PEER VICTIMIZATION AND REJECTION SENSITIVITY IN ADOLESCENTS WITH

MAJOR DEPRESSIVE DISORDER:

THE ROLE OF DAILY EMOTIONAL FUNCTIONING WITH PEERS

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While both peer victimization and rejection sensitivity are associated with a greater risk for depressive symptoms among adolescents (Bond et al., 2001; Marston et al., 2010), not all adolescents who have social difficulties develop depression. This study examined affective experiences with peers as possible moderators of the associations between victimization or rejection sensitivity and depression. Participants were adolescents ages 10-17 years, 29 of whom were currently experiencing a Major Depressive Episode at the time of the study and 31 of whom were age- and gender-matched controls with no lifetime history of Axis I psychopathology. A three-week ecological momentary assessment (EMA) protocol was used to assess daily affective responding in peer contexts. Negative affect, positive affect, and feelings of closeness and connectedness with peers were tested as possible moderators of the associations between victimization or rejection sensitivity and 1) depressive symptoms or 2) Major Depressive Disorder diagnosis. Additionally, group differences in peer victimization, rejection sensitivity, and affective responding in peer contexts were also examined.

The study makes several contributions to the field: 1) finding differences in reports of peer victimization and rejection sensitivity for youth with MDD versus healthy controls, 2) finding consistent associations between peer victimization or rejection sensitivity and both depressive symptoms and MDD diagnostic status, 3) finding differences in intensity of negative

affect experienced during interactions with peers for youth with MDD versus healthy controls, and 4) identifying unique associations between NA during peer interactions and depression, beyond the effects of rejection sensitivity or peer victimization. Also, exploratory analyses indicated that victimization, rejection sensitivity, and negative affect were also associated with anxiety symptoms across both groups and with anxiety disorder comorbidity among youth with MDD. Results suggest that adverse peer experiences, such as peer victimization, social-cognitive factors (e.g., rejection sensitivity), and negative emotional experiences in peer contexts are important factors in adolescent depression and anxiety and should be targets for further research and intervention.

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1.0   INTRODUCTION

During adolescence, there is a marked increase in the prevalence of depression and depressive symptoms (for a review, see Avenevoli, Knight, Kessler, & Merikangas, 2008). Together, depression and dysthymia are among the most common psychological disorders of adolescence, with a lifetime combined prevalence of 12% among adolescents ages 13 to 18 in the U.S. (Merikangas et al., 2010). Adolescent depression is associated with a number of comorbid disorders (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993) and increased risk for suicide (Rohde, Lewinsohn, & Seeley, 1991). Additionally, experiencing subclinical depressive symptoms or a major depressive episode during adolescence confers risk for negative outcomes during adulthood, including increased risk for suicide (Weissman et al., 1999); impairments in social, emotional, and psychological functioning (Chen, Cohen, Johnson, & Kasen, 2009; Gayman, Lloyd, & Ueno, 2011); and lower attainment in economical and educational domains (Weissman et al., 1999). Therefore, an important goal of research is to understand factors associated with Major Depressive Disorder in order to improve the effectiveness of interventions for youth with depression and, hopefully, improve adult outcomes.

The dramatic increase in depression prevalence observed during adolescence corresponds with significant developmental changes in several domains (e.g., biological, cognitive, emotional, social). A shift in social orientation, from family to peers, is an important developmental change that characterizes adolescence (Furman & Buhrmester, 1992). This shift

occurs in the context of changes in cognitive capacity, emotional responding and reward-seeking behavior, pubertal hormones, and social behavior (for a review, see Dahl, 2004). During adolescence, youth grow to rely on peers for many affiliative needs (e.g., intimacy, emotional support) (Berndt, 1982). At the same time, adolescents respond more intensely and more negatively to perceived rejection by peers than younger children (Silk, Stroud, et al., 2012). Thus, adolescence is a period of increased vulnerability to interpersonal difficulties, from both a social and emotional perspective. Together, these vulnerabilities have been posited as important mechanisms underlying the increase in depression during this developmental stage (Davey, Yücel, & Allen, 2008; Silk, Davis, McMakin, Dahl, & Forbes, 2012).

Interpersonal models of depression suggest that depression is essentially a social disorder; that is, difficulties with social relationships play a direct role in the development and maintenance of depression (for a review, see Joiner, Coyne, & Blalock, 2002). Research examining interpersonal variables in the context of adolescent depression has primarily involved correlational designs associating dimensional measures of interpersonal difficulties (e.g., peer victimization, rejection) and depressive symptoms in community samples of adolescents (Hawker & Boulton, 2000). Generally, results have suggested that interpersonal difficulties are concurrently and prospectively linked to increased depressive symptoms (Chango, McElhaney, Allen, Schad, & Marston, 2012; Nolan, Flynn, & Garber, 2003). However, there is a paucity of research examining interpersonal dysfunction in clinical samples of depressed adolescents.

Although many interpersonal difficulties have been associated with depressive symptoms, peer victimization has been given more attention than many other interpersonal variables. Peer victimization, generally defined as the experience of being the target of aggression against one's physical self or social relationships (Olweus, 1991), may confer risk for

depression via several pathways, including: emotional responding (e.g., sadness, anger), development of dysfunctional social cognitions (e.g., increased concerns about future rejection or victimization, decreased self-perceived social self-competence), and increased risk for additional interpersonal difficulties (e.g., peer rejection). In short, peer victimization may be conceptualized as a significant social stressor that increases vulnerability for depression in many domains (e.g., interpersonal, cognitive, emotional).

Additionally, individual differences in *sensitivity* to interpersonal stressors have been examined extensively as vulnerabilities that may confer increased risk for depression among adolescents. For example, rejection sensitivity describes a relatively stable pattern of cognitive biases and affective responses that center on a fundamental concern of being rejected by others. Namely, rejection sensitivity refers to the tendency to "anxiously expect, readily perceive, and overreact to rejection" (Downey & Feldman, 1996, p. 1327). Several studies have shown consistent associations between rejection sensitivity and increases in depressive and anxiety symptoms over time among adolescents in community samples (London, Downey, Bonica, & Paltin, 2007; Marston, Hare, & Allen, 2010; Rudolph & Conley, 2005).

Although peer victimization and rejection sensitivity are consistently liked with more severe depressive symptoms in community samples, it is not known if these variables are more prevalent among youth with MDD than non-depressed youth. Understanding the role of these peer variables in different stages of adolescent depression is important for planning intervention and prevention work. For example, some forms of interpersonal dysfunction, such as co-rumination, have been shown to be elevated prior to a major depressive episode (MDE) (Stone, Hankin, Gibb, & Abela, 2011), during an MDE (Waller, Silk, Stone, & Dahl, 2014), and after an MDE (Stone, Uhrlass, & Gibb, 2010) among youth; this suggests that co-rumination is an

important target for prevention, intervention, and relapse prevention. However, problems that are associated with risk for or development of a disorder are not always associated with the disorder itself. For example, marital conflict is associated with externalizing symptoms in community samples (for a review, see McMahon, Grant, Compas, Thurm, & Ey, 2003) and is considered to be a risk factor for conduct disorder but is not necessarily associated with conduct disorder (Rutter, 1994). Rutter (1994) explains that greater levels of marital conflict may contribute to risk for developing conduct disorder, but once symptoms reach the point that conduct disorder can be diagnosed, decreases in marital conflict are unlikely to change the symptoms of conduct disorder. It seems reasonable to think that a similar process may be involved in peer or interpersonal factors and depression among youth; thus, it is important to examine the prevalence of peer victimization and rejection sensitivity among youth currently in an MDE to extend existing research on these constructs in community samples.

Currently, it is not known whether peer victimization and rejection sensitivity are also elevated among youth currently experiencing an MDE. Therefore, examining rates of victimization and rejection sensitivity in a clinical sample of youth currently experiencing an MDE will contribute valuable information about the importance of these concerns for youth who are currently depressed and, therefore, potentially inform interventions for depressed youth.

While both peer victimization and rejection sensitivity are associated with elevated depressive symptoms among adolescents, not all adolescents who have social difficulties actually develop Major Depressive Disorder. Therefore, understanding resilience processes related to these problems is vitally important. Many current theoretical models of depression suggest that peer experiences interact with other risk factors in conferring risk for depression, including cognitive (for a review, see Lakdawalla, Hankin, & Mermelstein, 2007), biological (Angold,

Costello, Erkanli, & Worthman, 1999; Angold, Costello, & Worthman, 1998), and temperament-related (Clark & Watson, 1991) risk factors. In the extant literature, positive experiences with peers and interpersonal resources (e.g., having a friend) have been shown to buffer against the adverse effects of peer victimization (Bond, Carlin, Thomas, Rubin, & Patton, 2001; Hodges, Boivin, Vitaro, & Bukowski, 1999) and other interpersonal factors linked to depression (Feldman, Rubenstein, & Rubin, 1988) among children and adolescents. Additionally, adolescents' characteristic emotional response style may attenuate or exacerbate the effect of peer experiences on mood; adolescents with a particular pattern of affective functioning (i.e., low levels of positive affect (PA) and high levels of negative affect (NA)) have been shown to be more likely to develop depressive symptoms if they experience peer difficulties such as low social support (Wetter & Hankin, 2009). Indeed, specific patterns of difficulties with affective functioning (i.e., experiencing less positive affect (PA) and more negative affect (NA)) have been theorized to play important roles in psychopathology (Clark & Watson, 1991) and, more specifically, in adolescent depression (Forbes & Dahl, 2005).

While research evidence supports the moderating effects of positive peer relations and affective functioning, no research to date has explored possible buffering effects of affective functioning in *peer* contexts for interpersonal problems or vulnerabilities. Given that depression is strongly linked to dysfunctional affective responding (Chorpita, Plummer, & Moffitt, 2000; Forbes, Williamson, Ryan, & Dahl, 2004; Lonigan, Carey, & Finch, 1994; Lonigan, Phillips, & Hooe, 2003), even across social contexts (Axelson et al., 2003; Silk et al., 2011), adolescents who maintain positive, healthy, and rewarding affective responding in peer contexts *despite* experiences of victimization or increased concerns about rejection may experience a lessened risk for depression.

The current study also addressed two major limitations in our current understanding of adolescent depression. First, the majority of work examining emotional functioning in relation to adolescent depression has relied upon laboratory tasks (Pine et al., 2004) or self-report measures of global affect (Chorpita, Albano, & Barlow, 1998; Chorpita et al., 2000; Lonigan et al., 1994). Although momentary assessments of emotion are believed to provide more ecologically valid data regarding affective functioning, compared to laboratory or global self-reports, very few studies have employed momentary assessments to examine affective functioning in clinical samples of depressed adolescents (Axelson et al., 2003; Forbes et al., 2004; Silk et al., 2011). The current study built upon this small body of existing research by utilizing ecologically valid methods to assess affective functioning in peer contexts during adolescents' daily lives. Ultimately, it is hoped that results of this research could improve our understanding of affective functioning in peer contexts, as well as the relationships between peer difficulties and affective functioning, by providing more comprehensive and accurate insight regarding daily emotional functioning.

Second, most extant research linking peer difficulties or affective functioning to depression has been limited to community samples of adolescents. Thus, very little is known about the prevalence of peer victimization or rejection sensitivity among adolescents who meet diagnostic criteria for major depressive disorder (MDD). A handful of studies have examined relations between affective functioning and depression in clinical samples (Chorpita et al., 1998, 2000; Joiner & Lonigan, 2000), although most of these study samples included adolescents with a variety of disorders. Thus, very few studies have focused on adolescents with MDD (Axelson et al., 2003; Forbes et al., 2004; Silk et al., 2011) or at high risk for MDD (McMakin et al., 2011) and none of these have examined affective functioning within peer contexts in relation to peer

problems or interpersonal vulnerabilities, such as peer victimization or rejection sensitivity. Therefore, this study's focus is unique among studies in clinical samples of youth with current MDD.

In sum, the current study aimed to improve our understanding of risk and resilience associated with adolescent depression by examining the prevalence of variables that are believed to confer risk for adolescent depression due to their consistent association with elevated depressive symptoms in previous studies within community samples (i.e., peer victimization and rejection sensitivity) within a clinical sample of depressed adolescents. This is important because variables associated with symptoms of psychopathology in community samples may not be associated with the actual disorder. To this end, group differences (MDD versus controls) in peer victimization and rejection sensitivity, both of which have previously been associated with depressive symptoms in community samples, were examined. Additionally, the moderating effect of daily affective functioning in the company of peers was examined for both victimization and rejection sensitivity with regard to two outcomes: depressive symptoms (in keeping with the established literature), and 2) MDD caseness. Importantly, ecologically valid methods were used to assess daily emotional functioning in peer contexts across three weeks.

1.1   THE DEVELOPMENTAL SIGNIFICANCE OF PEER RELATIONSHIPS

From a developmental perspective, adequate participation in positive peer relationships during childhood and adolescence is important for healthy psychosocial development. Individuals who have poor relations with peers during childhood are at risk for a host of adverse psychosocial outcomes (Parker & Asher, 1987). Peers provide important contexts for the development of self-

identity, contribute to children's developing schemas about the world around them, and provide a template for understanding and expectations for future social relationships. Children who lack positive, productive peer experiences during childhood may internalize their negative experiences and develop feelings of low self-worth, negative self-perceptions regarding their social competence, and negative beliefs about future relationships (Rudolph, Ladd, & Dinella, 2007). Peer relationships also provide opportunities to develop social skills, self-regulation skills, and empathy (Hartup, 1989; Sullivan, 1953). Peers are sources of positive emotional support, intimacy, and validation (Sullivan, 1953). Participation in unsupportive or conflict-filled relationships prevents children from benefitting from these positive aspects of peer relations. Indeed, relationships are so important that losses within relationships (e.g., betrayal, dissolution of a friendship or romantic relationship) are considered to be adverse life events that may directly contribute to depression (Monroe, Rohde, Seeley, & Lewinsohn, 1999).

Peer relations are especially important for adolescents' emotional well-being. As children move into adolescence, they grow increasingly independent from their families of origin and increasingly dependent on peers for provisions of social and emotional support. During adolescence, there is a greater prevalence of cross-sex friendships and the beginnings of romantic relationships. Compared to peer relationships in middle-childhood, adolescent peer relations are characterized by greater self-disclosure and intimacy (Furman & Buhrmester, 1992). Sullivan (1953) suggested that the increasing salience of interpersonal intimacy during adolescence was an important determinant of the intense distress adolescents often feel in response to social rejection or isolation.

1.2 INTERPERSONAL DYSFUNCTION AND ADOLESCENT DEPRESSION

1.2.1 Peer victimization

Peer victimization involves being the target of one or more peers' aggressive behavior repeatedly over time (Olweus, 1991). Victimization by peers may take as many forms as there are methods of communication. Olweus (1991) described physical, verbal (i.e., saying mean things), and non-verbal (e.g., making dirty gestures or rude faces, refusing to listen to a peer's requests) forms of aggression. However, the recent explosion in mobile phone and online forms of communication has expanded this list to include several novel avenues for aggression: phone calls, text messaging, instant messaging, and mobile phone/video clips (Smith et al., 2008), chat rooms, email, and websites (Kowalski & Limber, 2007). These varied avenues for the expression of aggression also fall within differing domains of aggressive behavior. For example, overt or direct aggression refers to aggressive behavior that occurs 'in the open' (Olweus, 1991). Relational aggression, a construct closely related to indirect aggression, involves "harming others through purposeful manipulation and damage of their peer relationships" (Crick & Grotpeter, 1995, p. 711).

The experience of being victimized by peers is not uncommon. Among adolescents in community samples, prevalence estimates for traditional general victimization (i.e., combined overt and relational victimization occurring in non-electronic contexts) range from 34% to 56% (Baldry, 2004; Bond et al., 2001; Craig, 1998). In the U.S., the prevalence of cyberbullying (i.e., being victimized online or via mobile phone at least once) among adolescents ranges from 9% to 48% (Kowalski & Limber, 2007; Raskauskas & Stoltz, 2007; Ybarra, Mitchell, Wolak, & Finkelhor, 2006). The broad range of prevalence rates reported by these studies may be due, in

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part, to heterogeneity in measurement of bullying between studies.

1.2.1.1 Who is victimized?

The prevalence of victimization varies by age and gender. Physical victimization appears to decrease in prevalence from early to middle adolescence while the opposite has been found for relational aggression (Craig, 1998). Further, physical victimization appears to be more common among early adolescent boys than girls (Storch, Nock, Masia-Warner, & Barlas, 2003; Vuijk, van Lier, Crijnen, & Huizink, 2007). Some research suggests that electronic victimization increases with age, from 6th to 8th grade (Kowalski & Limber, 2007), while other research has found no age effects (Smith et al., 2008). Similarly, findings regarding gender prevalence of electronic victimization are mixed, with girls outnumbering boys as victims in some studies (Kowalski & Limber, 2007), while other studies have found no sex differences (Ybarra et al., 2006).

Besides age and sex, other individual differences also play a role in determining risk for experiencing victimization. Bullying behavior has been conceptualized as an attempt by individuals or groups to gain social power or prestige within the peer group (Salmivalli & Peets, 2009). Thus, bullies tend to select as targets children who are vulnerable and unlikely to retaliate. Vulnerabilities may be related to physical weakness (Hodges & Perry, 1999) or low social status (Bukowski & Sippola, 2001) and friendlessness (Hodges et al., 1999). Interpersonal dysfunction is often associated with behavioral difficulties, such as externalizing and internalizing problems, which are also linked to risk for victimization (for a review, see Hodges & Perry, 1999). In sum, children who are particularly likely targets for bullies are those with vulnerabilities across both behavioral and interpersonal domains (Hodges & Perry, 1999). A smaller body of literature regarding risk factors for being victimized in electronic contexts indicates that regular and

extensive use of the internet for social interactions (Smith et al., 2008; Ybarra & Mitchell, 2004b; Ybarra et al., 2006), victimization in other contexts (Jose, Kljakovic, Scheib, & Notter, 2011; Ybarra & Mitchell, 2004a), and social problems (Ybarra & Mitchell, 2004a; Ybarra et al., 2006) are associated with greater risk for victimization.

Another significant risk for peer victimization is victimizing others. Adolescents who do so are more likely to be victimized within both traditional (Craig, 1998; Raskauskas & Stoltz, 2007) and electronic (Jose et al., 2011; Raskauskas & Stoltz, 2007; Ybarra et al., 2006) contexts. Bullying also is linked to a risk of victimization across contexts; bullying others in traditional contexts is associated with being victimized online and via text-messages among adolescents ages 13 to 18 years (Raskauskas & Stoltz, 2007).

1.2.1.2 Associated social dysfunction

While interpersonal dysfunction is considered a risk factor for experiencing victimization, victimization itself is also conceptualized as a risk for social problems or interpersonal dysfunction. Victimization has been linked to low global and social self-worth in numerous studies (for a review, see Hawker & Boulton, 2000). Additionally, peer victimization has been associated with negative perceptions of others' motives during social interactions and increased concern about social evaluation (Rudolph, Troop-Gordon, & Flynn, 2009). Prospective research linking peer victimization to social difficulties is limited. Peer victimization predicts future victimization by peers (Bond et al., 2001; Hodges et al., 1999). Also, among elementary school children, peer victimization predicted being disliked by peers two years later (Hanish & Guerra, 2002). In a sample of 3rd through 7th grade students, baseline peer victimization was associated with having fewer friends and being rejected by peers one year later (Hodges & Perry, 1999).

1.2.1.3 Risk for depression

Repeated peer victimization is a significant interpersonal stressor and often is associated with additional social dysfunction. Therefore, it seems reasonable to expect that victimization would confer increased risk for depression among adolescents. Indeed, victimization is one of the most extensively studied peer risk factors for adolescent depression. All forms of peer victimization have been consistently associated with depressive symptoms in children and adolescents in cross-sectional research (for a review, see Hawker & Boulton, 2000). In more recent research in adolescent samples, both overt and relational victimization have been concurrently linked to elevated depressive symptoms (Bond et al., 2001; Desjardins & Leadbeater, 2011; Gibb & Abela, 2008; La Greca & Harrison, 2005; Prinstein, Boergers, & Vernberg, 2001; Storch et al., 2003). Although few studies have examined prospective associations between victimization and depressive symptoms in adolescent samples, results were consistent with findings from previous research: relational victimization (Desjardins & Leadbeater, 2011) and general victimization (Bond et al., 2001; Hodges & Perry, 1999) were associated with greater depressive symptoms. In addition, there is some evidence that the risk for elevated depressive symptoms is increased if adolescents are victimized more frequently (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2007) or repeatedly over time (Bond et al., 2001).

1.2.1.4 Moderators

Not all adolescents who are targets of victimization develop depression. In children and adolescents, several protective factors have been identified that buffer against the adverse effects of experiencing victimization. Among pre-adolescents and early adolescents (4th – 5th grade students), having a protective close friend (Hodges et al., 1999) attenuated the impact of victimization on internalizing symptoms. Similarly, Bond and colleagues (2001) found that

having a confidant or close, supportive friendship significantly attenuated the association between peer victimization and internalizing symptoms among adolescent boys, but not girls. Social support from fathers was found to attenuate the link between relational peer victimization and depressive symptoms among adolescents over 6 years, while social support from peers and mothers *strengthened* the association (Desjardins & Leadbeater, 2011). In addition to research examining interpersonally focused moderators of the effects of victimization, work has been done exploring biological moderators. There is some evidence that individual differences in biological responses to stress (i.e., anticipatory and task-related cortisol and salivary alpha amylase responses) moderate the association between self-reported peer victimization and self-reported depressive symptoms among adolescents (Rudolph, Troop-Gordon, & Granger, 2011).

1.2.2 Rejection sensitivity

Cognitive biases, such as hypersensitivity to social rejection, are also implicated in adolescent depression. Rejection sensitivity refers to a set of cognitive biases and pattern of emotional responses that includes: concerns about and expectations of negative evaluation, the tendency to readily perceive rejection even when it may not have occurred, and emotional sensitivity or overreaction to the experience of rejection (Downey & Feldman, 1996). In rejection sensitive individuals, a defensive stance against potential rejection may take the form of apprehension or anger (Downey, Lebolt, Rincón, & Freitas, 1998). Rejection sensitivity is closely related to the personality dimensions, neuroticism and harm avoidance, as well as several constructs focusing on interpersonal concerns, including interpersonal sensitivity and sociotropy (for a review, see Enns & Cox, 1997). While social-evaluative concerns in general are conceptualized as relatively stable and trait-like, rejection sensitivity and the associated fear of negative evaluation are also

recognized as symptoms of DSM-IV-TR (2000) disorders, such as MDD with atypical features and social phobia. Rejection sensitivity is common among psychiatric outpatients diagnosed with depression, dysthymia, and bipolar disorder (Posternak & Zimmerman, 2002).

1.2.2.1 Origins of rejection sensitivity

From a developmental perspective, sensitivity to peer rejection may increase during adolescence as part of the normative shift in social orientation from parents to peers. In support of this, Silk and colleagues (2012) have found that older adolescents display greater physiological responses (i.e., pupil dilation) to simulated peer rejection than younger adolescents. In general, however, rejection sensitivity is theorized to result from early experiences of social rejection (Downey & Feldman, 1996). Eisenberger and Lieberman (2005) noted that painful (i.e., rejecting) social experiences have similar emotional, cognitive, and behavioral sequelae to physically painful experiences: hypersensitivity to and avoidance of situations similar to the original painful experience; anticipation or expectation that similar situations will be painful; and (due to our anticipation of repeated pain) experiencing non-painful stimuli as painful. Together, these responses are the major elements of rejection sensitivity. While the proposed causal association between rejection and rejection sensitivity has not been extensively studied in adolescents, a small body of research provides support for this link (London et al., 2007; Wang, McDonald, Rubin, & Laursen, 2012).

In support of rejection sensitivity's conceptualization as a trait-like construct, rejection sensitivity does appear to be fairly stable in adolescence. Among early adolescents (i.e., 6th grade students), both angry and anxious expectations of rejection were found to be relatively stable across 4 months ($r = .60$ and $r = .54$, respectively) (London et al., 2007). Among older adolescents (i.e., from age 16 to 18), rejection sensitivity was also fairly stable across three years

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(r = .64 to .65); however, rejection sensitivity does appear to decline significantly from age 16 to age 18 (Marston et al., 2010).

1.2.2.2 Associated social dysfunction

While rejection sensitivity is likely a defensive response by the organism intended to avoid future painful social experiences, it may actually increase the likelihood of social dysfunction and rejection (Downey et al., 1998). Among adolescents, high levels of rejection sensitivity have been prospectively associated with social withdrawal (London et al., 2007) and decreased peer-rated social competence (Marston et al., 2010). In adolescent girls, both angry and anxious rejection sensitivity have been prospectively linked to greater difficulties in romantic relationships one year later, including: concerns about abandonment, engaging in more direct (i.e., saying mean things) and indirect (i.e., 'the silent treatment') verbal hostility during conflicts, and a greater likelihood of being the target of direct verbal hostility during conflicts (Purdie & Downey, 2000). Further, among early adolescents, angry expectations about rejection predicted more peer conflicts over the course of a year and a greater risk of being suspended from school for disciplinary reasons; it was also negatively associated with academic performance (Downey et al., 1998). In contrast, some research involving early adolescents (5th grade students) has found no association between self-reported social-evaluative concerns and teacher-rated social competence (Rudolph & Conley, 2005).

1.2.2.3 Risk for depression

In addition to being a risk factor for adverse social outcomes, rejection sensitivity is also believed to confer increased risk for depression. Silk and colleagues (2012) have suggested that this association is due to alterations in neural threat and reward processing associated with

rejection sensitivity (e.g., increased avoidant behavior and decreased reward-seeking behavior). Indeed, rejection sensitivity appears to have a significant main effect on depressive symptoms in adolescence: In cross-sectional research, rejection sensitivity with either angry or anxious expectations of rejection was significantly associated with greater depressive symptoms among adolescents in the 9th grade (McDonald, Bowker, Rubin, Laursen, & Duchene, 2010). Generalized rejection sensitivity has also been concurrently linked to depressive symptoms among 5th grade students (Rudolph & Conley, 2005). Compared to cross-sectional research, prospective studies provide more compelling evidence that rejection sensitivity is a risk factor for depressive symptoms. Although few studies of this type have been conducted, evidence is consistent. Rejection sensitivity predicted increases in depressive symptoms from age 16 to 18, with baseline social competence was held constant (Marston et al., 2010), and across 6-7 months between 5th and 6th grade (Rudolph & Conley, 2005). Additionally, rejection sensitivity has been prospectively linked to a related construct, loneliness, among early adolescents (6th grade students) (London et al., 2007). Although evidence has linked rejection sensitivity to depressive symptoms in community samples of adolescents, no work has been done with clinically depressed adolescents.

1.2.2.4 Moderators

Moderators of the association between rejection sensitivity and depressive symptoms have been examined in few studies of adolescents. In the research to date, interpersonal difficulties are generally examined as moderators. In one cross-sectional study of adolescents (M age = 14.3 years) (McDonald et al., 2010), angry rejection sensitivity was only associated with depressive symptoms among adolescents who reported low perceived social support from parents and friends. Among 7th grade students (M age = 13.1 years), rejection sensitivity was more strongly

associated with depressive symptoms for adolescents whose best friend reported high levels of rejection sensitivity (Bowker, Thomas, Norman, & Spencer, 2011). In sum, rejection sensitivity has been consistently linked to depressive symptoms among community samples of adolescents, both concurrently and prospectively. Its effects are moderated by perceived social support (McDonald et al., 2010) and best friend characteristics (Bowker et al., 2011).

To build upon the small body of extant research, which relies exclusively on community samples, research is needed to better understand moderators of the association between rejection sensitivity and depressive symptoms among clinically depressed adolescents. Further, although rejection sensitivity describes vulnerabilities in both cognitive and affective functioning, no research has examined potential moderating effects of daily affective functioning. Adolescents who report high levels of rejection sensitivity, yet maintain positive and affectively rewarding daily experiences with peers, may be less likely to experience depression than adolescents who do not benefit from emotionally positive daily interactions with peers.

1.3   AFFECTIVE FUNCTIONING AND ADOLESCENT DEPRESSION

While depression involves disruptions in cognitive and behavioral processes, it is primarily considered to be a disorder of dysregulated affect. Persistently low mood is a core diagnostic feature of the disorder. However, low mood is not unique to depression; many other disorders share this symptom. In particular, depression and anxiety share many of the same symptoms and are frequently comorbid. Clark and Watson (1991) sought to differentiate anxiety and depression with their tri-partite model of emotion; the model posits that individuals with depression experience heightened negative affect (NA) and low levels of positive affect (PA). While

individuals with anxiety also experience greater NA, anxiety is further characterized by physiological hyperarousal (PH) and is *not* characterized by low levels of PA (i.e., anhedonia) (Clark & Watson, 1991). Research has supported the application of the tri-partite model to adolescent depression in clinical samples (Chorpita et al., 1998, 2000; Joiner, Catanzaro, & Laurent, 1996).

Social affective neuroscience research examines the role of neural systems involved in NA, PA and reward in the development of depression among adolescents. This work situates adolescent depression within a framework of normative social and neural development. For example, among healthy adolescents, an increase in reward-seeking behavior is normative during adolescence (Martin et al., 2002). Further, the presence of peers serves to increase activity in neural circuits related to reward during risk-taking behaviors (Chein, Albert, O'Brien, Uckert, & Steinberg, 2011). Researchers have noted that, in contrast to healthy adolescents, adolescents who develop depression show dysfunctions in neural systems involved in positive affect and reward (Forbes & Dahl, 2005; Silk, Davis, et al., 2012).

Affective functioning is also central to other relevant neurodevelopmental theories regarding the development of adolescent depression. Davey, Yücel, and Allen (2008) have proposed that depression results from suppression of neural reward systems following disappointment over one's failure to achieve a social reward, such as being accepted by a peer. They note that failure to achieve certain high-level social goals essentially shuts off the reward system for an extended period of time, placing individuals at risk for the development of depressive symptoms. Experiencing these failures is increasingly likely during adolescence due to the development of cognitive abilities that coincide with maturation of the pre-frontal cortex during adolescence (e.g., the ability to represent and strive for increasingly complex and abstract

goals, such as love, belonging, agency, and status). Nelson *et al*. (2005) have suggested that during adolescence, a misalignment between development of affective and cognitive-regulatory nodes within the social information processing network leads to under-regulated (and therefore very strong) emotional responses to social experiences. Over time, these intense emotional responses may overwhelm the individual's ability to regulate emotion and lead to depressive symptoms. Finally, Silk and colleagues (2012) have proposed that experiencing childhood anxiety confers greater risk for adolescent depression due to its association with increased sensitivity to social evaluative threats and alterations in reward processing. The effects of these neural vulnerabilities are exacerbated during adolescence due to normative developmental changes (e.g., increased importance of interpersonal relations, changes in reward systems, and greater capacity for hypothetical and future-oriented cognition), therefore increasing risk for adolescent depression.

1.3.1   Measurement of emotion

The extant literature provides a body of evidence relating affective dysfunction to depressive symptoms. However, the methods employed for assessment of emotion in most studies to date have significant limitations. With the exception of a very small number of papers reporting on the results of a single sample of depressed youth (Axelson et al., 2003; Silk et al., 2011), research in clinical samples of adolescents has utilized either global self-report measures (Chorpita et al., 1998, 2000; Joiner & Lonigan, 2000) or emotion processing tasks conducted in the laboratory (Jazbec, McClure, Hardin, Pine, & Ernst, 2005; Pine et al., 2004; Silk et al., 2007). Certainly, laboratory tasks provide important advantages over self-report questionnaires; emotion can be assessed in real time in a controlled environment and both subjective and physiological measures

of emotional experience may be assessed concurrently. However, assessment of adolescents' emotion in the laboratory poses important limitations for ecological validity. First, tasks that are widely used to induce emotional responses in younger children (e.g., arm restraint, still-face procedure) are not developmentally appropriate for adolescents. In contrast to early childhood, when emotional experiences may be induced in the laboratory via social interactions with caregivers, strong negative emotional experiences during adolescence are likely to be induced by difficult experiences or conflicts with peers (Silk, Davis, et al., 2012) or parents. It is difficult to simulate these types experiences in the laboratory. Recreating some of the social difficulties that adolescents create for themselves in their daily lives would be unethical. Further, bringing depressed adolescents' actual peers into the laboratory to serve as confederates poses significant pragmatic and ethical challenges.

Researchers have sought to address these limitations by developing laboratory tasks that more closely approximate experiences that adolescents may have in their daily lives, such as the Chatroom Interact Task (Silk, Stroud, et al., 2012), which simulates peer rejection in vivo. However, adolescents' actual daily peer difficulties are *dependent* stressors; laboratory situations may have a lesser emotional impact than actual peer difficulties simply because they are more likely to be viewed by adolescents as independent, rather than dependent, events. Ideally, measurement of emotion would occur during adolescents' daily lives. This method would provide the greatest opportunity to measure intense emotional reactions as they naturally occur.

Besides studying emotion within ecologically valid contexts, another important consideration when assessing emotion is retrospective bias. When people are asked to report on previous emotional experiences, they are subject to a number of memory biases. For example, individuals tend to have a selective memory for the most intense or most recent emotion they

experienced (Fredrickson, 2000). Also, adolescents may have difficulty recalling the social context of an emotional experience (i.e., who their social companions were at the time) (Silk et al., 2011). Therefore, it is particularly important to limit retrospective reporting. Momentary assessment, or the measurement of emotion as it occurs, yields more accurate information about emotional experiences and their context by limiting biases inherent to retrospective reporting. Ecological momentary assessment (EMA; for a review, see Shiffman, Stone, & Hufford, 2008; Stone & Shiffman, 1994) is particularly well suited to measurement of emotion in adolescents. In this method, adolescents report on their social and emotional experiences in a series of brief assessments, such as electronic surveys or brief phone calls. Assessments are spaced out across several days or weeks, with multiple measurements occurring each day. In the current EMA study, adolescents were asked for detailed information about their emotional experiences, activities, coping behavior, and social companions during a series of brief phone calls. Thus, in this study, EMA provided a comprehensive, longitudinal view of adolescents' emotional functioning across multiple naturally occurring social contexts. In addition to providing ecologically valid assessment of adolescents' experiences, EMA limits retrospective biases because adolescents are asked to recall experiences that occurred within the hour.

1.3.2   Association with depression

As stated above, much of the research examining affective functioning in adolescent depression has been limited to self-report questionnaires (Joiner et al., 1996) or non-social tasks performed in the laboratory. Little research has examined emotional functioning during real-time social experiences in adolescent depression; but the few studies that have done so suggest that, relative to non-depressed adolescents, clinically depressed adolescents experience greater intensity

(Forbes et al., 2004) and duration of NA (Sheeber, Allen, Davis, & Sorensen, 2000), as well as less PA (Forbes et al., 2004). Further, research indicates that clinically depressed children and adolescents (ages 7 – 17 years) experience greater intensity and variability of NA as well as less PA, relative to NA (Silk et al., 2011). In community samples, high levels of depressive symptoms have also been linked to greater emotional lability (Larson, Raffaelli, Richards, Ham, & Jewell, 1990; Silk, Steinberg, & Morris, 2003) and greater intensity of negative emotion (Silk et al., 2003). In sum, research evidence is consistent with theories suggesting that depressed adolescents experience less PA and more NA, relative to non-depressed adolescents.

Perceived closeness or connectedness with others has also been assessed in relation to adolescent depression. In previous research, ratings of perceived social disconnection have been included in momentary assessments of affect following a simulated social rejection task; social disconnection was significantly associated with rejection sensitivity (i.e., neural reactivity to the rejection task) in adults (Eisenberger, Gable, & Lieberman, 2007) and children ages 9 to 17 years (Silk, Stroud, et al., 2012). Based on the results of these two studies, social disconnection during daily activities appears to be a marker for high levels of rejection sensitivity. Therefore, one would expect social disconnection to be associated with depressive symptoms in the same way that rejection sensitivity has been linked to depressive symptoms in research to date. Additionally, high levels of perceived disconnection may reflect a dysfunctional (i.e., exaggerated in duration and/or severity) response to general interpersonal stressors. Experiencing high levels of social disconnection may contribute to interpersonal dysfunction by interfering with one's full participation in and enjoyment of social interactions. Further, perceived social disconnection may contribute to a downward spiral of negative social cognition and dysfunctional social behavior. For example, disconnection may contribute to feelings of

insecurity regarding interpersonal relationships. This, in turn, could increase the likelihood of reassurance-seeking behaviors, which could contribute to loss of social relationships and thus contribute to risk for depression (Coyne, 1976).

1.3.3 Protective effects of positive affective functioning with peers

Positive affective responding in peer contexts may be considered to be a protective factor for depression simply because it reflects a pattern of positive emotional functioning over time. However, adolescents' experience of positive and negative affect in daily experiences with peers likely results from both their general affective functioning (i.e., overall levels of PA/NA in daily experiences) *and* aspects of peer relationships, such as friendship quality, that depend largely on adolescents' choices of friends. That is, adolescents who choose to spend their time with peers with whom they are more likely to experience positive interactions would be more likely to experience PA in peer contexts and be more likely to report feeling close or connected to their companions. Conversely, adolescents whose peer companions are more likely to engage in negative or non-rewarding interactions with them would be expected to experience greater levels of NA in peer contexts and report less closeness and connectedness with peers. Therefore, experiencing greater PA, lower levels of NA, and greater perceived closeness/connectedness is a marker of positive interpersonal functioning that consists of social and emotional dimensions.

Positive and emotionally rewarding experiences with peers may buffer adolescents from negative outcomes (i.e., depressive symptoms) commonly associated with peer victimization and rejection sensitivity. Both peer victimization and rejection sensitivity are frequently associated with a host of interpersonal difficulties. However, markers of positive interpersonal functioning, such as having a protective friend, have been shown to buffer the effect of peer victimization and

rejection sensitivity on risk for depressive symptoms. Therefore, it seems reasonable to expect that the associations between peer victimization and depression and rejection sensitivity and depression will be attenuated for adolescents who enjoy affectively rewarding experiences with peers.

1.4   STATEMENT OF PURPOSE

Both peer victimization (Hawker & Boulton, 2000; Klomek et al., 2007) and rejection sensitivity (Marston et al., 2010; McDonald et al., 2010) have been consistently linked to depressive symptoms in research with community samples of adolescents. However, little is known regarding the prevalence or influence of either peer victimization or rejection sensitivity among clinically depressed adolescents. Additionally, affective dysfunction has been observed among clinically depressed adolescents using both global self-report (Chorpita et al., 2000) and momentary (i.e., real-time) (Forbes et al., 2004; Silk et al., 2011) methods of assessment but has not been investigated specifically in peer interactions. Further, a small body of research has demonstrated an association between rejection sensitivity measured via increased neural reactivity during a simulated rejection task and feelings of social disconnection among young adults (Eisenberger et al., 2007) and youth (Silk, Stroud, et al., 2012). However, little is known about the potential protective effects of emotionally rewarding peer interactions in daily life. Finally, while there has been research examining moderating effects of interpersonal variables on the relations between either peer victimization or rejection sensitivity and depressive symptoms in community samples, no studies to date have examined possible moderating effects of *affective functioning* in community or clinical samples.

Peer victimization and rejection sensitivity were selected for this study because they represent different levels of interpersonal dysfunction. As a painful or aversive social experience, peer victimization may be conceptualized as an environmental stressor. Rejection sensitivity, however, describes a style of cognitive-affective responses to interpersonal situations – in short, sensitivity to interpersonal stressors. Thus, examining both of these variables allowed us to compare the relative impact of two distinct, but conceptually related, interpersonal variables that are associated with depressive symptoms in community samples that operate at different levels of interpersonal experience. Further, the study design permitted us to determine whether affective functioning in peer contexts buffers against the effects of one, both, or neither of these interpersonal variables.

This research integrated interpersonal and emotional risks and correlates of depression in adolescence to gain a more complete view of the relationships between social experiences, social cognition, and emotion in a clinical sample. Ecological momentary assessment (EMA; for a review, see Shiffman et al., 2008; Stone & Shiffman, 1994) methodology was utilized to provide momentary assessments of adolescents' daily emotional functioning in peer contexts across a three-week period. The study had two primary aims. First, we intended to examine differences in social functioning within peer contexts among clinically depressed adolescents, relative to non-depressed healthy controls. To that end, we examined group differences in experiences of positive and negative affect as well as perceptions of closeness and connectedness with peers during real-world interactions with peers. A second aim of this research was to explore the possibility that positive emotional functioning with peers could moderate the effect of interpersonal variables that have been associated with more severe depressive symptoms in community samples in previous research (i.e., peer victimization and rejection sensitivity) in

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predicting both depressive symptoms and depression caseness (i.e., diagnosis of MDD). A general model for these tests of moderation is shown in Figure 1.
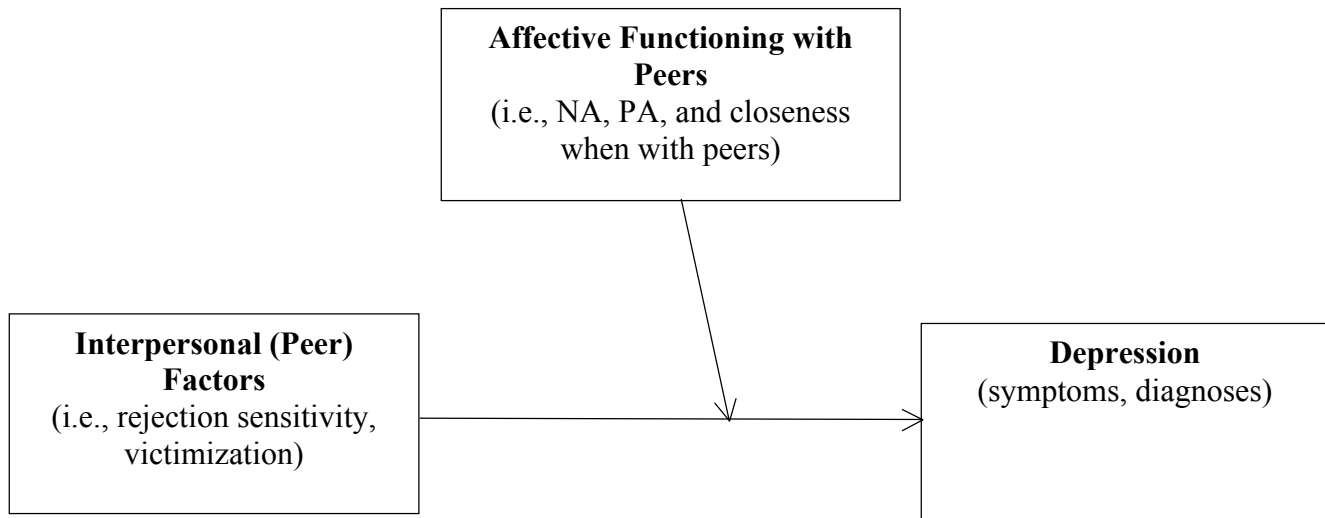
Figure 1. Model of Moderating Effects of Affective Functioning with Peers on the Associations between Peer Victimization or Rejection Sensitivity and Depression

1.5   AIMS AND HYPOTHESES

Aim 1: To examine whether peer relationship variables that have been linked to depressive symptoms in community samples differ between clinically depressed youth and healthy controls.

   Hypothesis 1: Compared to non-depressed controls, depressed adolescents will report more experiences of peer victimization.

   Hypothesis 2: Compared to non-depressed controls, depressed adolescents will report more rejection sensitivity.

   Aim 2: To examine real-world peer interactions using EMA in a clinical sample of depressed youth compared to healthy youth.

Hypothesis 3: Compared to non-depressed controls, depressed adolescents will report more peak negative affect during real-world peer interactions.

Hypothesis 4: Compared to non-depressed controls, depressed adolescents will report less peak positive affect during real-world peer interactions.

Hypothesis 5: Compared to non-depressed controls, depressed adolescents will report less momentary closeness and connectedness with others during real-world peer interactions.

Aim 3: To examine whether real-world peer interactions moderate the relationships between peer relationship variables identified in Aim 1 and severity of depressive symptoms in the full sample.

Hypothesis 6: The association between **peer victimization** and depressive symptoms will be moderated by:

a) Peak NA when peers are present, in that the association between victimization and depressive symptoms will be stronger for adolescents who experience higher peak NA when peers are present;

b) Peak PA when peers are present, wherein the association between victimization and depressive symptoms will be stronger for adolescents who experience lower peak PA when peers are present;

c) Perceived closeness and connectedness with peers when peers are present, wherein the association between victimization and depressive symptoms will be stronger for adolescents who experience lower perceived closeness and connectedness with peers when peers are present.

Hypothesis 7: The association between **rejection sensitivity** and depressive symptoms will be moderated by:

a) Peak NA when peers are present, such that the association between rejection sensitivity and depressive symptoms will be stronger for adolescents who experience higher peak NA when peers are present;

b) Peak PA when peers are present, wherein the association between rejection sensitivity and depressive symptoms will be stronger for adolescents who experience lower peak PA when peers are present;

c) Perceived closeness and connectedness with peers when peers are present, such that the association between rejection sensitivity and depressive symptoms will be stronger for adolescents who experience lower perceived closeness and connectedness with peers when peers are present.

Aim 4: To examine whether real-world peer interactions moderate the relationships between peer relationship variables identified in Aim 1 and MDD diagnostic status in the full sample. The direction of effect for all moderators described below is the same as what was described for Aim 3.

Hypothesis 8: The association between **peer victimization** and MDD diagnostic status will be moderated by:

a) Peak NA when peers are present;

b) Peak PA when peers are present;

c) Perceived closeness and connectedness with peers when peers are present.

Hypothesis 9: The association between **rejection sensitivity** and MDD diagnostic status will be moderated by:

a) Peak NA when peers are present;

b) Peak PA when peers are present;

c) Perceived closeness and connectedness with peers when peers are present.

1.5.1 Exploratory aims

Age and gender differences: To examine age and gender differences in the study variables and in the relationships between study variables (as described in hypotheses above).

Sensitivity analyses: To determine if affective functioning in *peer* contexts is a unique moderator of the associations between peer victimization, rejection sensitivity, and depression. That is, can affective functioning in other social contexts or affective functioning while alone also moderate these relationships?

Anxiety outcomes. Anxiety symptoms and anxiety disorders were also examined as outcomes in the moderation models. This allowed us to compare the effects of these models as predictors of depression, comorbid depression and anxiety, and anxiety.

2.0   METHODS

2.1   PARTICIPANTS

The sample consisted of 60 adolescents (ages 11-17 years; 17 male) who participated in a longitudinal study of pediatric affective disorders, the Youth Emotional and Social Development Study (YES-D). Of these, 29 participants were in a major depressive episode at the time of data collection. Thirty-one age- and gender-matched controls had no lifetime history of psychopathology. Because some youth with MDD originally recruited for the study did not meet final criteria for inclusion, the study sample ultimately contained more CON than MDD participants. While CON and MDD groups are therefore not identical with regard to age and gender, the groups did not differ significantly on these characteristics. Demographic characteristics are summarized in Table 1. CON and MDD groups did not differ significantly with regard to age, gender, race, or maternal education. Overall, females (71.7%) outnumbered males. The gender difference observed in this sample reflects national prevalence rates for adolescent depression in the U.S.; MDD is more common among females than males (Hankin et al., 1998; Merikangas et al., 2010). Because controls were matched by gender to the MDD group, there are also more female than male controls. The sample was European American (70%), African-American (26.7%), and Asian American (3.3%). Although differences were not statistically significant, there were some observable differences in maternal education across

groups; there were more mothers of youth with MDD whose education was completed after finishing high school; there were no mothers in the control group who did not complete at least some college. Group differences in race were also not significant, but again, there were subtle differences. Specifically, there were slightly more European American youth in the control group and slightly more African American youth in the MDD group.

Table 1. Demographic Characteristics, Depression Treatment, and Depressive Symptom Severity

Measure	Healthy Controls n = 31		Youth with MDD n = 29		$|t|$ or χ^2	p
Age (years)	14.52	(1.82)	14.41	(1.78)	.220	.827
Sex (% male)	32.3		24.1		.487	.485
Race (%)					1.792	.408
European American	77.4		62.1			
African American	19.4		34.5			
Asian American	3.2		3.4			
Maternal education (%)					7.14	.068
High school graduate	0.0		20.8			
Some college (at least 1 year)	46.4		29.2			
Degree from 4-year college	32.1		25.0			
Graduate professional training	21.4		25.0			
Currently taking SSRI (%)	0.0		6.90		2.21	.137
Mood and Feelings Questionnaire - Child	4.90	(6.46)	34.89	(14.98)	9.78	.000

Note. Values are means (and standard deviations) unless reported as percentages. Maternal education data were missing for 8 participants. Mood and Feelings Questionnaire scores were unavailable for one participant in the control group and one participant with MDD.

2.1.1   Inclusion criteria

Participants in the MDD group met DSM-IV diagnostic criteria for current Major Depressive Disorder (i.e., within the past 2 weeks), according to results of a structured clinical interview of adolescents and their parent(s) using the Schedule for Affective Disorders and Schizophrenia in School-Age Children—Present and Lifetime version (K-SADS-PL; Kaufman et al., 1997). Controls and their parent(s) also completed the K-SADS-PL to assess current and lifetime psychiatric disorders. Controls were eligible for the study if they had no lifetime history of Axis I disorders aside from Enuresis, which was permitted.

2.1.2   Exclusion criteria

Because of the biological measures involved in the original YES-D study protocols, adolescents were excluded if they had significant motor impairments, a history of head injury, neurological disorders, visual impairments (uncorrected vision < 20/40), or had metal objects in their body. Also excluded were adolescents taking psychotropic medications besides SSRIs or stimulants and those who were acutely suicidal. Two adolescents with MDD were taking antidepressant medication during the study; no participants were taking stimulants. Participants in the MDD group were excluded from this study if they had ever met DSM-IV criteria for a developmental disorder (e.g., autism spectrum disorders, mental retardation (IQ < 70)), schizophrenia, schizoaffective disorder, psychotic depression, or bipolar disorder, or currently met criteria for post-traumatic stress disorder, obsessive compulsive disorder, oppositional defiant disorder,

conduct disorder, substance abuse or dependence, or ADHD (predominantly hyperactive-impulsive type or combined type).

2.1.3   Youth with MDD

Twenty youth with MDD (69%) had a history of past outpatient treatment for mental health concerns (range: 3 weeks to 13 years) and three of these also had a history of inpatient psychiatric treatment. At baseline, 11 participants with MDD were actively engaged in outpatient therapy and two were taking SSRIs and participating in outpatient therapy. Several of the youth with MDD also met DSM-IV diagnostic criteria for anxiety disorders: GAD ($n = 9$); specific phobia ($n = 4$); social phobia ($n = 2$); separation anxiety ($n = 1$); and panic disorder with ($n = 1$) and without ($n = 1$) agoraphobia. Additionally, there were two youth who met criteria for ODD and one who was diagnosed with Enuresis.

2.2   PROCEDURES

Community advertisements were used to recruit youth in the control and MDD groups. Additionally, youth with MDD were recruited from mental health clinics and other research studies. To assess participants' current and lifetime history of DSM-IV disorders, adolescents and their parents completed structured clinical interviews during an initial 2-hour study visit. During the same visit, youth and parents also completed questionnaire measures. Both MDD and CON groups completed biological measures for the original study at baseline, followed by a 3-week ecological momentary assessment (EMA) protocol. Treatment for MDD was not provided

as part of this study; however, study staff provided information about treatment options in the local community and University to youth with MDD.

2.3   MEASURES

2.3.1   Diagnosis and screening of psychopathology

All participants and their parent(s) completed the K-SADS-PL during the initial study visit to assess current and lifetime psychopathology. Youth and parents were interviewed separately and findings were synthesized by the clinician who conducted the interviews. Fifteen percent of these interviews were double-coded to assess reliability; for diagnoses of past and current MDD, interrater reliability between two raters was 100%.

2.3.2   Depressive symptoms

Adolescents and parent(s) provided ratings of adolescents' depressive symptoms using the Mood and Feelings Questionnaire (Angold et al., 1995), child (33 items) and parent (34 items) versions. Participants indicate how true each item is of them (child version) or their child (parent version) over the past two weeks (0 = not true, 2 = true). Possible scores range from 0 to 66 (child version) and from 0 to 68 (parent version). For the child version of the MFQ, scores were available for 60 subjects (30 CON; 30 MDD) and internal consistency was high, $\alpha = .97$. Similarly, parent versions of the measure were completed for 54 participants (26 CON; 28 MDD) and internal consistency was high, $\alpha = .96$.

2.3.3   Peer victimization

Adolescents completed the 20-item Peer Relationships Questionnaire (PRQ; Rigby & Slee, 1993). Items consist of statements about several aspects of peer relationships, including bullying, victimization, and pro-social behavior. For each item, adolescents rate how true each item is of them on a scale from 1 to 4 (1 = Never, 4 = Very often). The victimization subscale, consisting of five items, was used in this study. The subscale includes four items targeting relational victimization (e.g., "I get called names by others"; "I get picked on by others"; "Others leave me out of things on purpose"; and "Others make fun of me") and one item relating to overt victimization (e.g., "I get hit and pushed around by others"). Possible scores on this subscale range from 5 to 20. Scores were available for 25 MDD and 28 CON participants. Internal consistency of this subscale in the study sample was high, $\alpha = .94$.

2.3.4   Rejection sensitivity

Adolescents completed the Brief Fear of Negative Evaluation Scale (Brief-FNE; Leary, 1983). In this 12-item self-report questionnaire, eight items consist of statements regarding concerns and apprehension about being negatively evaluated. Four items describe the absence of these concerns and are reverse coded. Adolescents rate how much each item applies to them on a scale from 1 to 5 (1 = Not at all; 5 = Extremely). Possible scores range from 12 to 60, with higher scores indicating greater concerns about negative evaluation. Internal consistency of this scale in a community sample of undergraduate students was high, Cronbach's $\alpha = .90$ (Leary, 1983), and very high, $\alpha = .97$, among a clinical sample of adults with social phobia and/or panic disorder (Collins, Westra, Dozois, & Stewart, 2005). Of note, in the latter study, the four reverse-worded

items were re-worded so that they were consistent with the other eight items. In the current sample, scores were available for 26 MDD and 30 CON participants and internal consistency of the full 12-item scale was good, $\alpha = .84$.

However, an 8-item version of the scale (created by simply leaving off 4 items) may have better reliability and validity than the 12-item measure due to some concerns with the wording of four reverse-coded items mentioned above. Previous work in a sample of undergraduate students (Rodebaugh et al., 2004) has shown that the 12 BFNE items actually fall on two moderately correlated ($r = .27$) factors: 1) the eight straightforwardly-worded items and 2) the four reverse-worded items. Rodebaugh and colleagues (2004) concluded that these two factors are a consequence of method variance due to confusion caused by the reverse-worded items and do not reflect separate underlying constructs. They also reported that convergent validity was greater for a subscale composed of the eight straightforward items, compared to the full measure. Certainly, there are concerns that methods variance associated with confusing wording may be an even greater problem in a younger sample.

To determine whether to utilize an 8- or 12-item form of the measure, an exploratory factor analysis of the measure was conducted in the present data. Results of a principal components analysis indicated that one factor consisting of the eight straightforwardly-worded items accounted for 49.3% of the variance in the scale. The four remaining items fell on a second factor, which accounted for an additional 15.8% of the variance. Among 56 youth who completed all eight straightforwardly-worded items, internal consistency for the 8-item scale was high, $\alpha = .94$. Two participants left the same negatively-worded item blank, leaving a subset of 54 youth who completed the four negatively–worded items; among these, the internal consistency for the scale was not high, $\alpha = .64$. Finally, the two subscales (consisting of either

straightforwardly-worded or negatively-worded items) were not significantly correlated, $r = -.17$, $p = .199$. Therefore, a scale consisting of only the 8 straightforward items was used as a measure of rejection sensitivity in this study. For the 8-item version of the scale, possible scores ranged from 8 to 40.

2.3.5   Ecological momentary assessment of emotion and social context

All youth participated in an EMA protocol that involved responding to phone calls conducted during three 5-day blocks (three week days and two weekend days) on consecutive weeks. Participants were provided with answer-only cell phones. Interviewers made 42 total phone calls to each participant (14 calls per week) between the hours of 4 PM on Thursday and 10 PM on Monday. Thus, there were four calls on weekdays and two on weekend days. Calls were made on a random schedule within two or four hour blocks of time.

During each EMA phone call, youth responded verbally to a brief structured interview querying them about emotional experiences and behavior. Calls lasted between 5-8 minutes on average. On all calls, youth were asked to rate affective experiences (e.g., "How sad/nervous/happy did you feel?") and to provide open-ended responses regarding social companions (e.g., "Who were you interacting with?" or "Who was with you?") for three time points: 1) time of the EMA phone call, 2) the most negative experience in the hour preceding the phone call, and 3) the most positive experience in the hour preceding the phone call. Thus, each EMA call yielded several measures of affective functioning that could be classified according to social context (i.e., with peers, parents, siblings, teachers).

2.3.5.1 Peer context

Calls in which adolescents reported being with a peer or peers at the time of the EMA call, peak positive event, or peak negative event were included in the analyses. Peers included individual friends (non-romantic or romantic), small groups of friends, classmates, or teammates.

2.3.5.2 Emotion ratings

As described above, ratings of emotional intensity were collected for three reference points during each phone call: time of the current phone call (i.e., momentary affect), most negative event in past hour (peak negative affect), and most positive event in past hour (peak positive affect). Only peak negative affect (NA) and peak positive affect (PA) ratings were used in this study. Five items (1 positive, 4 negative) from the Positive and Negative Affect Schedule for Children (PANAS-C; Laurent et al., 1999) were used to assess affect. For each item, adolescents reported to what degree they experienced an emotion (e.g., happy, sad, nervous, upset, angry) on a scale from 1 to 5 (1 = very slightly or not at all; 5 = extremely). One additional negative emotion item (bored) in this same format was also included. The mean of all five NA emotion ratings during the most negative event represented the peak NA score for each call. The single item, 'happy', was used as a measure of peak positive affect (PA). For each participant, average peak NA and peak PA scores were calculated across all ratings that occurred within a peer context.

2.3.5.3 Closeness and connectedness

Adolescents who reported interacting with a peer or peers at the time of the phone call were asked how close or connected they felt to their companion(s) (1 = very slightly or not at all; 5 =

extremely). For adolescents who reported being with peers during more than one phone call, a mean affect rating or closeness/connectedness rating was calculated across all relevant calls.

2.3.5.4 Data for analyses

Analyses involving EMA data were limited to a sample of 59 youth (30 CON and 29 MDD; 16 male) who completed at least 50% of EMA calls. The number of completed calls ranged from 21 to 42 calls per participant (M = 35.32 calls or 84.3% of calls made). All participants reported interacting with peers on at least one call. During 636 (30.5%) of the 2,084 completed calls, participants reported having peer companions either at the time of the call (67.5%) or while experiencing peak positive affect (73.1%) or peak negative affect (50%) in the hour prior to the call.

2.3.6   Covariates

Sex, age, ethnicity, and maternal education were also assessed via self-report measures.

2.3.7   Exploratory measures: Anxiety

Youth and parents completed the Self Report for Childhood Anxiety Disorders (SCARED; Birmaher et al., 1997) self-report questionnaire. The SCARED consists of 41 items; participants indicate how well each item describes them (child version) or their child (parent version) over the past three months (0 = Not true or hardly ever true, 2 = very true or often true). Possible scores range from 0 to 82. In the study sample, 55 youth (29 CON; 26 MDD) completed the SCARED and internal consistency was high, α = .96. Similarly, 49 parents (25 CON; 24 MDD)

rated their children's anxiety on the SCARED parent version and internal consistency was high, $\alpha = .93$. Diagnoses of current anxiety disorders were made via K-SADS-PL interview, as described above.

2.4   DATA ANALYTIC PLAN

2.4.1   Missing data

On self-report measures, values were included for participants who left up to two items incomplete on each measure. For the peer victimization and rejection sensitivity measures, the mean of all other items on the measure was used to replace up to two missing items. No substitutions were made for missing or incomplete items on measures of depressive symptoms, as these measures were treated as count data (i.e., symptom counts) in the regression models.

2.4.2   Distributions of measures

Because some of the analyses described below involved examination of dimensional variables across two groups (MDD vs. CON) that, when combined, may not have represented a normal distribution, the distributions of variables used as predictors and outcomes in the regression models were carefully examined. None of the study variables were found to have a bifurcated distribution, although some (e.g., peer victimization (PRQ), child- and parent-reported depressive symptoms (MFQ)) were positively skewed. Although recoding peer victimization as a categorical variable was considered, it was retained as a continuous measure in order to preserve

variance. Because MFQ scores included a large number of zeros, transforming the measure to address skew was impractical. Instead, regression models that accommodated positively skewed and overdispersed data were employed, as described below.

2.4.3 Analytic plan

To examine the first aim, determining whether peer relationship variables that have been linked to depressive symptoms and community samples differ between youth with MDD and healthy controls, t-tests were used to compare MDD and CON groups on measures of peer victimization and rejection sensitivity. Preliminary analyses examined possible group differences in rates of participation in positive, negative, and momentary interactions with peers to ensure that any group differences in EMA emotion variables were not due to group differences in overall participation in peer interaction.

For the second aim, examining real-world peer interactions of depressed and non-depressed youth using EMA, t-tests were used to compare group mean scores for peak NA with peers, peak PA with peers, and closeness/connectedness with peers. To ensure that group differences in real-world affective functioning were not due to group differences in rates of social interaction with peers, preliminary analyses examined possible group differences in time spent with peers (i.e., number of completed calls when adolescents reported being with a peer) for peak NA, peak PA, and momentary calls. Consistent with previous findings (Silk et al., 2011), no group differences were observed in rates of social activity with peers (p values ranged from .596 to .925).

Finally, to examine whether emotional experiences during real-world peer interactions moderate the relationships between peer risk variables (i.e., victimization and rejection

sensitivity) and child- or parent- reported depressive symptoms or MDD diagnostic status, three possible moderators (i.e., peak NA, peak PA, and momentary perceived closeness and connectedness) were tested for each of two peer predictor variables (i.e., victimization and rejection sensitivity). For models with MDD diagnostic status as the outcome, logistic binomial regression was conducted using R (2015). For models with depressive symptoms as the outcome, the skewed and overdispersed nature of the depressive symptoms measures (ratio of variance to mean = 18.38 and 14.98 for MFQ-Child and MFQ-Parent, respectively) precluded use of OLS regression. Instead, Poisson and negative binomial models were considered and fit characteristics compared; the negative binomial model, which accounts for overdispersion, was found to provide a better fit for the data and was therefore employed for all tests of moderation with continuous outcomes. R (2015) was used to calculate negative binomial models. Prior to inclusion in regression models, continuous measures were standardized.

2.4.4   Bootstrapping

Due to concerns regarding the small sample size and low likelihood of detecting small or possibly even moderate effects, if the regression coefficient for an interaction term in a given model indicated a moderate effect size but was not significantly different from zero according to results of the Wald z test, bootstrapping was performed (10,000 samples) for the standard error and 95% confidence interval of a regression coefficient. For negative binomial models, bootstrapping was performed in R (2015) and the Bias Corrected and Accelerated (BCA; Efron, B, 1987) method was used to calculate bootstrapped confidence intervals for regression coefficients. To determine the need for bootstrapping, effect sizes (Cohen's *d*) were estimated from odds ratios (see Chinn, 2000) for binomial regression models and from incidence response

rates (IRRs) for negative binomial models. Effects were classified as small ($.20 \leq d < .50$), moderate ($.50 \leq d < .80$), and large ($d \geq .80$) (Cohen, 1992).

2.4.5 Covariates

For tests of group differences and regression models, the following potential covariates were considered: sex, age, ethnicity, and maternal education. Group differences in the covariates were tested via t-test and associations were examined between covariates and study variables using bivariate correlations. Decisions to include variables as covariates in the analyses were based on findings for group differences and associations with other variables, as well as theory. As expected, given that the original study sample was group-matched by gender and age, Table 1 shows no significant group differences in sex or age. Further, there were no significant group differences in ethnicity or maternal education. It was decided that the lack of group differences and lack of association between the covariates (i.e., sex, ethnicity, and maternal education) and depression measures (see Table 5) meant it was reasonable not to test these variables as covariates in tests of group differences and regression models. However, despite the lack of group differences (see Table 1) and lack of correlation between age and any of the outcome measures (see Table 5), analyses were conducted with and without age as a covariate for theoretical reasons due to the broad age range represented in the study sample.

For analyses involving EMA emotion variables, the number of completed EMA calls relevant to each emotion measure was considered as a covariate for each test. For example, the total number of completed EMA calls during which each participant reported being with a peer while experiencing peak NA would be included as a covariate in a test of group differences on peak NA with peers. Although we found no group differences in number of completed calls (see

Appendix) and total calls did not correlate with any depression measures (see Table 5), theoretical concerns prompted the inclusion of number of completed EMA calls as a covariate in analyses. That is, due to variability in the number of calls during which adolescents reported being with peers, EMA analyses were conducted with and without the appropriate measure of total completed EMA calls with peers as a covariate.

Analytic strategies for testing the statistical significance of covariates differed depending on the type of analysis. For tests of group differences, ANCOVA, which is reasonably robust in the presence of skewed data, was employed to repeat *t*-tests with covariates. For regression models, covariates were tested by running each model with and without each covariate included.

2.4.6   Accounting for multiple comparisons

The Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995; Thissen, Steinberg, & Kuang, 2002) was used to control the false positive rate, given the multiple comparisons conducted in this research. This was applied only to planned analyses with hypothesized outcomes described above (i.e., not for exploratory analyses, including repeats of various analyses with covariates). R was also used to complete this analysis. Results are first presented without correction for multiple comparisons, then with correction for multiple comparisons.

2.4.7   Exploratory analyses

2.4.7.1 Age and gender

In addition to including age and gender as covariates in the analyses described above, possible age and gender effects on the outcome measures were examined by calculating bivariate

correlations between age and dimensional outcome measures and comparing male and female participants on dimensional (t-tests) and categorical (χ^2 test) outcomes. Because including gender as a covariate in moderation models was impractical given the small number of boys in the sample ($n = 17$), potential gender differences in moderation models were examined by repeating all of the analyses within girls only. Effect sizes for the girls-only subset were then compared descriptively to effect sizes obtained in the full sample.

2.4.7.2 Specificity of social context

An additional exploratory aim was to determine whether affective functioning with others or affective functioning removed from social contexts (i.e., while alone) also moderates relationships between peer victimization, rejection sensitivity, and depression. To this end, models in which affective experiences with peers moderated the association between peer variables and depressive symptoms were tested with two other moderators: affective experiences in 1) non-peer social contexts (i.e., all other social companions combined) and 2) while alone.

2.4.7.3 Specificity of outcomes

Another exploratory aim was to evaluate moderation models with regard to specificity of outcomes (i.e., anxiety versus depression). To this end, regression models described above were repeated with dimensional and categorical measures of anxiety as outcomes.

2.4.7.4 Analytic plan for exploratory analyses

Moderation models originally examining predictors of child- and parent-reported depressive symptoms were repeated with child- and parent-reported anxiety symptoms as outcomes. As above, the outcome measures were checked for skewness prior to performing tests of

moderation. Both child- and parent-reported measures of anxiety were positively skewed and overdispersed (dispersion statistics for child- and parent-reported measures were 14.01 and 9.71, respectively). As in the primary study analyses described above, negative binomial and Poisson models were considered. For both child- and parent-reported symptoms, the negative binomial model consistently provided a significantly better fit than the Poisson model and was therefore applied.

Moderation models originally examining predictors of MDD diagnostic status were all repeated using ordinal logistic regression with a 3-level outcome based on diagnostic category: Control vs. MDD only vs. MDD with anxiety disorder. The interdependent nature of the MDD and MDD/anxiety categories precluded use of multinomial logistic regression as there is a violation of the assumption of independence of the levels of the dependent variable. Therefore, ordinal regression analyses were completed using the PLUM procedure in SPSS v. 22.

2.4.8   Power analysis

For the *t*-tests comparing depressed and comparison groups on measures of rejection sensitivity and peer victimization, there was sufficient power (.80) to detect large effects (Cohen's d = .89 and d = .91, respectively) in one-tailed tests. For one-tailed *t*-tests comparing MDD and CON participants on measures of affective functioning, there was sufficient power to detect large effects for peak NA (d = .94), peak PA (d = .87), and closeness/connectedness (d = .93). For regression models, there was sufficient power to detect large effects for the full models (i.e., deviation of R^2 from zero) including all four predictors: peer variable (victimization or rejection sensitivity), EMA emotion variable, interaction, and covariate (age or number of completed

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calls). Within each regression model, there was sufficient power to detect moderate effects of the individual predictors.

3.0   RESULTS

3.1   FORMAT OF THE RESULTS

3.1.1   Covariates

As described in the data analytic plan (see above), age and total completed EMA calls were assessed as covariates for tests of group differences and regression models; the latter was included as a covariate only where appropriate (i.e., in analyses involving EMA measures). A larger number of potential covariates were initially considered and evaluated for inclusion in study analyses; the process by which potential covariates were evaluated and selected is described above in the analytic plan. Neither age nor number of completed EMA calls significantly affected the results of any analyses when they were included as covariates. Therefore, the following results are presented without inclusion of age or number of completed EMA calls as covariates for the sake of parsimony.

3.1.2   Accounting for multiple comparisons

In each section describing results of planned comparisons below, results are presented first without and then with the Benjamini-Hochberg correction for multiple comparisons. When there is no specific mention of results differing following application of the Benjamini-Hochberg

procedure in a given section, the reader may interpret this to mean that significance of the results was unchanged when corrections were applied for multiple comparisons.

3.2 HYPOTHESES 1-2: GROUP DIFFERENCES IN VICTIMIZATION AND REJECTION SENSITIVITY

As shown in Table 2, adolescents with MDD reported higher levels of peer victimization than healthy controls. The effect size for this difference was large, Cohen's $d = .94$. Similarly, youth with MDD reported greater rejection sensitivity than controls. This difference also had a large effect, $d = 1.31$.

Table 2. Descriptive Statistics and Tests of Group Differences for Peer Victimization, Rejection Sensitivity, and EMA Affect with Peers Variables

	CON		MDD					
Variable	*n*	*M (SD)*	*n*	*M (SD)*	*df*	*|t|*	*p*	*d*
Peer Victimization	29	6.07 (2.14)	25	9.40 (4.51)	33.13	3.38	.002	.94
Rejection Sensitivity	30	14.67 (5.38)	26	24.23 (8.81)	40.14	4.81	.000	1.31
EMA Affect with Peers:								
Peak NA	26	1.78 (.41)	24	2.29 (.49)	48	4.04	.000	1.15
Peak PA	29	3.69 (.76)	29	3.92 (.62)	56	1.24	.216	.34
Close./ connect.	27	3.71 (.88)	25	3.75 (.88)	50	.20	.846	.05

3.3 HYPOTHESES 3-5: GROUP DIFFERENCES IN EMA MEASURES OF AFFECT

As shown in Table 3, preliminary analyses confirmed that there were no group differences in rates of participation in peer experiences for peak PA, peak NA, or feelings of

closeness/connectedness (momentary) with peers; youth in both groups reported being in the presence of peers on similar numbers of EMA calls. Further, as shown in Table 4, there were no group differences in the number of youth within each group who reported being with peers on at least one EMA call for each emotional EMA variable (i.e., peak NA, peak PA, closeness/connectedness). Thus, it is unlikely that any group differences in EMA emotion variables described below can be attributed to group differences in peer involvement.

Results for tests of group differences in EMA emotion variables are summarized in Table 2. With regard to peak NA, youth with MDD reported experiencing greater overall levels of peak NA during real-world peer interactions, compared to controls. The size of this effect was large, *d* = 1.15. In contrast, youth with MDD did not differ significantly from controls with regard to peak PA with peers or feelings of closeness/connectedness with peers during peer interactions.

3.4   HYPOTHESES 6-7: TESTS OF MODERATION IN MODELS WITH DEPRESSIVE SYMPTOMS AS OUTCOMES

3.4.1   Intercorrelations

Table 5 summarizes intercorrelations among continuous variables included in the regression models. Both peer victimization and rejection sensitivity were positively associated with child- and parent-reported depressive symptoms. Higher levels of peak NA with peers were also associated with greater self- and parent-reported depressive symptoms. However, peak PA and feelings of closeness/connectedness with peers were not associated with depressive symptoms.

Table 3. Preliminary Analyses: Tests of Group Differences in Total EMA Calls Per Participant for Each EMA Variable

		CON			MDD				
EMA Variable	*n*	*M* (*SD*)	Range	*n*	*M* (*SD*)	Range	$|t|$(57)	*p*	*d*
Peak NA w. Peers	30	4.97 (5.14)	0 - 20	29	5.38 (6.67)	0 - 26	.27	.791	.07
Peak PA w. Peers	30	7.83 (6.95)	0 - 26	29	7.93 (6.91)	1 - 30	.05	.957	.01
Close./connect. w. Peers	30	6.97 (6.59)	0 - 25	29	7.59 (7.86)	0 - 32	.33	.744	.09

Table 4. Preliminary Analyses: Descriptive Statistics and Tests of Group Differences in Number of Participants Reporting None versus Some Victimization, Rejection Sensitivity, and Total Number of EMA Phone Calls During Which Each Participant Reported Peak NA with Peers, Peak PA with Peers, or Closeness/Connectedness with Peers

		CON			MDD			
Variable	*n*	Total Reporting None (%)	Total Reporting Some (%)	*n*	Total Reporting None (%)	Total Reporting Some (%)	χ^2	*p*
Peer Victimization	28	15 (53.6)	13 (46.4)	25	7 (28.0)	18 (72.0)	3.56	.059
Rejection Sensitivity	29	5 (17.2)	24 (82.8)	26	1 (3.8)	25 (96.2)	2.53	.112
EMA Calls								
Peak NA w. Peers	30	4 (13.3)	26 (86.7)	29	5 (17.2)	24 (82.8)	.17	.676
Peak PA w. Peers	30	1 (3.3)	0 (0)	29	29 (96.7)	29 (100.0)	.98	.321
Close./ connect. w. Peers	30	3 (10.0)	27 (90.0)	29	4 (13.8)	25 (86.2)	.20	.652

Table 5. Intercorrelations Among Study Variables for Participants Included in EMA Analyses ($n = 59$)

Measure	1	2	3	4	5	6	7	8	9	10	11
Predictor Variables											
1. Peer Victimization	--										
2. Rejection Sens.	.62**	--									
Moderator Variables											
3. Peak NA	.30*	.58****	--								
4. Peak PA	-.07	-.01	-.07	--							
5. Close/connected	-.17	-.12	.03	.50**	--						
Outcome Variables											
6. MFQ - Child	.46**	.59****	.59****	-.13	-.15	--					
7. MFQ - Parent	.37*	.52***	.41**	-.07	-.14	.76****	--				
Covariates											
8. Age	-.15	-.04	-.10	-.05	-.05	-.00	.01	--			
9. Total pos. emotional calls	-.14	-.12	-.07	.22$^+$	.40**	-.06	-.23	.24$^+$	--		
10. Total neg. emotional calls	-.13	-.02	.05	.09	.28*	.00	-.20	.32*	.85**	--	
11. Total momentary calls	-.10	-.09	.01	.23	.29*	-.02	-.18	.22	.90**	.82**	--
Mean (SD)	7.64 (3.83)	19.16 (8.65)	2.03 (.52)	3.81 (.70)	3.73 (.87)	19.68 (18.89)	11.84 (13.25)	14.46 (1.80)	7.88 (6.87)	5.17 (5.89)	7.27 (7.19)
N	53	55	50	58	52	57	51	59	59	59	59
Measure	1	2	3	4	5	6	7	10	11	12	13

$^+p < .10$, *$p<.05$, **$p<.01$, ***$p<.001$, ****$p<.0001$.

There were some additional significant correlations outside the scope of the planned regression models. Specifically, heightened feelings of closeness and connectedness with peers were associated with greater peak PA with peers and with more total EMA calls with peers in all categories (i.e., peak positive, peak negative, and momentary). Thus, youth who reported feeling more close and connected with peers also reported more experiences with peers in general. There were large positive correlations between total EMA calls in each category (i.e., positive, negative, momentary), suggesting within-person consistency in the amount of social participation with peers.

3.4.2   H6: Associations between victimization and depressive symptoms

Three variables were tested as moderators of the association between victimization and depressive symptoms (both child and parent ratings): Peak NA, peak PA, and closeness/connectedness. Variables were entered into regression models in a stepwise fashion; victimization was always the only variable in the first step of the model. Results are summarized in Table 6. Sample sizes varied across models due to differences in the number of youth with EMA data for each moderator tested.

Across all three models tested, there were consistent associations between victimization and child-reported depressive symptoms, with youth reporting higher levels of victimization more likely to report greater depressive symptoms. For every one standard deviation increase in victimization above the sample mean for victimization, there was a 44 – 72% increase in depressive symptoms. Although victimization was also positively associated with parent-reported depressive symptoms in all three models tested, with each one SD increase in victimization associated with a 37-46% increase in depressive symptoms, this association was

Table 6. Models Testing Contributions of Victimization, Rejection Sensitivity, and Emotional Experiences with Peers to Child- and Parent-Reported Depressive Symptoms and MDD Diagnostic Status

| | Depressive Symptoms | | | | | | | | | | MDD Diagnostic Status | | | | |
| | Child-Reported | | | | | Parent-Reported | | | | | | | | | |
	n	IRR	p(IRR)	ΔX^2	$p(\Delta X^2)$	n	IRR	p(IRR)	ΔX^2	$p(\Delta X^2)$	n	OR	p(OR)	ΔX^2	$p(\Delta X^2)$
Step 1	46			6.60	.010	39			3.34	.068	46			10.20	.001
Victimization		**1.72**	**.009**				1.46	.073				**4.19**	**.015**		
Step 2				14.86	.000				9.29	.002				6.10	.013
Victimization		1.53	.021				1.38	.097				2.59	.055		
Peak NA		**2.21**	**.000**				**1.78**	**.002**				**2.69**	**.022**		
Step 3				2.65	.100				1.87	.171				1.12	.290
Victimization		1.46	.034*				1.29	.178				3.15	.033*		
Peak NA		2.25	.000				1.76	.001				3.09	.016		
Victim. x Peak NA		1.45	.062				.75	.143				2.08	.311		
Step 1	52			5.54	.019	45			3.91	.048*	52			11.48	.001
Victimization		**1.44**	**.024***				1.37	.072				**3.60**	**.011**		
Step 2				.06	.802				.97	.324				6.05	.014
Victimization		1.44	.025*				1.42	.048*				4.77	.005		
Peak PA		.95	.779				.77	.209				**2.58**	**.025***		
Step 3				.13	.716				.01	.935				4.22	.040*
Victimization		1.45	.023				1.41	.072				11.05	.005		
Peak PA		.95	.749				.78	.276				3.28	.021		
Victim. x Peak PA		1.06	.692				1.03	.928				2.62	.141		
Step 1	47			5.94	.015	41			4.73	.030*	47			12.59	.000
Victimization		**1.48**	**.019**				**1.41**	**.049***				**4.08**	**.010**		
Step 2				.03	.871				.01	.906				2.25	.134
Victimization		1.48	.022				1.41	.058				4.63	.007		
Close/connected		.97	.881				.98	.904				1.77	.157		
Step 3				.14	.712				.00	.997				.77	.381
Victimization		1.52	.025*				1.41	.094				6.05	.011		
Close/connected		.97	.876				.98	.904				1.88	.121		
Victim. x Close/Connect		1.06	.727				1.00	.997				1.49	.392		

Table 6 (continued)

	Depressive Symptoms														
	Child-Reported					Parent-Reported					MDD Diagnostic Status				
	n	IRR	p(IRR)	ΔX^2	$p(\Delta X^2)$	n	IRR	p(IRR)	ΔX^2	$p(\Delta X^2)$	n	OR	p(OR)	ΔX^2	$p(\Delta X^2)$
Step 1	47			11.85	.001	40			11.94	.001	47			16.18	.000
Rejection Sens.		**1.82**	**.001**				**1.68**	**.001**				**4.30**	**.001**		
Step 2				11.67	.001				4.78	.029*				2.70	.101
Rejection Sens.		1.45	.055				1.44	.042*				2.93	.025*		
Peak NA		**2.07**	**.000**				**1.50**	**.034***				2.09	.114		
Step 3				5.87	.015				2.78	.095				.17	.682
Rejection Sens.		1.53	.020				1.53	.015				3.03	.025*		
Peak NA		2.15	.000				1.51	.027*				2.10	.115		
Rej. Sens. x Peak NA		**.63**	**.015**				.75	.109				.80	.685		
Step 1	53			12.56	.000	47			13.97	.000	54			18.41	.000
Rejection Sens.		**1.71**	**.001**				**1.74**	**.000**				**4.11**	**.000**		
Step 2				.94	.333				.07	.792				3.37	.066
Rejection Sens.		1.71	.000				1.74	.000				4.54	.000		
Peak PA		.86	.330				.95	.745				1.90	.086		
Step 3				.05	.816				1.06	.303				.11	.738
Rejection Sens.		1.71	.001				1.79	.000				4.42	.000		
Peak PA		.87	.359				.94	.702				1.98	.088		
Rej. Sens. x Peak PA		1.04	.805				.81	.195				1.17	.737		
Step 1	48			9.86	.002	43			10.29	.001	49			16.81	.000
Rejection Sens.		**1.68**	**.002**				**1.69**	**.001**				**4.13**	**.001**		
Step 2				.47	.492				.23	.628				.64	.422
Rejection Sens.		1.67	.002				1.66	.002				4.46	.001		
Close/Connected		.89	.508				.92	.614				1.37	.434		
Step 3				.00	.969				.12	.730				.04	.848
Rejection Sens.		1.67	.002				1.66	.002				4.48	.001		
Close/Connected		.90	.516				.92	.614				1.35	.471		
Rej. Sens. x Close/Conn.		1.01	.967				.94	.685				.93	.850		

Note. *Result no longer significant when Benjamini-Hochberg correction made for multiple comparisons.

significant in only 1 of the 3 models. Additionally, once corrections were made for multiple comparisons, the association between victimization and depressive symptoms was significant in only 2 of 3 models for child-reported depressive symptoms and victimization was *not* significantly linked to parent-reported depressive symptoms.

3.4.2.1 Peak NA

Beyond the effect of victimization, there was a significant additional effect of peak NA for child- and parent-reported depressive symptoms wherein a one SD increase in peak NA was linked to a 78% increase in parent-reported symptoms and a 121% increase in child-reported symptoms. The interaction between victimization and peak NA trended toward significance in the model for child-reported depressive symptoms ($p =.062$); for each one SD increase in peak NA, the effect of victimization on depressive symptoms increased by 45%. However, the effect size was negligible (*IRR* = 1.62) and bootstrapping was not performed. Further, this interaction was not significant in the model predicting parent-reported depressive symptoms and bootstrapping was not performed because the effect was negligible (*IRR* = .75).

3.4.2.2 Peak PA

Peak PA did not contribute significantly to the variance in child- or parent-reported depressive symptoms, beyond the effects of victimization; for each one SD increase in peak PA, child-reported depressive symptoms decreased by 5% while parent-reported symptoms decreased by 33%. There were no significant interactions between victimization and peak PA.

3.4.2.3 Closeness/connectedness

Beyond the effects of victimization, closeness/connectedness did not contribute significantly to the variance in child- or parent-reported depressive symptoms. Indeed, depressive symptoms decreased only 2-3% for each SD increase in closeness/connectedness. Further, the interaction between victimization and closeness/connectedness was not significant for child- or parent-reported depressive symptoms.

3.4.2.4 Summary

The association between peer victimization and child- and parent-reported depressive symptoms was generally positive, but not consistently significant. Beyond the effects of victimization, there was an additional effect of peak NA in peer contexts for both child- and parent-rated depressive symptoms, but no significant additional effects for peak PA or closeness/connectedness. There were no significant moderators of the relationship between victimization and depressive symptoms.

3.4.3 H7: Associations between rejection sensitivity and depressive symptom

As above, emotional experiences with peers (i.e., peak NA, peak PA, and closeness/connectedness) were tested as possible moderators of the association between rejection sensitivity and depressive symptoms. Findings are summarized in Table 6. Higher levels of rejection sensitivity were consistently associated with greater child- and parent-reported depressive symptom severity in all models. Specifically, an elevation of one SD above the mean in rejection sensitivity was associated with a 68-82% increase in child-reported symptoms and a 68-74% increase in parent-reported symptoms.

3.4.3.1 Peak NA

With rejection sensitivity held constant, there was an additional effect of peak NA for both child- and parent-reported depressive symptoms; for each one SD increase in peak NA with peers, there was a 107% increase in child-reported symptoms and a 50% increase in parent-reported symptoms. However, once corrections were made for multiple comparisons, the additional effect of peak NA only remained significant in the model for child-reported symptoms; the additional effect of peak NA was no longer significant for parent-reported symptoms.

There was a significant interaction between peak NA and rejection sensitivity for the model with child-reported depressive symptoms as the outcome. As shown in Figure 2, the association between rejection sensitivity and depressive symptoms differed depending on the level of NA reported for peer interactions. Specifically, for each one SD increase in peak NA with peers, the association between rejection sensitivity and depressive symptoms decreased by 37%. Thus, the relationship between rejection sensitivity and depressive symptoms was strongest at low levels of negative affect. With increasing NA intensity, the association between rejection sensitivity and depression decreased until it was no longer significant. For youth reporting high overall intensity of peak NA with peers ($\geq$ 1 *SD* above the mean), the association between rejection sensitivity and depressive symptoms was negligible and not significant; among these youth, depressive symptoms were elevated regardless of rejection sensitivity score.

It is important to note that the average peak NA reported by participants (*M* = 2.03, *SD* = .52) was "a little" and that a one standard deviation increase above the mean (2.55) was still "a little" negative affect on the original 1 to 5 scale. Further, one standard deviation below the mean falls between "very little or not at all" and "a little" on the same rating scale.

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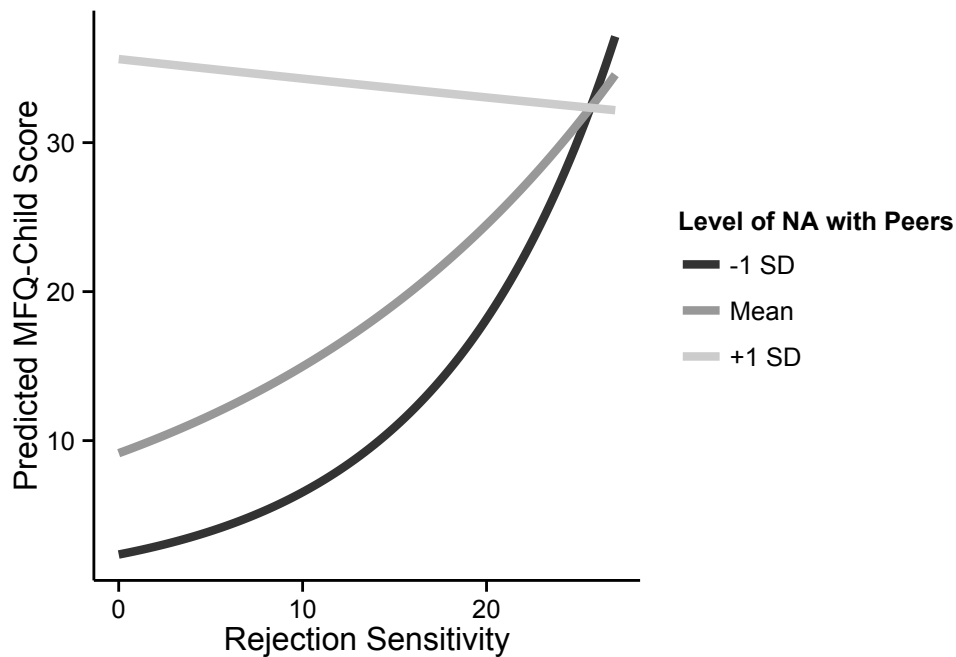
Figure 2. Interaction between Rejection Sensitivity and Peak NA for Negative Binomial Model Predicting Child-Reported Depressive Symptoms.

3.4.3.2 Peak PA

Beyond the effects of rejection sensitivity, peak PA with peers did not contribute significantly to the variance in child- or parent-reported depressive symptoms; for each one SD increase in peak PA with peers above the sample mean, child- and parent-reported depressive symptoms decreased 14% and 5%, respectively. There were no significant interactions between rejection sensitivity and peak PA.

3.4.3.3 Closeness/connectedness

With rejection sensitivity held constant, perceived closeness/connectedness with peers did not contribute significantly to the variance in child- or parent-reported depressive symptoms; for

each one SD increase in closeness/connectedness with peers above the sample mean, child- and parent-reported depressive symptoms decreased 11% and 8%, respectively. There were no significant interactions between rejection sensitivity and closeness/connectedness.

3.4.3.4 Summary

Youth who reported greater concerns about rejection consistently reported higher levels of depressive symptoms and were perceived as more depressed by their parents. Relative to the effects of rejection sensitivity, peak NA with peers contributed additional variance to the models for child- and parent-rated depressive symptoms, but this was only significant in the model for child-reported symptoms after corrections for multiple comparisons. There were no additional effects of peak PA or closeness/connectedness. One moderation effect was found, wherein the positive association between rejection sensitivity and depressive symptoms was less strong at higher levels of peak NA.

3.5 HYPOTHESES 8-9: TESTS OF MODERATION IN MODELS WITH MDD DIAGNOSTIC STATUS AS OUTCOME

3.5.1 H8: Association between victimization and MDD status

As described above for tests with continuous outcomes, a series of three nested models tested (1) the univariate effect of victimization, (2) additional effect of each EMA variable, and (3) an interaction between victimization and each EMA variable. Findings for all three models are summarized in Table 6. Victimization was significantly associated with MDD status for all three

models. Youth who reported levels of victimization one SD above the sample mean for victimization were 3.6 to 4.2 times more likely to be within the MDD group than youth reporting average levels of victimization. It should be noted that the sample average ($M = 7.64$, $SD = 3.83$) reflects a low level of victimization; a score of 5 on this subscale denotes *no* victimization.

3.5.1.1 Peak NA

The addition of peak NA to the model contributed significantly to increased odds of being in the MDD group, beyond the effects of victimization. For youth reporting levels of peak NA one standardization above the mean level of peak NA in the sample, the odds of falling within the MDD group were 2.69 times greater than youth reporting average levels of peak NA with peers. There was no significant interaction between victimization and peak NA.

3.5.1.2 Peak PA

Beyond the effects of victimization, the addition of peak PA with peers to the model contributed significantly to increased odds of falling within the current MDD group. For each one standard deviation increase in peak PA, the odds of falling within the MDD group increased 2.58 times; however, this effect was no longer significant when corrections were made for multiple comparisons. The interaction term (victimization x peak PA) did not differ from zero, although the chi-square test indicated that it contributed significantly to the overall model variance. However, this chi-square test finding was no longer significant once corrections were made for multiple comparisons.

3.5.1.3 Closeness/connectedness

Closeness/connectedness did *not* contribute significantly to the odds of being in the MDD group, beyond the effects of victimization. Further, the interaction between victimization and closeness/connectedness was not significant.

3.5.1.4 Summary

Youth reporting more experiences of peer victimization were more likely to fall within the MDD group. Greater experiences of NA with peers were associated with increased odds of falling within the MDD group. Once corrections were made for multiple comparisons, there were no additional effects of peak PA or closeness/connectedness and none of the interactions tested were significant.

3.5.2 H9: Association between rejection sensitivity and MDD status

The same three EMA measures described above were also tested as moderators of the association between rejection sensitivity and MDD status. Results were summarized in Table 6. Higher levels of rejection sensitivity were consistently associated with greater odds of falling within the MDD group. Specifically, compared to youth reporting average levels of rejection sensitivity, those reporting rejection sensitivity 1 SD above the mean were between 4.11 and 4.30 times more likely to fall within the MDD group.

3.5.2.1 Peak NA

Peak NA did not contribute significantly to explaining odds of falling within the MDD group with rejection sensitivity held constant and there was no significant interaction between rejection sensitivity and peak NA.

3.5.2.2 Peak PA

Beyond the effects of rejection sensitivity, peak PA with peers did not contribute significantly to the odds of falling within the MDD group although there was a trend toward significance ($p = .086$). This was a small effect ($OR = 1.90$). There was no interaction between rejection sensitivity and peak PA.

3.5.2.3 Closeness/connectedness

There was no additional effect of closeness/connectedness with peers and the interaction between rejection sensitivity and closeness/connectedness was not significant.

3.5.2.4 Summary

Youth reporting greater concerns about interpersonal rejection were more likely to fall within the MDD group. There were no additional or interaction effects for any of three moderators tested.

3.6   EXPLORATORY ANALYSES

Corrections to control the family wise discovery rate were *not* made for exploratory analyses described below.

3.6.1 Gender

3.6.1.1 Tests of sex differences in study variables

As shown in Table 7, gender comparisons were made for all continuous variables: predictors, moderators, and outcome variables. Results of *t*-tests showed no significant gender differences on measures of depressive symptoms, anxiety symptoms, peer victimization, rejection sensitivity, or EMA measures of NA, PA, and closeness/connectedness with peers. However, small (nonsignificant) effects were found for some variables. Namely, males reported slightly more peer victimization than females, while females reported slightly more peak PA with peers, closeness/connectedness with peers, and were rated as slightly more depressed by parents, compared to males.

Gender comparisons were made for the categorical outcome variable distinguishing youth with current MDD versus controls. It should be noted that in the original study, groups (MDD vs. control) were matched on gender. Of the 17 male participants, 7 (41.2%) were youth with MDD. In contrast, of the 43 female participants, 22 (51.2%) had current MDD. A chi-square test indicated that the proportion of youth with MDD did not differ among males and females, $\chi^2 = .49$, $p = .485$.

Gender comparisons were also made for the categorical outcome variable that distinguished youth with current MDD vs. youth with current MDD and an anxiety disorder vs. controls; findings are shown in Table 8. Again, it is important to note that the original study groups (MDD and control) were matched by gender. There were no gender differences in the proportion of youth with MDD only vs. MDD and anxiety vs. youth with no history of psychopathology.

Table 7. Tests of Sex Differences for Continuous Measures

	Male		Female					
Measure	*n*	*M* (*SD*)	*n*	*M* (*SD*)	*df*	|*t*|	*p*	*d*
Peer Victim.	16	8.63 (4.70)	38	7.18 (3.33)	52	1.28	.206	.34
Rej. Sensitivity	15	20.07 (8.74)	41	18.76 (8.61)	54	.50	.617	.15
EMA Affect								
Peak NA w. Peers	15	2.02 (.33)	35	2.03 (.58)	43.68	.00	.997	.00
Peak PA w. Peers	16	3.68 (.71)	42	3.85 (.70)	56	.84	.406	.25
Close/connect. w. Peers	14	3.44 (.81)	38	3.84 (.88)	50	1.47	.147	.49
Depressive symptoms								
Child report	16	17.44 (17.22)	42	20.12 (19.61)	56	.48	.633	.15
Parent report	14	9.86 (11.89)	38	12.31 (13.75)	50	.59	.558	.33

Table 8. Proportion of Male and Female Participants with Current MDD, Current MDD and Current Anxiety Disorder, or No Lifetime History of Psychopathology

	Current Diagnostic Group				
	Control	MDD only	MDD/Anxiety		
Sex	*n* (% within sex)	*n* (% within sex)	*n* (% within sex)	χ^2(2)	*p*
Male	10 (62.5)	2 (12.5)	4 (25.0)	2.257	.323
Female	21 (51.2)	13 (31.7)	7 (17.1)		

Note. n = 57, which includes male participant (control) excluded from EMA analyses for having too few completed phone calls. One male and one female subject from the MDD group were excluded from this comparison because information regarding anxiety disorder diagnostic status was not available.

3.6.1.2 Informal exploration of possible sex differences in regression models

All moderation models tested above in the full sample were repeated within female participants only. Descriptive comparisons of effect sizes from models calculated within the full sample versus girls only are provided below.

(a) Associations between victimization and depressive symptoms in girls

In general, the associations between peer victimization and depressive symptoms were similar in girls and in the full sample (*IRR*s ranged from 1.42 to 2.17 in girls, vs. 1.68 to 1.82 in the full sample). With victimization held constant, higher levels of peak NA were associated with greater depressive symptoms among girls, as in the full sample. However, the interaction between victimization and peak NA among girls differed from results observed in the full sample for the model with child-reported depressive symptoms as the outcome. Specifically, the direction of effect for the interaction was reversed among girls (*IRR* = .52) compared to the full sample (*IRR* = 1.45) and the interaction was statistically significant in girls, but not in the full sample. For each one SD increase in NA, the strength of association between victimization and child-reported depressive symptoms decreased by 48% in girls while it increased by 45% in the full sample. As in the full sample, there were no significant associations between peak PA or closeness/connectedness and depression.

(b) Associations between rejection sensitivity and depressive symptoms in girls

All associations between rejection sensitivity and depressive symptoms were similar for girls and

the full sample, as were additional effects of EMA emotion variables and interactions. Figure 3 shows the interaction between rejection sensitivity and peak NA for the model predicting child-reported depressive symptoms in girls only.
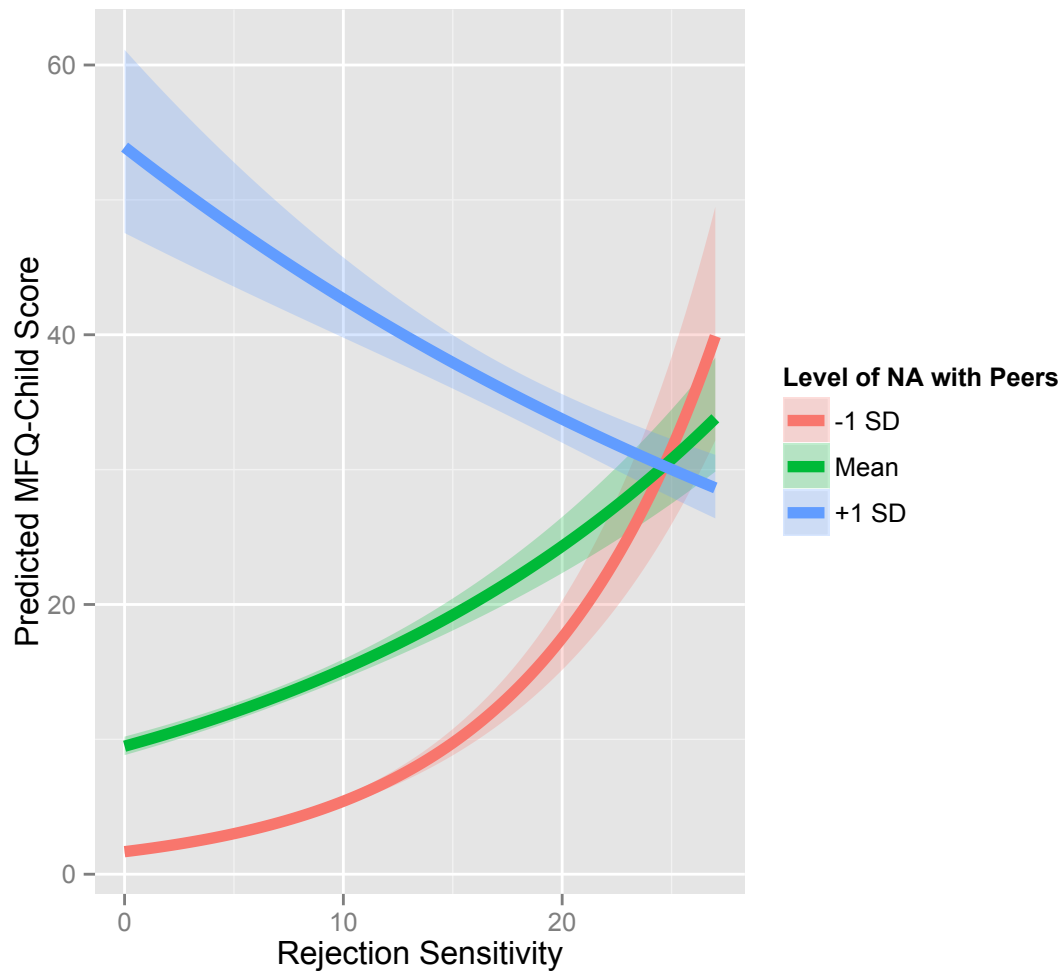
Figure 3. Interaction between Rejection Sensitivity and Peak NA for Negative Binomial Model Predicting Child-Reported Depressive Symptoms in Girls Only

(c) Association between victimization and MDD status in girls

Victimization was associated with MDD status in a similar fashion across the girls-only group and full sample; additional effects of EMA variables were also similar among girls and the full sample, as were interactions between victimization and EMA variables.

(d) Association between rejection sensitivity and MDD status in girls

Univariate associations between rejection sensitivity and odds of falling within the depressed group were similar among girls and the full sample. With rejection sensitivity held constant, there was an association between higher peak NA and greater odds of falling within the depressed group; this effect was significant among girls ($p = .040$), but not the full sample. The interaction between peak NA and rejection sensitivity was similar among girls and the full sample. As in the full sample, there were no significant associations between peak PA or closeness/connectedness and odds of falling within the MDD group.

3.6.1.3 Summary

No gender differences were observed for any of the study variables. When all of the regression models described above for Aims 3 and 4 were repeated within a subset of only girls, just two findings differed from those reported above for the full mixed-sex sample. Specifically, the positive association between peak NA with peers and odds of having an MDD diagnosis was significant among girls, but not in the full sample. Next, an interaction between victimization and peak NA with peers was significant among girls, but not in the full sample, in a regression model linking victimization and child-reported depressive symptoms. The direction of the effect for this interaction was also opposite in girls and in the full sample; among girls, as peak NA increased, the strength of association between victimization and depressive symptoms grew smaller in size

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or less positive. It is important to note that no corrections were made to address the familywise error rate in exploratory analyses, including any of the analyses conducted within the girls-only subset, and it seems possible that these significant results for girls would no longer be significant once this type of correction was applied.

3.6.2   Age

As shown in Table 5, age was not associated with measures of depressive symptoms, peer victimization, rejection sensitivity, or EMA measures of peak NA, peak PA, or closeness/connectedness with peers. Age was positively associated with one covariate: number of phone calls with peers in which youth reported being with peers during the most negative event in the hour preceding the EMA call.

3.6.3   Specificity of social context

Another exploratory aim was to determine if affective functioning in *peer* contexts was a unique moderator of the associations between peer victimization, rejection sensitivity, and depression, or if its effects were similar to effects of affective functioning in other social contexts. Therefore, the one hierarchical regression model regression reported above that showed a significant interaction was repeated using EMA data regarding affective functioning in 1) non-peer social contexts (i.e., all other social companions combined) and 2) while alone. This model tested an interaction between rejection sensitivity and peak NA with peers, with child-reported depressive symptoms as the outcome variable. In preparation for repeating this model with peak NA in different social contexts, descriptive statistics for peak NA in non-peer contexts and while

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alone are shown in Table 9 and correlations between these peak PA variables and the other study variables included in the regression models described below are shown in Table 10. Regardless of social context, greater levels of NA were associated with more victimization, more rejection sensitivity, and elevated depressive symptoms. As shown in Table 9, all study participants reported experience peak NA while alone on at least one EMA call and all but one participant reported experiencing peak NA with non-peers on at least one EMA call. For the regression models, there were more participants with complete data for inclusion in each of the hierarchical models (n = 53 and 54 for models testing peak NA in non-peer contexts and peak NA while alone, respectively) than were found with complete data for the model tested previously for peak NA with peers (n = 47).

In the first model, testing peak NA with non-peer social companions, step 1 was significant (*IRR* = 1.70, *p* = .001), indicating that with each one SD increase in rejection sensitivity, depressive symptoms increased by70%. In step 2, there was an additional effect of peak NA with non-peers (*IRR* = 1.62, *p* = .002) relative to the effects of rejection sensitivity: with each one SD increase in peak NA with non-peers, depressive symptom severity increased by 62%. Unlike the model tested previously for peak NA with peers, the interaction between rejection sensitivity and peak NA with non-peers was not significant, *IRR* = .85, *p* = .398.

In the second model, testing peak NA while alone, the univariate association between rejection sensitivity and child-reported depressive symptoms in step 1 was significant (*IRR* = 1.74, *p* = .000); for each one SD increase in rejection sensitivity, there was a corresponding increase of 74% in depressive symptoms. Further, there was an additional effect of peak NA while alone (*IRR* = 1.76, *p* = .001) beyond the effects of rejection sensitivity so that for each one SD increase in peak NA while alone, there was an increase of 76% in depressive symptoms.

However, the interaction between rejection sensitivity and peak NA while alone only trended towards significance, $IRR = .73, p = .068$.

3.6.3.1 Summary

As in previous analyses, higher levels of rejection sensitivity were associated with more severe child-reported depressive symptoms. Relative to rejection sensitivity, peak NA with peers and peak NA while alone contributed significantly to the variance in depressive symptoms (greater NA was linked to more severe symptoms) in a manner similar to results reported above for peak NA with peers. However, in contrast to results for peak NA with peers, no significant interactions were observed between rejection sensitivity and NA either while alone or with non-peers.

3.6.4 Specificity of outcomes: Anxiety

Moderation models completed for Aims 3 and 4 above were repeated with anxiety outcomes (symptoms and diagnostic status).

3.6.4.1 Bivariate correlations

Bivariate correlations between victimization, rejection sensitivity, EMA affect measures in peer contexts, depressive symptoms, and anxiety symptoms are shown in Table 11. Results indicated that peer victimization, rejection sensitivity, and peak NA with peers were positively correlated with child- and parent-reported anxiety symptoms, while peak PA with peers and closeness/connectedness with peers were not.

Table 9. Exploratory Analysis: Descriptive Statistics and Tests of Group Differences in EMA Peak NA in Non-Peer Social Context and While Alone

	CON			MDD						
Variable	n	M (SD)	Range	n	M (SD)	Range	df	|t|	p	d
Peak NA while alone	30	1.87 (.42)	1.27 – 2.71	29	2.26 (.46)	1.35 – 3.17	57	3.44	.001	.90
Peak NA with non-peers	29	1.90 (.47)	1.00 – 2.78	29	2.26 (.49)	1.19 – 3.24	56	2.90	.005	.76

Table 10. Correlations Between Study Variables, Peak NA while Alone, and Peak NA with Non-Peers

	Peak NA	
Measure	Alone	With Non-peers
Peer Victimization	.35*	.32*
Rejection Sens.	.52**	.45**
Depressive symptoms		
Child report	.54**	.55****
Parent report	.39**	.28*
Mean (SD)	2.06 (.48)	2.08 (.51)
n	59	58

*p<.05, **p<.01, ***p<.001, ****p<.0001.

Table 11. Bivariate Correlations Between Anxiety and Depressive Symptoms and Other Study Variables Included in Regression Models

	Anxiety Symptoms	
Measure	Child Report	Parent Report
Peer Victimization	.54****	.47**
Rejection Sens.	.78****	.62****
EMA affect		
Peak NA	.61****	.31*
Peak PA	-.15	-.09
Close/connected	-.14	-.05
Depressive symptoms		
Child report	.85****	.56****
Parent report	.70****	.71****
Anxiety symptoms		
Child report	--	.62****
Parent report	.62****	--
Mean (*SD*)	20.58 (16.98)	11.47 (10.55)
n	55	49

*p<.05, **p<.01, ***p<.001, ****p<.0001.

Table 12. Models Testing Contributions of Victimization, Rejection Sensitivity, and Emotional Experiences to Peers to Child- and Parent-Reported Anxiety Symptoms and MDD/Anxiety Disorder Diagnostic Status

| | | Anxiety Symptoms | | | | | | | | | Diagnostic Status | | |
| | | Child-Reported | | | | | Parent-Reported | | | | | | |
Step/Measure	n	IRR	p(IRR)	ΔX^2	p(ΔX^2)	n	IRR	p(IRR)	ΔX^2	p(ΔX^2)	n	OR	p(OR)
Step 1	45			14.16	.000	40			8.66	.003	45		
Victimization		**1.76**	**.000**				**1.57**	**.002**				**3.77**	**.002**
Step 2				16.72	.000				1.80	.180			
Victimization		1.58	.000				1.45	.010				3.08	.003
Peak NA		**1.70**	**.000**				1.20	.158				**2.46**	**.021**
Step 3				3.37	.066				.147	.702			
Victimization		1.56	.000				1.47	.009				3.09	.003
Peak NA		1.72	.000				1.21	.148				2.45	.022
Victim. x Peak NA		**.77**	**.043**				1.07	.642				1.07	.889
Step 1	51			10.18	.001	44			9.55	.002	50		
Victimization		**1.46**	**.002**				**1.43**	**.002**				**3.87**	**.000**
Step 2				.72	.397				1.03	.310			
Victimization		1.46	.002				1.46	.001				4.11	.000
Peak PA		.89	.361				.86	.254				1.95	.065
Step 3				.80	.372				.05	.819			
Victimization		1.48	.001				1.48	.001				5.0	.001
Peak PA		.87	.278				.85	.265				1.89	.087
Victim. x Peak PA		1.11	.358				.95	.806				1.81	.118
Step 1	46			13.45	.000	41			11.11	.001	46		
Victimization		**1.54**	**.000**				**1.48**	**.001**				**3.83**	**.000**
Step 2				.0001	.992				1.00	.318			
Victimization		1.54	.000				1.53	.000				4.68	.000
Close/connected		1.00	.992				1.13	.331				1.83	.114
Step 3				1.00	.318				.12	.727			
Victimization		1.62	.000				1.55	.001				5.86	.000
Close/connected		1.00	.992				1.13	.353				1.76	.127
Victim. x Close/Connect		1.13	.298				1.04	.729				1.47	.303

Table 12 (continued)

			Anxiety Symptoms										
		Child-Reported					Parent-Reported					Diagnostic Status	
Step/Measure	n	IRR	p(IRR)	ΔX^2	$p(\Delta X^2)$	n	IRR	p(IRR)	ΔX^2	$p(\Delta X^2)$	n	OR	p(OR)
Step 1	45			40.64	.000	40			18.11	.000	47		
Rejection Sens.		**2.18**	**.000**				**1.57**	**.000**				**4.72**	**.000**
Step 2				8.20	.004				.02	.895			
Rejection Sens.		1.77	.000				1.56	.001				3.60	.002
Peak NA		**1.47**	**.003**				1.02	.892				1.78	.157
Step 3				5.79	.016				.08	.774			
Rejection Sens.		1.82	.000				1.55	.002				4.10	.001
Peak NA		1.55	.000				1.02	.899				2.08	.111
Rej. Sens. x Peak NA		**.73**	**.011**				1.04	.781				.62	.322
Step 1	51			40.94	.000	45			25.42	.000	53		
Rejection Sens.		**2.01**	**.000**				**1.61**	**.000**				**4.40**	**.000**
Step 2				2.99	.084				.01	.923			
Rejection Sens.		2.04	.000				1.61	.000				4.51	.000
Peak PA		.85	.095				1.01	.919				1.45	.260
Step 3				.79	.373				.92	.337			
Rejection Sens.		2.01	.000				1.64	.000				4.54	.000
Peak PA		.86	.121				.98	.882				1.46	.257
Rej. Sens. x Peak PA		1.10	.372				.89	.294				.97	.931
Step 1	46			32.28	.000	42			21.41	.000	49		
Rejection Sens.		**1.98**	**.000**				**1.61**	**.000**				**4.76**	**.000**
Step 2				1.52	.218				.55	.456			
Rejection Sens.		1.99	.000				1.64	.000				4.99	.000
Close/Connected		.87	.231				1.09	.470				1.34	.405
Step 3				.81	.368				2.30	.130			
Rejection Sens.		1.99	.000				1.67	.000				5.06	.000
Close/Connected		.89	.315				1.09	.454				1.36	.388
Reject. Sens. x Close/Conn.		1.10	.331				.86	.130				.93	.819

3.6.4.2 Associations between victimization and anxiety symptoms

Three variables were tested as moderators of the association between victimization and anxiety symptoms (both child and parent ratings): peak NA, peak PA, and closeness/connectedness. Results are summarized in Table 12. Consistently, youth who reported greater victimization more likely to report and be perceived by parents as having more severe anxiety symptoms. There was an additional effect of peak NA; greater peak NA was associated with more severe child-reported – but not parent-reported - anxiety symptoms. There was no significant interaction between victimization and peak NA for parent-reported anxiety symptoms. For child-reported symptoms, the regression coefficient for the interaction was significant, but inclusion of the interaction term in step 3 did not contribute significantly to the model and the effect size was negligible. Bootstrapping was not performed. There were no significant effects of peak PA or closeness/connectedness.

3.6.4.3 Associations between rejection sensitivity and anxiety symptoms

As above, EMA variables were tested as potential moderators of the associations between rejection sensitivity and anxiety symptoms (both child and parent ratings). Results are summarized in Table 12. Across all models tested, youth who reported higher levels of rejection sensitivity more likely to report and be rated by parents as having greater anxiety symptoms.

Peak NA contributed significantly to explaining variance in child-reported, but not parent-reported, anxiety symptoms with rejection sensitivity held constant; greater peak NA was associated with higher levels of symptoms. There was a significant interaction between rejection sensitivity and peak NA for child-reported, but not parent-reported, anxiety symptoms. As shown in Figure 4, the strength of the positive association between rejection sensitivity and anxiety

differed depending on the level of peak NA with peers. For every one standard deviation increase in peak NA, the association between rejection sensitivity and anxiety symptoms decreased in magnitude by 37%. There were no significant effects of peak PA or closeness/connectedness.

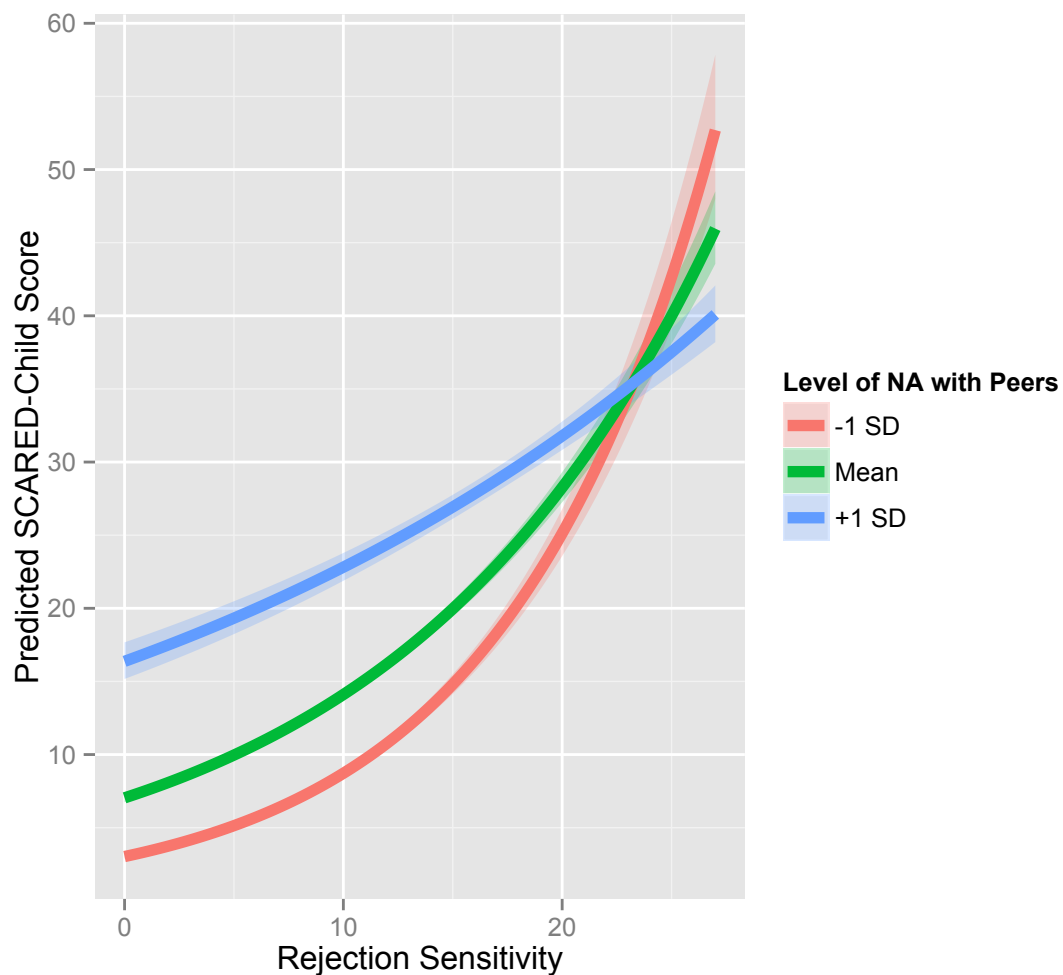**Figure 4**. Interaction between Rejection Sensitivity and Peak NA for Negative Binomial Model Predicting Child-Reported Anxiety Symptoms.

3.6.4.4 Association between victimization and MDD vs. MDD + anxiety status

Three variables were tested as moderators of the association between victimization and diagnostic status: Peak NA, peak PA, and closeness/connectedness. Results are summarized in

Table 12. Greater victimization was associated with larger odds of falling within a diagnostic group, with youth who reported greater victimization more likely to meet diagnostic criteria for MDD or MDD and an anxiety disorder. A significant additional effect of peak NA was found, where increased peak NA was associated greater odds of having a diagnosis, regardless of the level of victimization. No other significant effects were observed.

3.6.4.5 Associations between rejection sensitivity and MDD vs. MDD + Anxiety status

The procedure described above for associations between victimization and MDD vs. MDD with an anxiety disorder was repeated with rejection sensitivity, rather than victimization, as the predictor in the first step of the models. Results are summarized in Table 12. Across all regression models, youth who reported greater rejection sensitivity more likely to meet diagnostic criteria for MDD or MDD and an anxiety disorder. Specifically, youth who reported levels of rejection sensitivity one SD above the sample mean for rejection sensitivity were 4.4 to 4.7 times more likely to be within the MDD group or MDD + Anxiety groups than youth reporting average levels of rejection sensitivity. There were no significant additional or moderating effects for peak NA, peak PA, or closeness/connectedness.

3.6.4.6 Summary and comparison with outcomes for depression

In models with anxiety symptoms as the outcome, findings were all similar to those reported above with depressive symptoms as outcomes. The same similarities were observed for models predicting diagnostic status. In general, there were no significant additional effects or interactions involving peak PA or closeness/connectedness. The only additional effects found were for peak NA and the only significant interaction was between peak NA and rejection

sensitivity. This overall pattern of results is consistent with findings for depression outcomes described above.

4.0   DISCUSSION

4.1   SUMMARY

This study had two primary goals. The first was to examine group differences in interpersonal (peer) functioning and affective responding in real-world peer contexts among depressed adolescents ages 11-17 years, relative to non-depressed, age- and gender-matched controls. The second goal was to examine potential moderating effects of affecting functioning in peer contexts on the relationships between peer victimization and rejection sensitivity and depression outcomes.

The study makes several contributions to the field: 1) finding differences in reports of peer victimization and rejection sensitivity for youth with MDD versus healthy controls, 2) finding consistent associations between peer victimization or rejection sensitivity and both depressive symptoms and MDD diagnostic status, 3) finding differences in intensity of negative affect experienced during interactions with peers for youth with MDD versus healthy controls, and 4) identifying associations between NA during peer interactions and depression (both symptoms and diagnosis), beyond the effects of rejection sensitivity or peer victimization. In addition, exploratory analyses provided additional insight into the role of gender and associations between peer victimization or rejection sensitivity and anxiety. For ease of interpretation, findings for each set of variables are discussed together below. That is, all findings related to

peer victimization and rejection sensitivity are discussed before findings for EMA variables. Significant findings are presented first, followed by results that did not support hypotheses.

4.2   PEER VICTIMIZATION AND REJECTION SENSITIVITY

4.2.1   Group differences

The current results indicate that rates of interpersonal difficulties and social-cognitive vulnerabilities previously associated with depressive symptoms in community samples are indeed higher among youth with MDD than youth with no history of psychopathology. Specifically, compared to healthy controls, youth with current MDD perceive themselves to be experiencing elevated levels of peer victimization and report greater sensitivity to interpersonal rejection. This is the first study we are aware of that has shown elevated levels of rejection sensitivity among youth in a current MDE.

4.2.2   Univariate associations with depression

In the current study, youth who reported higher levels of peer victimization and rejection sensitivity were more likely to report greater depressive symptoms, be perceived by parents as more depressed, and to have a current diagnosis of MDD. These findings are consistent with previous research in community samples. Peer victimization has been positively associated, both concurrently (Bond et al., 2001; Desjardins & Leadbeater, 2011; Gibb & Abela, 2008; Hawker & Boulton, 2000; Prinstein et al., 2001; Storch et al., 2003) and prospectively (Bond et al., 2001;

Desjardins & Leadbeater, 2011; Hodges & Perry, 1999; Klomek et al., 2007) with elevated depressive symptoms in community samples. Also consistent with the results of the present study, rejection sensitivity has been concurrently (McDonald et al., 2010) and prospectively (Marston et al., 2010) linked to elevated depressive symptoms in a small number of community samples. These associations in the current study are also consistent with our findings that youth with MDD reported greater experiences of peer victimization and more concerns about rejection sensitivity.

These results appear to be consistent with some elements of Coyne's (1976) interpersonal model of depression. Specifically, the association between victimization and depressive symptoms observed in our study suggests that individuals who perceive their current social experiences to be more aversive are more likely to report feeling more depressed. This seems consistent at least in part with previous theories suggesting that ongoing unpleasant social experiences contribute directly to depressed mood (Joiner et al., 2002). However, it is also likely that youth who are depressed are more likely to experience peer victimization (Sweeting, Young, West, & Der, 2006). To better understand these transactions across time, future longitudinal work would be required.

Exploratory analyses revealed no gender difference in the strength of the associations between peer victimization or rejection sensitivity and depressive symptoms. When analyses were repeated with anxiety as the outcomes, peer victimization and rejection sensitivity were linked to elevated symptoms and to increased odds of being in the MDD or MDD/Anxiety diagnostic groups. Effect sizes were very similar to those reported for models with depression outcomes. The latter finding may suggest that peer victimization and rejection sensitivity are similarly relevant to both anxiety and depression; therefore, they may be potentially considered

as vulnerabilities shared across diagnostic categories. Further peer victimization and rejection sensitivity may fall under the same broad construct: sensitivity to potential threat. This is notable because it supports the Research Domain Criteria (RDoC) guiding research funded by the National Institute of Mental Health (NIMH), which supports the importance of identifying mechanisms or vulnerabilities underlying multiple disorders in order to more effectively treat psychopathology (Insel et al., 2010). Thus, the current study findings suggest that sensitivity to potential threat in social contexts appears to be relevant to both anxiety and depression outcomes and therefore may be a possible transdiagnostic vulnerability.

4.3 EMOTIONAL EXPERIENCES WITH PEERS

4.3.1 Group differences

In addition to higher levels of victimization and greater concerns about rejection, youth with MDD also reported experiencing greater overall intensity of peak negative affect during peer interactions, compared to healthy controls. These findings are consistent with previous research suggesting that youth with MDD report higher intensity momentary NA during real-time social experiences compared to healthy controls (Forbes et al., 2004; Silk et al., 2011) and research linking greater momentary NA to elevated depressive symptoms in community samples (Silk et al., 2003).

4.3.2   Interaction effects

We are not aware of existing research that has explored potential interactions between emotional functioning during daily interactions with peers and peer victimization or rejection sensitivity. Importantly, the EMA methodology employed in the current study allowed us to tease apart different aspects of daily emotional experiences with peers (i.e., PA, NA, closeness/connectedness).

While numerous interactions were tested in this study, only one interaction was found to be significant in a model with child-reported depressive symptoms as the outcome. Specifically, the association between rejection sensitivity and depressive symptoms differed depending on youths' perceptions of NA intensity during peer interactions. The largest associations between rejection sensitivity and depression were observed in youth reporting the lowest levels of NA with peers. As peak NA intensity increased, the size of the positive association between rejection sensitivity and depressive symptoms decreased. Among youth reporting high levels of NA with peers (more than one SD above the mean), there was no significant association between rejection sensitivity and depression. Instead, those youth all reported clinically elevated symptoms of depression and their depressive symptom severity had no relation to rejection sensitivity. In other words, this finding suggests that at high levels of negative affect with peers, the effects of rejection sensitivity essentially wash out and rejection sensitivity has no effect on depressive symptoms. This finding is consistent with previous research indicating that elevated NA is associated with depression in youth (Forbes et al., 2004; Silk et al., 2011, 2003) because it suggests that high levels of NA are strongly linked to more severe depressive symptoms and can even wash out the effects of other factors, such as rejection sensitivity..

However, among youth reporting low to moderate levels of NA with peers, there is a significant association between rejection sensitivity and depressive symptoms. The interaction showed that for a given level of rejection sensitivity (among youth reporting low to moderate NA with peers), those youth who reported greater overall intensity of negative emotions during negative experiences where peers were present reported more severe depressive symptoms. This seems to indicate among rejection sensitive youth who were hypervigilant to aversive peer experiences, those who actually perceived negative peer experiences (and experienced NA with peers) reported more severe depressive symptoms than those who did not experience their peer interactions as negative. This pattern of findings is consistent with previous research indicating that elevated NA is linked to depression among youth (Forbes et al., 2004; Silk et al., 2011, 2003) because – at any given level of rejection sensitivity - youth reporting more NA also reported greater depressive symptom severity. Also, these findings are consistent with previous research linking concerns about social rejection to adolescent depression (Chango, McElhaney, Allen, Schad, & Marston, 2012; Marston, Hare, & Allen, 2010)..

4.3.2.1 Exploratory analyses

Exploratory analyses yielded similar results, compared to the planned analyses. The same interaction was observed in a girls-only subset of the sample. Exploratory analyses in which these regressions were repeated with anxiety as outcomes showed nearly identical findings when compared to models with depression outcomes. The latter finding may suggest that the factors examined in the current study are similarly important for both anxiety and depression symptoms; this could mean that these factors (i.e., victimization, rejection sensitivity, daily emotional experiences with peers) are potential candidates for shared transdiagnostic vulnerabilities.

The interaction between rejection sensitivity and peak NA with peers was also tested with peak NA in other social contexts, such as with non-peer companions or alone. Peak NA with non-peers and while alone did *not* moderate the effect of rejection sensitivity. Together, these findings suggest that the interaction is specific to affective responding with peers; this appears to be consistent with previous research regarding the increasing importance of peers for social needs during adolescence (Berndt, 1982).

4.3.3 Additional effects

Greater NA with peers was also associated with more severe depressive symptoms and greater odds of meeting diagnostic criteria for MDD, with rejection sensitivity and victimization held constant. These positive associations between NA and depression are consistent with research indicating that elevated NA is observed in depression among youth (Forbes et al., 2004; Joiner et al., 1996; Lonigan et al., 2003).

4.3.3.1 Exploratory analyses

Results were similar to those reported above for depression in models predicting anxiety outcomes and when regression models were repeated in a subset of girls with one exception: Among girls, the victimization x peak NA interaction was in an opposite direction from the interaction in the full sample. In the girls-only subset, victimization was positively associated with depressive symptoms and the strength of this association *decreased* as NA with peers increased.

The one significant interaction effect found for analyses with depression outcomes was repeated with peak NA measured in non-peer contexts or alone to assess degree of specificity of

the findings with regard to social context. As reported for peak NA with peers, there were significant additional effects of peak NA, relative to rejection sensitivity, regardless of social context; greater peak NA was consistently associated with more severe depressive symptoms. None of the interactions with NA in non-peer contexts were significant. However, the associations between elevated peak NA and greater depressive symptoms across social contexts are consistent with findings from previous research that found youth with MDD reported elevated momentary NA in multiple social contexts (i.e., peer, family, school-related, alone) (Silk et al., 2011).

4.4   HYPOTHESES THAT WERE NOT SUPPORTED

There was a dearth of significant findings for hypotheses involving positive affect and feelings of closeness/connectedness with peers. First, the MDD and control groups did not differ with regard to overall intensity of peak PA and closeness/connectedness with peers. While the lack of group differences in peak PA with peers initially appears to be inconsistent with existing theory and research indicating that low PA is observed in youth depression (Forbes & Dahl, 2005; Forbes et al., 2004; Lonigan et al., 2003; Silk et al., 2011), it should be noted that PA was assessed differently in the current study than reported in previous research. Specifically, the present study examined the mean level of *peak PA* within each participant (i.e., the most intense PA experienced during a given period of time - in this case, during the hour prior to the phone call). Previous EMA studies have shown differences between controls and youth with MDD with regard to momentary PA, which is measured at the present moment (e.g., "How _____ do you feel now?"); specifically, Silk and colleagues (2011) found that youth with MDD reported lower

levels of *momentary* PA intensity than controls with no history of DSM-IV Axis I psychopathology. The current study is one of the first we are aware of to examine *peak* PA among youth with MDD. Our results suggest that youth with MDD are able to recall high points involving peers over the previous hour and they describe these high points as being similarly enjoyable to positive peer events described by healthy controls.

Also in contrast to the hypotheses, peak PA with peers and closeness/connectedness with peers were not significantly associated with depressive symptoms or odds of having an MDD diagnosis when included in the models with rejection sensitivity. Similarly, there were no interactions between peak PA or closeness/connectedness with peers and victimization or rejection sensitivity in models with depressive symptoms or MDD diagnosis as outcomes. When these analyses were repeated with anxiety as outcomes, findings were similar; effect sizes were similar, if not slightly smaller, than for depression outcomes and effects were in the same direction as for depression.

It is possible that measurement issues and analytic strategies may have contributed to the lack of significant results for the positive emotion variables. For example, in the current study the PA and closeness/connectedness measures consisted of only one item each. Variability was therefore likely limited compared to the measure of NA. Additionally, there is a good amount of variability within the MDD group with regard to intensity of PA and NA. Unfortunately, the analytic strategies employed in this study do not permit individual level comparisons of NA, PA, and depressive symptoms. It seems possible that subtypes exist within the depressed group – or even within the control group – based on patterns of affective responding in peer interactions within, rather than between, persons. Examining individual-level profiles of emotional responding may be a fruitful avenue for future research.

4.4.1   Exploratory analyses

Despite the broad age range of the study, age was only associated with one study variable; older youth were more likely to report experiencing a peak negative event involving a peer on more EMA calls than younger youth. It is unclear if this reflects age-related differences in overall frequency of emotional experiences with others or is specific to peers; future research may examine this in greater depth. Age was not a significant covariate in any of the models tested. The general lack of developmental effects may be due to the nature of the sample. That is, half the sample had MDD while half did not; the depressed youth may have been more similar to one another than to similar-aged non-depressed peers. Additionally, the study had low power to detect small effects. The sample also included a fairly low number of younger adolescents, as would be expected given that depression is more common in middle to late adolescence than in early adolescence (Merikangas et al., 2010). It is possible that rejection sensitivity is more developmentally normative among younger adolescents than older adolescents. If so, future research examining developmental differences in the association between rejection sensitivity and depression may find that the association is stronger among older than younger adolescents.

In addition to the lack of effects for age, the number of completed EMA phone calls was not a significant covariate in any of the analyses. Further, no significant gender differences were found for peer victimization, rejection sensitivity, EMA emotional experience variables, or depression outcomes.

4.5 STRENGTHS

Among the strengths of this study were the use of EMA methodology, which permitted us to sample social and emotional functioning in youths' daily lives, thereby reducing retrospective bias compared to other self-report measures (e.g., questionnaires that prompt youth to respond regarding the past 2 weeks) and providing excellent ecological validity for measurement of emotional responding.

This study's use of a clinical sample is unique and provides important and novel insight regarding the rates of peer victimization and rejection sensitivity among youth with MDD, which yields important information regarding the presence of these concerns among youth currently in an MDE. It also allowed us to compare and contrast effects associated with categorical outcomes, such as MDD diagnosis – even to compare MDD versus MDD with comorbid anxiety disorders - versus continuous outcomes, such as depressive or anxious symptoms. Examining associations with categorical outcomes, such as diagnoses, is in line with the diagnostic system most commonly employed by clinicians treating anxiety and depression in youth (i.e., the DSM), whereas exploring dimensional outcomes is consistent with assertions made by the NIMH that psychopathology should be examined dimensionally in order to detect possible underlying mechanisms that may span multiple DSM diagnoses (Insel et al., 2010).

Overall, it appears that these constructs are equally important to both categorical and continuous outcomes as well as anxiety and depression outcomes. Findings were remarkably consistent for analyses examining predictors of categorical and continuous outcomes. Effects were consistently in the same direction and steps in the regression models showed similar patterns of statistical significance regardless of the format of the outcome. These findings are in line with assertions made in the NIMH's RDoC about the fundamental importance of examining

dimensional outcomes to identify underlying mechanisms that span multiple DSM diagnoses (Insel et al., 2010). The current study findings suggest that peer victimization and rejection sensitivity are similarly related to both categorical and dimensional measures of depression and anxiety, indicating that these factors are important for anxiety and depression both as categorized by DSM and as dimensional constructs.

Additionally, results also suggested that rejection sensitivity, victimization, and affective experiences with peers have similar effects on anxiety and depression outcomes measured in this study. However, we present this finding cautiously as it is the result of an exploratory analysis and corrections were not made for the familywise error rate. Further, because the analyses were exploratory we were not overly concerned with the degree of association between anxiety and depressive symptom outcome measures. However, it would have been quite surprising to find notable differences in models predicting depressive vs. anxiety symptoms given the high degree of correlation between measures of anxiety and depression; effect sizes were large. Additionally, the three-level outcome variable tested in models predicting categorical anxiety outcomes (i.e., control vs. depressed only vs. depressed/anxiety disorder) overlaps quite a bit with the two-level outcome variable employed in models predicting categorical outcomes for depression (i.e., control vs. depressed).

In addition to comparing and contrasting categorical and continuous as well as anxiety and depression outcomes, this study is also the first we are aware of to explore moderators of the associations between peer victimization or rejection sensitivity and depressive symptoms in a clinical sample. While previous research has examined moderators of peer victimization or rejection sensitivity (Bowker et al., 2011; McDonald et al., 2010), those studies have involved community samples only.

Finally, the study's examination of daily emotional experiences as a potential moderator is novel; this is the first study we know of that examined possible moderating effects of affective functioning on peer victimization or rejection sensitivity in either community or clinical samples. Given the important role emotional responding is believed to play in psychopathology and in internalizing disorders in particular, it is hoped that this work will provide valuable insight regarding the role of emotional functioning during daily experiences as it relates to victimization and rejection sensitivity among depressed and non-depressed youth.

4.6   LIMITATIONS

There are some limitations to consider when interpreting the results of this study. First, while small sample sizes are common in studies with clinical samples of youth – especially those employing extensive contact with participants, as is characteristic of EMA – the small sample size does limit the study's statistical power. Thus, many small and medium effects did not reach statistical significance. Second, the study sample included youth from a broad range of ages. Although covarying for age did not alter any of the results and age was not associated with any of the predictor, moderator, or outcome variables, this characteristic of the sample precludes any conclusions regarding social and emotional dysfunction at particular stages of development. Third, the sample includes two groups of youth who are expected to be markedly different on a number of characteristics related to their mental health (e.g., youth with a current MDE vs. youth with no lifetime history of any Axis 1 disorder except Enuresis). Conducting analyses with dimensional outcome variables across these two groups is potentially problematic due to concerns regarding bifurcation of the sample. Although we conducted analyses in a manner that

accounted for positive skew found in the sample, it seems likely that some of the associations described above may differ between groups; we did not conduct analyses to test possible group differences in correlations or regression coefficients due to sample size constraints. Next, because this was a naturalistic study and we did not exclude youth who were obtaining treatment for MDD, some youth in the MDD group were beginning treatment in the community during the EMA protocol and treatments were not standardized.

There are limitations associated with the timing of measures collected for this study. Specifically, the predictors and outcomes modeled in regressions were collected at the same time point and the proposed moderator (EMA affective responding) was measured afterwards. Thus, longitudinal examinations of the interplay between social functioning, emotional functioning, and symptoms of anxiety and depression could not be conducted. The design of this study also prevented us from drawing any conclusions about the role of peer victimization and rejection sensitivity as risk factors for depression. These variables were identified as possible risk factors for adolescent depression in previous research, but we do not presume to draw conclusions about risk factors in the current study.

The MDD group and controls were also borderline different with regard to SES and race; in other words, the groups did not differ significantly but they were descriptively dissimilar. Several mothers in the MDD group had completed their education after 12 years, while all the mothers of controls had completed at least some college. Additionally, the MDD group contained more African American youth than the control group, although this difference was not statistically significant. Together, these differences suggest that the matching performed was not perfect. However, it is important to note that there is a large body of research documenting the inverse association between family SES and risk for psychopathology, including depression (for

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a review, see Brooks-Gunn & Duncan, 1997). For this reason, it would have been difficult to perfectly match this sample to a control sample on all demographic characteristics.

There are some limitations to consider related to the EMA measures of emotion used in this study. Specifically, while the EMA method used in this study should be less vulnerable to retrospective bias than other measurement techniques, such as global retrospective self-report questionnaires, there may still be some bias involved when youth are asked to report on events during the past hour. Further, the EMA protocol asked youth, "Who is/was with you?" or "Who were you interacting with?" to inquire about social context. In general, when youth reported having a social companion the person was actually in the room with them. However, it is possible that online interactions may not have been captured as well by these prompts. Finally, our measure of 'peer context' included a variety of peers and we were therefore not able to examine potential differences in the effects of negative affect in romantic vs. platonic peer contexts.

There are also some limitations related to measurement of victimization and rejection sensitivity in this study. First, the victimization measure consists almost entirely of items that assess relational victimization; only one item assesses physical victimization. Thus, results reflect effects (or lack of effects) related primarily to relational victimization. Future work may expand to also explore effects of physical victimization. Second, many youth in both groups reported no experiences of victimization. As a result, victimization was significantly positively skewed, which may have limited our ability to find detectable effects, especially given the small sample size. In contrast, relatively few participants reported experiencing no rejection sensitivity and this measure was not skewed; this may partially explain the significant findings for rejection sensitivity. Further, in contrast with the peer victimization that specifically targeted youths'

experiences with peers, rejection sensitivity as measured here was not specific to peers. It reflects broader concerns about social rejection by any social partner. Thus, the findings actually indicate that *overall* concerns about rejection sensitivity in any context interact with negative affect in peer contexts in the model with depressive symptoms as the outcome.

Further, rejection sensitivity may be viewed as part of overall higher levels of negative affect that are experienced by individuals with depression. Indeed, the strong association between rejection sensitivity and peak NA with peers in the current study ($r = .58$) suggests that these measures may be part of the same broad construct of negative emotionality. However, the rejection sensitivity measure used in this study included items that assessed cognitive vulnerabilities and behavioral avoidance in addition to intense negative emotion in response to perceived rejection, so we do not believe that it is entirely non-distinct from general negative emotionality. Future research may focus on behavioral avoidance as a component of rejection sensitivity that is distinct from the broader construct of negative emotionality. It is also important to note that the negative affect with peers measured in this study may reflect broader elevated negative affect reported by youth with MDD across social contexts, as has been shown in previous research (Silk et al., 2011). Negative affect is also a component of other forms psychopathology; it is certainly not unique to adolescent depression or even to depression. Certainly, when people feel very distressed in one context this is likely to also be the case across contexts.

On a related note, there was a strong association between victimization and rejection sensitivity but the nature of the current study precluded any examination of transactions between the two variables across time. Previous research has linked experiencing peer rejection to having elevated concerns about rejection (London et al., 2007; Wang, McDonald, Rubin, & Laursen,

2012), but it also seems likely that experiencing victimization may contribute to development of rejection sensitivity. Conversely, youth who are more rejection sensitive may behave in ways that contribute to them being targets of victimization. Future work could explore transactions between these two peer variables across time. Additionally, youth who are more sensitive to rejection may react more strongly to experiences of victimization; moderating effects (i.e., one moderating the effects of the other) may also be a target of future research involving these variables.

4.7   FUTURE DIRECTIONS

One major goal in moving forward from the current research is to better understand the relationships between adverse peer experiences, anxiety or concern about interpersonal rejection, actual social behavior, and affective responding during social interaction in relation to depression and anxiety in youth. As a first step, we should aim to fully understand the associations between the variables presented in the current study. To this end, future research should examine affective responding in social contexts as potential mediators of the associations between rejection sensitivity and depressive symptoms or anxiety symptoms. Additionally, it seems plausible that rejection sensitivity could be a result of peer victimization experiences and may actually mediate the association between victimization and depression. Further, peer victimization, rejection sensitivity, anxiety symptoms, and depressive symptoms are likely to interact in a transaction across time. Longitudinal research to examine pathways by which interpersonal dysfunction contributes to depression would be informative. Specifically, future work should examine longitudinal interactions between interpersonal dysfunction, emotional responding, and

depression along with mechanisms from differing levels of analysis (e.g., biological, cognitive) that may link social and emotional functioning to psychopathology.

As described above, one limitation of this research was that summary measures of victimization experiences and rejection sensitivity were used and EMA data were averaged across three weeks. Future work may take more advantage of the longitudinal and immediate nature of EMA methods by collecting daily measures of victimization experiences and concerns about rejection or rejection experiences along with daily emotional experiences, perhaps for a longer period than three weeks. This would allow for more fine tuned examination of the associations between specific negative experiences in the peer group or concerns about negative experiences and affective responding during typical daily peer interactions. It would also permit one to better understand the temporal associations between these factors in a way that is not possible in the current study.

Further, there are a number of additional variables to explore in order to better understand how adverse peer experiences shape interpersonal and intrapersonal experiences. For example, we have not considered in this study the type of daily peer experiences reported by youth that corresponded with affect ratings (i.e., At the time you felt the worst in the past hour, what were you doing?) Additionally, this study grouped all peers together; future work could separate out social experiences with friends, classmates, teammates, and romantic partners. Understanding more about the context of negative affective experiences with peers would be beneficial in future work designing intervention or prevention efforts. Certainly, examining the interplay between NA in peer contexts and NA in other contexts would be an important avenue to explore in future research as previous research has shown that NA is not restricted only to peer interactions among youth with MDD (Silk et al., 2011). Further, evidence suggests that bullying others is also

associated with depression (Bond et al., 2001; Klomek et al., 2007); in this sample, we do have several youth who report engaging in bullying of peers. Future work may examine bullying in addition to peer victimization.

4.8   CLINICAL IMPLICATIONS

Given the robust associations between peer victimization, rejection sensitivity, and depression, developing interventions to prevent or ameliorate the effects of peer victimization seems to be an important next step. Currently, there are few – if any - evidence based treatments that have been shown to protect against the negative effects of experiencing peer victimization, although some prevention programs are currently in development. For example, Annette La Greca is leading a project currently to evaluate the effectiveness of interpersonal therapy to prevent the development of depression among youth who are victimized by peers. Ben Hankin's project tests two prevention programs for adolescent depression that are designed to target either interpersonal or cognitive vulnerabilities.

The results of this study suggest that treatments designed to identify and address dysfunctional thoughts related to social behavior, along with problematic social behavior, may be particularly useful for youth at risk for depression. Overly negative perceptions of social situations are clear targets for cognitive therapy. With regard to addressing elevated NA intensity in peer contexts, it seems likely that therapies focused on developing improved social skills (e.g., assertiveness skills, emotion coping skills) could help decrease the frequency of negative social interactions. Assertiveness skills are commonly included as a part of cognitive behavioral therapy; emotion coping skills may be taught via Linehan's (1993) Dialectical Behavioral

Therapy model. Finally, addressing social anxieties or concerns about rejection via cognitive behavioral treatment for social anxiety is likely to improve youths' social interactions, either by directly affecting their social behavior or by prompting them to seek out and befriend healthier peers.

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