use and what relationship these two

variables have with depressive symptoms. This study examined the relationships among these variables, expanding our knowledge of the associations among co-rumination, using social media, and adjustment, especially for adolescents who use social media at high rates. Another maladaptive friendship process that requires further examination in this area is excessive reassurance seeking. Excessive reassurance seeking online has been shown to be related to depressive symptoms as well as being associated with time spent on social media (Nesi & Prinstein, 2015). A gap in this literature exists as to what mechanisms are at play in the relationships between friendship processes and social media use that contribute to poor mental health outcomes. Examining multiple types of interpersonal processes will help to determine the relative contributions of these processes to depressive symptoms and the ways in which social media use plays a role in these relationships. The associations among interpersonal processes, depressive symptoms, and social media use (both quantity and quality) were also be examined in the context of gender. Gender has been found to be related to the likelihood of engagement in different interpersonal processes and varying rates of depressive symptoms, with women engaging in higher rates of maladaptive interpersonal processes and endorsing higher rates of depressive symptoms (Calmes & Roberts, 2008; Rose et al., 2007; Stone et al., 2011). These processes were expected to be distinct but related constructs that serve as mechanisms in the development of depressive symptoms in adolescence, particularly in the context of heavy and maladaptive social media use and increased exposure to stressors during the pandemic.

Another important reason to examine multiple friendship processes as they relate to social media use and depression is the shift of interpersonal relationships from dyadic to group-based friendships. With increased use of social media, there has been more group-based interpersonal communication (e.g., group chats and commenting on public posts) and, as a result,

it is expected that maladaptive friendship processes are being implemented in group settings as well (Nesi et al., 2018). The examination of multiple dimensions of both adaptive and maladaptive interpersonal processes allows for a more thorough evaluation of friendship functioning beyond single dyadic friendships as representative of overall friendship experiences. Co-rumination, which has been defined as a dyadic process (Rose et al., 2007; Rose, 2002), was examined in this study under the context of general co-ruminative behavior with friends, filling a gap in the literature of how co-rumination can apply beyond individual friendships, particularly in relation to social media use (Nesi et al., 2018). Looking at excessive reassurance seeking, co-rumination, and social support as moderators for how social media use relates to depressive symptoms allows for a nuanced understanding of how interpersonal processes function for those using social media at various rates. Research on interpersonal moderators of the relationship between social media use and depressive symptoms has been lacking in the literature, especially as it pertains to the broader experiences with specific friendship processes that an individual has with their entire social landscape (Nesi et al., 2018). This study shed light on these areas to understand interpersonal processes' relationship to depressive symptoms in adolescence and how these associations relate to social media use.

Social Media: Quantity and Quality

Social media use was measured by both the quantity of time spent using social media as well as the quality of behaviors in relation to online communication. The quantity of time spent on social media was measured through self-report and screenshots of time on social media applications for iPhone users, following the Ruben et al. (2020) protocol modified specifically for social media screen time rather than general iPhone screen time. This provided objective information on the time being spent on these platforms as a function of adolescents' overall

social communication. Additionally, measures of quality were examined to understand the nature of what is happening when adolescents engage in online communication. For assessing quality, participants provided information related to social media addiction, attention seeking behavior, and stress related to being away from social media as indicators of poor social media use (Hawk et al., 2019). These areas together provide an understanding of the intrapersonal maladaptive use of social media by adolescents. It was expected that increased time spent on social media would be related to greater levels of maladaptive use of social media and serve as a more objective measure of social media use. Both quality and quantity were used to assess the relationship between interpersonal variables and depressive symptoms.

The operationalization of social media use was, in part, meant to mirror the transformation framework's goals of understanding the differences between in-person communication and online communication. The primary way in which this was done is through the sub-areas of availability and quantifiability, which is the most significant difference between in-person and online interpersonal communication (Nesi et al., 2018). These aspects of the transformation framework were operationalized through time spent on social media. This allowed for an objective examination of the time investment that adolescents are making in their online social world. Another way in which the transformation framework was operationalized is through degree of engagement in attention seeking behavior (a measure of behavior quality), which exemplifies the publicness aspect of the framework by showing the ways in which a public forum is utilized by adolescents in order to achieve goals of gaining attention. Examining these areas of online interpersonal communication among adolescents is important in distinguishing differences in the ways that adolescents are engaging with others online rather

than in-person and the related mental health concerns that are associated with increased maladaptive use of social media as a mode of communication with peers.

Interpersonal Processes During COVID-19

The COVID-19 pandemic as a context for investigating adolescent mental health is important in understanding interpersonal processes for a few key reasons. The primary reason for this consideration is that the ways in which individuals communicated were likely different from prior to the pandemic, with more individuals using exclusively online modalities for social interaction when social distancing restrictions were required (Czeisler et al., 2020; Shaman & Galanti, 2020; Yang Kandula, & Shaman, 2021). Of note, the current study population of college students may have had more access to in-person interactions than younger adolescents due to some classes being in-person and many students living in dorms or in other group living situations. In the early months of the pandemic, a relationship was observed between co-rumination about the pandemic and internalizing symptoms, such as depression and anxiety in college-age adolescents (Starr et al., 2021). This indicates that there may have been increased levels of internalizing symptoms as a result of maladaptive friendship processes occurring during the height of the pandemic that had the potential to continue throughout the course of the pandemic. Adolescents were living in a unique time in history at the intersection of crucial social developmental milestones when in-person social availability was at an all-time low. This paved the way for more social media use for social communication and the potential for higher levels of maladaptive social media use. Interpersonal processes and social media use are key areas to consider for adolescents when trying to understand mechanisms related to increased depression during the COVID-19 pandemic.

Summary of the Present Study

The primary goal of this study was to expand the understanding of social media use, maladaptive interpersonal processes, and gender and their relationship to depressive symptoms in late adolescents, particularly in the context of the COVID-19 pandemic. To investigate these areas more specifically, the study was broken down into four sections, including replicating some previous findings and exploring three areas of gaps in the literature. Previous studies have examined the relationship between different friendship processes and depressive symptoms, identifying both adaptive and maladaptive processes in relation to depressive symptoms (e.g., Hefner & Eisenberg, 2009; Rose et al., 2007; Starr & Davila 2008). Additionally, there have been studies investigating components of social media use that relate to negative mental health outcomes (Hawk et al., 2019; Nesi et al., 2018). Some studies have also examined mental health and friendship processes in the context of the COVID-19 pandemic (Starr et al., 2021; Zhou et al., 2021). These areas were assessed using self-report data to replicate previous findings in these areas of research.

The first gap in the literature to be addressed focused on relating general tendencies to engage in particular friendship processes to social media use and depressive symptoms. Social support, co-rumination, and excessive reassurance seeking have all been studied in relation to depressive symptoms in adolescents (Nesi & Prinstein, 2015; Rose et al., 2007; Starr & Davila, 2008). Additionally, social media use has been shown to be related to depressive symptoms (Lin et al., 2016). While there have been studies examining each of these relationships individually, no study had investigated each of these factors as moderators of the social media/depression relationship. This study was also the first to examine multiple interpersonal processes under the conceptualization of the transformation framework, providing a structured evaluation of the

relationship social media use has to the general engagement in particular kinds of friendship processes, with the ultimate goal of understanding mechanisms driving the social media and depressive symptoms relationship.

The second gap in the literature was related to gender and social media use. While the gender and friendship processes literature has long been studied in the context of depressive symptoms, there are still many gaps in the literature as to how these areas are related to the modern context of social media use. Building upon the existing literature of in-person friendship processes, this study implemented areas of the transformation framework to conceptualize differences among individuals' experiences online as a function of their general tendencies to engage in particular types of interpersonal behaviors and gender in relation to depressive symptoms.

The third gap in the literature that was examined focused on the context of the COVID-19 pandemic. The literature will be developing for years to come as the pandemic's long-term consequences continue to unfold. This study had the unique opportunity to collect data during some of the peak pandemic restrictions with university students learning from primarily online course work, engaging in social distancing, and hearing reports of high rates of COVID-19 illness and deaths. Given that this time period was universally distressing, particularly for interpersonal relationships, this allowed for an examination of how adolescents engaged in various behaviors during times of intense stress. The experiences of these stressors and their relationship to interpersonal processes, social media, and depressive symptoms integrates the overall adolescent experience during this time period. The data collected during the Spring 2021 and Spring 2022 semesters represent a period of time in which adolescents experienced social isolation as well as the beginnings of in-person re-integration in the later stages of the pandemic.

The data were cross-sectional in order to specifically capture the period in which COVID-19 effects were particularly salient for adolescents. This study provides a starting point by which to examine the possible mental health consequences of the COVID-19 pandemic.

Hypotheses for the Present Study

Replication of Previous Findings

Previous studies (Hames, Hagan, & Joiner, 2013; Rose et al., 2007; Starr & Davila, 2008) have found relationships between different maladaptive friendship processes and depressive symptoms. More specifically, research has revealed that co-rumination and excessive reassurance seeking predict depressive symptoms in adolescents (Rose et al., 2007; Starr & Davila, 2008), whereas other studies have found that social support serves as a protective factor against the development of depressive symptoms (Berndt, 1989; Hefner & Eisenberg, 2009). It was hypothesized that at higher levels of co-rumination, individuals would experience higher levels of depressive symptoms, regardless of gender (Hypothesis 1a). Similarly, it was hypothesized that higher levels of excessive reassurance seeking by individuals would be associated with higher levels of depressive symptoms (Hypothesis 1b). It was also expected that excessive reassurance seeking would be positively correlated with co-rumination as co-occurring maladaptive friendship processes (Hypothesis 1c). Lastly, it was hypothesized that individuals who engaged in higher levels of co-rumination would also report experiencing higher levels of social support, similar to previous studies (Boren, 2014; Rose et al., 2007; Hypothesis 1d).

Further replications were conducted in relation to social media use. It was expected that a variety of maladaptive social media behaviors would be related to one another as has been found in previous research (Hawk et al., 2019). Based on the findings of Hawk et al. (2019) on the interrelation of different types of maladaptive social media behaviors, it was hypothesized that

attention-seeking behavior on social media (ASQ), smartphone stress (SPS), and social media addictive behavior (SMDS) would be positively associated with one another (Hypothesis 1e).

Friendship Processes and Social Media Use

Recent research has indicated that engaging in one type of maladaptive social media process is related to other maladaptive uses (Hawk et al., 2019; Van den Eijden et al., 2016). Some of these processes include attention seeking, smartphone stress, and social media addiction. These constructs would seem to require large amounts of time on social media and, as a result, were expected to be related to increased time spent on social media applications. It was hypothesized that higher levels of attention seeking behavior, smartphone stress, and social media addiction would predict individuals spending increased time on social media (Hypothesis 2a).

The amount of time spent on social media was hypothesized to be related to depressive symptoms with a variety of interpersonal moderators impacting the strength of this relationship. While there have been studies investigating each of these relationships individually (Nesi & Prinstein, 2015; Rose et al., 2007; Starr & Davila, 2008), no study had examined each of these factors as moderators of the social media/depression relationship. It was hypothesized that there would be associations among co-rumination, excessive reassurance seeking, and social support on the social media/depression relationship. A test of moderation was conducted to investigate if the general tendency to engage in co-rumination moderated the relationship between time spent on social media and depressive symptoms. It was hypothesized that at higher levels of co-rumination there would be a stronger relationship between more time spent on social media and higher levels of depressive symptoms (Hypothesis 2b). Another similar moderation analysis was conducted to assess if the general tendency to engage in excessive reassurance seeking

moderated the relationship between time spent on social media and depressive symptoms. It was hypothesized that higher levels of excessive reassurance seeking would strengthen the relationship between more time spent on social media and higher levels of depressive symptoms (Hypothesis 2c). Lastly, a moderation analysis was conducted to examine the moderating effect of social support on the relationship between time spent on social media and depressive symptoms. It was hypothesized that at higher rates of perceived social support, the relationship between more time on social media and higher levels of depressive symptoms would be weakened (Hypothesis 2d).

Gender and Social Media Use

Throughout the literature on friendship processes, social media use, and depression there are clear differences seen between men and women. Gender has been shown to play a primary role in vulnerability to depressive symptoms through maladaptive interpersonal processes, such as co-rumination (Calmes & Roberts, 2008; Rose et al., 2007; Stone et al., 2011). Replicating previous studies (Calmes & Roberts, 2008; Tompkins et al., 2011), it was hypothesized (Hypothesis 3a) that the general tendency to engage in co-rumination would moderate the association between gender and depressive symptoms such that higher levels of co-rumination would strengthen the association between being a woman and experiencing higher levels of depressive symptoms. To further our understanding of gender differences in depression, it was also hypothesized (Hypothesis 3b) that higher rates of social media use would moderate the relationship between gender and depressive symptoms such that depressive symptoms would be higher in women than in men who use spend high amounts of time on social media. Additionally, it was hypothesized that attention seeking behavior online would moderate the association between gender and depressive symptoms such that higher levels of attention seeking behavior

online would strengthen the association between being a woman and experiencing increased depressive symptoms (Hypothesis 3c).

COVID-19 and Interpersonal Functioning

The last hypotheses examined the role of COVID-19-related stressors in the relations among the aforementioned factors of maladaptive interpersonal processes, social media use, and depressive symptoms. While the COVID-19 pandemic progresses and research is still continuing to emerge, initial studies found a relationship between COVID-19-related stress and maladaptive interpersonal processes (Grasso, 2020; Starr et al., 2021). To replicate some of these initial findings related to COVID-19 stress, exposure to health and social stressors from COVID-19 were hypothesized to be positively related to higher levels of depressive symptoms (Hypothesis 4a). The next hypothesis aimed to understand the relationship among maladaptive interpersonal processes (co-rumination and excessive reassurance seeking), exposure to social stressors from COVID-19, and depressive symptoms. A multiple regression analysis was conducted to examine the influence of co-rumination, excessive reassurance seeking, and exposure to social stressors as a result of COVID-19 on depressive symptoms with the expectation that higher levels of maladaptive interpersonal behaviors and social stressors from COVID-19 would predict higher levels of depressive symptoms (Hypothesis 4b). Finally, the last hypothesis sought to investigate the relationship among time spent on social media, maladaptive social media behaviors (attention seeking behavior, smartphone stress, and social media addiction), and exposure to social stressors as a result of COVID-19 on depressive symptoms. A multiple regression analysis was conducted to examine if the influence of increased time spent on social media, attention seeking behavior, smartphone stress, social media addiction, and exposure to social-related COVID-19 stressors on depressive symptoms, such that higher levels would predict higher rates of

depressive symptoms (Hypothesis 4c). These analyses were intended to reinforce and extend the current understanding of the relation of pandemic-specific experience to interpersonal processes, social media, and depression.

CHAPTER 2: METHODS

Participants

A total of 471 participants were recruited from the University of Maine Psychology Subject Pool across two academic years. Power analysis using the G*Power 3.1.9.2 program (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that a total sample size of 328 participants would result in a 95% chance of detecting a small to medium effect (d=0.4) when assessing the effects of the most constrained, anticipated model. A sample size of approximately 180 individuals was recruited for each semester to account for possible technical difficulties and participants who do not complete the study, with more participants in the second semester of collection (*n*=300). The full sample had a relatively equal gender distribution with slightly more men when accounting for gender identity (*n*= 244, 51.8%) and included predominately white participants (*n*=404, 88.6%). The age of participants ranged from 18 to 25 years, with a mean age of 19.4 years. The subset of participants who had Screen Time had a similar composition as the total sample (*n*=304, 49.7% men; 88.2% White). Demographic descriptive statistics from the full sample are presented in Table 1 and those included in Hypotheses 2, 3, and 4 are presented in Table 2.

Table 1. *Full Sample Demographics*

Characteristic	*n*	%ile	*M*	*SD*
Age			19.4	1.45
Gender^				
Male	239	52.4		
Female	203	44.5		
Female to Male Transgender	5	1.0		
Male to Female Transgender	8	1.8		
Non-Binary	1	0.2		
Race/Ethnicity*				
White	404	88.6		
Asian	13	2.9		
Hispanic	11	2.4		
Black	9	2.0		
American Indian	7	1.5		
Other/Multiple	12	2.6		

^Gender was collapse by gender identity for gender-related analyses. Non-binary was excluded from gender analyses.

* Other/Multiple included: "Pacific Islander" (2), "Mixed" (6), and "Middle Eastern" (4).

Table 2. *Screen Time Sample Demographics*

Characteristic	*n*	%ile	*M*	*SD*
Age			19.33	1.36
Gender				
Male	149	50.3		
Female	139	47.0		
Female to Male Transgender	1	0.3		
Male to Female Transgender	4	1.3		
Race/Ethnicity				
Caucasian	261	88.2		
Asian	5	1.7		
Hispanic	8	2.7		
African American	7	2.4		
American Indian	6	2.0		
Other/Multiple	9	3.0		

. ^Gender was collapse by gender identity for gender-related analyses.

* Other/Multiple included: "Mixed" (6), and "Middle Eastern" (3).

Measures

Demographic information (Appendix B). Participants were asked basic demographic information (i.e., age, gender, race). The demographic information was used to describe the

sample and examine for possible group differences. Gender was used in data analyses for Hypothesis 3a-3c with transgender individuals included in their identified gender.

Co-Rumination (Appendix C; CRQ; Rose, 2002). Participants completed the Co-Rumination Questionnaire. This measure is a 27-item questionnaire that assesses the extent to which discussions have featured perseverative style, have been characterized by unproductive dwelling, have focused on emotions, and have occurred at the expense of other activities (e.g., "We talk for a long time to figure out all of the different reasons why the problem might have happened." and "We talk a lot about how bad the person with the problem feels."). Within this measure, there are nine content areas assessed, including frequency of problem discussion, discussing problems instead of engaging in alternative activities, encouraging focus on friend's problems from the individual and the friend, discussing problems repeatedly, speculating about the causes, speculating about the consequences, speculating about parts of the problem that are not understood, and focusing on the negative emotions being experienced as a result. The questionnaire can also be divided into sub-content areas of co-brooding (i.e., dwelling on the negative aspects of the problem; "We talk a lot about all of the different bad things that might happen because of the problem.") and co-reflecting (i.e., speculating for the purpose of understanding the problem; "We talk a lot about parts of the problem that don't make sense to us."), indicating the different functional aspects of co-rumination (Bastin et al., 2014). Each item is given a rating from 1 (*not at all true*) to 5 (*really true*). The original study reported high internal consistency of the measure (Cronbach's $\alpha = 96$; Rose, 2002).

Excessive Reassurance Seeking (Appendix D; DIRI-RS; Joiner, Alfano, & Metalsky, 1992; Joiner & Metalsky, 2001). The Depressive Interpersonal Relationships Inventory-Reassurance Seeking subscale is a four-item measure assessing the degree to which individuals

excessively seek assurance from people they are close to about whether they truly care (e.g., "Do you frequently seek reassurance from people you feel close to as to whether they really care about you?"). This measure illustrates maladaptive interpersonal processes. Items are rated on 5-point Likert-type scales ranging from 1 (*not at all*) to 5 (*extremely often*). Previous studies have shown high internal consistency (e.g., Starr, 2015; Cronbach's $\alpha = .90$).

Social Support (Appendix E; SSQ; Sarason et al., 1983). The Social Support Questionnaire is a 4-item abbreviated self-report questionnaire used to assess general perceived social support. Participants list the initials of each person on whom they can count when they are feeling tense or upset, and then rate their satisfaction of this support. Items are rated on 5-point Likert-type scales ranging from 1 (*Very dissatisfied*) to 6 (*Very satisfied*). The SSQ has demonstrated good internal consistency, test-retest reliability, and concurrent validity (Sarason et al. 1987).

COVID-Related Stress (Appendix F; EPII; Grasso, Briggs-Gowan, Ford, & Carter, 2020). The Epidemic-Pandemic Impacts Inventory is a recently developed inventory designed to understand the effects of the COVID-19 pandemic on personal and family life. The inventory lists 92 common stressors linked to COVID-19 and asks whether the participant or anyone in the participant's home was affected by them (e.g., being laid off of work, being homeless). The stressors are classified in the follow groups: work and employment, education and training, home life, social activities, economic, emotional health and well-being, physical health, physical distancing and quarantine, infection history, and positive change. A latent class analysis of the EPII has shown that the measure can identify at-risk groups (Grasso et al., 2020). Recent studies have found good internal consistency (e.g., Cronbach's alpha = .86; Starr, Huang, & Scarpulla, 2021).

Social Media Use (Appendix G; Ruben, Stosic, Correale, & Blanch-Hartigan, 2020). Following the technology use protocol from Ruben et al. (2020), participants who had iPhones were instructed to go to their phone settings and extract their average daily screen time on social applications. This screen time metric is a real-time report of how much time a participant spends with their phone screen turned on in an average week using social applications, such as iMessage, Instagram, Facebook, and Snapchat. This time captures only the time in which the applications were present on the screen and does not measure applications that were not actively in use (i.e., not measuring applications running in the background). To ensure participants did not alter their responses in order to appear more socially desirable, it also requested that they upload a screenshot of this information. In addition to this objective measure of technology use, participants were asked to self-report on a scale of 0 (*does not describe me at all*) to 10 (*describes me very well*) how well the following statements described their technology use (e.g., "I tend to be an active user, posting frequently" and "I tend to be a passive user, scrolling through posts and photos.") Together, these two questions comprise a self-report measures of technology use: active and passive. Because these are single item questions rather than a single item, participants can report any combination of active and passive technology use. Additionally, participants were asked to rank the specific social media applications that they used from most time spent to least time spent. This showed the frequency of social media use and the type of use that was occurring.

Social Media Experience (Appendix H; SMDS; Van den Eijden et al., 2016; Appendix I; ASQ; Hawk et al., 2019; Appendix J; SPS; Hawk et al., 2019). Three measures of social media experience were used to identify a variety of problematic social media experiences following the Hawk et al. (2018) grouping of maladaptive social media behaviors. The Social Media Disorder

Scale is a 9-item self-report questionnaire that mirrors the DSM-5 criteria for Internet Gaming Disorder, such as items related to addiction to social media with questions pertaining to social media behavior over the past year (e.g., "During the past year, have you regularly found that you can't think of anything else but the moment that you will be able to use social media again?"). This measure is scored dichotomously with 0 (*no*) and 1 (*yes*). The Attention Seeking Questionnaire is a 5-item self-report questionnaire that assesses attention-seeking behavior on social media (e.g., "I post messages and pictures because I get attention from others."). Items are scored on a scale of 1 (*not at all true*) to 4 (*very true*), with higher scores indicating more attention-seeking behavior. The Smartphone Stress Scale is a 5-item self-report questionnaire examining nomophobia (i.e., fear of being without their smartphone) and stress responses to social media content (e.g., "If I don't have my smartphone with me, I feel uncomfortable."). Items are scored on a scale of 1 (*completely untrue*) to 5 (*completely true*). These measures have demonstrated a range of internal consistency (α: .57-.91). These measures are shown to be interrelated in the context of social media-specific problem behavior for social functioning and provided information on the quality of social media experience.

Depressive Symptoms (Appendix K; BDI-II; Beck, Steer, & Brown, 1996). The Beck Depression Inventory is a 21-item self-report measure that assesses the severity of depression symptoms. Respondents are asked to select one of four statements, on a 0–3 scale, which best describes how they have been feeling over the past 2 weeks, with higher numbers indicating more severe symptoms. These items include physical, emotional, and cognitive symptoms of depression. The BDI-II includes an item on suicidality, a diagnostic marker of depression, and was used in conjunction with an elevated total BDI-II score for assessing risk. In the event that

participants scored in the moderate range or above in depressive symptoms or endorsed the suicidality item, a risk procedure was initiated (see below under Risk Assessment).

The BDI-II has been shown to have strong validity and reliability in the assessment of depressive symptoms for the purposes of research and clinical utility. The BDI-II has demonstrated strong internal consistency with late adolescents (α's = .83-.90; Calmes & Roberts, 2008; Storch, Roberti, & Roth, 2004; Barstead, Bouchard, & Shih, 2013). The BDI-II has also been found to have high test-retest reliability as well as good construct validity, with similar results when compared to clinician-rated structured interviews (Sprinkle et al., 2002). The BDI-II is one of the most utilized measures of depressive symptoms.

Procedure

Participants were invited to participate via Sona. The link took them to a Qualtrics survey, which first presented them with the informed consent form (Appendix A). As part of the informed consent process, participants were informed that they would be asked to complete a set of anonymous questionnaires. They were informed that their participation in the study would contribute to our understanding of social media, friendship processes, and psychosocial well-being. Participants were told that their participation was completely voluntary, and they could discontinue participating at any point during the study. They were informed as to their compensation for participation in the study (i.e., 1 research credit).

Participants were informed of the risks and benefits of participating in the study. Specifically, they were informed that they may experience discomfort answering questions and that they could skip questions that they preferred not to answer. All participants were provided with a list of mental health resources (Appendix M). Additionally, they were informed that

should their answers indicate distress or risk for harming themselves that they would receive an individual message encouraging them to use these resources.

Risk Assessment

As soon as the participant completed the online surveys, all participants were given a list of mental health resources (Appendix M), and those with elevated risk automatically were shown a message that included resources and encouraged follow-up (Appendix N). Participants whose BDI-II scores were elevated to the extent of indicating moderate to severe depression (i.e., BDI-II scores ≥ 20) and/or who endorsed the BDI-II item of suicidality met criteria for elevated risk and received the additional communication for support. The suicidality item had four possible responses, ranging from 0 ("I don't have any thoughts of killing myself") to 3 ("I would kill myself if I had the chance"), with any response above 0 prompting follow-up.

Any participants who replied to the follow-up message and requested further assistance were directed to the on campus Psychological Services Center or the University of Maine Counseling Center or encouraged to contact the crisis hotline in case of emergency (Appendix N). Further follow-ups were made available to participants as needed.

CHAPTER 3: RESULTS

Preliminary Analyses

All analyses were conducted using IBM SPSS Statistics 27 and the application extension PROCESS macro for moderation analyses (Hayes, 2022). The questionnaires were examined for accuracy of data coding and missing values. There were six missing values on the SSQ, two missing values on the DIRI-RS, and five missing values on the BDI-II, each for different participants. These values were replaced by the mean. There were no identified patterns of missing data across participants or variables.

The presence of outliers and skewness was examined prior to hypothesis testing analyses. Outliers were defined by z-scores greater than or equal to ±3.29 (Verkoeijen, Marike, & Bouwmeester, 2018) and Bonferroni tests were used for statistical correction of correlations with adjusted p-values reported. Identified outliers were winsorized by changing the scores to the closest case in order to preserve power and participant variability. Extremely high values were identified in the BDI-II (*n*=3), the ASQ (*n*=3), and the EPII (Social; *n*=3). Extremely low values were identified in the SSQ (*n*=2). The acceptable ranges for skewness and kurtosis were defined as ±1. The ASQ and the EPII (Health) fell outside of the range of skewness (ASQskew=1.07; EPIIskew=1.03). For these measures, logarithmic transformations were conducted to improve statistical modeling (ASQskew=.57; EPIIskew=-.42). The full sample (see Table 3) was compared to the sample of participants who had Screen Time data reported (*n*=304, see Table 4). In addition, the participants from Spring 2021 (*n*=171, see Table 5) were compared to the participants from Spring 2022 (*n*=300, see Table 6). No significant differences were found between these samples on any measures. Because the responses of the two cohorts did not differ, they were combined into one dataset for subsequent analyses.

A total of 471 participants were recruited from the University of Maine Psychology Subject Pool across two academic years. Of the recruited participants, 456 met the inclusion criteria for testing Hypothesis 1. Participants were excluded from all analyses if they spent less than 5 minutes completing the survey (n=11), responded to less than 75% of the survey (n=15), and/or did not fall in the age range of 18 to 25 (n=1). Additionally, a higher percentage of participants did not have iPhone Screen Time available than anticipated (10% expected). There were 299 participants who had recorded Screen Time (67.8% of participants) and were included in analyses for Hypotheses 2, 3, and 4. Participants spent an average time of 28 minutes and 43 seconds completing the survey. The questionnaires for this study were investigated for reliability. Internal consistency was found to be good to excellent for all measures and subscales ($\alpha = 0.75$ to 0.96).

Table 3. *Descriptive Statistics of Self-Report Questionnaire: Full Sample*

Measure	*M*	*SD*	Range	Internal Consistency (α)
BDI-II	11.99	3.70	0-47	0.94
CRQ	2.70	0.78	1-5	0.96
SSQ	4.92	1.03	1.75-6.00	0.90
EPII (Health)	3.15	2.32	0-15	0.77
EPII (Social)	6.30	3.73	0-17	0.87
DIRI-RS	8.85	4.17	4-20	0.87
ASQ	7.89	3.28	5-18	0.86
SPS	12.95	4.63	5-25	0.80
SMDS	7.64	6.04	0-27	0.91

Table 4. *Descriptive Statistics of Self-Report Questionnaires: Screen Time Sample*

Measure	*M*	*SD*	Range	Internal Consistency (α)
BDI-II	11.89	3.67	0-47	0.94
CRQ	2.67	0.77	1-4.96	0.95
SSQ	4.88	1.03	1.75-6.00	0.91
EPII (Health)	3.18	2.33	0-15	0.75
EPII (Social)	6.48	3.64	0-17	0.86
DIRI-RS	8.78	4.13	4-20	0.89
ASQ	8.12	3.37	5-18	0.86
SPS	13.07	4.53	5-25	0.78
SMDS	7.78	5.84	0-27	0.90

Table 5. *Descriptive Statistics of Self-Report Questionnaires: Spring 2021 Sample*

Measure	*M*	*SD*	Range	Internal Consistency (α)
BDI-II	14.18	3.83	0-47	0.93
CRQ	2.65	0.80	1-4.96	0.96
SSQ	4.81	1.02	1.75-6.00	0.91
EPII (Health)	3.14	2.32	0-15	0.74
EPII (Social)	7.02	3.81	0-17	0.86
DIRI-RS	8.51	4.01	4-20	0.89
ASQ	8.33	3.27	5-18	0.84
SPS	12.61	4.61	5-25	0.77
SMDS	7.71	5.78	0-27	0.91

Table 6. *Descriptive Statistics of Self-Report Questionnaires: Spring 2022 Sample*

Measure	*M*	*SD*	Range	Internal Consistency (α)
BDI-II	10.75	3.63	0-47	0.95
CRQ	2.72	0.76	1-4.96	0.96
SSQ	4.98	1.05	1.75-6.00	0.92
EPII (Health)	3.20	2.43	0-15	0.77
EPII (Social)	6.00	3.57	0-17	0.86
DIRI-RS	9.04	4.26	4-20	0.88
ASQ	8.02	3.43	5-18	0.86
SPS	13.15	4.64	5-25	0.80
SMDS	7.66	6.21	0-27	0.90

Hypothesis 1

The first set of hypotheses was tested to replicate previous findings in the literature that have documented relations among friendship processes, depressive symptoms, and various social media behaviors.

Hypotheses 1a-d. Based on previous literature, it was first hypothesized that at higher levels of co-rumination (CRQ), individuals would experience higher levels of depressive symptoms (BDI) (Hypothesis 1a; Rose et al., 2007, Stone et al., 2011). Similarly, it was hypothesized that higher levels of excessive reassurance (DIRIRS) seeking by individuals would be associated with higher levels of depressive symptoms (BDI) (Hypothesis 1b; Starr & Davila, 2008). Zero-order correlations between each hypothesized variable are presented in Table 7. In line with Hypotheses 1a and 1b, the more participants reported engaging in co-rumination (r = .10, p = .041) and excessive reassurance seeking behaviors (r = .32, p < .001), the more depressive symptoms they reported on the BDI. Also, as expected based on previous literature (Boren, 2014; Rose et al., 2007), greater co-rumination was significantly related to excessive reassurance seeking (Hypothesis 1c; r = .42, p < .001) as well as higher levels of perceived social support (Hypothesis 1d; r = .13, p = .010). Additionally, it was found that the less perceived social support they received, the more depressive symptoms participants reported on the BDI-II (r = -.27, p < .001), which is also consistent with previous literature (Alsubaie, Stain, Webster, & Wadman, 2019). These findings are all in line with expectations based on the initial hypotheses.

Table 7. *Correlations for Study Variables Hypothesis 1a-d*

Variable	1	2	3	4
1. Depressive Symptoms	—			
2. Co-Rumination	.10*	—		
3. Excessive Reassurance Seeking	.32**	.42**	—	
4. Perceived Social Support	-.27**	.13**	-.16**	—

* $p<.05$. ** $p<.01$

Hypothesis 1e: Maladaptive social media behaviors. Next, analyses aimed to examine the ways in which various maladaptive social media behaviors are related to one another. Zero-order correlations between each hypothesized variable are presented in Table 8. It was hypothesized that attention-seeking behavior on social media (ASQ), smartphone stress (SPS), and social media addictive behavior (SMDS) would be positively associated with one another (Hypothesis 1e). Zero-order correlations between each hypothesized variable are presented in Table 8. In line with the hypothesis and previous literature (Hawk et al., 2018), the increased endorsement of each social media behavior was significantly related to the increased endorsement of the other social media behaviors. Greater levels of attention seeking behavior were significantly related to greater levels of smartphone stress ($r = .33$, $p < .001$) as well as to greater levels of social media addiction ($r = .38$, $p < .001$). Greater levels of smartphone stress were also related to greater levels of social media addiction ($r = .53$, $p < .001$). These findings show that those who engage in each of these social media behaviors are likely to also engage in the other maladaptive social media behaviors.

Table 8. *Correlations for Study Variables Hypothesis 1e and 2a*

Variable	1	2	3	4
1. Attention Seeking Behavior	—			
2. Smartphone Stress	.33**	—		
3. Social Media Addiction	.38**	.53**	—	
4. Time Spent on Social Media	.12*	-.03	.08	—

* $p<.05$. ** $p<.01$

Hypothesis 2

The following analyses sought to address the relationship among friendship processes, social media use, and depressive symptoms. The first analysis compared time spent on social media to various maladaptive social media behaviors, and the following analyses examined how various friendship processes related to depressive symptoms and time spent on social media.

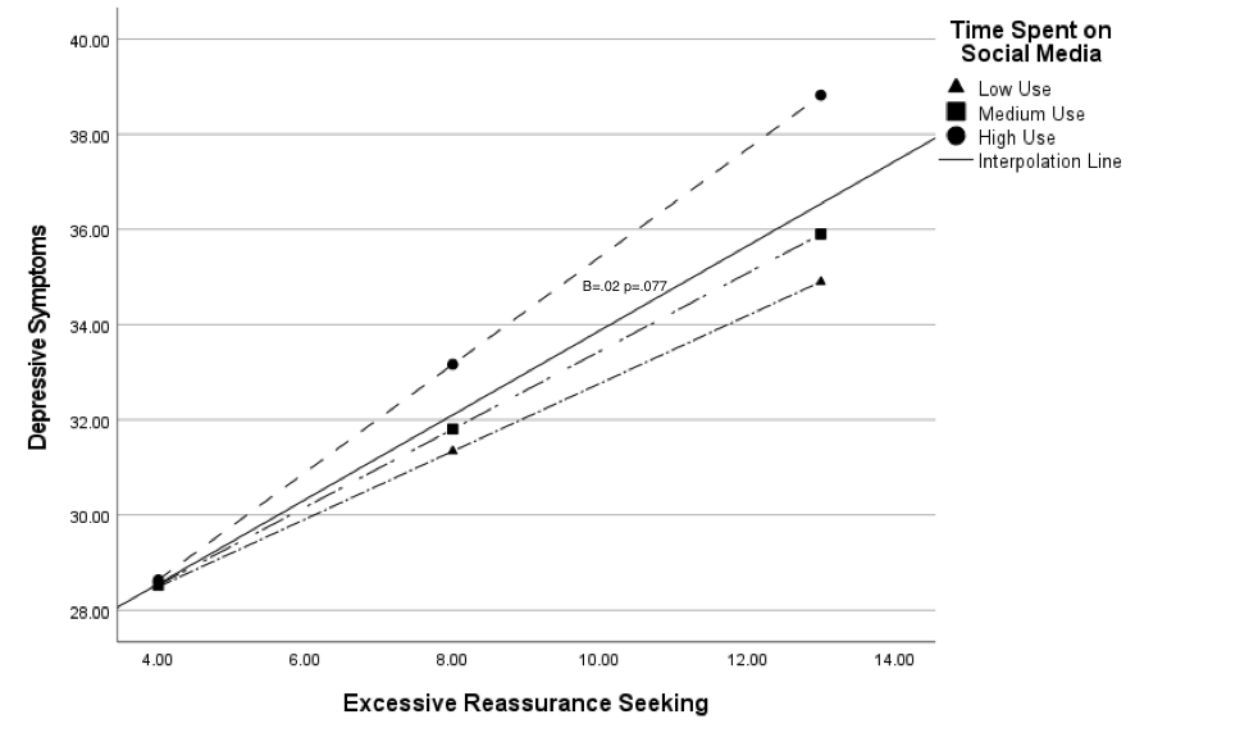
Hypothesis 2a: Social Media Variable Comparison. This set of analyses aimed to determine if more time spent on social media, operationalized through social media phone screen time, related to greater endorsement of the maladaptive social media behaviors of attention seeking behavior (ASQ), smartphone stress (SPS), and social media addiction (SMDS). Zero-order correlations between each hypothesized variable are presented in Table 8. In line with the hypothesis, the increased endorsement of attention seeking behavior was associated with more screen time on social media ($r = .12$, $p = .032$). However, contrary to the initial hypothesis, greater levels of smartphone stress ($r = -.03$, $p = .643$) and social media addiction ($r = .08$, $p = .182$) were not found to be associated with more screen time on social media. These results were somewhat contrary to expectations as only one type of maladaptive social media behavior was related to the time spent on social media.

Hypothesis 2b-d: Friendship Processes and Time Spent on Social Media. Time spent on social media was examined in relation to three friendship processes (i.e., co-rumination, excessive reassurance seeking, perceived prosocial support). The first analysis sought to determine if higher levels of social media use would strengthen the relationship between high levels of co-rumination (CRQ) and higher levels of depressive symptoms (BDI). Hayes' PROCESS for moderation analyses (Hayes, 2022) was used to test the hypothesis that at higher levels of social media use, there would be a stronger relationship between higher levels of co-rumination and higher levels of depressive symptoms. The overall model was not statistically significant, $R^2 = .02$, $F_{(3, 281)} = 1.67$, $p = .168$. When all variables were entered into the model, a marginally significant relationship between co-rumination and depressive symptoms remained ($B = .08$, $t(281) = 1.65$, $p = .082$). However, there was no significant relationship between time spent on social media and depressive symptoms ($B = .01$, $t(281) = 1.13$, $p = .260$). In addition, Hypothesis 2b was not supported, as there was no significant interaction between co-rumination and time spent on social media ($B = .00$, $t(281) = -0.80$, $p = .427$). In other words, the relationship between co-rumination and depressive symptoms remained consistent across all levels of social media use.

The second analysis examined if higher levels of social media use would strengthen the relationship between higher levels of excessive reassurance seeking (ESR) and higher levels of depressive symptoms (BDI). A moderation analysis tested the hypothesis that the relationship between higher levels of excessive reassurance seeking and higher levels of depressive symptoms would be stronger for participants who spend more time on social media. Results are presented in Figure 1. The overall model was statistically significant, $F_{(3, 295)} = 15.52$, $p < .001$, and the variables of interest explained 14% of the variance in depressive symptoms. Supporting

correlation analyses, excessive reassurance seeking was significantly related to higher levels of depressive symptoms (B = .59, $t_{(295)}$ = 2.51, p = .013). Once again, participants' time spent on social media was unrelated to their depressive symptoms (B = .00, $t_{(295)}$ = -0.73, p = .464). However, in line with hypothesis 2c, there was a marginally significant interaction between time spent on social media and excessive reassurance seeking (B = .02, $t_{(295)}$ = 1.78, p = .077). Conditional effects analysis, run due to the marginal significance, supported the hypothesized direction such that there was not a significant relationship between time spent on social media and depressive symptoms for participants low in excessive reassurance seeking (16th percentile; B = .00, $t_{(295)}$ = 0.11, p = .910), yet there was a significant relationship between excessive reassurance seeking and depressive symptoms for those above the 50th percentile in time spent on social media (50th percentile: B = .01, $t_{(295)}$ = 2.13, p = .034; 84th percentile: B = .01, $t_{(295)}$ = 2.72, p = .0070). In other words, the strengthening of the relationship between excessive reassurance seeking and depressive symptoms was significant only for those whose social media use was more than 50% of that of the participants in this sample.

Figure 1. *Moderation of time spent on social media on the relationship between excessive reassurance seeking and depressive symptoms.*



Lastly, the third analysis examined if higher levels of social media use would weaken the relationship between higher levels of perceived social support (SSQ) and higher levels of depressive symptoms (BDI). A moderation analysis tested the hypothesis that the relationship between higher levels of perceived social support and higher levels of depressive symptoms would be weaker for participants who spend more time on social media. The overall model was statistically significant, $F_{(3, 295)} = 9.11$, $p < .001$, and the variables of interest explained 9% of the variance in depressive symptoms. Supporting correlation analyses, higher levels of perceived social support were significantly related to lower levels of depressive symptoms ($B = -2.54$, $t_{(295)} = -2.78$, $p = .006$). Again, participants' time spent on social media was unrelated to their depressive symptoms ($B = .00$, $t_{(295)} = -0.73$, $p = .464$). Contrary to hypothesis 2d, there was no significant interaction between time spent on social media and perceived social support ($B = .00$,

$t_{(295)} = 1.78$, $p = .546$). The overall model significance was driven by the negative correlation between perceived social support and depressive symptoms, such that the relationship between perceived social support and depressive symptoms is consistent across all levels of social media use.

Hypothesis 3

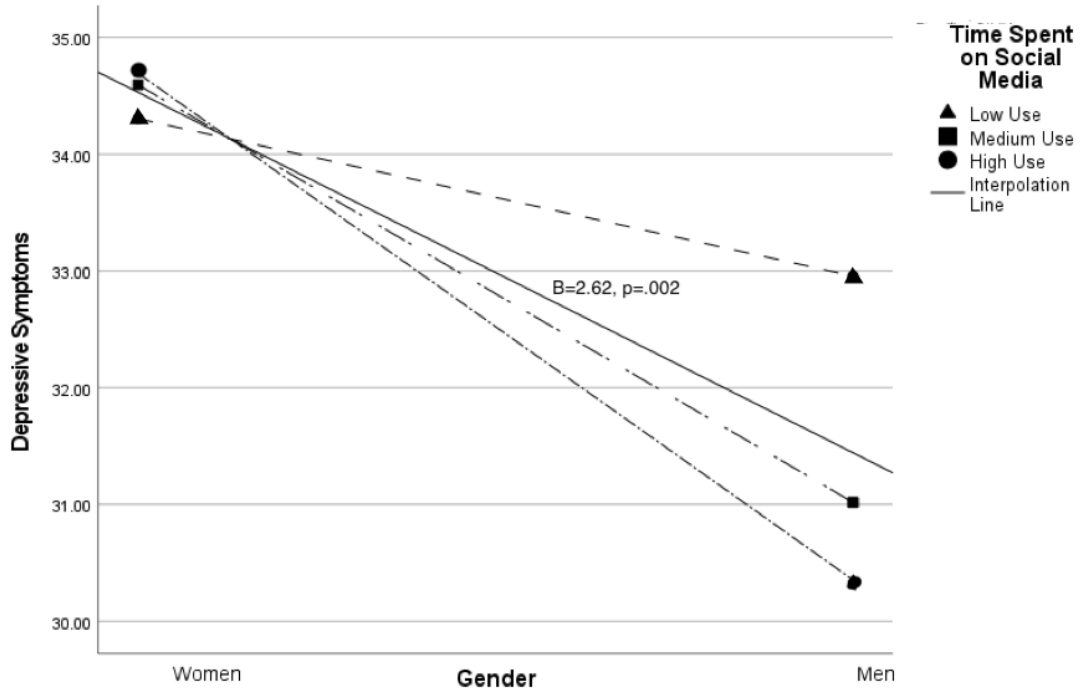
The third set of hypotheses examined the role of gender in the relations among the variables of social media use, interpersonal processes, and depressive symptoms.

Hypothesis 3a: Gender and Friendship Processes. The first analysis sought to replicate previous findings (Calmes & Roberts, 2008; Tompkins et al., 2011), which indicated that at higher levels of co-rumination, being a woman is more strongly associated with depressive symptoms. A moderation analysis was conducted to test the hypothesis that at higher levels of co-rumination, there would be a stronger relationship between being a woman and higher levels of depressive symptoms. The overall model was statistically significant, $R^2 = .02$, $F_{(3, 439)} = 2.88$, $p = .036$. There was not a significant relationship between co-rumination and depressive symptoms ($B = .07$, $t(439) = 1.30$, $p = .192$). However, there was a significant relationship between gender and depressive symptoms ($B = .26$, $t(439) = 0.15$, $p = .04$). Hypothesis 3a was not supported, as there was no significant interaction between co-rumination and gender ($B = -.02$, $t(439) = -0.73$, $p = .46$). The relationship between gender and depressive symptoms was consistent across levels of co-rumination, which is contrary to previous literature and expectations.

Hypothesis 3b: Gender and Social Media Time. The second analysis examined the role of time spent on social media in the relationship between gender and depressive symptoms (BDI). A moderation analysis tested the hypothesis that the relationship between being a woman

and higher levels of depressive symptoms would be stronger for participants who spend more time on social media. These findings are presented in Figure 2. The overall model was statistically significant, $F_{(3, 295)} = 4.54$, $p = .004$, and the variables of interest explained 4% of the variance in depressive symptoms. Supporting previous literature (Grant et al., 2004; Nolen-Hoeksema et al., 2008), being a woman was significantly related to higher levels of depressive symptoms ($B = 2.62$, $t_{(295)} = 3.09$, $p = .002$). Once again, participants' time spent on social media was unrelated to their depressive symptoms ($B = .00$, $t_{(295)} = -0.90$, $p = .369$). However, in line with Hypothesis 3b, there was a significant interaction between time spent on social media and gender ($B = .00$, $t_{(295)} = 1.93$, $p = .05$). In other words, at high levels of social media use, women were more likely to report depressive symptoms than men.

Figure 2. *Moderation of time spent on social media on the relationship between gender and depressive symptoms.*



Hypothesis 3c: Gender and Attention Seeking Behavior. The last analysis aimed to examine the role of the specific maladaptive social media behavior of attention seeking (ASQ) on the relationship between gender and depressive symptoms (BDI). A moderation analysis was used to test the hypothesis that at higher levels of attention seeking behavior, there would be a stronger relationship between being a woman and higher levels of depressive symptoms. The overall model was statistically significant, $R^2 = .02$, $F_{(3, 439)} = 2.85$, $p = .037$. When all variables were entered into the model, a marginally significant relationship between attention seeking behavior and depressive symptoms remained ($B = 12.20.08$, $t(439) = 1.80$, $p = .073$). However, there was still no significant relationship between gender and depressive symptoms ($B = 2.45$, $t(439) = 0.99$, $p = .321$). Hypothesis 3c was not supported, as there was no significant interaction between attention seeking behavior and gender ($B = -4.00$, $t(439) = -1.40$, $p = .162$). In other words, the relationship between gender and depressive symptoms remained consistent across all levels of attention seeking behavior.

Hypothesis 4

The last hypotheses examined the role of COVID-19-related stressors in the relations among the aforementioned factors of maladaptive friendship processes, social media use, and depressive symptoms.

Hypothesis 4a: COVID-19 Stressors and Depressive Symptoms. To replicate some of the initial findings related to COVID-19 stress (Grasso, 2020; Starr et al., 2021), exposure to health and social stressors from COVID-19 (EPII) were hypothesized to be related to higher levels of depressive symptoms (BDI). Zero-order correlations between each hypothesized variable are presented in Table 9. In line with the hypothesis and previous literature (Grasso,

2020; Starr et al., 2021), the greater exposure to health and social-related COVID-19 stressors and depressive symptoms were all positively correlated with one another. Higher levels of depressive symptoms were significantly related to greater exposures to health-related COVID-19 stressors ($r = .34$, $p < .001$) as well as to greater exposures to social-related COVID-19 stressors ($r = .27$, $p < .001$). Greater exposures to social-related COVID-19 stressors and greater exposures to health-related COVID-19 stressors were also significantly related to one another ($r = .43$, $p < .001$). These findings are in line with previous literature on the initial relationships of COVID-19 stressors to higher levels of depressive symptoms.

Table 9. *Correlations for Study Variables Hypothesis 4a*

Variable	1	2	3
1. Depressive Symptoms	—		
2. Health-Related COVID-19 Stressors	.34**	—	
3. Social-Related COVID-19 Stressors	.27**	.43**	—

**$p<.01$

Hypothesis 4b: COVID-19 Stressors and Maladaptive Friendship Processes. The next analysis aimed to understand the relationship among maladaptive friendship processes (co-rumination and excessive reassurance seeking), exposure to social stressors from COVID-19, and depressive symptoms. A multiple regression analysis was conducted to examine the influence of co-rumination (CRQ), excessive reassurance seeking (ERS), and exposure to social stressors as a result of COVID-19 (EPIISocial) on depressive symptoms (Table 10). Combined, these variables explained a total of 15% of the variance in depressive symptoms [Figure 3; $F(3, 439) = 25.22$, $p < .001$]. Both excessive reassurance seeking ($B = .29$, $t_{(439)} = 5.88$, $p < .001$) and exposure to social stressors as a result of COVID-19 ($B = .24$, $t_{(439)} = 5.35$, $p < .001$) were significant predictors of depressive symptoms in the current model. However, after accounting

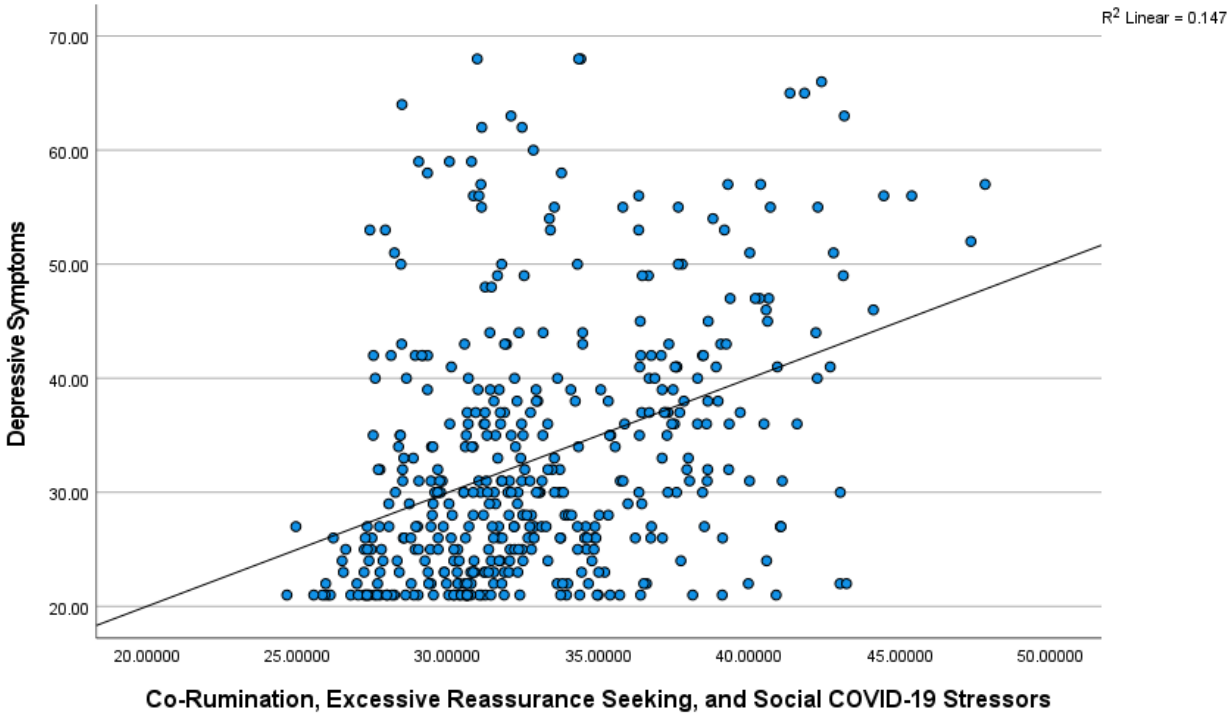
for the unique effects of these two variables, co-rumination was no longer a significant predictor of depressive symptoms ($B = -.04$, $t_{(439)} = -0.77$, $p = .440$). Excessive reassurance seeking and exposure to social-related COVID-19 stressors predicted depressive symptoms, but not co-rumination.

Table 10. *Multiple Regression Interpersonal Processes Predicting Depressive Symptoms*[a]

Variable	*B*	*SE B*	β	*t*	*p*
1. Co-Rumination	-.02	.03	-.04	-.77	.440
2. Excessive Reassurance Seeking	.772	.13	.29	5.88	<.001
3. Social COVID-19 Stressors	.728	.14	.24	5.35	<.001

[a]Dependent Variable: Depressive Symptoms

Figure 3. *Multiple Regression of co-rumination, excessive reassurance seeking, and social-related COVID-19 stressors predicting depressive symptoms. $R^2 = 0.15$.*



Hypotheses 4c: COVID-19 Stressors and Social Media Use. Finally, the last set of analyses sought to examine the relationship among time spent on social media, maladaptive

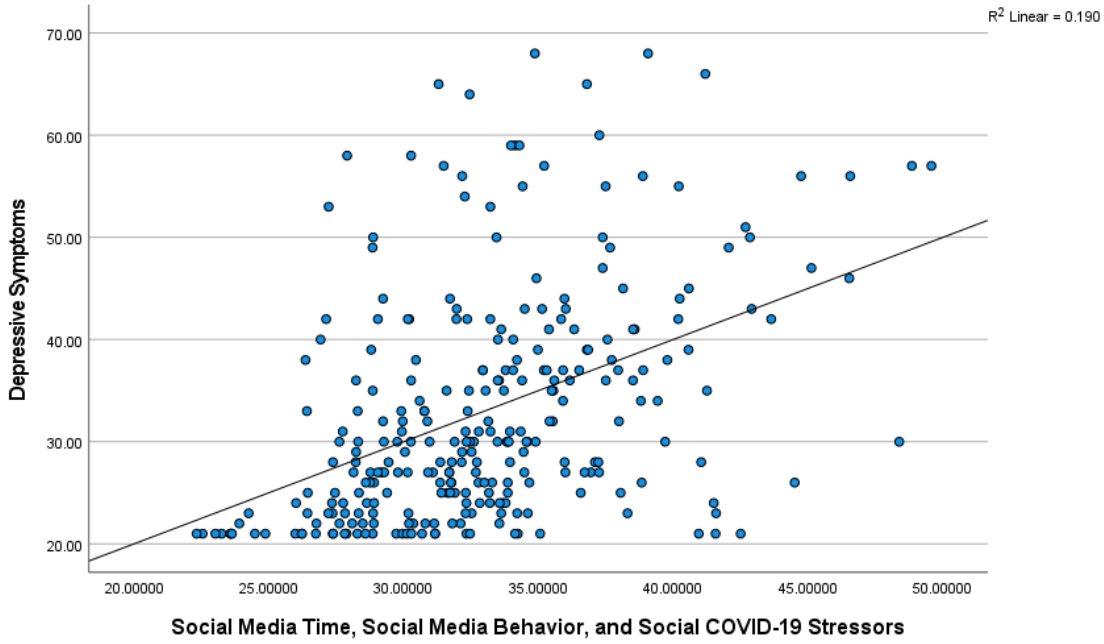
social media behaviors (attention seeking behavior, smartphone stress, and social media addiction), and exposure to social stressors as a result of COVID-19 on depressive symptoms. A multiple regression analysis was conducted to examine the influence of time spent on social media, attention seeking behavior (ASQ), smartphone stress (SPS), social media addiction (SMDS), and exposure to social-related COVID-19 stressors (EPIISocial) on depressive symptoms (Table 11). Combined, these variables explained a total of 19% of the variance in depressive symptoms [$F(3, 278) = 13.07$, $p < .001$]. Both social media addiction ($B = .30$, $t_{(278)} = 4.31$, $p < .001$) and exposure to social stressors as a result of COVID-19 ($B = .20$, $t_{(278)} = 3.51$, $p < .001$) were significant predictors of depressive symptoms in the current model. However, after accounting for the unique effects of these two variable, attention seeking behavior ($B = -.08$, $t_{(278)} = -1.26$, $p = .208$), smartphone stress ($B = .04$, $t_{(278)} = .64$, $p = .522$), and time spent on social media ($B = .08$, $t_{(278)} = 1.50$, $p = .136$) were not significant predictors of depressive symptoms. Social media addiction and exposure to social-related COVID-19 stressors predicted depressive symptoms, but not time spent on social media, attention seeking behavior, or smartphone stress.

Table 11. *Multiple Regressions Social Media Predicting Depressive Symptoms*[a]

Variable	*B*	*SE B*	β	*t*	*p*
1. Time Spent on Social Media	.00	.00	.08	1.50	.136
2. Social Media Addiction	.59	.136	.30	4.31	<.001
3. Attention Seeking Behavior	-5.01	3.97	-.08	-1.26	.208
4. Smartphone Stress	.104	.162	.04	.64	.522
5. Social COVID-19 Stressors	.635	.181	.20	3.51	<.001

[a]Dependent Variable: Depressive Symptoms

Figure 4. *Multiple Regression of time spent on social media, attention seeking behavior, smartphone stress, social media addiction, and social-related COVID-19 stressors predicting depressive symptoms.* $R^2 = 0.19$.



CHAPTER 4: DISCUSSION

The overall goal of this study was to further explore the contextual factors of current adolescent social functioning and depressive symptoms, particularly considering social media and COVID-19 stress as factors. By replicating previous literature on the specific areas of friendship processes and social media use individually, then integrating these areas of research and adding additional contextual factors (i.e., gender, COVID-19 stress), the present study extends the literature into pressing concerns for adolescents in the modern era. The relatively recent advent and ubiquity of social media with the additional stressors brought on by the COVID-19 pandemic have created a new social environment for adolescents to navigate, and this environment has the potential for exacerbating depressogenic outcomes for adolescents. The current study examines these factors together to understand the associations among these variables and how they relate to depressive symptoms for late adolescents.

The first aim of this study was to further examine the general tendency to engage in various friendship processes and the relationship among these processes, social media use, and depressive symptoms. To conceptualize social media use, the first consideration was to understand how the time spent on social media relates to the types of behaviors adolescents engage in on social media. This provides information on both the quantity and quality of social media use for adolescents. To understand the relationship among quantity of time on social media, friendship processes, and depressive symptoms, the three friendship processes of co-rumination, excessive reassurance seeking, and social support were identified as factors that could potentially be related to time spent on social media as well as depressive symptoms. Overall, the goal was to better understand interpersonal behaviors and how they related to depressive symptoms as a function of time spent on social media.

The second aim of this study was to investigate both quantity and quality of social media use for adolescents, general tendency to engage in certain friendship processes, and gender and how these may be related to depressive symptoms. The first step was to replicate findings regarding how gender differences in co-rumination are associated with gender differences in depressive symptoms in adolescents. From there, the quantity of time spent on social media and the quality of time spent on social media were both tested as moderators of the relationship between gender and depressive symptoms. The goals were to further understand the roles that quality and quantity of social media use play in depressive symptoms.

The final aim of this study was to integrate friendship processes, social media use, and depressive symptoms in the context of COVID-19-related stress. The specific time frame of data collection (Spring 2021 and Spring 2022) provided a unique window to understand relationships COVID-19 specific stressors have with other factors of adolescent functioning. Some of the initial findings about COVID-19 stress and interpersonal processes indicate a relationship with depressive symptoms along with some research indicating a relationship among different social media behaviors during the early pandemic (Magson et al., 2021; Starr, Huang, & Scarpulla, 2021). The present study aims to integrate the research areas of friendship processes and social media use with a focus specifically on health stressors and social stressors during the pandemic with the goal of understanding which areas are predicting higher levels of depressive symptoms for adolescents.

Replication of Previous Findings

Friendship Processes and Depressive Symptoms

The current study found associations among the different friendship processes and in how these processes related to depressive symptoms in late adolescence. In line with previous studies

and expectations (Rose et al., 2007; Starr & Davila, 2008; Stone et al., 2011), adolescents that engaged in higher levels of the maladaptive friendship processes of co-rumination and excessive reassurance seeking reported higher levels of depressive symptoms. These findings provide further evidence that those adolescents who excessively dwell on negative feelings in their friendship interactions and that seek high levels of reassurance are at greater risk for depressive symptoms. Additionally, engaging in co-rumination at higher levels was related to participating in higher levels of excessive reassurance seeking. While this was not initially hypothesized as part of the present study, it suggests that engaging in one maladaptive process is related to an increased likelihood of engaging in other maladaptive processes. This finding is in line with previous literature (Boren, 2014) and may indicate an overarching maladaptive social behavioral tendency that should be further examined.

The present study also replicated previous literature regarding perceived social support. Specifically, higher levels of co-rumination were related to higher levels of perceived social support, a finding also obtained by Rose et al. (2007). Notably, while higher levels of co-rumination are related to greater reported depression, higher levels of perceived social support are related to lower reported depression. This paradoxical finding is consistent with previous literature (Alsubaie et al., 2019). Co-rumination is related to both the positive experience of perceived social support (due to feeling close while having an intimate exchange with a friend) and the negative experience of higher levels of depression (due to the strong focus on negative emotions within the exchange). In contrast, perceived social support on its own is solely related to lower levels of depression. This calls attention to the benefits and drawbacks of co-rumination and emphasizes the role of perceived social support as a particularly important protective factor against depression.

Maladaptive Social Media Behaviors

Another area of the literature that was replicated in the present study were findings concerning the relationship that social media behaviors have with one another. The three social media behaviors of social media addiction, attention seeking behavior, and smartphone stress (nomophobia) were all related to one another such that higher levels of each behavior were related to higher levels of the others. This was consistent with previous literature (Hawk et al., 2018). The engagement in various maladaptive social media behaviors appears to hang together, which supports the theory that the quality of social media use may fall into a similar pattern as maladaptive interpersonal processes. These behaviors together suggest the possibility of an overarching construct, potentially driven by concerns with social comparison and vulnerability to low self-esteem, that leads to engagement in several maladaptive social media behaviors for adolescents. It is possible that successful attention-seeking behavior may lead to addiction to social media and, in turn, a strong need to be near one's phone and stress from being away from the phone. This could mean that participating in social media use is serving as a reward system for some that includes engaging in multiple maladaptive social media behaviors simultaneously.

While the social media behaviors examined were all related to one another, the present study had an unexpected finding that some of these behaviors were not related to time spent on social media. The one behavior that was related to time spent on social media was attention seeking behavior. Attention seeking behavior was related to more time spent on social media, which was expected given that seeking attention would require time to either post or communicate with others, and then engage further to receive the desired social feedback. On the other hand, social media addiction and smartphone stress were not related to time spent on social media, which was contrary to expectations as it would be assumed that addictive behavior would

necessitate increased time spent on social media (van den Eijden et al., 2016). Given these findings, it appears that there are some adolescents who are spending large amounts of time on social media without experiencing symptoms of addiction or symptoms of nomophobia. This begs the question of what is compelling some adolescents to need the time on social media and others to spend similar amounts of time without experiencing the need to be on social media. One consideration is that different types of social media as well as different ways of engaging on these platforms (i.e., posting versus scrolling) could be eliciting different behaviors. Previous literature (Scarpulla et al., 2023) has shown that posting is related to different mental health outcomes (e.g., anxiety, stress) than is passively scrolling online, which is not related to negative mental health outcomes. Therefore, the particular patterns of behaviors that adolescents may be engaging in might confound the relationship between time spent online and addictive behaviors. An alternative explanation could be that some adolescents are not self-aware enough to recognize that they are experiencing addictive behaviors. If they do not feel addicted to social media, it may not relate to negative outcomes, as they are not distressed by their social media use at this time. Time spent on social media may be related to different behaviors and mental health outcomes depending on platform, which was not explored in the present study.

Friendship Processes, Time Spent on Social Media, and Depression

The current study also sought to understand the role of general tendencies to engage in different friendship processes relating to depression and how time spent on social media could strengthen or weaken these relationships. The first friendship process examined was co-rumination. While higher levels of co-rumination were related to higher reported depressive symptoms, neither co-rumination nor depression was related to time spent on social media. These findings indicate that time spent on social media is not associated with the relationship

between co-rumination and depression. A possible explanation for co-rumination not being related to time spent on social media could be that adolescents' time on social media might involve a wide variety of behaviors, many of which do not involve co-rumination. Whereas some adolescents may spend much of their time on social media involved in co-rumination, many others may spend only a small proportion of their overall time on social media engaged in co-rumination. Although the findings were contrary to initial expectations and some previous literature (Brunborg & Andreas, 2019; Vahedi & Saiphoo, 2018), the lack of relationship between social media behaviors and time spent on social media suggests that time spent may not be as influential of a factor in adolescent distress. One possible explanation for this is that time spent on social media may actually serve as a protective factor for some, while it may be harmful for others. Particularly given the time of data collection being during COVID-19 lockdowns, time spent on social media may have served as a helpful social outlet for some adolescents, especially while physically isolated. In a period in which more in-person social outlets are available (i.e., pre- and post-COVID-19), spending more time on social media as a social outlet may play a stronger role in predicting depressive symptoms among adolescents. Notably, when adolescents have the opportunity to engage in-person, these interactions tend to be of higher quality than online interactions (Ahn, 2011; Nesi et al., 2018). Thus, when adolescents are engaging in a high level of online interactions when in-person interactions are also available, their greater involvement in potentially lower-quality online interactions may make them more vulnerable to developing depressive symptoms.

The second friendship process examined was excessive reassurance seeking. As predicted, more time spent on social media did strengthen the relationship between higher levels of excessive reassurance seeking behavior and reported depressive symptoms. Although the total

model was marginally significant, time spent on social media appeared to have particular significance in the excessive reassurance seeking and depression relationship for those who used social media more than others in the sample. This may indicate that the high-level social media users are more vulnerable to the negative effects of excessive reassurance seeking. As feedback is received more quickly online, these findings are consistent with previous literature that this would increase vulnerability to depressive symptoms, particularly for those who are not receiving the reassurance that they are seeking (Valkenburg, Peter, & Schouten, 2006). Heavy social media users are likely to have more opportunities to engage in excessive reassurance seeking as they are having high levels of communication with peers. It also could be the case that those who are strongly focused on receiving high levels of reassurance are choosing to spend more time on social media as a way to easily seek reassurance from a large group of people. This increased communication could be leading to a faster cycle of reassurance seeking that contributes to more experiences of social rejection and subsequent depressive symptoms. Furthermore, these adolescents are likely experiencing social rejection from a wider variety of people, as they have easier access to more people for more time of the day with the online modality. As these individuals reach out to more people, they have increased opportunities to experience rejection. This may indicate that adolescents are experiencing a poor-get-poorer phenomenon in which the negative effects of social rejection from a trait-level tendency to engage in excessive reassurance seeking is becoming amplified by using social media, thus leading to depressive symptoms for adolescents.

The final friendship process examined was perceived social support. Contrary to expectations, time spent on social media was not associated with the relationship between perceived social support and depressive symptoms. It appears that regardless of the amount of

time spent on social media, adolescents with high perceived social support were experiencing lower levels of depressive symptoms. A possible explanation for the lack of interaction with time spent on social media could be that those with high perceived social support were experiencing a rich-get-richer phenomenon in which the time they spend on social media, whether a low or high amount, provides these particular adolescents with greater feelings of social support, which protect them from depressive symptoms. For those who do not experience feelings of social support, amount of time on social media may not matter, as their perceptions of low social support likely leave them vulnerable to experiencing higher levels of depression. Thus, it appears that quality of perceptions of social support play an important role in vulnerability to depressive symptoms, regardless of the amount of time that adolescents spend on social media.

Social Media Time and Quality, Gender, and Depression

Gender and Friendship Processes

The present study aimed to understand the ways in which gender might be associated with the relationships among friendship processes, social media time and quality, and depressive symptoms. The first goal in examining gender was to replicate findings suggesting that at higher levels of co-rumination, being a woman would be more strongly associated with depressive symptoms. Contrary to previous literature (Calmes & Roberts, 2008; Tompkins et al., 2011), engagement in higher levels of co-rumination did not strengthen the relationship between gender and depression, such that women would be even more likely to experience more depressive symptoms when being frequent co-ruminators. Co-rumination was not found to be related to depressive symptoms, but being a woman did relate to higher levels of depressive symptoms. Of note, there were no differences found between men and women in terms of reported engagement in co-rumination. Several factors may have contributed to these findings being contrary to

previous literature. One potential explanation could be that men were co-ruminating more during the COVID-19 pandemic. This could be due to the need for men to spend more time building relationships online and forming more intimate bonds, possibly by co-ruminating more than prior to the pandemic (Shapiro & Margolin, 2013; Tsitsika et al., 2014). Another possible explanation is that the overarching increase of co-rumination during the COVID-19 pandemic was significant enough to eliminate differences between men and women in co-rumination engagement. Interestingly, when the rates of co-rumination in the present study were compared to the rates of co-rumination in a pre-pandemic study (Waller et al., 2014), it was found that co-rumination in the current study sample was higher than had been reported by adolescents from a non-clinical sample. In fact, the rate of co-rumination reported in the current sample was actually comparable to pre-pandemic rates of co-rumination reported in a sample of those diagnosed with major depressive disorder (Waller et al., 2014). This indicates that current co-rumination rates are at a higher level across the board, and the current rates in general population samples are now closer to what was previously seen in clinically depressed populations. Although the rates of co-rumination did not differ by gender in the present study, there was still a relationship observed between gender and depressive symptoms, suggesting that co-rumination may not contribute as strongly to depressive symptoms in men as it does in women. Further, the findings suggest that, in addition to co-rumination, there may be many other issues in women's lives (e.g., socialized to be more passive/helpless, more likely to be victimized, more concerned about body image, more hormonal fluctuations) that contribute to their higher levels of depressive symptoms (Perloff, 2014). Overall, the current findings revealed that women endorsed higher depressive symptoms than men, but they engaged in similar levels of co-rumination.

Gender and Social Media Time

Another goal of the present study was to examine whether time spent on social media might be associated with the relationship between gender and depressive symptoms. As expected, there was a significant interaction between time spent on social media and gender in relation to depressive symptoms such that, at higher levels of social media use, women were more likely to experience depressive symptoms. As found in previous parts of the study, time spent on social media was not related to depressive symptoms, whereas, being a woman was related to higher reported depressive symptoms. It appears that the lack of significant relationship between time spent on social media and depressive symptoms may be particularly driven by the finding that men who spend more time on social media are actually less likely to experience depression, whereas women are more likely to experience increased depressive symptoms. This could mean that social media use may have positive effects on adolescent boys, with boys experiencing less depression, and negative effects on adolescent girls, with girls experiencing more depression. There are several considerations for why men may be receiving more benefits from time spent online. Adolescent boys may be more successful than girls at capitalizing on the known benefits of social media use, such as improved self-presentation and social skill building (Shapiro & Margolin, 2013; Tsitsika et al., 2014). Given that men tend to experience less societal pressure to practice social skill improvement (Allen et al., 2014), social media use could serve as an outlet for men to gain more social skill building than in-person interaction previously provided. On the other hand, women appear to be at higher risk for depressive symptoms, especially when they spend more time on social media. Previous literature has found that women are more likely to be victims of cyberbullying and body image comparison when spending time on social media (Perloff, 2014; Wright & Wachs, 2020). The

increased time women are spending on social media may be contributing to the negative effects of cyberbullying and body image comparison, more so than for men. As a result, women are at a higher risk of depressive symptoms.

Gender and Attention Seeking Behavior

Beyond examining time spent on social media, the current study sought to investigate the ways in which the quality of social media behavior may play a role in the relationship between gender and depressive symptoms. For the purposes of this study, attention-seeking behavior was used as a measure of quality of social media use. In contrast with expectations, engagement in attention seeking behavior did not strengthen the relationship between being a woman and higher levels of depressive symptoms. Attention-seeking behavior was found to be related to higher levels of depressive symptoms, but attention-seeking behavior did not interact with gender. This suggests that adolescents are being socialized across gender to seek attention on social media, even if this may be in different ways (e.g., men through engaging in risky behaviors, trying to impress others; women seeking attention through physical appearance or social skills/relationships). Attention-seeking behavior may be related to depressive symptoms for both men and women due to possible negative reactions from peers for engaging in this behavior. If peers are seeing that the purpose of the behavior is to seek attention, these adolescents may be ignored or rejected by peers regardless of gender. Additionally, those who are experiencing depressive symptoms may be more inclined to go online to seek attention, making the relationship between attention-seeking and depressive symptoms possibly bidirectional. Overall, results suggest that engagement in attention-seeking behavior is related to depressive symptoms, but does not interact with gender in predicting depressive symptoms.

COVID-19 Stress, Social Media Use, Friendship Processes, and Depression

COVID-19 Stress and Depression

A primary goal of the present study was to examine COVID-19-related stressors and their associations with depressive symptoms along with the previously discussed factors of friendship processes and social media that are also related to depression risk. The two cohorts examined were students in the Spring 2021 and Spring 2022 semesters. In comparing these two cohorts, there were no differences found across measures of exposure to COVID-19 stressors, engagement in friendship processes, social media use, depressive symptoms, or any other measure examined in the study. A possible explanation for the lack of differences is that these semesters both encompassed an acute stage of the COVID-19 pandemic, such that these individuals experienced similar types of stressors that were associated with similar friendship processes and mental health concerns. With a larger time gap between cohorts, there may have been differences seen related to depressive symptoms, social media use, and friendship processes, but the social environment at the two times of data collection was likely similar for most students, due to continued social distancing restrictions and prevalence of online learning. Given the lack of differences, the two cohorts were combined to examine the ways in which exposure to COVID-19 stressors related to depressive symptoms as well as other factors of interest.

Exposure to more social (e.g., separation from friends and family, inability to engage in enjoyable activities with others, missing social milestones) and health stressors (e.g., contracting COVID-19, requiring hospitalization, having medical procedures canceled) was expected to be related to higher levels of depressive symptoms, which was found in the current study. This suggests that exposure to these types of stressors may be leading to increases in depressive

symptoms in late adolescence. In general, during the lockdown period of the COVID-19 pandemic, rates of depression in adolescence increased (CDC, 2021; U.S. Census Bureau, 2020), which was likely related to the broad exposure to stressors during this period. In addition to both types of COVID-19 stressors being related to depressive symptoms, exposure to more social stressors was related to exposure to more health stressors. A possible explanation could be that some of the stressors being experienced in one category are contributing to stressors in another category. For example, an individual may be experiencing the health-related stressor of increased symptoms of COVID-19 or other comorbid disorders and, as a result of their illness, also endorsing exposure to the social-related stressor of experiencing isolation. The stressors are directly linked by one event with negative outcomes in several areas. These findings highlight the far-reaching and compounding consequences of COVID-19 on adolescent experiences.

COVID-19 Stress and Maladaptive Friendship Processes

To further examine the role of COVID-19 social stressors in depression, the current study also factored in the use of maladaptive friendship processes. There was a mix of expected and unexpected findings in predicting depression. As hypothesized, social stressors from COVID-19 and engagement with excessive reassurance seeking both were predictors of depressive symptoms. However, contrary to expectations and several studies (e.g., Rose, 2002; Spendelow, Simonds, & Avery, 2017; Stone et al., 2011) co-rumination was not a predictor of depressive symptoms. These findings indicate that exposure to social stressors as well as certain maladaptive social behaviors (i.e., excessive reassurance seeking) are related to depressive symptoms. Excessive reassurance seeking typically leads to social rejection by peers, contributing to greater loneliness and increased risk for depression (Joiner, Metalsky, Gencoz, & Gencoz, 2001; Starr & Davila, 2008). In addition, the experience of social stressors may include

social isolation and loneliness that likewise increase the risk for depressive symptoms. A possible explanation for the lack of main effect for co-rumination could be that benefits of co-rumination (i.e., perceived social support and increased intimacy with peers) were amplified during the COVID-19 lockdowns, which could have protected adolescents from depressive symptoms. Moreover, with only 15% of the variance in depressive symptoms explained by these three variables (i.e., excessive reassurance seeking, exposure to COVID-19 social stressors, and co-rumination), there are likely other social aspects to consider (e.g., peer victimization, loneliness, intimacy) when examining adolescent mental health during and after COVID-19 lockdowns. There were several negative social experiences during the COVID-19 pandemic including social isolation, missing of important social milestones (e.g., prom, graduation, family events), and loss of friends and family members. These social experiences clearly had unique mental health considerations, including increased risk for depressive symptoms that may have lasting impacts. Considering the key social development occurring during late adolescence, there are likely several consequences both socially and psychologically that have yet to be seen on top of the ones revealed in the present study. The current investigation exemplifies the ways in which negative social behavior and experience during COVID-19 predicted depressive symptoms in adolescents.

COVID-19 Stress and Social Media Use

In addition to friendship processes, the present study sought to examine social media quantity and quality as they related to COVID-19 social stressors and depressive symptoms. COVID-19 social stressors continued to predict depressive symptoms in the model with social media behaviors and, in combination with social media time and behaviors, made up 19% of the variance in depressive symptoms. With the three identified social media behaviors of smartphone

stress, attention-seeking behavior, and social media addiction, there were mixed findings as to what social media behaviors predicted depressive symptoms. As expected, social media addiction did predict depressive symptoms. In line with previous literature (Hawk et al., 2019; Hou et al., 2019; Huang, 2017), addictive behavior leads to increased distress and subsequent risk for increased depressive symptoms. Attention-seeking behavior and smartphone stress, on the other hand, may be implemented in ways that do not cause distress. Attention-seeking behavior can be effective at reducing distress if the individual is successfully able to gain attention from their behavior. Similarly, smartphone stress, defined as fear of being away from one's phone, can be avoided if the adolescent is never away from their phone, which older adolescents may not have to be. Attention-seeking behavior and smartphone stress when successfully utilized (i.e., the adolescent is gaining attention and does not spend time away from their phone) may not be causing similar levels of distress and thus are not increasing risk for depressive symptoms.

In addition to social media behaviors, time spent on social media was addressed in the model of depressive symptoms and, contrary to expectations, time spent on social media did not predict depressive symptoms. Given that several behaviors and time spent on social media did not predict depressive symptoms, it is possible that these actions within themselves are not causing distress for adolescents. As previously discussed, time spent on social media may have significant positive and negative effects depending on what behaviors are being engaged in online, so any potential negative effects may be canceled out by the beneficial interactions that many adolescents may also experience. This would indicate the need for the examination of additional social media quality variables, including specific negative variables (e.g., cyberbullying, social comparison, body image issues), as well as specific positive variables (e.g.,

support, validation, intimacy) to differentiate why some who use social media at high levels are also experiencing depressive symptoms while some are not. Overall, based on the current findings, it appears that COVID-19 stressors and social media addiction are contributing to an increased risk for depressive symptoms in adolescents, but time spent on social media is not.

Implications

The results of this investigation provide a jumping-off point for further research on the ways in which current events relate to depressive symptoms in late adolescence. The replication of some previous findings is encouraging as it reinforces the understanding of how interpersonal processes relate to one another as well as to depression. Furthermore, the replication of findings that social media behaviors relate to one another follows a similar pattern to maladaptive friendship processes relating to one another. The relationship among maladaptive behaviors both online and offline suggests the possibility of an overarching tendency towards maladaptive social behavior seen in some adolescents. These maladaptive behaviors are associated with an increased risk for depression, highlighting an important consideration for both prevention and treatment.

There was a mix of expected and unexpected findings when considering the role of social media in depressive symptoms. In examining the quality and quantity of social media use, only attention seeking behavior was related to time spent on social media, while social media addiction and nomophobia were not related to time spent on social media. Although social media addiction did not relate to more time on social media, it was related to increased risk for depressive symptoms. This implies that quality of social media use is more strongly related to depression than time spent on social media, particularly when it comes to addiction. Furthermore, this can add to conversations around the moral panic of social media use (for

review, see Ferguson, 2018) as the current study indicates that time spent is not the primary concern. As a result, there may need to be consideration of social media addiction as a target for intervention for depressive symptoms, rather than targeting social media use as a whole. Some previous literature has indicated that quality of social media use is more important than quantity (Panayiotou et al., 2023), while other literature suggests that time spent is an important factor (Brunborg & Andreas, 2019). The current study indicates that quality of social media use is playing a greater role than quantity of use. Indeed, there may be some specific behaviors that are contributing more to depression than others, particularly social media addiction, which should be a target for future intervention.

There were also mixed findings when friendship processes were included in the examination of these relationships. While co-rumination and perceived social support maintained consistent relationships with depressive symptoms across the spectrum of time spent on social media, excessive reassurance seeking appears to have a stronger relationship with depressive symptoms for those who use social media at high levels. A possible explanation for this pattern of findings is that co-rumination and perceived social support both include a component of having a close relationship with peers, whereas excessive reassurance seeking does not. Those who spend a greater amount of time on social media may be looking for reassurance and not receiving it, which may put them at higher risk for depressive symptoms. This could indicate that feeling close with friends through engaging in co-rumination and receiving social support may be strong enough protective factors to reduce the risk for depressive symptoms, regardless of how much time is spent on social media.

In addition to mixed findings related to friendship processes and social media use, there were mixed results when examining gender in the context of friendship processes, social media

use, and depression. One interesting finding was that men and women engaged in similar amounts of co-rumination, but women endorsed more depressive symptoms than men. This may indicate that adolescent boys are not as vulnerable to the negative effects of co-rumination as girls, which has been found in previous literature (Rose et al., 2007). Furthermore, it appears that men who spend more time on social media are actually less likely to experience depressive symptoms than those who use it at lower levels, whereas the opposite is true for women. This may indicate that social media use could be protective for men, while it is a risk factor for women. The current findings suggest that men may not be experiencing as many negative mental health effects from what is typically considered maladaptive social behavior. Thus, it is possible that men are receiving more social support and engaging more intimately with peers online, which provide socioemotional benefits. On the other hand, women may be having more maladaptive experiences online (e.g., cyberbullying, cybervictimization, social comparison) that may negatively impact their self-esteem. Given that adolescent girls are more likely to experience relational victimization online than boys (Wright & Wachs, 2020), this could be a differentiating factor in risk for depressive symptoms not measured in the current study. This would imply the need for social media intervention specifically targeting adolescent girls to protect against depressive symptoms. Overall, it appears that gender is an important factor in the relationship among friendship processes, social media use, and depressive symptoms, such that women may require more intervention related to their social media use to protect against depressive symptoms.

The unique time of data collection allowed for a more nuanced examination of the relationship between COVID-19 stressors and depressive symptoms, but does come with drawbacks. There are rich data for this specific cohort of adolescents, but these results may not

be generalizable to other age groups who experienced these stressors over time. The results seen regarding COVID-19 stressors, including exposure to social and health-related stressors being associated with higher levels of depressive symptoms, serve as a clear indicator that the stressors experienced during the pandemic are not only linked to one another but also contributed to higher levels of depressive symptoms. The exposure to these stressors may have a compounding effect on several areas of adolescent functioning. Given that adolescence is a key time for social development and mental health vulnerability, the particular cohort of adolescents who experienced the peak of COVID-19 stressors appear to be exhibiting negative mental health effects when exposed to unprecedented social stressors.

Limitations

While the current study provides some starting points for research pertaining to the relationship among interpersonal processes, social media use, COVID-19 stress, and depressive symptoms, there are a number of important limitations to consider when interpreting the results. A significant limitation in this study is the cross-sectional nature of the data. The lack of longitudinal data prevents a determination of causality among any of the variables examined in the current study. In addition, there were no attention checks used in the data collection process, so there could be responses that were answered without being read, resulting in some inaccurate data. There could be confounding factors, such as socioeconomic status, race, and other interpersonal factors that contributed to the correlations among these variables that were not accounted for in this study. The population of this study primarily identified as WEIRD (white, educated, industrialized, rich, and democratic; Pitesa & Gelfand, 2023) which limits the generalizability of the sample. In addition to potential confounding variables that were not considered, measurements of friendship processes should be interpreted with caution in the

context of this study. The measures of friendship processes were conceptualized as trait-level engagement in co-rumination, excessive reassurance seeking, and social support across contexts. As a result, this measurement is not specific to engagement in these friendship processes on social media and assumes that these processes function similarly both in person and online. This assumption could be missing variations in the way these processes function on different platforms. For example, some adolescents may be more likely to engage in co-rumination or excessive reassurance seeking on Instagram versus TikTok. Without differentiating specific platforms on variables of social behavior, it is unclear if specific platforms may be eliciting more or less maladaptive behavior. Further examination of social media platform differences and other possible confounding social variables should be considered in further research on social media and interpersonal behavior.

Another set of limitations is related to the measurements of social media use. Time spent on social media was measured through the Screen Time application on the iPhone, which was limiting in key ways. First, this captured only time spent on phone-based social media applications, which does not account for time spent using other devices, such as laptops or iPads. For some participants, this may have missed a substantial portion of their time spent on social media. This application also accounted for time spent on iMessage, which does not have the same publicness of social media applications and may not have the same relationship to depression. Additionally, the Screen Time application being available only for iPhone users was more limiting than initially anticipated. In previous studies (Ruben et al., 2020), nearly 90% of participants were iPhone users with the Screen Time application available. Unexpectedly, there were far fewer iPhone users in the current study sample (67.8%), which led to a far smaller sample size for analyses focusing on time spent on social media. Those who did not have

iPhones were excluded from these analyses and, although there were no significant differences found among the variables measured for this study based on having an iPhone or not, there are several variables not measured in the study that could have influenced these results. Findings utilizing only the Screen Time users participant pool should be interpreted with caution due to potential for confounding variables (e.g., socioeconomic status, social status) associated with those who use an iPhone versus other possible cellphones. Lastly, this study involved questionnaires that could have elicited social desirability response bias. In particular, the attention-seeking questionnaire exhibited significant skew, which could indicate that participants may have been underreporting attention-seeking behaviors. This measure involves questions that could lead participants to respond in ways that would be more favorable to the participant (e.g., "I post messages and pictures because I get attention from others."). There were no checks in place to account for desirability of responses, which may have led to the uneven distribution of these scores that should be considered in the interpretation of findings associated with the attention-seeking questionnaire. All of these limitations should be considered in interpreting the results of this study, and further research into these questions could address the concerns with these limitations.

Future Directions

As the current study highlights new avenues to examine risk factors for poor mental health outcomes for adolescents, there are several future directions that should be examined as next steps for the literature. The first future direction to consider would be the way in which friendship processes are conceptualized for online communication. While one study (Battaglini et al., 2021) has begun examining co-rumination specifically across modalities, this has only begun to scratch the surface of the differences in online versus in-person friendship processes.

There are currently no studies that are conceptualizing friendship processes as functioning differently online, which has been a call to action for the social media literature (Nesi et al., 2018). Given that different social media platforms involve different types of communication (e.g., sharing photos, sending text messages, speaking in real-time), the conceptualization of friendship processes in the current form may not capture the nuances of the interactions adolescents engage in on social media. The literature's current understanding of friendship processes may need re-evaluation and updating to better fit the current experience of adolescent friendship processes.

Another important future direction should be to continue examining the long-term outcomes of COVID-19 stress as it relates to adolescent mental health into adulthood. During the time of data collection (Spring 2021 and Spring 2022), the United States was in a state of emergency regarding the concerns of COVID-19. While the state of emergency has been lifted since the data were collected, the mental health effects of COVID-19 stress have not necessarily concluded. Current rates of internalizing disorders for adolescents are at an all-time high (CDC, 2023). While there are a multitude of explanations as to the rising rates of depression in adolescents, COVID-19 stress appears to be strongly related to depressive symptoms. COVID-19 has many lasting impacts for both physical and mental health that will continue to require examination, particularly for those who experienced lockdown during critical developmental periods. It is still unknown how missing out on typical social behaviors during critical periods of social development may impact youth over time. It will be important for future studies to examine the possible cohort effects of COVID-19 stress, particularly lockdowns on the social development of youth, over the next several years.

Lastly, the current study indicates the potential need for social media use to be considered in interventions for depression. Social media platforms will continue to change over time, but the use of maladaptive behaviors may be relatively stable across these changes. Given that the current study indicates that specific social media behaviors (i.e., attention-seeking) are related to depression, intervention specifically targeting these maladaptive behaviors would be an important future direction in the literature. Of note, one study (Hou et al., 2019) has integrated cognitive behavioral interventions when treating social media addiction specifically. This presents as one avenue for social media-related disorder intervention; however, the far-reaching effects of social media should be considered within various disorders. Currently, social media use is rarely assessed in diagnostics unless it is to rule out functional neurologic disorder etiology (Hull & Parnes, 2021). With mounting evidence to support the connection between social media use and various mental health conditions, it seems to be a missed opportunity to intervene in a relevant area of behavior. Given that specific behavior (e.g., social media addiction, attention-seeking behavior) appears to be more related to depressive symptoms, this suggests that a behavioral intervention like cognitive behavioral therapy could be expanded to specifically target maladaptive social media use more broadly. The results of the current study indicate that changes in adaptive interactions with social media should be considered the goal, rather than a general decrease in time spent on social media. Particularly with adolescents, these interventions could also help clinicians learn more about the ways in which their patients' behavior could be contributing to their mental health in ways that may be missed when focusing on in-person communication. While there are a multitude of ways research on social media use, COVID-19, friendship processes, and depression could be expanded, these are a few important considerations going forward, given the results of the current study.

Conclusions

The current study sets the stage for a nuanced examination of the modern adolescent experience with the context of social media and COVID-19 stress as distinctive for this generation. Many findings reported in the previous literature regarding the relationship of friendship processes and depression as well as the relationship among maladaptive social media behaviors were replicated in the present study. In addition, there were several novel findings that are important contributions to the literature, including time spent on social media strengthening the relationship between high levels of excessive reassurance seeking and depressive symptoms as well as strengthening the relationship between being a woman and depressive symptoms. Additionally, there were novel findings about COVID-19 social stressors along with excessive reassurance seeking, as well as these stressors and social media addiction predicting depressive symptoms. These findings suggest that COVID-19 may have created a new context of stressors for adolescents to navigate in their social development. The continued integration of literature on friendship processes and social media, with the new considerations of COVID-19 experiences, will be important for extending knowledge about factors relating to depression in the coming years for adolescents**.**

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APPENDICES

Appendix A: Informed Consent

You are being asked to participate in a University of Maine research project. The study is being conducted by Emily Scarpulla, M.A., a graduate student in the Department of Psychology, and Dr. Cynthia Erdley, a Professor in the Department of Psychology. The purpose of this study is to learn about social media experiences and mental health. You must be between 18 and 25 years of age to participate in this study. You will need a computer or tablet with a keyboard to participate.

What Will You Be asked to Do?

This study consists of a 60-minute, online session

- You will be asked to respond to a series of questionnaires
    - You will be asked for demographic information about yourself (e.g., age, race, gender, relationship status).
    - You will be asked to answer questions or select statements about your mood (e.g., "I do not feel sad."), as well as about thoughts you may have had about suicide (e.g., "Have you ever had thoughts of suicide?").
    - You will be asked about your friendships and social behaviors.
    - You will be asked about your social media experience and use. Participants who use iPhones will be asked to provide a screenshot of their screen time use.
- The total time for the session is expected to be 60 minutes.

Risks

Some questions may make you feel uncomfortable or distressed. You may skip any question that you do not wish to answer and can elect to end your participation in the study at any time. You will be provided with a list of mental health resources after the last survey. If your responses indicate that you are at an elevated risk for depression or self-harm, you will receive a message with further follow-up information.

The risks associated with completing the online questionnaires at Qualtrics are thought to be no greater than the risks encountered during routine internet access. Qualtrics has enhanced security and safety measures in place to protect the website and its users from fraud, and states that customers' information will not be used for any other purposes. You can find out more information about their security by clicking on the privacy statement found at www.qualtrics.com.

Benefits

Although there may be no direct benefit to you for participating in this research, your responses will tell us more about social media experiences and mental health. This knowledge could help psychologists design more effective intervention programs for individuals who have mental health difficulties related to social media behavior.

Compensation
You will receive 1 Sona credit for enrolling in this study.

Confidentiality
Your responses are anonymous. Names will not be attached to the data collected, and the information will be used only for research purposes. Your responses to the questionnaires will be downloaded to a desktop computer stored in a locked laboratory room that is only accessible to the principal investigators and research assistants. If the data are used for a research publication or conference presentation, they will be presented in a summary format only. The data will be kept indefinitely.

Voluntary
Your participation in this study is voluntary. You may choose to withdraw from the study at any point and skip any questions that you do not want to answer and still receive credit.

Contact Information
If you have questions about this study, please email me at emily.scarpulla@maine.edu. You may also email the faculty advisor on this study, Dr. Cynthia Erdley at erdley@maine.edu. If you have any questions about your rights as a research participant, please contact the Office of Research Compliance, University of Maine, 207/581-2657 (or e-mail umric@maine.edu).

By clicking on "Yes; I consent" you indicate that you have read and understood the information above and consent to participate in this study.
___Yes; I consent to participate.
___No; I do not consent to participate.

Appendix B: Demographics and basic information

1. Age (years and months)_____

2. What sex were you assigned at birth?
_____ Female
_____ Male
_____ Other (please specify): _____

3. What is your gender identity?
_____ Female
_____ Female to male transgender
_____ Male
_____ Male to female transgender
_____ Non-gender binary
_____ Other (please specify): _____

4. Ethnicity
____ Hispanic/Latino/a
____ Not Hispanic/Latino/a

5. Race (check one):
____ White
____ Black
____ Latino/a
____ Asian
____ American Indian/Native American
____ Other (please specify):_____

Appendix C: Co-Rumination Questionnaire

Think about the way you usually are with your friends and circle the number for each of the following statements that best describes you.

1. We spend most of our time together talking about problems that my friends or I have.

   1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
   not at all true a little true somewhat true pretty true really true

2. If one of us has a problem, we will talk about the problem rather than talking about something else or doing something else.

   1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
   not at all true a little true somewhat true pretty true really true

3. After my friends tells me about a problem, I always try to get them to talk more about it later.

   1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
   not at all true a little true somewhat true pretty true really true

4. When I have a problem, my friends always try really hard to keep me talking about it.

   1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
   not at all true a little true somewhat true pretty true really true

5. When one of us has a problem, we talk to each other about it for a long time.

   1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
   not at all true a little true somewhat true pretty true really true

6. 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.

   1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
   not at all true a little true somewhat true pretty true really true

7. When my friends have a problem, I always try to get them to tell me every detail about what happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

8. After I've told my friends about a problem, they always try to get me to talk more about it later.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

9. We talk about problems that my friends or I are having almost every time we see each other.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

10. If one of us has a problem, we will spend our time together talking about it, no matter what else we could do instead.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

11. When my friends have a problem, I always try really hard to keep them talking about it.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

12. When I have a problem, my friends always tries to get me to tell every detail about what happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

When we talk about a problem that one of us has….

13. We will keep talking even after we know all of the details about what happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

14. We talk for a long time trying to figure out all of the different reasons why the problem might have happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

15. We try to figure out every one of the bad things that might have happened because of the problem.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

16. We spend a lot of time trying to figure out parts of the problem that we can't understand.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

17. We talk a lot about how bad the person with the problem feels.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

18. We'll talk about every part of the problem over and over.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

When we talk about a problem that one of us has…

19. We talk a lot about the problem in order to understand why it happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

20. We talk a lot about all of the different bad things that might happen because of the problem.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

21. We talk a lot about parts of the problem that don't make sense to us.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

22. We talk for a long time about how upset it has made one of us with the problem.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

23. We usually talk about that problem every day even if nothing new has happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

24. We usually talk about all of the reasons why the problem might have happened.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

25. We spend a lot of time talking about what bad things are going to happen because of the problem.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

26. We try to figure out everything about the problem, even if there are parts that we may never understand.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

27. We spend a long time talking about how sad or mad the person with the problem feels.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5
not at all true a little true somewhat true pretty true really true

Appendix D: Excessive Reassurance Seeking (DIRI-RS)

DIRI-RS

Please answer the following by circling your response:

1. Do you find yourself often asking the people you feel close to how they truly feel about you?	**NOT AT ALL 1 2 3 4 EXTREMELY OFTEN 5**
2. Do you frequently seek reassurance from people you feel close to as to whether they really care about you?	**NOT AT ALL 1 2 3 4 EXTREMELY OFTEN 5**
3. Do the people you feel close to sometimes become irritated with you for seeking reassurance from them about whether they really care about you?	**NOT AT ALL 1 2 3 4 EXTREMELY OFTEN 5**
4. Do the people you feel close to sometimes get "fed up" with you for seeking reassurance from them about whether they really care about you?	**NOT AT ALL 1 2 3 4 EXTREMELY OFTEN 5**

Appendix E: Social Support Questionnaire (SSQ)

Social Support Questionnaire

The following questions ask you about people that you know who provide you with help or support. For each question, first list the INITIALS of all of the people you know who you can count on for help or support in the manner describe. Do this by putting the people's FIRST and LAST INITIALS in the blanks below each question. Use ONE blank PER PERSON.

You may include a romantic partner if s/he provides support in the manner described, but you should exclude yourself.

Second, indicate how satisfied you are with the overall support you have.

If you have no support for a question, enter a "0" in the "Total # of People" field, but still rate your level of satisfaction.

1. Who can you really count on to help you feel more relaxed when you are tense or under pressure?

_____ _____ _____ _____ _____ _____ _____ _____ _____ Total # of People _____

Overall satisfaction: Very Dissatisfied 1 2 3 4 5 6 Very satisfied

2. Who accepts you totally, including both your worst and best points?

_____ _____ _____ _____ _____ _____ _____ _____ _____ Total # of People _____

Overall satisfaction: Very Dissatisfied 1 2 3 4 5 6 Very satisfied

3. Who can you really count on to care about you, regardless of what is happening to you?

_____ _____ _____ _____ _____ _____ _____ _____ _____ Total # of People _____

Overall satisfaction: Very Dissatisfied 1 2 3 4 5 6 Very satisfied

4. Who can you really count on to help you feel better when you are feeling either very upset or generally down in the dumps?

_____ _____ _____ _____ _____ _____ _____ _____ _____ Total # of People _____

Overall satisfaction: Very Dissatisfied 1 2 3 4 5 6 Very satisfied

If you have a romantic partner, please write your partner's initials here: _____

Appendix F: COVID-Related Stress (EPII)

EPIDEMIC – PANDEMIC IMPACTS INVENTORY (EPII)

INSTRUCTIONS

We would like to learn how the coronavirus disease pandemic has changed people's lives. For each statement below, please indicate whether the pandemic has impacted you or a person in your home in the way described.

Check **YES (Me)** if you were impacted.

Check **YES (Person in Home)** if another person (or people) in your home were impacted.

Check **NO** if you and the people in your home were not impacted.

Check **N/A** if the statement does not apply to you or someone in the home.

****If both* **YES (Me)** *and* **YES (Person in Home)** *are true, check both****

Since the coronavirus disease pandemic began, what has changed for you or your family?

WORK AND EMPLOYMENT			
1. Laid off from job or had to close own business.	YES (Me) YES (Person in Home)	NO	N/A
2. Reduced work hours or furloughed.	YES (Me) YES (Person in Home)	NO	N/A
3. Had to lay-off or furlough employees or people supervised.	YES (Me) YES (Person in Home)	NO	N/A
4. Had to continue to work even though in close contact with people who might be infected (e.g., customers, patients, co-workers).	YES (Me) YES (Person in Home)	NO	N/A
5. Spend a lot of time disinfecting at home due to close contact with people who might be infected at work.	YES (Me) YES (Person in Home)	NO	N/A
6. Increase in workload or work responsibilities.	YES (Me) YES (Person in Home)	NO	N/A
7. Hard time doing job well because of needing to take care of people in the home.	YES (Me) YES (Person in Home)	NO	N/A
8. Hard time making the transition to working from home.	YES (Me)	NO	N/A

	YES (Person in Home)		
9. Provided direct care to people with the disease (e.g., doctor, nurse, patient care assistant, radiologist).	YES (Me) YES (Person in Home)	NO	N/A
10. Provided supportive care to people with the disease (e.g., medical support staff, custodial, administration).	YES (Me) YES (Person in Home)	NO	N/A
11. Provided care to people who died as a result of the disease.	YES (Me) YES (Person in Home)	NO	N/A

EDUCATION AND TRAINING			
12. Had a child in home who could not go to school.	YES (Me) YES (Person in Home)	NO	N/A
13. Adult unable to go to school or training for weeks or had to withdraw.	YES (Me) YES (Person in Home)	NO	N/A
HOME LIFE			
14. Childcare or babysitting unavailable when needed.	YES (Me) YES (Person in Home)	NO	N/A
15. Difficulty taking care of children in the home.	YES (Me) YES (Person in Home)	NO	N/A
16. More conflict with child or harsher in disciplining child or children.	YES (Me) YES (Person in Home)	NO	N/A
17. Had to take over teaching or instructing a child.	YES (Me) YES (Person in Home)	NO	N/A
18. Family or friends had to move into your home.	YES (Me) YES (Person in Home)	NO	N/A
19. Had to spend a lot more time taking care of a family member.	YES (Me) YES (Person in Home)	NO	N/A
20. Had to move or relocate.	YES (Me) YES (Person in Home)	NO	N/A

21.	Became homeless.	YES (Me) YES (Person in Home)	NO	N/A
22.	Increase in verbal arguments or conflict with a partner or spouse.	YES (Me) YES (Person in Home)	NO	N/A
23.	Increase in physical conflict with a partner or spouse.	YES (Me) YES (Person in Home)	NO	N/A
24.	Increase in verbal arguments or conflict with other adult(s) in home.	YES (Me) YES (Person in Home)	NO	N/A
25.	Increase in physical conflict with other adult(s) in home.	YES (Me) YES (Person in Home)	NO	N/A
26.	Increase in physical conflict among children in home.	YES (Me) YES (Person in Home)	NO	N/A
SOCIAL ACTIVITIES				
27.	Separated from family or close friends.	YES (Me) YES (Person in Home)	NO	N/A
28.	Did not have the ability or resources to talk to family or friends while separated.	YES (Me) YES (Person in Home)	NO	N/A
29.	Unable to visit loved one in a care facility (e.g., nursing home, group home).	YES (Me) YES (Person in Home)	NO	N/A
30.	Family celebrations cancelled or restricted.	YES (Me) YES (Person in Home)	NO	N/A
31.	Planned travel or vacations cancelled.	YES (Me) YES (Person in Home)	NO	N/A
32.	Religious or spiritual activities cancelled or restricted.	YES (Me) YES (Person in Home)	NO	N/A
33.	Unable to be with a close family member in critical condition.	YES (Me) YES (Person in Home)	NO	N/A
34.	Unable to attend in-person funeral or religious services for a family member or friend who died.	YES (Me) YES (Person in Home)	NO	N/A

35.	Unable to participate in social clubs, sports teams, or usual volunteer activities.	YES (Me) YES (Person in Home)	NO	N/A
36.	Unable to do enjoyable activities or hobbies.	YES (Me) YES (Person in Home)	NO	N/A
ECONOMIC				
37.	Unable to get enough food or healthy food.	YES (Me) YES (Person in Home)	NO	N/A
38.	Unable to access clean water.	YES (Me) YES (Person in Home)	NO	N/A
39.	Unable to pay important bills like rent or utilities.	YES (Me) YES (Person in Home)	NO	N/A
40.	Difficulty getting places due to less access to public transportation or concerns about safety.	YES (Me) YES (Person in Home)	NO	N/A
41.	Unable to get needed medications (e.g., prescriptions or over-the-counter).	YES (Me) YES (Person in Home)	NO	N/A
EMOTIONAL HEALTH AND WELL-BEING				
42.	Increase in child behavioral or emotional problems.	YES	NO	N/A
43.	Increase in child's sleep difficulties or nightmares.	YES	NO	N/A
44.	Increase in mental health problems or symptoms (e.g., mood, anxiety, stress).	YES (Me) YES (Person in Home)	NO	N/A
45.	Increase in sleep problems or poor sleep quality.	YES (Me) YES (Person in Home)	NO	N/A
46.	Increase in use of alcohol or substances.	YES (Me) YES (Person in Home)	NO	N/A
47.	Unable to access mental health treatment or therapy.	YES (Me) YES (Person in Home)	NO	N/A
48.	Not satisfied with changes in mental health treatment or therapy.	YES (Me) YES (Person in Home)	NO	N/A
49.	Spent more time on screens and devices (e.g., looking at phone, playing video games, watching TV).	YES (Me) YES (Person in Home)	NO	N/A

PHYSICAL HEALTH PROBLEMS				
50.	Increase in health problems not related to this disease.	YES (Me) YES (Person in Home)	NO	N/A
51.	Less physical activity or exercise.	YES (Me) YES (Person in Home)	NO	N/A
52.	Overeating or eating more unhealthy foods (e.g., junk food).	YES (Me) YES (Person in Home)	NO	N/A
53.	More time sitting down or being sedentary.	YES (Me) YES (Person in Home)	NO	N/A
54.	Important medical procedure cancelled (e.g., surgery).	YES (Me) YES (Person in Home)	NO	N/A
55.	Unable to access medical care for a serious condition (e.g., dialysis, chemotherapy).	YES (Me) YES (Person in Home)	NO	N/A
56.	Got less medical care than usual (e.g., routine or preventive care appointments).	YES (Me) YES (Person in Home)	NO	N/A
57.	Elderly or disabled family member not in the home unable to get the help they need.	YES (Me) YES (Person in Home)	NO	N/A
PHYSICAL DISTANCING AND QUARANTINE				
58.	Isolated or quarantined due to possible exposure to this disease.	YES (Me) YES (Person in Home)	NO	N/A
59.	Isolated or quarantined due to symptoms of this disease.	YES (Me) YES (Person in Home)	NO	N/A
60.	Isolated due to existing health conditions that increase risk of infection or disease.	YES (Me) YES (Person in Home)	NO	N/A
61.	Limited physical closeness with child or loved one due to concerns of infection.	YES (Me) YES (Person in Home)	NO	N/A
62.	Moved out or lived away from family due to a high-risk job (e.g., health care worker, first responder).	YES (Me) YES (Person in Home)	NO	N/A
63.	Close family member not in the home was quarantined.	YES (Me)	NO	N/A

		YES (Person in Home)		
64.	Family member was unable to return home due to quarantine or travel restrictions.	YES (Me) YES (Person in Home)	NO	N/A
65.	Entire household was quarantined for a week or longer.	YES	NO	N/A
INFECTION HISTORY				
66.	Currently have symptoms of this disease but have not been tested.	YES (Me) YES (Person in Home)	NO	N/A
67.	Tested and currently have this disease.	YES (Me) YES (Person in Home)	NO	N/A
68.	Had symptoms of this disease but never tested.	YES (Me) YES (Person in Home)	NO	N/A
69.	Tested positive for this disease but no longer have it.	YES (Me) YES (Person in Home)	NO	N/A
70.	Got medical treatment due to severe symptoms of this disease.	YES (Me) YES (Person in Home)	NO	N/A
71.	Hospital stay due to this disease.	YES (Me) YES (Person in Home)	NO	N/A
72.	Someone died of this disease while in our home.	YES	NO	N/A
73.	Death of close friend or family member from this disease.	YES (Me) YES (Person in Home)	NO	N/A
POSITIVE CHANGE				
74.	More quality time with family or friends in person or from a distance (e.g., on the phone, Email, social media, video conferencing, online gaming).	YES (Me) YES (Person in Home)	NO	N/A
75.	More quality time with partner or spouse.	YES (Me) YES (Person in Home)	NO	N/A
76.	More quality time with children.	YES (Me) YES (Person in Home)	NO	N/A
77.	Improved relationships with family or friends.	YES (Me) YES (Person in Home)	NO	N/A

78.	New connections made with supportive people.	YES (Me) YES (Person in Home)	NO	N/A
79.	Increase in exercise or physical activity.	YES (Me) YES (Person in Home)	NO	N/A
80.	More time in nature or being outdoors.	YES (Me) YES (Person in Home)	NO	N/A
81.	More time doing enjoyable activities (e.g., reading books, puzzles).	YES (Me) YES (Person in Home)	NO	N/A
82.	Developed new hobbies or activities.	YES (Me) YES (Person in Home)	NO	N/A
83.	More appreciative of things usually taken for granted.	YES (Me) YES (Person in Home)	NO	N/A
84.	Paid more attention to personal health.	YES (Me) YES (Person in Home)	NO	N/A
85.	Paid more attention to preventing physical injuries.	YES (Me) YES (Person in Home)	NO	N/A
86.	Ate healthier foods.	YES (Me) YES (Person in Home)	NO	N/A
87.	Less use of alcohol or substances.	YES (Me) YES (Person in Home)	NO	N/A
88.	Spent less time on screens or devices outside of work hours (e.g., looking at phone, playing video games, watching TV).	YES (Me) YES (Person in Home)	NO	N/A
89.	Volunteered time to help people in need.	YES (Me) YES (Person in Home)	NO	N/A
90.	Donated time or goods to a cause related to this disease (e.g., made masks, donated blood, volunteered).	YES (Me) YES (Person in Home)	NO	N/A
91.	Found greater meaning in work, employment, or school.	YES (Me) YES (Person in Home)	NO	N/A
92.	More efficient or productive in work, employment, or school.	YES (Me)	NO	N/A

	YES (Person in Home)		

Appendix G: Social Media Use

I am active on at least one social media platform
Yes No

I check my social media many times throughout the day.

Does not describe me at all					Describes me very well
0	1	2	3	4	5

In a typical day, what is the average percentage break down of time that you spend on each type of social media (please make sure these add up to 100%)
Instagram:
Twitter:
Facebook:
Youtube:
Tiktok:
Snapchat:
Other:
Specify:

I tend to be an active user, posting at least once a day.

Does not describe me at all					Describes me very well
0	1	2	3	4	5

I tend to be a passive user, scrolling through posts and photos.

Does not describe me at all					Describes me very well
0	1	2	3	4	5

I live stream and/or post on my story at least once a week.

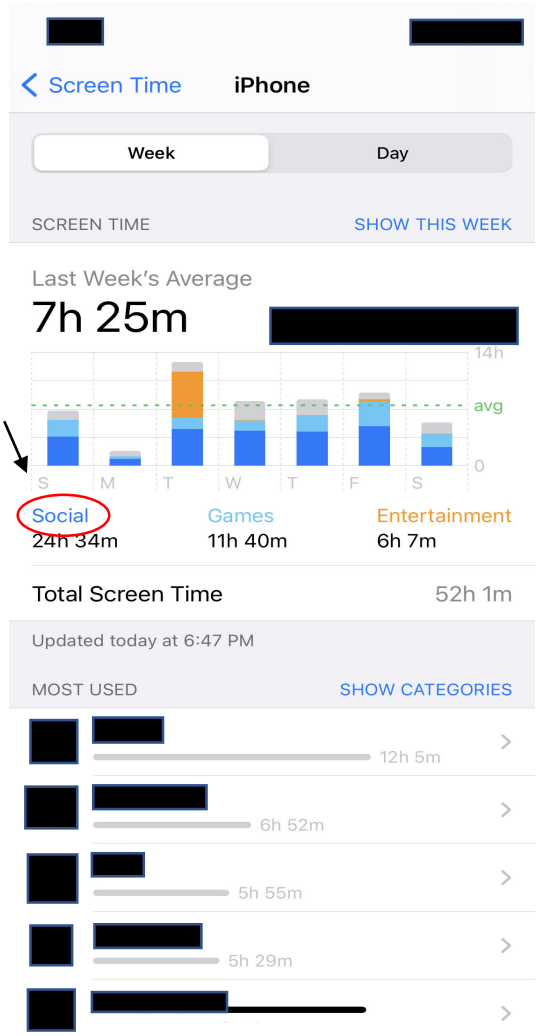
Does not describe me at all					Describes me very well
0	1	2	3	4	5

I comment, post, or DM others regularly.

Does not describe me at all					Describes me very well
0	1	2	3	4	5

For iPhone Users (if you do not use an iPhone, you may skip this item)

Please go to your Settings → Screen Time → See All Activity. Once there, scroll to the previous full week of screen time activity.



How much time did you spend on Social last week?

How much time did you spend on your most used app?

Please upload a screenshot of your screen time from last week:

Appendix H: Social Media Disorder Scale

During the past year, have you ...

... often found it difficult not to look at messages on social media when you were doing something else (e.g. school work)? Y N

... regularly found that you can't think of anything else but the moment that you will be able to use social media again? Y N

... often sat waiting until something happens on social media again? Y N

During the past year, have you ...

... felt the need to use social media more and more often? Y N

... felt the need to check messages on social media more and more often? Y N

... regularly felt dissatisfied because you wanted to spend more time on social media? Y N

During the past year, have you ...

... often felt tense or restless if you weren't able to look at your messages on social media? Y N

... regularly felt angry or frustrated if you weren't able to use social media? Y N

... often felt bad when you could not use social media? Y N

During the past year, have you ...

... tried to reduce your use of social media, but failed? Y N

... tried to spend less time on social media, but failed? Y N

... been unable to stop using social media, even though others told you that you really should? Y N

During the past year, have you ...

... regularly used social media to take your mind off your problems? Y N

... often used social media so you didn't have to think about unpleasant things? Y N

... often used social media to escape from negative feelings? Y N

During the past year, have you ...

... often not paid attention at school, while doing homework or at work because you were using social media? Y N

... regularly not had enough sleep because you were using social media too late at night? Y N

... regularly had arguments with others because of your social media use? Y N

During the past year, have you ...

... regularly lied to your parents or friends about the amount of time you spend on social media? Y N

... regularly hidden your social media use from others? Y N

... often used social media secretly? Y N

During the past year, have you ...

... regularly devoted no attention to people around you (e.g. family or friends) because you were using social media? Y N

... regularly had no interest in hobbies or other activities because you would rather use social media? Y N

... regularly neglected other activities (e.g. hobbies, sport) because you wanted to use social media? Y N

During the past year, have you ...

... had serious problems at school or at work because you were spending too much time on social media? Y N

... had serious conflict with your parent(s) and sibling(s) because of your social media use?

Y N

... jeopardized or lost an important friendship or relationship because you were spending too much time on social media? Y N

Appendix I: Attention Seeking Questionnaire

How much do the following statements apply to your social media behavior?

I post messages and pictures because I want to be better known among peers.

1	2	3	4
(Not at all true)			(Very true)

I think it's important that I get as many comments as possible on my posts.

1	2	3	4
(Not at all true)			(Very true)

I think it's important that I get as many 'likes' as possible on my posts.

1	2	3	4
(Not at all true)			(Very true)

I post messages and pictures because I get attention from others.

1	2	3	4
(Not at all true)			(Very true)

I post messages and pictures so that I can look cool to my peers.

1	2	3	4
(Not at all true)			(Very true)

Appendix J: Smartphone Stress Scale

How much do the following statements apply to your smartphone use?

If I forget my smartphone, I have to go back to get it right away.

1	2	3	4	5
(Completely untrue)				(Completely true)

If I don't have my smartphone with me, I feel uncomfortable.

1	2	3	4	5
(Completely untrue)				(Completely true)

I feel uncomfortable if I notice that I have an incoming message but can't immediately look at it.

1	2	3	4	5
(Completely untrue)				(Completely true)

I feel stressed when I notice that I can't keep track of all the messages on my smartphone.

1	2	3	4	5
(Completely untrue)				(Completely true)

I usually read messages on my smartphone superficially because I do not have enough time to read everything properly.

1	2	3	4	5
(Completely untrue)				(Completely true)

Appendix K: Depressive Symptoms (BDI-II)

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statements in each group that best describes the way you have been feeling during the **past two weeks, including today.**

1.
0 I do not feel sad.
1 I feel sad
2 I am sad all the time and I can't snap out of it.
3 I am so sad and unhappy that I can't stand it.

2.
0 I am not particularly discouraged about the future.
1 I feel discouraged about the future.
2 I feel I have nothing to look forward to.
3 I feel the future is hopeless and that things cannot improve.

3.
0 I do not feel like a failure.
1 I feel I have failed more than the average person.
2 As I look back on my life, all I can see is a lot of failures.
3 I feel I am a complete failure as a person.

4.
0 I get as much satisfaction out of things as I used to.
1 I don't enjoy things the way I used to.
2 I don't get real satisfaction out of anything anymore.
3 I am dissatisfied or bored with everything.

5.
0 I don't feel particularly guilty
1 I feel guilty a good part of the time.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6.
0 I don't feel I am being punished.
1 I feel I may be punished.

2 I expect to be punished.
3 I feel I am being punished.

7.
0 I don't feel disappointed in myself.
1 I am disappointed in myself.
2 I am disgusted with myself.
3 I hate myself.

8.
0 I don't feel I am any worse than anybody else.
1 I am critical of myself for my weaknesses or mistakes.
2 I blame myself all the time for my faults.
3 I blame myself for everything bad that happens.

9.
0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10.
0 I don't cry any more than usual.
1 I cry more now than I used to.
2 I cry all the time now.
3 I used to be able to cry, but now I can't cry even though I want to.

11.
0 I am no more irritated by things than I ever was.
1 I am slightly more irritated now than usual.
2 I am quite annoyed or irritated a good deal of the time.
3 I feel irritated all the time.

12.
0 I have not lost interest in other people.
1 I am less interested in other people than I used to be.
2 I have lost most of my interest in other people.
3 I have lost all of my interest in other people.

13.

0 I make decisions about as well as I ever could.
1 I put off making decisions more than I used to.
2 I have greater difficulty in making decisions more than I used to.
3 I can't make decisions at all anymore.

14.
0 I don't feel that I look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel there are permanent changes in my appearance that make me look unattractive
3 I believe that I look ugly.

15.
0 I can work about as well as before.
1 It takes an extra effort to get started at doing something.
2 I have to push myself very hard to do anything.
3 I can't do any work at all.

16.
0 I can sleep as well as usual.
1 I don't sleep as well as I used to.
2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
3 I wake up several hours earlier than I used to and cannot get back to sleep.

17.
0 I don't get more tired than usual.
1 I get tired more easily than I used to.
2 I get tired from doing almost anything.
3 I am too tired to do anything.

18.
0 My appetite is no worse than usual.
1 My appetite is not as good as it used to be.
2 My appetite is much worse now.
3 I have no appetite at all anymore.

19.
0 I haven't lost much weight, if any, lately.
1 I have lost more than five pounds.
2 I have lost more than ten pounds.
3 I have lost more than fifteen pounds.

20.

0 I am no more worried about my health than usual.

1 I am worried about physical problems like aches, pains, upset stomach, or constipation.

2 I am very worried about physical problems and it's hard to think of much else.

3 I am so worried about my physical problems that I cannot think of anything else.

21.

0 I have not noticed any recent change in my interest in sex.

1 I am less interested in sex than I used to be.

2 I have almost no interest in sex.

3 I have lost interest in sex completely.

Appendix L: Debriefing Text

Thank you for your participation in the study titled "Social Media and Friendship Processes Study." You will be awarded 1 research credit for your participation.

The purpose of this study was to examine how social media and friendship processes relate to mental health. We ask that you please do not discuss details of this study with other potential participants, as this could impact the results. A list of mental health resources has been attached, and we encourage you to use these resources if you are feeling distressed.

If you have any questions or concerns about your participation in this study, please contact Emily Scarpulla at emily.scarpulla@maine.edu

Appendix M: List of Resources

Counseling Services		
ON-CAMPUS RESOURCES Available for UMaine Faculty, Staff, and Students		
Counseling Center **Cutler Health Building (Gannet Hall side)** **(FREE to UMaine students)**	**207-581-1392** **http://www.umaine.edu/counseling/**	Weekdays 8:00 am-4:30 pm After business hours, call UMaine Police, 581-4040 or 911
Psychological Services Center **330 Corbett Hall** (Sliding fee scale; costs are your responsibility)	**207-581-2034** **http://umaine.edu/clinicalpsychology/psychological-services-center/**	Weekdays 8:00 am – 4:30 pm
COMMUNITY RESOURCES Available to Anyone		
Community Health & Counseling Services **42 Cedar Street** **Bangor, ME 04401** (Any costs are your responsibility)	**207-947-0366** http://www.chcs-me.org/	Weekdays 8:00 am-5:00 pm
Northeast Crisis Services (Any costs are your responsibility)	**1-888-568-1112** **http://www.chcs-me.org/index.php?id=2&sub_id=119**	7 days/week 24 hours
Psychological Services Center **330 Corbett Hall** (sliding fee scale)	**207-581-2034** **http://umaine.edu/clinicalpsychology/psychological-services-center/**	Weekdays 8:00 am – 4:30 pm
Contact Your Primary Care Provider (Any costs are your responsibility)		

Maine Statewide Crisis Hotline **1-888-568-1112**

NATIONAL RESOURCES
Mental Health Services Locator http://store.samhsa.gov/mhlocator
National Suicide Prevention Lifeline, Toll-Free, 24-hour Hotline, 1-800-273-TALK (1800-273-8255)

Appendix N: Follow-up Message for Risk

Dear [name],

Thank you for submitting your responses to "Social Media and Friendship Processes." From your answers to the questionnaires, you seemed to be experiencing some distress.

I would like to talk with you to make sure you're safe and to see if there is anything, we can do to help if you are interested. Please feel free to send me an email at emily.scarpulla@maine.edu for further information. Please note, however, that this email is not monitored continuously and if this is an emergency you should call 911.

I've attached a list of community resources. I encourage you to contact those services or your primary care provider.

Appendix O: Sona Listing

This study is titled “Social Media and Friendship Processes.”

The purpose of this study is to learn about how social media and friendship processes relate to mental health. You must be between the ages of 18 and 25 to participate in this study. You will need a computer or tablet with a keyboard to participate.

This study involves completing anonymous online questionnaires on socio-emotional adjustment, friendship processes, and social media use. This is expected to take approximately 1 hour to complete and you will be awarded 1 research credit.

BIOGRAPHY OF THE AUTHOR

Emily Scarpulla was born in Ithaca, New York on December 14th 1995. She began her research career as a high school intern at Cornell University's B.A.B.Y Lab when she was a senior in high school. She graduated from Ithaca High School in 2014. Emily completed her undergraduate B.A. in Psychology with a minor in Italian Studies at University of Rochester in 2018. During her undergraduate career, she was a research assistant for Dr. Judith Smetana's Social Development and Family Processes Research Group and Dr. Lisa Starr's Internalizing Disorders and Emotional Adjustment Lab. Emily entered the University of Maine's Clinical Psychology Doctoral Program with a child emphasis in 2018, with Dr. Cynthia Erdley as her advisor. Emily's research focused on maladaptive interpersonal processes in adolescence with an emphasis on the role of social media use and COVID-19, which informed her dissertation study. Emily has presented her research as a first author at 9 national conferences. She has also co-authored two peer-reviewed publications and one book chapter. Emily is completing her pre-doctoral internship at Stanford Children's Hospital/Children's Health Council Consortium in Palo Alto, CA. After completing her degree, Emily plans to continue her education with a post-doctoral fellowship in pediatric psychology at Stanford University School of Medicine. She is a candidate for the Doctor of Philosophy degree in Psychology with a concentration in Clinical Psychology from the University of Maine in August 2024.