

**A STRESS GENERATION MODEL OF THE DEVELOPMENT OF DEPRESSION IN GIRLS DURING
THE TRANSITION TO ADOLESCENCE: ELUCIDATING THE ROLE OF INTERPERSONAL
DYSFUNCTION**

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The goal of the present study was to examine the extent to which deficits in emotional, social-cognitive, and behavioral functioning might precipitate heightened levels of depression symptoms in a community sample of girls followed through the transition to adolescence (ages 11 to 15 years) while also considering the peer, family, and developmental contexts that might attenuate or enhance this pathway. Partial support was found for study hypotheses.

First, associations between age 11 negative emotionality, social-cognitive biases, and negative social behaviors, were generally low and below hypothesized ‘moderate’ levels. Associations *within* the component measures of these interpersonal domains ranged from low to high and suggested some coherence among the study measures comprising each domain. Second, as expected, age 11 measures of interpersonal functioning predicted elevations in depression symptoms age 15 when each domain was examined separately. Only measures of negative emotionality, however, contributed unique variance in models incorporating all three domains simultaneously. Third, the majority of the main effects of interpersonal deficits were moderated by friendship quality and parent-child interaction; however, the risk-protective processes of having a high quality friendship *and* positive mother-child relationship were counter to anticipations, leading to worse, rather than better, emotional adjustment, in comparison to other girls. Importantly, parent and peer relationships were not interchangeable, as demonstrated by the little protection *high* friendship quality offered girls whose interactions with their mothers were low in positive features and also demonstrated poor self-control. On the other hand, *high* quality mother-child interactions protected against emotional difficulties associated with interpersonal deficits in girls with *low* friendship quality. Together, these findings highlight the continuing salience of the parent-child relationship in adolescent girls’ emotional adjustment, and the need to delineate the dynamic interplay of the peer and parenting contexts as they together shape the development of adolescent girls. Findings suggest that the onset of pubertal development interacts with social contextual factors to accentuate processes linking negative emotionality, but not social-cognitive biases or negative

social behaviors, and depression symptoms. Future research should examine other indicators of the adolescent transition as they might accentuate pathways to depression.

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1.0 INTRODUCTION

Following an extended period of relatively higher functioning throughout early and middle childhood, especially in comparison to boys, the start of puberty marks a shift in girls' ability to cope with developmental transitions. Indeed, epidemiological reports of girls' increasing rates of depressive symptoms and diagnoses beginning as early as age 13 suggest that girls may experience heightened levels of emotional distress as they negotiate the psychological, biological, and social challenges inherent in adolescence (e.g., Hankin et al., 1998). Although a universally agreed upon theoretical model explaining girls' emerging difficulties has yet to be established, most researchers implicate interpersonal stress, including loss and disruption experienced within significant relationships, as an important pathway to depression in girls (e.g., Cyranowski, Frank, Young, & Shear, 2000; Hankin & Abramson, 2001; Prinstein, Borelli, Cheah, & Aikins, 2005; Rudolph et al, 2000). This premise is based upon research and theory suggesting that girls place increasing importance on social relationships during the transition to adolescence, thereby enhancing their risk for experiencing emotional upset in the context of interpersonal stress (Crick & Zahn-Waxler, 2003; Rudolph, 2002). Accordingly, a meta-analysis of gender differences in stressful life events revealed that adolescent girls not only encounter more negative interpersonal events than their male peers, but also experience them as more aversive (Davis, Matthews, & Twamley, 1999). While these observations underline the possibility that girls face unique challenges as they adapt to adolescence, the gender- and age-specific processes underlying the association between interpersonal difficulties and heightened negative emotionality have yet to be elucidated.

Recently, researchers have emphasized the need to consider adolescent girls as active participants in their own social and emotional well-being (Hammen, 1991; 2009; Rudolph et., al 2000). Accumulating evidence that the majority of social difficulties at the heart of emotional disturbances are within, rather than outside of, adolescent girls' control (Hammen, Brennan, & Keenan-Miller, 2008; Rudolph & Hammen, 1999; Shih, Eberhart, Hammen, & Brennan, 2006) highlights the importance of delineating the interpersonal characteristics and tendencies underlying

negative social experiences and their emotional consequences. To date, the examination of girls' "interpersonal vulnerability" to developing depression during the transition to adolescence has been scattered. One of the largest impediments to the literature is that, in the absence of a pathway-specific model, the majority of researchers simply incorporate the investigation of interpersonal processes within the rubric of their own theory or model of depression. Important to understanding the stress generation process in adolescent girls, however, is a model elucidating the social-cognitive, emotional, and behavioral deficits specific to interpersonal dysfunction manifested in the context of adolescent girls' social relationships. The primary goal of the proposed study, therefore, is to examine features of interpersonal dysfunction as they relate to peer difficulties and the development of depression symptoms in girls during adolescence.

Another major limitation of the literature is the continued practice of studying these processes using mixed-gender designs and ill-defined measures of 'adolescence'. Although the examination of gender differences in the development of psychopathology is necessary for constructing gender-sensitive definitions of and treatment for childhood adjustment difficulties, a "premature focus" on differences between boys and girls on general measures of functioning is likely to hinder understanding of female-specific areas of vulnerability and disruption (Crick & Zahn-Waxler, 2003; Hinshaw, 2008). This is particularly relevant to the study of social skills and relationship stress; relationship needs and expectations vary between boys and girls (Buhrmester & Prager, 1995; Rose & Rudolph, 2003), suggesting that stress will be likely to reflect social experiences specific to each gender group (Rose & Rudolph, 2003). Thus, incorporating measures of social stress geared to girls' relationship needs (e.g., dyadic friendship quality) in female samples is an important first step to building a theoretical model of the role of interpersonal stress in the development of depression symptoms in adolescent girls.

The developmental course of depression symptoms and interpersonal events in girls are characterized by fluctuating levels across childhood, adolescence, and adulthood (Dekker et al, 2007; Ge, Conger, & Elder, 2001; Ge, Lorenz, Conger, Elder, & Simons, 1994; Ge, Natsuaki, & Conger, 2006; Hankin et al., 1998). Additionally, the tasks and coping abilities of an individual evolve as she enters and progresses through adolescence into young adulthood (Cicchetti & Rogosch, 2002). Therefore, any study examining the emergence of depression symptoms and interpersonal stress in adolescence should focus on stages of adolescence rather than on the adolescent era generally. However, because early adolescence is a period characterized by psychological, biological, and social changes that span several years and may not occur concurrently (Cicchetti & Rogosch, 2002; Graber & Brooks-Gunn, 1996), this

can be a challenge. For example, a 12-year-old girl might start middle school before any physical changes of puberty have become manifest, while a 10-year-old girl in 4th grade might experience her first menstrual cycle. Given that pubertal development predicts increasing depression symptoms better than age alone (e.g., Angold, Costello, & Worthman, 1998), and the wide age range of pubertal onset in girls (DeRose et al, 2006), the inclusion of pubertal development measures is, therefore, essential for further investigation of pathways to depression in girls.

The emergence of both negative interpersonal experiences and depression symptoms during the adolescent transition is a well-documented finding; however, the extent to which girls evidence features of interpersonal dysfunction that might put them at risk for interpersonal stress or depression *before* the adolescent transition is still unclear (Crick & Zahn-Waxler, 2003; Keenan & Hipwell, 2005). Early gender-specific socialization practices fostering the development of high levels of concern for others and the desire to preserve social relationships at all costs certainly prime girls to react negatively to interpersonal conflict long before the start of puberty (Keenan & Hipwell, 2005; Keenan & Shaw, 1997). However, while researchers argue that individual differences in the ability to effectively negotiate social interactions in middle to late childhood serve as a diathesis for emotional perturbations in adolescence (Nolen-Hoeksema & Girgus, 1994; Keenan & Hipwell, 2005), little is known about the specific problems in interpersonal functioning that exist prior to the onset of adolescence and whether difficulties in social-cognitive, emotional, and behavioral functioning are indicators of interpersonal dysfunction.

Finally, while adolescents do experience more conflict and disruption in family relationships than they do prior to adolescence, most continue to enjoy and profit from warm and supportive relationships with their parents (Hillaker, Brophy-Herb, Villaruel, & Haas, 2008; Steinberg & Silk, 2002). Accordingly, adolescent girls chiefly experience dependent interpersonal stress in the context of peer relationships in comparison to pre-adolescent girls, who are most likely to report independent, or *fateful*, stressful events in the family context (Rudolph & Hammen, 1999). This pattern might explain the scarcity of research on the mutual or interactive effects of peer and family relationships on emotional adjustment in adolescent girls. However, given the social and emotional benefits of close, supportive parent-child relationships (Barber, Stoltz, & Olsen, 2005; Hillaker et al., 2008), understanding the degree and extent to which current family functioning might buffer the effects of peer stress on the development of depression in girls is important to the identification of areas of vulnerability and resilience.

The current study aims to improve our understanding of the stress generation process and its association with the development of depression symptoms in girls during the transition to adolescence by delineating the

specific components of maladaptive interpersonal functioning that might characterize “stress generating” social interactions and subsequently result in emotional distress. To this end, the nature of interpersonal dysfunction was examined in a community sample of girls in early adolescence using multi-informant measures of emotional, social-cognitive, and behavioral functioning. The interactive effects of interpersonal dysfunction and friendship quality on depression symptoms were then explored while simultaneously considering the effects of the mother-child relationship. Interpersonal dysfunction was expected to interact with poorer friendship quality, on the premise that a lack of a close friendship might be especially stressful for an adolescent girl, and, therefore, prospectively predict increasing levels of depression symptoms in mid-adolescence. It was further hypothesized that the mother-daughter relationship would serve as a protective factor in the development of depression symptoms in the context of lower friendship quality. Finally, it was expected that the hypothesized pathways to depression would be enhanced in girls who were in advanced stages of puberty.

1.1 ADOLESCENCE, DEVELOPMENT, AND PSYCHOPATHOLOGY

The transition to adolescence is a period of remarkable biological, psychological, and social change (Cicchetti & Rogosch, 2002; Compas, Hinden, & Gerhardt, 1995). Although no longer characterized as a period of pandemic “storm and stress” (Arnett, 1999), the preponderance of behavioral and emotional unrest associated with adjustment to the challenges of adolescence is a distinguishing feature of this developmental period (Cicchetti & Rogosch, 2002). Consequently, the higher normative levels of mood disturbances, engagement in risky behaviors, and parent-child conflict during this transitional period blur the boundaries between normative functioning and psychopathology, as well as between adaptive and maladaptive coping strategies (Cicchetti & Rogosch, 2002). A key challenge for theorists and researchers, therefore, is to identify the behaviors and strategies that represent ‘true’ psychopathology, in order to examine to their developmental antecedents, underlying mechanisms and processes, and outcomes. A developmental psychopathology perspective, therefore, is integral to understanding the adolescent transition.

1.1.1 The Developmental Psychopathology Perspective

Developmental psychopathology provides an important framework for elucidating the interpersonal characteristics underlying interpersonal stress and the development of depression in girls during the transition to adolescence. First, its twin concentration on normal and abnormal functioning in the context of normative age- and stage-salient developmental changes highlights the importance of considering normative changes in girls' social relationships with peers that might accentuate or trigger maladaptive responses to negative social experiences.

1.2 THE CONTEXT OF INTERPERSONAL STRESS IN ADOLESCENT GIRLS

Given a developmental psychopathology perspective, one must consider the larger context of normative and systemic changes accompanying the onset of adolescence in order to better conceptualize pathways from interpersonal stress to depression in girls. The following section reviews the key developmental issues or changes that are believed to potentiate emotional difficulties in the face of interpersonal stress.

1.2.1 Pubertal Development

The pubertal transition is arguably the most distinctive and distinguishing feature of adolescence. Perhaps because the physical markers are difficult to hide, the onset of puberty appears to be the socially accepted necessary and sufficient cue to adolescent entry, thereby forcing even the youngest to embrace all or most of the stage-salient tasks of adolescence at once. As such, puberty should be viewed as affecting the individual on multiple levels simultaneously (biological, psychological, social). Pubertal development is also characterized by an unfolding of physiological, physical, and neural processes over an extended period of time (5-6 years) (DeRose et al., 2006), suggesting that it should be considered as a process rather than a single event (Hyde, Mezulis, & Abramson, 2008). While there is a broad spectrum of individual differences associated with both the onset and rate of development, puberty generally begins in middle childhood (DeRose et al., 2006)

To date, pubertal timing and status (e.g., Caspi & Moffitt; 1991; DeRose et al, 2006; Ge et al, 2001; Natsuaki, Breal, & Ge, 2009; Rudolph, 2008), hormonal influences (e.g., Cyranowski, Frank, Young, & Shear, 2000), neurobiological shifts (e.g., Silk et al., 2009), and social changes (DeRose et al., 2006) have each been shown to influence or amplify emotional reactivity to stress. The majority acknowledge that the physiological and social changes associated with pubertal development interact with contextual factors (e.g., school transitions, parent-child relationships) to shape adolescent social and emotional outcomes (also see Hyde et al, 2008 for review).

In particular, researchers have focused on the timing of pubertal development as a risk factor for the development of depression symptoms (Caspi & Moffit, 1991; DeRose et al., 2006, for review: see Hyde et al., 2008), such that adolescents who mature early in comparison to their peers face more developmental demands before those who mature later (Caspi & Moffitt, 1991; Gruber & Brooks-Gunn, 1996). Caspi and Moffit (1991) argue that early maturing adolescents who are “vulnerable” to showing negative characteristics are more likely to demonstrate them in the context of challenging social situations. It will be important to examine whether girls with interpersonal deficits who also undergo pubertal development relatively earlier than their peers are indeed more vulnerable to the development of depression symptoms. Given mixed evidence for personal-accentuation models such as this (Ge et al., 2006), it will be important to also consider how pubertal status interacts with social contextual factors in the prediction of depression symptoms.

1.2.2 Gender Intensification

Although the process of gender socialization begins long before adolescence (e.g., Keenan & Shaw, 1997), the start of adolescence appears to accelerate this process, resulting in a heightened identification with gender-stereotyped attitudes, behaviors, and values (gender-intensification hypothesis; Hill & Lynch, 1983). It is believed that adolescent girls’ friendship needs “intensify” in adolescence, thereby putting them at risk for emotional distress in the context of interpersonal stress (Cyranowski et al., 2000). Further, girls’ tendency to use emotion-focused coping styles, in which she directs attention to her negative affect and thoughts surrounding stressful situations, is also hypothesized to be reinforced through this process (Broderick & Korteland, 2002; 2004).

1.2.3 Role Transitions in the Family, Peer, and School Setting

Family Setting. The parent-child relationship witnesses a fundamental shift as parents slowly relinquish authority and control over their adolescent (Steinberg & Silk, 2002). While conflict can arise over issues such as chores, curfews, clothing, and rules, disputes such as these rarely disrupt the parent-child bond (Sheeber et al., 2001; Steinberg & Silk, 2002). In comparison to boys, girls struggle more in their attempts to establish behavioral autonomy, especially in early adolescence, which can escalate conflict (Pomerantz & Ruble, 1998). However, these episodes gradually fade as parents become more comfortable with their redefined roles and their daughter's growing independence (Sheeber, Hops, & Davis, 2001). Contrary to popular belief, high levels of conflict are non-normative and associated with adverse outcomes (Sheeber et al., 2001). Although they spend much less time together, adolescents ultimately remain close to their parents (Steinberg & Silk, 2002).

Peer Setting. Friendship and peer group status become increasingly salient to girls' socio-emotional well-being as they enter adolescence (Crick & Zahn-Waxler, 2003; Cyranowski et al., 2000; Rose & Rudolph, 2006; Rudolph, 2002). Adolescent girls' friendships are characterized primarily by high levels of emotional support, intimacy and affection, and self-disclosure (although they also provide instrumental guidance, companionship, and self-validation) (Brown & Klute, 2003; Cyranowski, et al, 2000; Roy, Benenson, & Lilly, 2000). Girls' communal relationship style has its roots in early childhood, but intensifies in adolescence as a function of other biological and social changes such as gender intensification (Cyranowski et al., 2000). Heightened relationship needs may put girls at risk for experiencing emotional distress in the face of interpersonal conflict or stress, both real and imagined (Benenson & Christakos, 2003).

Self-disclosure, in which both factual and intimate information is shared with another, is an increasingly common feature of friendship communication in adolescence (Roy et al, 2000). Whereas parents are typically the partners of self-disclosing conversations during middle-childhood, friends become the primary recipients of intimate details during adolescence (Buhrmester & Prager, 1995). While beneficial for self-validation and stress reduction, self-disclosure also is a major source of interpersonal stress and friendship instability in girls, as disclosure is frequently used as fodder for relational aggression (Benenson & Christakos, 2003), ultimately weakening the relationship (Benenson & Alavi, 2004).

In addition, peer groups evolve into rigid, highly structured, “cliques”, which are extremely exclusive in nature and associated with social status (Brown & Klute, 2003). As a salient context for the development and maintenance of close friendships, clique membership plays a principal role in girls’ emotional adjustment (Kuperminc, Sack, Blatt, & Leadbeater, 2000). Given the greater instability of friendships in this developmental period (Benenson & Alavi, 2004), clique members may feel the need to protect their existing friendship status, whereas those who do not belong may feel rejected.

Finally, because adolescents spend more time with their peers than with their families, they must negotiate peer difficulties with less instrumental support from their parents. Moreover, their growing autonomy needs might hinder attempts to ask for help in challenging situations.

School Setting. The transition to a secondary school setting involves many changes including school structure, class organization, academic standards, teacher expectations, teacher-student relationships, and the peer social network (Eccles, Lord, & Buchanan, 1996; Rudolph, Lambert, Clark, & Kurlakowsky, 2001; Rudolph, 2002). With teachers less invested in student relationships and parents less involved in the secondary school system (Eccles et al, 1996), adolescents’ coping resources may be overwhelmed in the context of social stress.

1.3 THE NATURE OF INTERPERSONAL STRESS IN ADOLESCENT GIRLS

Important to the developmental process is the girl’s active involvement in shaping her own experiences (Sroufe & Rutter, 1984). For example, she constructs her own internal representation of external events (e.g., social-cognitions), which shapes both her internal processes (e.g., emotional responses) and her future interactions with the environment (e.g., behavioral responses), chooses the types of environments that she prefers to occupy (e.g., friend selection), and evokes responses from others through her personal characteristics (e.g., use of relational aggression) (Cummings et al., 2000). Depression and emotional adjustment, therefore, are not just “the luck of the draw”, but the sum of numerous individual-environment transactions.

1.3.1 A Transactional Perspective of Stress

The construct of interpersonal stress is generally defined as negative events that occur in the context of important social relationships. A transactional perspective on interpersonal stress emphasizes further that it is the individual's internal representation of the negative event that determines the extent and degree to which it is actually experienced as stressful (Lazarus & Folkman, 1987). While there are events that the majority of girls would find aversive and emotionally arousing and, as such, would be considered as 'inherently stressful', these events are stressful only if they are perceived as such. For example, one girl might find a romantic break-up extremely upsetting and stressful, whereas another might feel relieved that she is free to date other people.

The transactional perspective also considers the degree and extent to which an individual actively contributes to the occurrence of the stressful event as an essential feature of interpersonal stress. As adolescents begin to experiment with their growing autonomy, they are more likely to precipitate, or generate, events that will ultimately be experienced as stressful Rudolph & Hammen, 1999). It is dependent, or self-generated, stress that is considered to play a role in the development of depression symptoms, rather than independent, or "fateful", stress (Hammen, 1991, 1992; Rudolph, 2002; Rudolph & Hammen, 1999; Rudolph et al, 2000).

Dependent stress in the peer setting occurs both within dyadic friendships and the peer group. Adolescent girls are more likely to express unmet needs and anger through covert and indirect methods than through confrontation; they gossip, spread rumors, and threaten friendship status as a means of addressing friendship problems rather than use more direct forms of communication (Letendre, 2007). Intensified relationship needs heighten girls' vigilance, as well as emotional responses, to indirect cues of relationship threat. Perceptions of lowered friendship quality, limited network size, and low social status might provoke girls to use relational aggression to protect friendships and social status (Letendre, 2007). The consequences of relational aggression, however, are usually fatal to friendships (Benenson & Christakos, 2003). The discrepancy between what is frequently cited as a stressful event and an individual's internal experiences thereof renders the investigation of interpersonal stress, dependent or otherwise, complicated and difficult. The current study aimed to examine friendship features (i.e., low friendship quality) that many girls might experience as negative and emotionally arousing, but whether these features resulted in the subjective experience of stress by each participant can only be considered as conjecture, even if they resulted in predicting later depression symptoms.

1.3.2 Linking Dependent Stress with the Development of Depression Symptoms in Adolescent Girls:

Evidence for a Stress Generation Model of Depression

There are a number of theoretical models and reviews addressing the mechanisms underlying gender differences in the development of depression during the transition to adolescence (e.g., Cyranowski et al., 2000; Hankin & Abramson, 2001; Hyde, Mezulis, & Abramson, 2008; Nolen-Hoeksema & Girgus, 1994). While all of these authors acknowledge the role of negative interpersonal events in the development of depression symptoms in adolescent girls, Rudolph and colleagues (Rudolph, 2002; Rudolph & Hammen, 1999; Rudolph et al, 2000) were the first to focus on and empirically investigate the processes linking interpersonal stress to depression in girls. Their findings from a systematic evaluation of the context (interpersonal vs. non-interpersonal) and types (dependent vs. independent) of stress that predict increasing rates of depression symptoms in youth support an age- and gender-specific stress generation model of the development of depression symptoms (Rudolph, 2002; Rudolph & Hammen, 1999; Rudolph et al, 2000). Specifically, in comparison to adolescent boys and preadolescent girls, adolescent girls experience higher levels of *dependent interpersonal* stress, and are more likely to respond to these episodes with heightened negative emotionality. Notably, adolescent boys and girls do not appear to differ in terms of their experiences of overall stress, underscoring the importance of examining gender-specific pathways to psychopathology with gender- and context-specific measures. Indeed, if the authors had limited their findings to global measures of stress they may not have found evidence for stress generation in adolescent girls.

Taken together, these findings suggest that adolescent girls are much more likely to experience stress as a consequence of their own behaviors than as a consequence of uncontrollable life events, and are more likely to experience emotional distress in the context of *dependent, interpersonal* stress than other forms of stress. These observations suggest that interpersonal dysfunction is likely to underlie both stress exposure and stress reactivity in adolescent girls. Specifically, deficits in internal representations of social events (i.e., social cognitions), internal processes (i.e., emotional responses), and personal characteristics (i.e., social behaviors) are likely to evoke negative responses in significant social partners and exacerbate the emotional outcomes of these interactions, thereby limiting future responses to stress.

1.4 INTERPERSONAL DYSFUNCTION, STRESS GENERATION, AND DEPRESSION IN GIRLS DURING THE TRANSITION TO ADOLESCENCE

Delineating the social-cognitive, emotional, and behavioral components of interpersonal dysfunction that contribute to stress generation and depression in adolescent girls is necessary for understanding the interpersonal processes underlying both adaptive and maladaptive functioning in the context of interpersonal stress. While researchers have started to examine the potential behavioral, social-cognitive, and emotional variables involved in the stress generation process, progress in understanding the stress generation process itself has been hindered by the absence of a unified approach to the study of interpersonal functioning. Specifically, researchers have integrated the stress generation model into their own theoretical perspectives, leaving many holes in the literature. For example, investigators using cognitive-vulnerability models of depression examine their own cognitive theory (Kercher & Rapee, 2009), which is generally a downward extension of adult theory, as it relates to global measures of dependent stress. Thus, they fail to gather information regarding the social-cognitions specific to girls' social environments or any context-, gender-, or age-specific processes.

Another limiting factor, arguably the largest, is the failure to examine all three areas of interpersonal functioning as they might relate to stress generation simultaneously, thereby preventing a thorough account of the processes underlying this phenomenon. Research examining processes underlying interpersonal dysfunction in other domains of childhood adjustment (i.e., aggression; Crick & Dodge, 1994) have demonstrated that aspects of social-cognitive, emotional, and behavioral functioning work in concert to determine a child's social and emotional adjustment. Thus, it stands to reason that interpersonal dysfunction in adolescent girls might also be defined by deficits in all three areas of functioning. The following section reviews literature on the behavioral, social-cognitive, and emotional variables that might interfere with interpersonal functioning and contribute to the stress generation process in girls in early adolescence.

1.4.1 Social Behaviors

Stress generation necessarily implies that an individual is behaving in ways that evoke negative reactions from social partners that then eventuate in diminished, rather than enhanced, relationship quality. Thus far three social behaviors have been investigated as they might contribute to this process: co-rumination, negative feedback-seeking, and excessive reassurance-seeking. Co-rumination refers to “excessively discussing personal problems within a dyadic friendship” and is the only construct developed specifically to apply to adolescent girls (Rose, 2002). Negative feedback-seeking and excessive reassurance seeking, persistently asking one’s peers for confirmation of either negative self-evaluations or one’s lovability, respectively, were drawn from studies of depression in adults. Although somewhat different in nature, each of these behaviors occurs in the dyadic context, involves conversations that repeatedly center on negative thoughts and feelings, and requires that the social partner provide feedback regarding the solicitor’s social situation. Accordingly, the study of these behaviors yielded somewhat similar patterns of results.

First, each of these behaviors appears, for the most part, to be triggered by both perceptions of or actual experiences of interpersonal stress, but they do little to alleviate social and emotional distress in the long run (Abela, Zuroff, Ho, Adams, & Hankin, 2006; Borelli & Prinstein, 2006; Prinstein, et al., 2005; Reijntes, Stegge, Tervogt, Kamphuis, & Telch, 2007; Rose, 2002, Rose, Carlson, & Waller, 2007). While co-rumination was related to *enhanced* friendship quality (Rose et al., 2007), negative feedback-seeking and excessive reassurance seeking prospectively predicted friendship difficulties (Borelli & Prinstein, 2006; Prinstein et al., 2005). Findings from the study of excessive reassurance-seeking suggest that it interacts with life stress in the prediction of depression, such that high levels of excessive reassurance-seeking result in emotional distress only in the context of stressful life events (Abela et al., 2006; Prinstein et al., 2005). Notably, findings were inconsistent regarding the extent to which they were specific to girls in early adolescence, and they were based on global measures of stress.

In general, it appears that interpersonal behaviors aimed at alleviating social and emotional distress may become self-fulfilling prophecies. Moreover, it appears that these behaviors may rely on social-cognitive appraisals and emotional reactivity, underscoring the importance of a multi-dimensional approach to the study of the stress generation process. Further efforts aimed at examining behaviors specific to the unique social context of adolescent girls (e.g., relational aggression) are needed. Given the rise in girls’ relational aggression across middle childhood to

early adolescence (Crick ,1996; Crick & Zahn-Waxler, 2003; Murray-Close, Ostrov, & Crick, 2007) and its prospective association with increasing levels of *both* friendship intimacy and internalizing problems (e.g., Murray-Close et al., 2007), it is remarkable that the field has ignored its role in stress generation and the development of depression in adolescent girls. Although a normative behavior to some extent, excessive use of relational aggression can be destructive to girls' friendships and peer group processes. As such, the examination of relational aggression within a stress generation model of depression in adolescent girls should be a priority. The examination of behaviors that are contrary to gender expectations may also prove fruitful for understanding this process (e.g., Crick, 1997).

1.4.2 Social-Cognition Variables

The findings reviewed above suggest that maladaptive interpersonal behaviors might be triggered by emotional responses to cognitive evaluations of the social environment. Rudolph (2002) proposes that heightened levels of social-evaluative concerns could trigger higher levels of emotional reactivity when cues signaling interpersonal problems are read. Several studies have evaluated this hypothesis by investigating need for approval and its association with depression, interpersonal stress, and social competence. In line with this model, adolescent girls high in social evaluative concerns experience emotional distress in the context of peer stressors (Calvete & Cardeonos, 2005; Rudolph, Caldwell, & Conley, 2005), and are likely to endorse depressive symptomatology (Calvete & Cardeonos, 2005; Ewart, Jorgenson, & Kolodner, 1998; Little & Garber, 2000; Rudolph et al., 2005). However, it does not appear that social-evaluative concerns alone play a role in stress generation, as girls with heightened peer concerns are *more* competent rather than less competent (Rudolph & Conley, 2005; Rudolph et al, 2005).

Social information-processing abilities are dependent not only on the awareness of a variety of verbal and non-verbal behaviors, but on the interpretation of these cues as well. Poor attention to and biased interpretation of social cues might contribute to maladaptive emotional and behavioral responses. The application of a social information-processing model to explain children's and adolescent's social-emotional adjustment is not a new concept in the developmental literature (e.g., Crick & Dodge, 1994). Although this model has been used primarily to understand hostile attribution biases of aggressive and rejected children, interest in its possible application to the development of depression symptoms is slowly emerging.

To date, two groups of researchers (Dearing & Gotlib, 2009; Joorman, Talbot, & Gotlib, 2007; Prinstein, Cheah, and Guyer, 2005) have examined this phenomenon. Prinstein and et al. (2005) found that adolescent girls who were “vigilant” to cues of rejection in socially ambiguous scenarios had low self-esteem and elevated levels of depression and loneliness, even in the *absence* of actual peer-rated rejection. Gotlib and colleagues (Dearing & Gotlib, 2009; Joorman et al., 2007) demonstrated that girls at high genetic risk for depression interpreted ambiguous social information and facial expressions negatively.

Taken together, these data demonstrate the presence of deficits in social information-processing abilities and depression symptoms in adolescent girls. Questions remain, however, regarding the extent to which processing deficits might map on to perceptions of group acceptance, the types of emotional reactions and behavioral responses evoked by perceptions of imagined (or real) interpersonal stress, and whether and how these processes eventuate in the development of depression symptoms in the context of friendship quality.

1.4.3 Emotional Variables

In light of evidence that pubertal development is a time of marked emotional reactivity (Silk et al., 2009; Quevedo, Benning, Gunnar, & Dahl, 2009), individual differences in girls’ emotional reactivity, especially in the context of social challenges, are likely to play a salient role in the development of depression during this transitional era (Cyranowski et al, 2000; Hankin & Abramson, 2001; Hyde et al, 2008; Keenan & Hipwell, 2009; Rudolph, 2002). While Wetter and Hankin (2009) found that supportive relationships interacted with low levels of positive emotionality in the prediction of depression symptoms in a school-based sample of 6th to 10th graders, very little is known about the role of negative emotionality in the stress generation process. Researchers must still examine the processes by which negative emotionality might interact with the social environment in its association with the development of depression symptoms.

1.5 FAMILY RELATIONSHIPS

1.5.1 Family Processes

While adolescent girls rely on and favor peer relationships as a primary source for intimacy and affection, emotional support, companionship, and self-validation (Buhrmester & Prager, 1995; Rose & Rudolph, 2006), their social and emotional development and adjustment also hinge on family relationships and family functioning (Sheeber et al., 2001). Specifically, it has been widely shown that an adverse family environment is a significant risk factor for the development of depression symptoms (Goodman, 2002; Sheeber et al., 2001). Family processes are likely to influence adolescent adjustment in the context of peer stress through two processes: as a source of stress or support and through social interactions (Sheeber et al., 2001).

1.5.2 Families as a Source of Stress or Support

Family environments characterized by insecure attachment to parents (Rubin, et al., 2004; Sund & Wichstrøm, 2002), low levels of parental acceptance, intimate support, and warmth (Ge et al., 1994; Hipwell et al., 2008; Jenkins, Goodness, & Buhrmester, 2002; Nelson, & Coyne, 2009; Ohannessian, Lerner, von Eye, & Lerner, 1996; Sheeber, Davis, Leve, Hops, & Tildesley, 2007), high levels of criticism and psychological control (Feng et al., 2009; Gamble & Roberts, 2005; Garber, Robinson, & Valentiner, 1997), and low cohesion and adaptability (Gauze, Bukowski, Aquan-Assee & Sippola, 1996) have been shown to contribute directly to the development of depression symptoms in adolescents. High levels of psychological control and low levels of warmth and support appear to be particularly relevant to girls as they advance from late childhood to early adolescence (Ge, Natsuaki, Niederhiser, Reiss, 2009; Hipwell et al., 2008; Feng et al., 2009).

While parent acceptance, support, and attachment are inversely associated with depression symptoms in adolescence (Barber et al., 2005; Landman-Peeters et al., 2005; Rubin et al., 2004; Sheeber et al., 2001), very little is known about the extent to which positive and supportive family relationships might off-set or *buffer* the effects of interpersonal stress on emotional adjustment in adolescent girls (Ge et al., 2009; Landman-Peeters, 2005). Theory and research indicating that females seek and benefit from emotional support from relationships (Landman-Peeters

et al., 2005; Rose & Rudolph, 2006), especially during times of stress (Taylor et al, 2000), certainly suggest that families should provide an effective source of support for girls when they are experiencing problems in their peer relationships, and vice versa.

It has been argued that because there is substantial overlap in the functions of family and peer relationships, children and early adolescents should have many resources for obtaining emotional and instrumental support, intimacy, closeness, and encouragement (Furman & Buhrmester, 1985). Consequently, unmet relationship needs in one setting can be satisfied in another. However, when a child must rely on only one source of social and emotional support, the emotional consequences of failure or success in one social context might then depend on the extent to which it is the primary source of support.

Gauze and colleagues (1996) tested and upheld one aspect of this theory in a nine month prospective study of 4th, 5th, and 6th graders attending an urban, public school. Children's emotional adjustment was more dependent on fluctuations and changes in their friendships when they were from families with low, rather than high, levels of cohesion and adaptability. Rubin and colleagues (2004) obtained similar results in a study of 5th grade students, in which friendships buffered the effects of low parental support on emotional adjustment, but only in the context of high relationship quality. Taken together, these results suggest that an over reliance on peers is a double-edged sword, as normative fluctuations in relationship quality are associated with concurrent changes in adjustment. One might postulate that for girls in early adolescence, a period of normative friendship intensification and disruption, the emotional ramifications of lowered relationship quality in a best friendship are something that they might be willing to protect it at all costs, especially if they come from a troubled family background.

These findings suggest that, at least in early adolescence, peer relationships are more likely to exacerbate than attenuate emotional distress associated with low family functioning. Important to the study of the interpersonal processes implicated in the development of depression in adolescent girls, however, is the extent to which families might attenuate the effects of peer difficulties on emotional functioning. As stated previously, children raised in warm, supportive, and accepting families are less likely to develop depression symptoms. It stands to reason, therefore, that a supportive family environment should offset emotional distress in the context of peer stress. Wenz-Gross, Siperstein, Untch, and Widaman (1997) demonstrated that perceptions of parental emotional support moderated the association between peer stress and depression symptoms in a sample of middle school children.

Likewise, Ge et al. (2009) ascertained that maternal ratings of parent-child closeness buffered the effects of interpersonal stress on depression symptoms.

1.5.3 Social Interactions

Families indirectly influence child social-emotional development through their daily interactions with their child and other important social partners. Specifically, children and adolescents learn how to engage in appropriate conversations with others and how to respond to various stressors by observing their parents model these behaviors for them. As such, it stands to reason that the stress generation process could be an outcome of parent socialization behaviors.

One group of researchers (Jones, Beach, & Forehand, 2001) investigated the stress generation process in mothers of adolescents between the ages of 11 and 15 years and its potential association with depressive symptoms in their children. Mothers' stress generation tendencies predicted both mother and adolescent depressive symptoms, both concurrently and prospectively. Further, research conducted on youth followed from birth to age 20 reveals that associations between mother and adolescent depression in late adolescence is partially mediated by youth interpersonal dysfunction manifested by age 15 (Hammen et al., 2008). These findings suggest that parents (due to both genes and behavior) might be modeling and reinforcing social behaviors that contribute to the stress generation process and the development of depression symptoms.

The emotional climate of the family has been shown to exert an influence on both social and emotional development. For example, in families characterized by high levels of negative affect, adolescents are more likely to experience high levels of depression symptoms and internalizing problems (Fosco & Grych, 2007; Hamilton, Hammen, Minasian, & Jones, 1993; Silk et al., 2009 Stocker, Richmond, Rhoades, & Kiang, 2007), find marital conflict more distressing (Fosco & Grych, 2007), have poorer social functioning (McCleary & Sanford, 2002), and express more criticism towards their parents (Hamilton et al., 1993). Family environments such as this are not likely to help adolescents successfully establish close friendships and negotiate conflict with peers.

2.0 STATEMENT OF PURPOSE

Adolescent girls play an active role in shaping their social and emotional experiences, including the frequency and occurrence of negative social experiences that are most often linked with dysphoric mood. The study of the interpersonal deficits that might underlie both stress exposure and stress reactivity is, therefore, essential to disentangling the role of negative interpersonal events in the development of depression in adolescent girls. From a developmental perspective, it is also important to examine signs of maladaptive interpersonal functioning manifest in late childhood/early adolescence to better understand how and when early interpersonal experiences might be associated with emotional adjustment in later adolescence. Further, while the use of global measures of interpersonal stress have helped to identify the types of problems (e.g., dependent) that most frequently trigger negative emotional reactions in adolescent girls, knowledge concerning *whether* specific friendship characteristics (e.g., lower friendship quality) might result in heightened emotional distress is needed. Finally, because interpersonal difficulties do not arise in the peer setting alone, researchers must determine how the peer and family environment, either together or alone, are associated with adolescents' social-emotional adjustment.

The goal of the current study is built upon extant research and theory concerning the interpersonal processes implicated in the development of depressive symptoms in adolescent girls by investigating domains of interpersonal dysfunction, identified by measures of emotional, social-cognitive, and behavioral functioning, as they relate to depressive symptoms within the larger contexts of friendship characteristics and family relationships. The sample comprises a female subset (479/1,364) of children recruited to participate in the NICHD Study of Early Child Care and Youth Development, who were followed longitudinally from birth to age 15. The data used for the current study were collected via observations, questionnaires completed by multiple informants, and physical examinations by a nurse practitioner or pediatrician.

Interpersonal dysfunction was assessed using multi-informant measures of emotional (i.e., emotional reactivity, emotion expression), social-cognitive (i.e., perceptions of peer support and victimization, attribution

biases), and behavioral (i.e., self-control, aggression, relational aggression, and prosocial behavior) functioning important to social relationships. In other words, associations within and among the various domains of interpersonal dysfunction were examined to determine the extent to which emotional, social-cognitive, and behavioral functioning cohere as components of a construct of interpersonal dysfunction. Next, the nature and degree of associations between each domain of interpersonal dysfunction and friendship characteristics (i.e., friendship quality), family relationships (i.e., quality of parent-child interactions), and depressive symptoms were examined. To examine developmental pathways from early interpersonal functioning to later emotional adjustment, age 11 measures of interpersonal dysfunction and family relationships were modeled with age 12 measures of friendship characteristics and age 15 measures of depressive symptoms. Finally, the intervening effects of pubertal development on these pathways were examined. Pubertal status measures include mother-reported and nurse-observed physical development and the start of menstruation.

Based on the present review of the literature, it was expected that measures of interpersonal dysfunction would demonstrate moderate levels of coherence within and among emotional, social-cognitive, and behavioral dimensions. It was also expected that dimensions of interpersonal dysfunction and friendship characteristics would interact in their prospective association with depressive symptoms, and that positive family relationships would serve as a buffer in this process. Finally, it was expected that for girls who started the pubertal transition at age 11, interpersonal dysfunction would be more closely associated with peer functioning and depressive symptoms than in those who were still pre-pubescent.

3.0 HYPOTHESES

3.1 HYPOTHESIS 1: DIRECT ASSOCIATIONS AMONG AGE 11 NEGATIVE EMOTIONALITY, SOCIAL-COGNITIVE BIASES, AND NEGATIVE SOCIAL BEHAVIOR

On the basis of the developmental psychopathology perspective and prior research, it is hypothesized that age 11 negative emotionality (i.e., emotional reactivity, emotional lability in the social context), social-cognitive biases (i.e., perceptions of peer support and victimization, hostile attribution biases), and negative social behaviors [i.e., relational aggression, aggression with peers, prosocial behavior (reversed), and self-control (reversed)] will be moderately associated with one another.

3.2 HYPOTHESIS 2: DIRECT ASSOCIATIONS BETWEEN AGE 11 NEGATIVE EMOTIONALITY, SOCIAL-COGNITIVE BIASES, AND NEGATIVE SOCIAL BEHAVIOR AND DEPRESSION SYMPTOMS

Based on prior research, it is expected that age 11 social-cognitive biases (e.g., Prinstein et al., 2005), negative emotionality (e.g., Rudolph, 2002), and negative social behaviors (Murray-Close et al., 2007), will predict higher levels of depression symptoms prospectively (i.e., at age 15). It is further expected that each of these three dimensions will contribute unique variance in the prediction of depression symptoms.

3.3 HYPOTHESIS 3A: BETWEEN NEGATIVE EMOTIONALITY AND FRIENDSHIP QUALITY

Given preliminary evidence that emotionality interacts with relationship quality in the prediction of depression symptoms (Wetter & Hankin, 2009), it is expected that low levels of positive friendship quality at age 12 will moderate associations between age 11 negative emotionality and later depressive symptoms.

3.4 HYPOTHESIS 3B: INTERACTIONS BETWEEN SOCIAL-COGNITIVE BIASES AND FRIENDSHIP QUALITY

Given preliminary evidence that high levels of peer stress enhance prospective associations between social-cognitive biases and depression symptoms (e.g., Prinstein et al., 2005), it is expected that lower friendship quality at age 12 will also enhance the magnitude of the association between age 11 social-cognitive biases and age 15 depression symptoms.

3.5 HYPOTHESIS 3C: INDIRECT ASSOCIATIONS BETWEEN NEGATIVE SOCIAL BEHAVIORS AND FRIENDSHIP QUALITY

Given evidence of the deteriorating effects of interpersonal behaviors on friendship quality, it is expected that low levels of friendship quality at age 12 will mediate the association between negative social behaviors and age 15 depressive symptoms.

3.6 HYPOTHESIS 4: THE PROTECTIVE ROLE OF FAMILY RELATIONSHIPS

Based on theory and research pointing to the family as a source of support, it is expected that positive family relationships (i.e., better relationship quality and more positive interactions) assessed at age 11 will attenuate

associations between social-cognitive biases, negative emotionality, and negative social behaviors and depression.

Given the lasting nature of family experiences, it is expected that these effects will persist across time.

**3.7 HYPOTHESIS 5: DIFFERENCES IN INTERPERSONAL PROCESSES AS A FUNCTION OF
PUBERTAL STATUS**

Pubertal development gives rise to a number of biological, psychological, and social changes that might exacerbate the effects of interpersonal processes on emotional adjustment. It is, therefore, expected that the aforementioned hypothesized processes will be enhanced in girls at advanced stages of pubertal development at age 11.

4.0 METHOD

4.1 PARTICIPANTS

This study used data collected from the female subset of a sample recruited in 1991 to participate in the multi-site, NICHD Study of Early Child Care and Youth Development. Healthy newborn babies and their families were recruited from hospitals located near the ten primary data collection sites across the US: Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle, WA; and Madison, WI. The analyses for this study were based upon socio-demographic data collected at baseline (age 1 month) and information gathered from the participants between the ages of 11 and 15 years.

Out of the 1,364 participants constituting the original sample, a total of 659 were female. Of these, 497 mothers and children were included in the present study on the basis of data available at age 15. Attrition analyses, comparing study families that were not included ($N = 162$) with those families who were, revealed statistical differences between the groups. Data collected at the one month home visit indicate that the girls included in this study have more highly educated ($M = 14.55$ vs. 13.63 years of education, $F = 16.73, p = .000$) and older mothers ($M = 28.92$ vs. 26.44, $F = 24.57, p=.000$); included girls lived in families with higher income-to-needs ratios ($M = 2.98$ vs. 2.22, $F = 8.13, p = .004$). They also were more likely to live in a two-parent household (79.7% vs. 63.6%) and to be Caucasian (81.3% vs. 74.7%). Thus, the sample for the current study is biased towards more educated and affluent backgrounds.

4.2 PROCEDURES

Children were followed at regular intervals from age 1 month through age 15 years. Detailed measures of family and child characteristics were obtained via interviews, questionnaires, and observations. Data for the current study rely on assessments conducted regularly at home and school, as well as during laboratory visits, when children were in fifth and sixth grade (that is at ages 11 and 12 years respectively), and again at age 15. During the initial one month visit, demographic information including marital status, maternal educational level, ethnicity, and income was obtained. Demographic data on the family continued to be updated during phone calls and home visits at regular intervals through age 11 years.

Maternal and teacher reports of children's social behaviors and emotions were obtained via questionnaires at ages 11 years. Observations of mother-child interaction were obtained in the laboratory at 11 years. Children's social information-processing biases and self-rated measures of peer support, victimization, quality of best friendship, and depression symptoms were also assessed in the laboratory at 11 years. At age 15, adolescents returned to the laboratory and reported on their depression symptoms. Nurse practitioners examined children during a pediatric office visit to determine pubertal status and maternal reports were collected via questionnaire when girls were 11 years old.

Additional details about all data collection procedures and measurement instruments are documented in the study's Manuals of Operation (<http://secc.rti.org>).

4.3 MEASURES

4.3.1 Demographics

Maternal Education. The number of years in school completed at the time of recruitment was used as an index of maternal education

Ethnicity. During home interviews at one month, mothers reported the child's ethnicity.

Income-to-needs ratio. Family income and size were recorded during home visits conducted regularly between age one month and age 11. Total household income was divided by the appropriate poverty threshold for that year based on household size (U.S. Department of Labor, 1994; NICHD Early Child Care Research Network, 1999). The income-to-needs ratio was averaged from 1 month through age 11 to create an index of each family's economic status. Scores of ≤ 2.0 are indicative of poverty.

Marital Status. Mothers reported their marital status during interviews from 1 month to age 11. A categorical marital status variable was created based on whether mothers had ever (yes/no) reported that they were single.

4.3.2 Measures of Interpersonal Dysfunction

4.3.2.1 Negative Emotionality

Child Emotion Regulation. At age 11, mothers completed a 10-item questionnaire measuring children's expressed emotion, or *emotional reactivity* ($\alpha=.91$) in response to positive and negative events.

Child Behavior Checklist (CBCL) Achenbach, 1991a). At age 11, mothers reported on the study child's behavior problems. The parent responded to 118 items assessing a broad range of behavioral and emotional problems. Items are rated on 3-point scale (0 = not true, 1 = somewhat/sometimes true, and 2 = very true/often true). Eleven items from the CBCL were used to generate a composite measure of *emotional lability in social contexts*. Items include: cries a lot, easily jealous, nervous/high-strung, too fearful/anxious, self-conscious/easily embarrassed, stubborn/sullen/irritable, sudden changes in mood or feelings, sulks a lot, temper tantrums/hot temper, and whining worries. Inter-item correlations ranged from .20 to .57 and internal consistency was adequate ($\alpha=.85$).

4.3.2.2 Social-Cognitive Biases

Perceptions of Peer Support, Bullying, and Victimization. At age 11, study children were asked to complete an 18-item questionnaire derived from measures developed by Ladd and colleagues designed to assess perceptions of support from peers at school, perceptions of peer victimization by classmates, and engagement in physical bullying with classmates. Items were coded using a 5-point scale (1 = never, 2 = hardly ever, 3 = sometimes, 4 =

most of the time and 5 = always), and was not administered to children who were home schooled. Nine girls from the current study were homeschooled. The 10-item *perceptions of support* ($\alpha = .92$) was used previously in studies of friendship quality and peer acceptance (Ladd, Kochenderfer, & Coleman, 1996, 1997). The 4-item *peer victimization* ($\alpha = 0.81$) has been used in several studies of adjustment in school (Ladd et al., 1997).

Intent Attributions and Feelings of Distress Questionnaire. At age 11, children were administered a questionnaire designed to assess child intent attributions and feelings of distress in response to socially ambiguous situations (Crick, 1995). Four stories were used that describe provocation situations in which the intent of the provocateur is ambiguous. Three of the stories depict instrumental provocation focusing on acts of potential overt aggression (e.g., one's radio is broken by a peer), and one of the stories depicts relational provocation focusing on potential rejection (e.g., walking down the hallway and hearing kids laugh at you). For each story, the child indicated a reason for the provocation (hostile vs. benign intent), whether the provocative behavior was intended to be mean (1 = "Trying to be mean") or not mean (2 = "Not trying to be mean"), and feelings of distress (1 = "Not upset or mad at all", 2 = "A little upset or mad", and 3 = "Very upset or mad") the child would experience if the events in the story happened to her. *Total hostile intent* ($\alpha = .79$; 0-1 scale), computed as the mean of hostile intent items across all stories, and *total distress* ($\alpha = .60$; 1-3 scale), computed as the mean response to feelings of distress to the four stories depicting aggression, had moderate to modest internal reliability. The two scores were moderately associated ($r = .59$, $p = 000$), and they were composited to form an overall *hostile attribution biases* score for the purposes of this study.

4.3.2.3 Negative Social Behaviors

Social Skills Rating System (SSRS). At age 11, mothers and teachers completed the SSRS (Gresham & Elliott, 1990), a 38-item questionnaire assessing the child's social skills such as sharing, helping, initiating relationships, and controlling one's temper. Items are rated on a 3 point scale (0 = never, 1 = sometimes, 2 = very often). The SSRS identifies deficits in positive social behavior, which are grouped into four subscales. The 10-item *self-control* subscale has acceptable reliability for mother ($\alpha = .81$) and teacher ($\alpha = .89$) scores. Mother ($M = 14.06$, $SD = 3.25$) and teacher ($M = 15.65$, $SD = 3.63$) scores were composited to reflect child behavior demonstrated across the home and school settings.

Child Relationships with Peers Questionnaire (CRP). At age 11, mothers and teachers completed the 43-item CRP (Crick, Bigbee, & Howes, 1996; Ladd & Proffitt, 1996) to assess child negative, (bullying, exclusion, victimization), and positive (prosocial) behavior with peers. Behavior with peer was rated on a 3-point scale (0 = true, 1 = sometimes true, 2 = often true). Principal components analysis of responses in the current sample yielded several internally consistent scales relevant to the current analyses that did not overlap in content with other parent or teacher report measures such as the CBCL and SSRS. Maternal rated *relational aggression* (6 items; $\alpha = .75$), use of *aggressive behavior* ($\alpha = .80$), and *prosocial behavior* (9 items; $\alpha = .80$), had moderate to excellent internal consistency. Teacher rated *relational aggression* (6 items; $\alpha = .86$), use of *aggressive behavior* (9 items; $\alpha = .92$), and *prosocial behavior* (9 items; $\alpha = .88$), likewise showed moderate to excellent internal consistency. Again, mother and teacher scores for *relational aggression* ($M = .31$, $SD = .33$ and $M = .38$, $SD = .46$, respectively), *aggressive behavior* ($M = .22$, $SD = .26$ and $M = .24$, $SD = .38$, respectively), and *prosocial behavior* ($M = 1.71$, $SD = .35$ and $M = 1.56$, $SD = .41$, respectively) were averaged to generate a composite measure reflecting child behavior at home and at school.

4.3.3 Friendship

Friendship Quality (FQQ). At age 11, children completed the 21-item FQQ (Parker & Asher, 1993), assessing their views of their relationship with their best friend. Items are rated on a 5-point scale (1 = not at all true to 5 = really true). Twenty items make up the total *friendship quality* score ($\alpha = .89$), with higher scores reflecting a more positive (validation, companionship, disclosure) and less negative (conflict) relationship.

4.3.4 Family Relationships

Observations of Mother-Child Interactions. Mother-child interactions were videotaped at age 11 years. Mothers and their children participated in different sets of age-appropriate activities designed to elicit and assess maternal parenting qualities, child self-regulatory behavior, and qualities of the dyadic interaction. Specifically, mothers and children were asked to participate in a discussion task and a problem-solving task. The videotapes of mother-child interactions were sent to a central, non-data collection site for coding. Coders were trained and

supervised regularly to ensure reliability. They were blind to information about study families and the videotapes were randomly assigned to coders (NICHD Early Child Care Research Network, 1999; 2003).

Behaviors specific to *maternal sensitivity* were rated on three 7-point scales: supportive presence, respect for autonomy, and hostility. The scores range from 1 (not at all characteristic of the interaction) to 7 (highly characteristic of the interaction). A composite of *maternal sensitivity* ($\alpha = .87$) was derived from summing the scores across these scales (with hostility reversed). Inter-observer reliability was assessed with intraclass correlations averaged across pairs of raters; reliability was high, ranging from .84 to .91.

A composite measure of *child positive engagement with her mother* ($\alpha = .70$) was generated from three ratings of child behavior considered to reflect the quality of her relationship with her mother. At age 11, the scales comprised felt security, affection towards the mother, and negativity. At each age, these behaviors were rated on 7-point scales ranging from 1 (not at all characteristic of the interaction) to 7 (highly characteristic of the interaction), and were summed, with negativity reversed. *Maternal sensitivity* and *child positive engagement* were moderately associated ($r = .55, p = .000$), and composited to form an overall measure of *mother-child positive interaction*. Higher scores reflect both higher levels and rates of maternal positive behaviors towards her child *and* higher levels and rates of child positive behaviors towards her mother.

4.3.5 Depression

Child Depression Inventory (CDI). At age 15, children completed a 10-item measure of depressive symptoms experienced in the past two weeks (Children's Depression Inventory, Short Form, CDI; Kovacs, 1992). Ten sets of three statements were presented and the child selected the one that best described the way she felt over the last two weeks. Raw scores above 8 for girls are considered "well above average". Internal consistency for the current sample is moderate ($\alpha = 0.81$).

Child Behavior Checklist (CBCL). At age 15, mothers of study adolescents completed the CBCL (described above). Parent responses are used to generate standardized scores for eight syndrome scales. Scores on the Anxious/Depressed Syndrome Scale (14 items; $\alpha = .80$) were used to assess maternal-reported depression. A recent confirmatory factor analysis of DSM-IV symptoms of child and adolescent clinical disorders found that symptoms of Major Depressive Disorder and Generalized Anxiety Disorder were correlated 'near unity' and that models

treating the disorder separately failed to converge (Lahey et al., 2008). As such, the Anxious/Depressed Syndrome Scale should be considered a valid measure of depression symptoms. Five of the 14 items comprising this scale overlap with the *emotional lability* measures created at age 11, including: ‘cries a lot’, ‘nervous, high strung, or tense’, ‘too fearful or anxious’, ‘self-conscious or easily embarrassed’, and ‘worries’.

4.3.6 Pubertal Development

Beginning at 9 ½ years of age, all study children and their mothers were asked to participate in an annual Health and Physical Development Assessment. This assessment consists of questionnaires completed by the child’s mother and a physical exam of the child completed by a nurse practitioner or physician.

Mother reports of pubertal development as assessed by the Tanner Drawings and a Pubertal History and Expectations (PHE) questionnaire were developed for this assessment. The Tanner Drawings have been used extensively in the assessment of children and adolescents ages 10 and older. In the Tanner Drawings (Morris & Udry, 1980), the respondent selects from a set of schematic pictures the one that best represents the child’s current stage of physical development (Stages I through V). The physical exam by the nurse practitioner complemented the mother’s report based on the Tanner Drawings. Based on past research, scores below 3 were considered as indicative of *early* stages of pubertal development and scores 3 and above were considered indicative of *mid-to-late* stages of pubertal development at age 11½ years (Rudolph & Flynn, 2007). Girls who were reported by their mother in the PHE as having experienced menses were considered as having reached *mid-to-late* stage of pubertal development, regardless of Tanner scores. The OR rule was used to determine pubertal status such that the higher score was used for analyses when both the nurse practitioner and mother have completed the questionnaires.

4.4 MISSING DATA

As mentioned above, all participants with information pertaining to age 15 depression symptoms (as assessed by the CDI or CBCL) were included in this study. The expectation maximization (EM) method in SPSS, utilizing a maximum likelihood approach, was then used to impute data missing from measures collected at age 11 and 12

years (Dempster, Laird, & Rubin, 1977). As can be seen in Table 1, almost half of the sample ($N = 219$; 44.06%) completed all study measures and while girls with incomplete data were more likely to live in households below the poverty line than girls with complete data ($\chi^2=7.85, p<.01$) at age 11, girls with and without complete data were otherwise comparable in terms of demographic characteristics.

Table 1. Descriptive Statistics for Demographic Variables

	Final Sample (N = 497)				Sample Complete Data (N = 219)				Sample Incomplete Data (N = 278)			
	N	%	M	SD	N	%	M	SD	N	%	M	SD
Maternal Education (age 1 month)			14.55	2.43	219		14.68	2.36	278		14.45	2.48
Less than 12 years	37	7.4			12	5.5			25	9.0		
High School or GED	89	17.9			38	17.4			51	18.4		
Bachelor's Degree	121	24.3			49	22.4			72	25.9		
Postgraduate work	80	16.1			38	17.4			42	15.1		
Income-to-Needs Ratio (Age 10)			4.81	4.25			4.94	4.25			4.71	4.25
≤ 2.0 ^a	116	23.3			38	17.4			78	28.1		
> 2.0	381	76.7			181	82.6			200	71.9		
Race												
Caucasian	404	81.3			193	88.1			211	75.9		
Minority	93	18.7			26	11.9			67	44.1		
Marital Status (age 10)												
Married/partnered, living together	413	83.1			185	84.5			228	82.0		
Separated/divorced/not living together	68	13.7			29	13.2			39	14.0		
Other	16	3.2			5	2.3			11	4.0		

^a Scores below or equal to poverty threshold.

5.0 DATA ANALYTIC PLAN

The primary aim of the proposed research was to examine associations within and among measures of negative emotionality, social-cognitive biases, and negative social behaviors assessed at age 11 and how they might directly and additively predict levels of depression symptoms at age 15 in the context of peer and family relationships.

Analyses focused on the combined and unique variance in depression symptoms accounted for by the interpersonal domains (i.e., negative emotionality, social-cognitive biases, and negative social behaviors) and the moderating effects of friendship quality and family environment on the association between each interpersonal domain and depression. Finally, in order to ascertain the extent to which these processes may differ as a function of pubertal development, the moderating effects of pubertal status (i.e., *early* versus *mid-to-late*) on the association between each domain and depression symptoms were examined.

Data imputation using expectation maximization in SPSS was utilized to deal with missing data on demographic, child and parent predictor, and child outcome variables: this method uses a maximum likelihood approach (Dempster, Laird, & Rubin, 1977).

Maternal education and race were included as covariates in all analyses to control for the potential influence of sociodemographic characteristics on study outcomes. Pubertal status was also included as a covariate in all analyses given the hypothesized role of pubertal development in the prediction of depression symptoms.

6.0 RESULTS

Descriptive statistics and intercorrelations for study variables are presented first. Next, associations within and among negative emotionality, social-cognitive biases, and negative social behaviors are evaluated. These domains are then examined as they predict, both alone and together, age 15 depression symptoms. The moderating effects of friendship quality, mother-child positive interaction, and pubertal status are next assessed in a step-wise fashion for each domain.

6.1 DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATIONS

Descriptive statistics for study variables are presented in Tables 2 - 3 and bivariate correlations among selected study variables are provided in Tables 4- 5. Mother and nurse ratings of breast ($M = 2.05$; $SD = 0.84$ and $M = 2.09$; $SD = 0.82$, respectively) and pubic hair development ($M = 1.79$; $SD = 0.93$ and $M = 1.85$; $SD = 0.83$, respectively) suggest that girls are on average in the *early* stages of pubertal development at age 11½ years (Table 2). However, 28 girls had experienced menarche and 36.6 percent of the sample was considered in *mid-to-late* pubertal development as measured by having at least one Tanner Stage rating of 3 or above and/or having been reported by their mother to have undergone menarche.

Mean levels of functioning on measures of age 11 negative emotionality, social-cognitive biases, and negative behaviors were generally low (Table 3); however, an examination of the ranges suggests a wide distribution of scores. Z-scores ranged from -1.83 to 3.39, -1.39 – 3.34, and -1.29 to 3.41 for negative emotionality, social-cognitive biases, and negative behaviors, respectively.

Observations of mother-child interactions at age 11 were generally positive ($M = 16.78$ out of 21; $SD = 1.92$), and girls tended to view their best friendships at age 12 in a very positive light ($M = 4.31$ out of 5; $SD = 0.50$).

Girls generally rated themselves as having low levels of depression symptoms at age 15 ($M = 2.52$; $SD = 2.95$), with 5.8% girls reporting “well above average” levels of symptoms. Likewise, mean levels of CBCL scores were in the average range ($M = 52.35$; $SD = 4.6$), with 9.8 % of mothers reporting elevated levels of anxiety and depression symptoms (T-score > 60) and .4% of mothers reporting clinically significant symptom levels (T-score >70).

Table 4 presents bivariate correlations between covariates and primary study measures. Maternal education and race were significantly related ($r = .27$, $p < .001$) indicating that white, non-Hispanic women had higher educational levels; race was significantly associated with pubertal status ($r = -.19$, $p < .001$), with minority girls reaching puberty earlier. While significant associations with interpersonal, parent-child relationship, and friendship measures emerged for the demographic variables (maternal education and race), pubertal status was significantly related to behavioral interpersonal measures only. Notably, none of the covariates were significantly correlated with either measure of age 15 depression symptoms.

Table 5 presents bivariate correlations among primary study measures. Significant associations emerged between measures within all three interpersonal domains and mother-child positive interaction, and between measures within the social-cognitive and behavioral domains and friendship quality. While all three interpersonal domains demonstrated significant associations with age 15 depression scores, patterns of association varied as a function of both domain and outcome measure. Specifically, effects were largest and most consistent for measures of negative emotionality, and CBCL scores were more consistently associated with interpersonal measures than were CDI scores.

Effect sizes for measures of negative emotionality ranged from low to moderate, with each measure showing weak but significant associations with CDI scores and low to moderate associations with CBCL scores. Strengths of association were generally higher for *emotional lability* than for *emotional reactivity*. Social-cognitive biases measures were generally weakly related to CDI and CBCL scores, and the association between *hostile attribution biases* and CDI scores was insignificant. Contrary to expectations, *prosocial* behavior was unrelated to both CDI and CBCL scores, and only *self-control* demonstrated a significant association with CDI scores.

Notably, mother-child positive interaction and friendship quality variables were not significantly associated with age 15 depression symptoms.

Table 2. Descriptive Statistics for Pubertal Development

	N	%	Mean	SD	Range
Tanner Breast Development - M			2.05	.84	1.0 – 5.0
<i>Early</i> (Stages 1- 2)	362	72.8			
<i>Middle</i> (Stage 3)	111	22.3			
<i>Late</i> (Stages 4 – 5)	24	4.8			
Tanner Breast Development - N			2.09	.82	1.0 – 5.0
<i>Early</i> (Stages 1- 2)	356	71.6			
<i>Middle</i> (Stage 3)	116	23.3			
<i>Late</i> (Stages 4 – 5)	25	5.0			
Tanner Pubic Hair Development - M			1.79	.93	1.0 – 5.0
<i>Early</i> (Stages 1- 2)	356	71.6			
<i>Middle</i> (Stage 3)	116	23.3			
<i>Late</i> (Stages 4 – 5)	25	5.0			
Tanner Pubic Hair Development - N			1.85	.83	1.0 – 4.0
<i>Early</i> (Stages 1- 2)	396	79.7			
<i>Middle</i> (Stage 3)	78	15.7			
<i>Late</i> (Stages 4 – 5)	23	4.6			
Age of menarche (years) - M			10.30	.26	9.75 – 10.75
Pre-Menarche ^a	449	94.4			
Post- Menarche	28	5.6			
Pubertal Status ^b					
Early Development	309	62.2			
Mid-to-Late Development	188	37.8			

^a Pre-menarche was determined by absence of mother-reported age-of-onset.

^b Pubertal status was based on both mother and nurse report. If a girl was rated to be in *middle* or *late* development on any one measure, or had undergone menarche, her pubertal status was categorized as *mid-to-late* development.

Table 3. Descriptive Statistics for Study Variables

Variables	N	Mean	SD	Range
<u>Interpersonal Measures (Age 11)</u>				
<i>Negative Emotionality</i>				
Emotional Reactivity – M	497	33.81	5.58	15.00 - 49.00
Emotional Lability - M	497	3.42	3.93	0 – 19.00
<i>Social-Cognitive Biases</i>				
Peer Victimization - S	497	1.77	.73	1.00 – 4.75
Perceptions of Support (Reversed) - S	497	.64	.65	0 – 4.00
Hostile Attribution Bias (z)	497	.00	.89	-2.14 – 2.28
<i>Negative Social Behaviors</i>				
Self-Control (Reversed)– (M/T)	497	5.16	2.69	0 – 13.50
Prosocial (Reversed) (M/T)	497	1.77	.44	.07 – 1.77
Aggressive – (M/T)	497	.23	.26	0 – 1.50
Relational Aggression – (M/T)	497	.35	.31	0 – 1.50
<u>Parent-Child Relationship (Age 11)</u>				
Mother-Child Positive Interaction - O	497	16.78	1.92	9.50 – 21.00
<u>Friendship (Age 12)</u>				
Friendship Quality - S	497	4.31	.50	1.39 – 5.00
<u>Depression (Age 15)</u>				
CDI - S	497	2.52	2.95	0 – 18.00
CBCL – M	497	52.34	4.56	50 - 89

Note: M= maternal report; S = self-report; M/T = composite of maternal and teacher report; O = observer report. CDI = Child Depression Inventory; CBCL = Child Behavior Checklist

Table 4. Bivariate Correlations between Covariate and Study Measures

	Maternal Education	Race	Pubertal Status
Covariates			
Maternal Education	--		
Race ^a	.27 ***	--	
Pubertal Status ^b	-.08	-.19 ***	--
Interpersonal Measures (Age 11)			
<i>Negative Emotionality</i>			
Emotional Reactivity	-.03	.01	.01
Emotional Lability	-.08	.10 *	.07
<i>Social-Cognitive Biases</i>			
Peer Victimization	-.15 ***	-.07	.04
Perceptions of Support (Reversed)	-.09 *	-.04	.03
Hostile Attribution Biases	-.23 ***	-.06	.00
<i>Negative Behaviors</i>			
Self-Control (Reversed)	-.28 ***	-.30 ***	.12 **
Prosocial Behavior (Reversed)	-.28 ***	-.33 ***	.13 **
Aggressive Behavior	-.19 ***	-.25 ***	.08
Relational Aggression	-.18 ***	-.14 **	.05
Parent-Child Relationship (Age 11)			
Mother-Child Positive Interaction	.22 ***	.20 ***	-.04
Friendship (Age 12)			
Friendship Quality	.06	.11 *	.01
Depression (Age 15)			
CDI	.02	.03	.06
CBCL	-.04	.06	.01

Note. CDI = Child Depression Inventory; CBCL = Child Behavior Checklist

^aRace coded as 0 = minority, 1 = majority.

^bPubertal Status coded as 0 =early, 1 = mid-to-late.

* $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 5. Intercorrelations among Study Variables

	Mother- Child Positive Interaction	Friendship Quality	CDI	CBCL
Interpersonal Measures				
Negative Emotionality				
Emotional Reactivity	-.05	-.02	.15 ***	.25 ***
Emotional Lability	-.15 ***	-.07	.19 ***	.53 ***
Social-Cognitive Biases				
Peer Victimization	-.18 ***	-.16 ***	.13 **	.10 *
Perceptions of Support (Reversed)	-.14 **	-.27 ***	.10 *	.13 **
Hostile Attribution Biases	-.14 ***	-.09	.04	.13 **
Negative Behaviors				
Self-Control (Reversed)	-.34 ***	-.14 **	.14 **	.20 ***
Prosocial Behavior (Reversed)	-.22 ***	-.15 ***	.05	.02
Aggressive Behavior	-.28 ***	-.10 *	.04	.11 *
Relational Aggression	-.16 ***	-.06	.03	.12 **
Parent-Child Relationship				
Mother-Child Positive Interaction	- -	-.07	-.05	-.17
Friendship				
Friendship Quality	- -	- -	-.07	-.01

* $p < .05$, ** $p \leq .01$, *** $p \leq .001$

6.2 HYPOTHESIS 1: DIRECT ASSOCIATIONS AMONG INTERPERSONAL VARIABLES

The first step in testing the hypothesis that the interpersonal domains of negative emotionality, social-cognitive biases, and negative social behavior would be related was to examine the internal consistency of each set of measures. The goal of this task was to ascertain how well the hypothesized measures of each domain of interpersonal functioning coalesce. To this end, Cronbach's alpha scores were computed from the standardized scores of individual measures of each domain. The following measures were reverse-scored to ensure unidirectionality of scores, with higher scores reflecting more interpersonal problems: perceptions of support, self-control, and prosocial behavior. Table 6 provides bivariate correlations among the interpersonal measures.. For ease of interpretation, intercorrelations *within* each dimension are presented in the upper half of the table and intercorrelations *across* each dimension are presented in the bottom of the table.

Emotional reactivity and *emotional lability* were significantly and moderately related ($r = .44, p <.001$); however, internal consistency of the negative emotionality composite was low ($\alpha = .61$).

Peer victimization, *perceptions of support* (reverse scored), and *hostile attribution biases* were significantly related to each other. While *peer victimization* and *perceptions of support* were moderately associated ($r = .50, p <.001$), their correlations with *hostile attribution biases* were modest ($r = .33, p <.001$ and $r = .28, p <.001$, respectively). The mean correlation value among all measures was low, $r = .37$, and internal consistency was modest ($\alpha = .64$).

Self-control (reverse scored), *prosocial behavior* (reverse scored), *aggressive behavior*, and *relational aggression* were significantly and moderately associated with each other. Intercorrelations between the negative social behavior measures ranged from moderate to high. The lowest association was between *prosocial behavior* and *relational aggression* ($r = .46, p <.001$) and the highest between *aggressive behavior* and *relational aggression* ($r = .72, p <.001$). The mean correlation value of all measures was moderate, $r = .60$, and internal consistency was high ($\alpha = .86$).

Bivariate correlations were computed to test the associations between the domains of negative emotionality, social-cognitive biases, and negative social behaviors. Contrary to expectations, correlation values

between measures of negative emotionality, social-cognitive biases, and negative social behaviors were generally in the low range (i.e., <.30). Negative emotionality demonstrated weak to low levels of association with social-cognitive biases (mean $r = .16$; range = .08 - .21). Although correlations between both measures of negative emotionality and *self-control* were moderate, associations between negative emotionality and negative social behaviors were low (mean $r = .24$; range = .08 – .21). A similar pattern emerged for correlations between social-cognitive biases and negative social behavior (mean $r = .21$; range = .08 - .31).

On the basis of both the poor to modest internal consistency of the negative emotionality and social-cognitive composite scores and inconsistent associations between individual measures and depression scores within each domain (Table 5), it was concluded that remaining study analyses should focus on individual measures of interpersonal functioning, rather than composite scores. Further, individual measures were only included in analyses in which they showed significant associations with the outcome measure as demonstrated in these preliminary analyses. Subsequently, *prosocial behavior* was removed from all analyses because of insignificant associations with both CDI and CBCL scores.

Table 6. Intercorrelations among Interpersonal Variables

	1	2	3	4	5	6	7	8	9
1. Emotional Reactivity	--	.44 ***							
2. Emotional Lability		--							
3. Peer Victimization	.18 ***	.21 ***	--	.50 ***	.33 ***				
4. Perceptions of Support	.08	.19 ***		--	.28 ***				
5. Hostile Attribution Bias	.18 ***	.11 *			--				
6. Self-Control	.34 ***	.42 ***	.28 ***	.22 ***	.26 ***	--	.63 ***	.68 ***	.57 ***
7. Prosocial	.05	.13 **	.14 ***	.10 *	.18 ***		--	.55 ***	.46 ***
8. Aggressive	.22 ***	.28 ***	.31 ***	.20 ***	.25 **		--		.72 ***
9. Relational Aggression	.19 ***	.30 ***	.19 ***	.08	.26 ***			--	

Note: Upper triangle presents bivariate correlations among variables within each domain, whereas the bottom triangle depicts bivariate correlations among variables across domains. Perceptions of support, self-control, and prosocial behavior are reverse-scored.

* $p < .05$, ** $p \leq .01$, *** $p \leq .001$

6.3 HYPOTHESIS 2: DIRECT ASSOCIATIONS BETWEEN AGE 11 NEGATIVE EMOTIONALITY, SOCIAL-COGNITIVE BIASES, AND NEGATIVE SOCIAL BEHAVIOR AND DEPRESSION SYMPTOMS

To examine the direct associations between the three interpersonal domains and depression symptoms, hierarchical regression equations were computed to determine the proportion of variance accounted for by each set of variables. A separate model for each domain was first examined to estimate total variance contributed by each domain to depression symptoms before constructing an overall model of depression incorporating all three interpersonal domains to estimate how they incrementally predict depression. Continuous predictor variables were centered to eliminate non-essential multicollinearity, and *VIF* values and tolerance statistics were examined to address concerns about essential multicollinearity. Only the interpersonal measures significantly associated with the model outcome variable (i.e., CDI or CBCL score; Table 6) were included in the model estimation. All analyses were conducted with the following covariates: maternal education, race, and pubertal status. Tables 7 – 12 present the negative emotionality, social-cognitive biases, and negative social behavior models of depression symptoms, and Tables 13 provides the overall models of depression symptoms predicted by all three domains.

Direct Associations between Age 11 Negative Emotionality and Age 15 Depression Symptoms

All covariates were entered in the first step of the model and were nonsignificant in the prediction of both self-reported depression symptoms (CDI) (Table 7) and mother-rated depression/anxiety (CBCL) symptoms (Table 8). This is not surprising given bivariate correlation analyses also revealed nonsignificant associations between these variables.

In line with hypotheses, *emotional reactivity* and *emotional lability* together contributed significant variance to both CDI and CBCL scores beyond the covariates, $\Delta R^2 = .04, p < .001$ and $\Delta R^2 = .27, p < .001$, respectively. Further, *emotional lability* demonstrated unique associations with both CDI, $\beta = .14, p < .01$, and CBCL, $\beta = .52, p < .001$, scores. On the other hand, *emotional reactivity* did not emerge as a unique predictor of CDI or CBCL scores.

Direct Associations between Age 11 Social-Cognitive Biases and Age 15 Depression Symptoms

The CDI model included *peer victimization* and *perceptions of social support* (Table 9), whereas the CBCL model included all three social-cognitive biases measures (Table 10). In line with study hypotheses, measures of social-cognitive biases together predicted higher levels of CDI and CBCL scores, both $\Delta R^2 = .03, p < .01$. *Peer Victimization* was significantly and uniquely associated with CDI scores, whereas *perceptions of support* and *hostile attribution biases* predicted CBCL scores uniquely only at trend-level, both $\beta = .09, p < .10$.

Direct Associations between Age 11 Negative Social Behaviors and Age 15 Depression Symptoms VIF.

The CDI model included *self-control* (Table 11) and the CBCL model comprised *self-control*, *aggressive behavior*, and *relational aggression* (Table 12). In this model only, the race covariate became significant in the CBCL model of depression when the negative social behavior measures were entered in the second step.

As predicted, measures of negative social behavior together predicted higher levels of CDI and CBCL scores, $\Delta R^2 = .03, p < .001$ and $\Delta R^2 = .06, p < .001$, respectively. *Self-control* was significantly and uniquely associated with both CDI, $\beta = .17, p < .001$, and CBCL, $\beta = .25, p < .001$, scores. Contrary to expectations, *aggressive behavior* and *relational aggression* did not predict CBCL scores. Further, *aggressive behavior* was inversely related to CBCL scores. Follow-up analyses revealed a positive association once both *self-control* and *relational aggression* were removed from the equation, and only then did *aggressive behavior* explain unique variance in CBCL scores, $\beta = .12, p < .01, \Delta R^2 = .01, F(1, 492) = 6.88, p < .05$. *Relational aggression* also predicted CBCL scores only when *self-control* and *aggressive behavior* were removed from the model, $\beta = .13, p < .01, \Delta R^2 = .02, F(1, 492) = 8.13, p < .05$, while the effects of *self-control* were reduced without *aggressive behavior* and *relational aggression* in the equation, $\beta = .17, p < .001, \Delta R^2 = .03, F(1, 492) = 13.06, p < .01$. These findings suggest the presence of bias in the model caused by multicollinearity. Correlations between *aggressive behavior*, on the one hand, and *self-control* and *relational aggression*, on the other, were .68 and .72, respectively, and *VIF* values were on average above 2 (Bowerman & O'Connell, 1990), indicating the potential for concerning, albeit subtle levels of multicollinearity.

The model appears most affected by the variance shared between *aggressive behavior* and *relational aggression* given their high correlation value ($r = .72$), similar standardized coefficient and R^2 change values when entered without the other, and contribution of no variance over the other when entered both in sequence and simultaneously. After consideration of several solutions including creating a composite score of overall aggression or removing both *aggressive behavior* and *relational aggression*, it was decided to trim out *aggressive behavior* only. One of the strengths of this study is its focus on gender-specific constructs and pathways to depression, and

omitting *relational aggression* would reduce the potential contribution of this study to the literature. Of note, exploratory analysis with an overall aggression composite score revealed continuing problems with inverse and nonsignificant associations with depression symptoms. Finally, *VIF* values (1.50 – 1.66) and tolerance statistics (.60 - .67) showed improvement when *aggressive behavior* was not included in the equation. This resulted in a small reduction in change statistics ($R^2 = .047$, $F(2, 491) = 5.59$, $p < .001$) and in standardized coefficient scores for *self-control* ($\beta = .23$, $p < .001$) and *relational aggression* ($\beta = .01$, *ns*), than when all three negative social behavior variables were included in the analysis.

Direct Associations between Age 11 Negative Emotionality, Social-Cognitive Biases, and Negative Social Behaviors and Age 15 Depression Symptoms

The final set of hierarchical regression analyses examined whether measures of negative emotionality, social-cognitive biases, and negative social behaviors incrementally account for unique variance in depression symptoms. For both CDI and CBCL models of depression, covariates were again entered in the first step, followed by negative emotionality measures in the second step, social-cognitive measures in the third step, and negative social behavior measures in the fourth and final step. Order of entry was determined by developmental timing, stability, and order of internal process. Negative emotionality develops first, is considered relatively stable, and is an immediate response to an external trigger or cue. Social-cognitive biases develop later, but are also relatively stable and occur soon following an event. Negative social behaviors are less stable, and often occur as a consequence of negative emotionality and social-cognitive biases. Squared multiple semi-partial correlations (sr^2), as reflected in the ΔR^2 value already noted in the tables, examined the question of whether a set of predictors significantly predicted variance in the criterion value not already accounted for by previous set(s) of predictors. Squared multiple partial correlations (pr^2) examined whether a set of variables accounted for unique residual variance in depression not already accounted for by previous sets of predictors. The following equation was used to compute these values.

$$pr^2_{y.set2.set1} = \frac{r^2_{y.set1.set2} - r^2_{y.set1}}{1 - r^2_{y.set1}}$$

In terms of the CDI model (Table 13), measures of negative emotionality together predicted both unique, $\Delta R^2 = .038$, $p < .001$, and residual ($pr^2 = .04$, $F(2, 491) = 9.74$, $p < .01$) variance above and beyond the covariate

variables. *Emotional lability* predicted unique variance in CDI scores in the second, $\beta=.14$, $p<.001$, and third, $\beta=.13$, $p<.001$, steps of the model, and remained at a trend-level in the final model, $\beta=.10$, $p < .10$. Social-cognitive biases measures did not contribute unique, $\Delta R^2 = .01$, ns, or residual variance ($pr^2 = .01$, $F(2, 489) = 2.33$, ns) to CDI scores above and beyond covariate (step1) and negative emotionality (step 2) variables. None of the individual measures significantly predicted CDI depression symptoms at this step in the equation. Likewise, measures of negative social behavior contributed neither unique, $\Delta R^2 = .00$, ns, nor residual variance ($pr^2 = .00$, $F(1, 488) = 2.07$, ns) above and beyond all other covariate and interpersonal measures, and none of the individual measures significantly predicted CDU depression symptoms at this step in the equation.

In terms of the CBCL model, measures of negative emotionality together predicted both unique, $\Delta R^2 = .27$, $p < .001$, and residual ($pr^2 = .27$, $F(2, 491) = 92.52$, $p < .01$) variance above and beyond the covariates. *Emotional lability* emerged as a significant predictor in the final model, $\beta = .53$, $p < .001$. Again, social-cognitive measures did not contribute either unique, $\Delta R^2 = .00$, ns, or residual ($pr^2 = .00$, $F(3, 488) = .44$, ns) variance to CBCL scores above and beyond covariate (step1) and negative emotionality (step 2) variables. None of the individual measures significantly predicted CBCL depression symptoms at this step in the equation. Negative social behaviors also did not explain unique, $\Delta R^2 = .00$, ns, or residual ($pr^2 = .00$, $F(2, 486) = 1.36$, ns) variance above and beyond all covariate and interpersonal measures, and none of the individual measures emerged as significant predictors of CBCL scores in the final step of the model.

Table 7. Hierarchical Regression Analyses Predicting Age 15 Self-Reported Depression Symptoms from Age 11 Negative Emotionality, Age 12 Friendship Quality, Age 11 Mother-Child Positive Interaction, and their Interaction Effects

	Hypothesis 2						Hypothesis 3						Hypothesis 4						
	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6			
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	
Mat. Ed.	.02	.01	.047	.04	.03	.046	.04	.04	.046	.04	.04	.046	.05	.04	.047	.05	.04	.047	
Race	.32	.04	.047	.15	.02	.047	.21	.03	.047	.17	.02	.047	.22	.03	.048	.21	.03	.048	
PS	.42	.07	.046	.33	.06	.045	.35	.06	.045	.32	.05	.045	.33	.05	.045	.33	.05	.046	
ER				.05	.09	†	.049	.05	.09	†	.049	.05	.09	†	.049	.05	.09	†	
EL				.13	.14	**	.050	.12	.14	**	.050	.12	.14	**	.050	.11	.13	*	
FQ							-.39	-.07	.045	-.35	-.06	.045	-.34	-.06	.045	-.34	-.06	.046	
ER x FQ										.03	.03	.049	.02	.03	.049	.02	.02	.050	
EL x FQ										-.13	-.07	.048	-.12	-.07	.048	-.11	-.06	.050	
MCPI													-.06	-.04	.046	-.05	-.04	.047	
ER x MCPI																.01	.02	.052	
EL x MCPI																-.01	-.03	.054	
FQ x MCPI																.02	.01	.047	
ER xFQxMCPI																		.00	
ELxFQ xMCPI																		.01	
ΔR^2	.006			.038			.004			.004			.001			.001			.004
ΔF	0.94			9.82	***		2.26			1.08			0.59			0.15			0.98

Note: PS = Pubertal Status; ER = Emotional Reactivity; EL = Emotional Lability; FQ = Friendship Quality; MCPI = Mother-Child Positive Interaction

† $p < .10$, * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 8. Hierarchical Regression Analyses Predicting Age 15 Maternal-Reported Depression Symptoms from Age 11 Negative Emotionality, Age 12 Friendship Quality, Age 11 Mother-Child Positive Interaction, and their Interaction Effects

	Hypothesis 2						Hypothesis 3						Hypothesis 4							
	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6				
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE		
Mat. Ed.	-.11	-.06	.047	.01	.00	.040	.01	.00	.040	.00	.00	.040	.03	.02	.040	.03	.02	.040		
Race	.95	.08	.047	.07	.01	.041	.03	.01	.041	.03	.00	.041	.24	.02	.042	.19	.02	.041		
PS	.21	.02	.046	-.22	-.02	.039	-.23	-.02	.039	-.31	-.03	.039	-.29	-.03	.039	-.27	-.03	.039		
ER				.02	.02	.043	.02	.02	.043	.02	.03	.043	.03	.03	.043	.03	.04	.043		
EL				.70	.52 ***	.043	.70	.52 ***	.043	.70	.52 ***	.043	.68	.50 ***	.044	.66	.49 ***	.044		
FQ							.26	.29	.039	.23	.03	.039	.26	.03	.039	.21	.02	.039		
ER x FQ										.11	.08	.042	.10	.07	.042	.11	.08	.042		
EL x FQ										-.12	-.05	.042	-.11	-.04	.042	-.09	-.03	.043		
MCPI													-.24	-.10	.040	-.24	-.10	.040		
ER x MCPI																-.01	-.01	.045		
EL x MCPI																-.06	-.10	.046		
FQ x MCPI																-.13	-.03	.040		
ER xFQxMCPI																		-.20	-.04	.041
ELxFQ xMCPI																		-.05	-.08	.050
ΔR^2	.007			.272			.001			.005			.009			.010			.003	
ΔF	1.22			92.5 ***			0.57			1.68			6.52 **			2.40			1.19	

Note: PS = Pubertal Status; ER = Emotional Reactivity; EL = Emotional Lability; FQ = Friendship Quality; MCPI = Mother-Child Positive Interaction

† $p < .10$ * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 9. Hierarchical Regression Analyses Predicting Age 15 Self-Reported Depression Symptoms from Age 11 Social-Cognitive Biases, Age 12 Friendship Quality, Age 11 Mother-Child Positive Interaction, and their Interaction Effects

	Hypothesis 2						Hypothesis 3						Hypothesis 4						
	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6			
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	
Mat. Ed.	.02	.01	.047	.04	.03	.047	.04	.03	.047	.04	.03	.047	.05	.04	.047	.05	.04	.047	
Race	.32	.04	.047	.34	.05	.047	.39	.05	.047	.41	.05	.047	.46	.06	.048	.43	.06	.048	
PS	.42	.07	.046	.40	.07	.045	.41	.07	.045	.41	.07	.045	.41	.07	.045	.41	.07	.046	
PV				.54	.11 *	.052	.44	.11 *	.052	.42	.10 *	.052	.40	.10 †	.052	.37	.09 †	.054	
PNS				.22	.05	.052	.16	.03	.053	.18	.04	.053	.17	.04	.053	.11	.02	.054	
FQ							-.31	-.05	.047	-.31	-.05	.048	-.30	-.05	.048	-.33	-.06	.049	
PV x FQ										-.50	-.07	.050	-.52	-.07	.050	-.49	-.07	.051	
PnS x FQ										.42	.04	.051	.43	.05	.051	.50	.05	.052	
MCPI													-.07	-.05	.047	-.07	-.05	.047	
PV x MCPI																-.03	-.02	.056	
PnS x MCPI																-.12	-.05	.055	
FQ x MCPI																.03	.01	.047	
PV xFQxMCPI																		.68 .20 *** .058	
PnSxFQ xMCPI																		.31 .07 .056	
ΔR^2	.006			.020			.003			.004			.002			.004			.042
ΔF	0.94			4.92 **			1.33			1.05			1.00			0.60			11.1 ***

Note: PS = Pubertal Status; PV = Peer Victimization; PnS = Perceptions of Support; FQ = Friendship Quality; MCPI = Mother-Child Positive Interaction.

Perceptions of Support reverse-scored.

† $p < .10$ * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 10. Hierarchical Regression Analyses Predicting Age 15 Mother-Reported Depression Symptoms from Age 11 Social-Cognitive Biases, Age 12 Friendship Quality, Age 11 Mother-Child Positive Interaction, and their Interaction Effects

	Hypothesis 2						Hypothesis 3						Hypothesis 4												
	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6									
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE							
Mat. Ed.	-.11	-.06	.047	-.05	-.02	.048	-.05	-.02	.048	-.04	-.02	.047	.00	.00	.047	.01	.00	.047							
Race	.95	.08	† .047	.97	.08	† .047	.94	.08	† .047	.82	.07	.047	1.1	.10	*	.047	1.2	.10	*	.047					
PS	.21	.02	.046	.20	.02	.045	.19	.02	.045	.22	.02	.045	.22	.02	.044	.22	.02	.045	.19	.02	.045				
PV				.19	.03	.053	.19	.03	.053	.24	.04	.052	.13	.02	.052	.19	.03	.054	.17	.03	.054				
PNS				.64	.09	† .052	.68	.10	† .053	.61	.09	.053	.56	.08	.052	.58	.08	.054	.56	.08	.053				
HA				.47	.09	† .048	.47	.09	† .048	.56	.11	*	.048	.51	.10	*	.048	.50	.10	*	.048				
FQ							.24	.03	.046	.52	.06	.048	.54	.06	.047	.56	.06	.048	.57	.06	.049				
PV x FQ										-.21	-.02	.051	-.27	-.03	.050	-.31	-.03	.051	.35	.03	.058				
PnS x FQ										-2.2	-.15	*	.051	-2.1	-.14	*	.051	-2.1	-.14	*	.051	-2.4	-.16	*	.056
HA x FQ										1.2	.15	*	.048	1.2	.15	*	.048	1.2	.15	*	.049	.92	.12	*	.051
MCPI													-.39	-.16	*	.046	-.39	-.17	*	.046	-.35	-.15	*	.047	
PV x MCPI																.12	.04	.055	.16	.05	.056				
PnS x MCPI																.02	.01	.055	-.04	-.01	.056				
HA x MCPI																-.06	-.02	.048	-.06	-.02	.048				
FQ x MCPI																-.01	.00	.047	-.17	-.04	.050				
PV xFQxMCPI																			.63	.12	*	.060			
PnSxFQ xMCPI																			-.17	-.03	.058				
HAxFQxMCPI																			-.23	-.05	.050				
ΔR^2	.007			.026			.001			.030			.024			.001			.009						
ΔF	1.22			4.32 **			0.33			5.11 **			12.9 ***			0.18			1.67						

Note: PS = Pubertal Status; PV = Peer Victimization; PnS = Perceptions of Support; HA = Hostile Attribution Biases; FQ = Friendship Quality; MCPI = Mother-Child Positive Interaction. Perceptions of Support reverse-scored.

† $p < .10$ * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 11. Hierarchical Regression Analyses Predicting Age 15 Self-Reported Depression Symptoms from Age 11 Negative Social Behaviors, Age 12 Friendship Quality, Age 11 Mother-Child Positive Interaction, and their Interaction Effects

	Hypothesis 2						Hypothesis 3						Hypothesis 4										
	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6							
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE					
Mat. Ed.	.02	.01	.047	.06	.05	.047	.06	.05	.047	.06	.05	.047	.06	.05	.048	.06	.05	.048					
Race	.32	.04	.047	.61	.08	†	.048	.65	.09	†	.048	.68	.09	†	.048	.70	.09	†	.048				
PS	.42	.07	.046	.36	.06	.045	.37	.06	.045	.36	.06	.045	.36	.06	.045	.34	.06	.045	.36	.06	.045		
SC				.19	.17	***	.048	.18	.75	***	.048	.19	.17	***	.048	.18	.16	***	.050	.18	.17	***	.051
FQ							.36	-.06	.045	-.47	-.08	†	.047	-.47	-.08	†	.047	-.45	-.8	.047	-.30	-.05	.048
SC x FQ										.13	.07	.046	.13	.07	.046	.15	.08	.048	.16	.08	.048		
MCPI													-.03	-.02	.048	-.03	-.02	.048	-.01	-.01	.048		
SC x MCPI																.01	.01	.046	.00	.01	.046		
FQ x MCPI																.13	.04	.047	.00	.00	.050		
SC xFQxMCPI																			.11	.12	*	.050	
ΔR^2	.006			.026			.004			.004			.000			.002			.011				
ΔF	0.94			13.1 ***			1.94			2.04			0.17			0.42			5.48 *				

Note: PS = Pubertal Status; SC = Self-Control; FQ = Friendship Quality; MCPI = Mother-Child Positive Interaction. Self-control reverse-scored.

† $p < .10$, * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 12. Hierarchical Regression Analyses Predicting Age 15 Mother-Reported Depression Symptoms from Age 11 Negative Social Behaviors, Age 12 Friendship Quality, Age 11 Mother-Child Positive Interaction, and their Interaction Effects

	Hypothesis 2						Hypothesis 3						Hypothesis 4							
	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6				
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE	B	β	SE		
Mat. Ed.	-.11	-.06	.047	-.01	-.01	.047	-.01	-.01	.047	-.02	-.01	.047	.01	.00	.047	.01	.00	.047		
Race	.95	.08	† .047	1.56	.13	** .048	1.55	.13	** .048	1.65	.14	** .048	1.80	.15	*** .048	1.80	.15	*** .048		
PS	.21	.02	.046	.08	.01	.045	.07	.01	.045	.07	.01	.045	.09	.01	.044	.08	.01	.045		
SC				.38	.22	*** .057	.38	.23	*** .057	.40	.24	*** .057	.33	.20	*** .058	.33	.19	*** .059		
RA				.18	.01	.054	.18	.01	.054	.05	.00	.054	.14	.01	.053	.09	.01	.054		
FQ							.12	.01	.045	-.14	-.02	.046	-.11	-.01	.046	-.13	-.01	.046		
SC x FQ										.36	.12	*	.054	.36	.12	*	.054	.37	.12	*
RA x FQ										-1.42	-.05	.052	-1.71	-.06	.052	-1.78	-.06	.053		
MCPI													-.33	-.14	** .047	-.33	-.14	** .048		
SC x MCPI																.00	.00	.054		
RA x MCPI																-.24	-.03	.053		
FQ x MCPI																.02	.01	.047		
SC xFQxMCPI																		.03	.02	.055
RAxFQ xMCPI																		1.05	.07	.053
ΔR^2	.007			.047			.000			.009			.016			.001			.005	
ΔF	1.22			12.1 ***			0.09			2.46	†		8.63 **			0.16			1.23	

Note: PS = Pubertal Status; SC = Self-Control; RA = Relational Aggression; FQ = Friendship Quality; MCPI = Mother-Child Positive Interaction. Self-control reverse-scored.

† $p < .10$, * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

Table 13. Hierarchical Regression Analyses Predicting Age 15 Depression Symptoms from Age 11 Negative Emotionality, Social-Cognitive Biases, and Negative Behaviors

	Hierarchical Regression Analyses Predicting Age 15 Depression Symptoms from Age 11 Negative Emotionality, Social-Cognitive Biases, and Negative Behaviors												
	Step 1			Step 2			Step 3			Step 4			
	B	β	SE	B	β	SE	B	β	SE	B	β	SE	
Predicting Self-Reported Depression													
Maternal Education	.02	.01	.047	.04	.03	.046	.05	.04	.046	.07	.06	.047	
Race	.32	.04	.047	.15	.02	.047	.19	.02	.047	.34	.05	.049	
Pubertal Status	.42	.07	.046	.33	.06	.045	.33	.05	.045	.32	.05	.045	
Emotional Reactivity				.05	.09	†	.049	.04	.08	.049	.03	.07	.050
Emotional Lability				.13	.14	**	.050	.11	.13	* .051	.09	.10	† .053
Peer Victimization							.31	.08	.052	.28	.07	.052	
Perceptions of Support							.16	.04	.051	.14	.03	.051	
Self-Control										.08	.07	.055	
ΔR^2	.006			.038			.009			.003			
ΔF	0.94			9.82 ***			240 †			1.80			
Predicting Mother-Reported Depression													
Maternal Education	-.11	-.06	.047	.01	.00	.040	.01	.01	.041	.00	.00	.042	
Race	.95	.08	.047	.07	.01	.041	.07	.01	.041	-.06	-.01	.043	
Pubertal Status	.21	.02	.046	-.22	-.02	.039	-.22	-.02	.039	-.21	-.02	.039	
Emotional Reactivity				.02	.02	.043	.02	.03	.043	.03	.03	.044	
Emotional Lability				.70	.52	*** .043	.69	.51	*** .044	.71	.53	*** .047	
Peer Victimization							-.22	-.04	.046	-.19	-.03	.047	
Perceptions of Support							.32	.05	.045	.31	.04	.045	
Hostile Attribution Biases							.12	.02	.042	.16	.03	.043	
Self-Control										-.04	-.02	.055	
Relational Aggression										-.52	-.04	.048	
ΔR^2	.007			.272			.002			.002			
ΔF	1.22			92.48 ***			0.51			0.62			

Note. Perceptions of Support and Self-Control are reverse-scored.

† $p < .10$, * $p < .05$, ** $p \leq .01$, *** $p \leq .001$

6.4 HYPOTHESES 3A – 3C: MODERATING EFFECTS OF FRIENDSHIP QUALITY

Hypotheses examining the moderating effects of age 12 friendship quality on the associations between age 11 measures of interpersonal functioning and age 15 depression symptoms are discussed next. Although it was originally hypothesized that age 12 friendship quality would mediate associations between age 11 negative social behaviors and depression scores, friendship quality did not show significant associations with depression (see Table 5) and subsequently did not fulfill the criteria necessary for testing a mediation model (Baron & Kenny, 1986). However, it stands to reason that low levels of friendship quality might enhance associations between negative social behavior and depression scores and moderation analyses were therefore explored.

To ascertain whether the associations between interpersonal measures and depression symptoms are strengthened in the context of low levels of self-reported friendship quality, two hierarchical regression equations were computed for each domain of interpersonal dysfunction (i.e., negative emotionality, social-cognitive biases, and negative social behaviors). Each regression equation, extensions of the CDI and CBCL models discussed above, added the first-order terms followed by the second- and third-order interaction terms. The centered friendship quality term was entered into each regression equation as the third step of that equation (covariates = step 1; interpersonal measures = step 2) followed by the interaction between each interpersonal measure and friendship quality as the fourth step. Significant higher-order interactions were followed up with simple regressions on the criterion variables at low (-1 SD) and high (+1 SD) levels of the moderator variables (Aiken & West, 1991). These will be discussed in further detail below.

Interactions between Negative Emotionality and Friendship Quality

Contrary to study hypotheses, interactions between friendship quality and the negative emotionality measures did not emerge as significant predictors of either CDI (Table 7) or CBCL scores (Table 8), although the interaction between friendship quality and *emotional reactivity* approached significance, $\beta = .08, p < .10$. As can be seen, *emotional lability* remained a significant main effect with the addition of friendship quality and their interaction terms in both the CDI and CBCL models, $\beta = .14, p < .01$ and $\beta = .51, p < .001$, respectively.

Interactions between Social-Cognitive Biases and Friendship Quality

In line with hypotheses, interaction effects for *perceptions of support* and *hostile attribution biases* with friendship quality emerged in the CBCL model (Table 10), suggesting that associations between *perceptions of support* and *hostile attribution biases* and CBCL scores vary at different levels of friendship quality. Following Aiken and West (1991), simple regression slopes assessed the association between *perceptions of support* and *hostile attribution biases* and CBCL scores at low (- 1 SD) and high (+ 1 SD) levels of friendship quality.

The simple slopes testing associations between *perceptions of support* and CBCL scores are depicted in Figure 1 and demonstrate that *perceptions of low support* are associated with relatively higher levels of CBCL scores, and vice versa, for girls reporting *low* levels of friendship quality ($\beta = .21, p < .001$) but not for girls experiencing high levels of friendship quality ($\beta = -.02, p = .74$)¹. In contrast, higher levels of *hostile attribution biases* are significantly associated with elevations in CBCL scores in the context of *high* levels of friendship quality ($\beta = .19, p < .001$) but not at low levels of friendship quality ($\beta = .03, p < .61$) (Figure 2).

Interactions between friendship quality and social-cognitive biases variables did not emerge in the CDI model of depression symptoms.

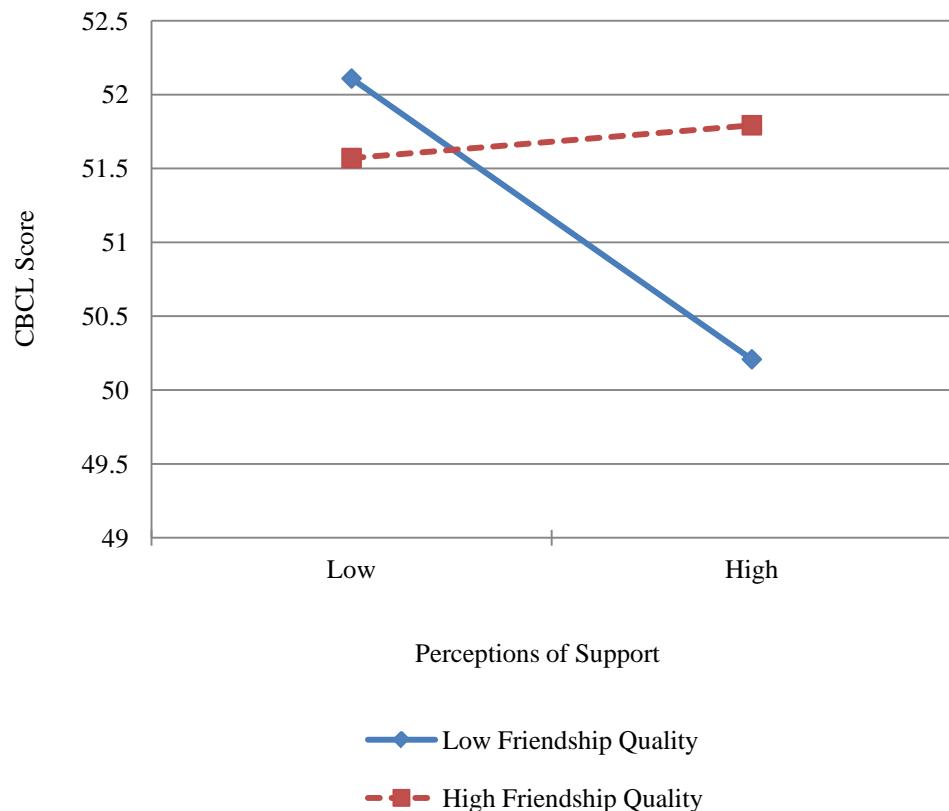
Hypothesis 3c: Interactions between Negative Behaviors and Friendship Quality

Although interactions did not emerge in the CDI model (Table 11), a significant interaction between *self-control* and friendship quality emerged in the CBCL model signifying that associations between self-control and CBCL scores vary at different levels of friendship quality (Table 12). In contrast with hypotheses, the effect of *self-control* on CBCL scores was stronger at *high* ($\beta = .32, p < .001$) than at *low* ($\beta = .15, p < .05$) levels of friendship quality such that lower levels of *self-control* were associated with higher CBCL scores (Figure 3)².

¹ Because *perceptions of social support* was reverse scored to maintain unidirectionality within the domain of social-cognitive biases in the prediction of depression scores, the slopes reported above do not reflect the written and graphical interpretations of the interactions.

² As with *perceptions of support*, *self-control* was reverse-scored in analyses predicting CBCL scores and therefore slope direction contradicts written and graphical interpretation of the simple slopes.

Figure 1. Predicted Mother-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Perceptions of Support and Friendship Quality



Note: Perceptions of support was reverse scored in the overall model and in post-hoc tests of simple slopes. For ease of interpretation, values of perceptions of support are shown in appropriate direction.

Figure 2. Predicted Mother-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Hostile Attribution Biases and Friendship Quality

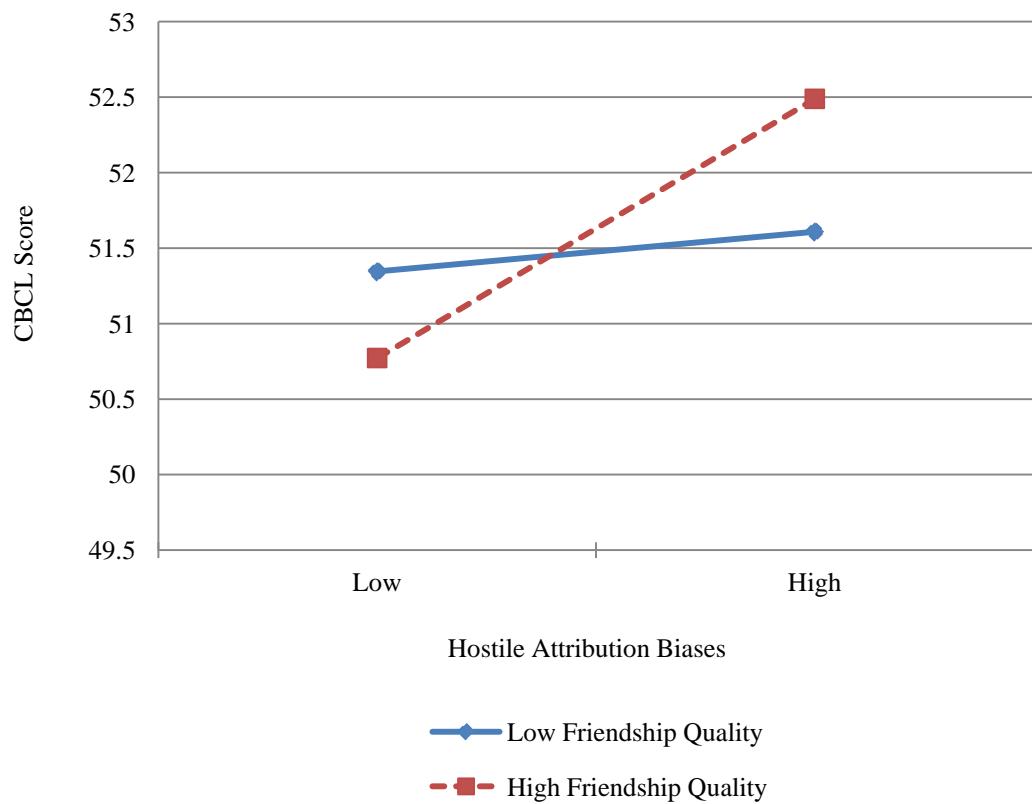
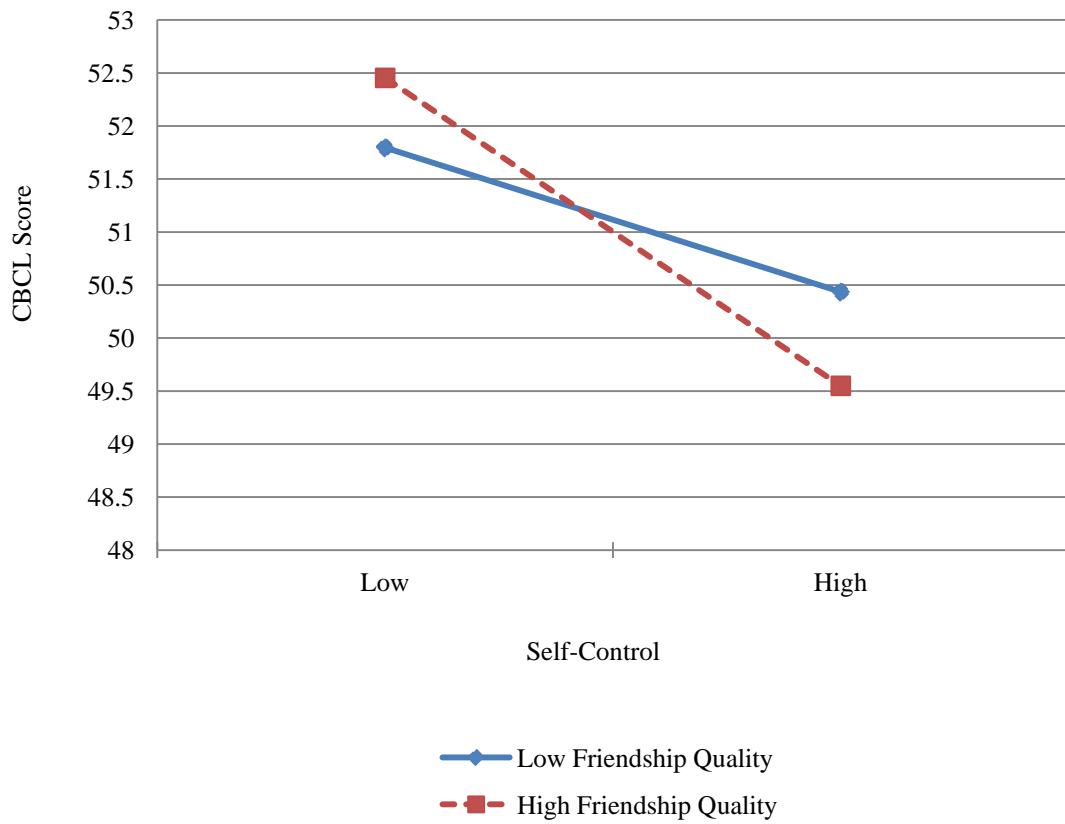


Figure 3. Predicted Mother-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Self-

Control and Friendship Quality



Note: Self-control was reverse scored in the overall model and in post-hoc tests of simple slopes. For ease of interpretation, values of self-control are shown in appropriate direction.

6.5 HYPOTHESES 4: THE PROTECTIVE ROLE OF FAMILY RELATIONSHIPS

Hypotheses examining the moderating effects of mother-child positive interactions on the above pathways will be discussed next. To ascertain whether the associations between interpersonal measures, friendship quality, and depression symptoms are attenuated in the context of high levels of mother-child positive interactions, the hierarchical regression equations described above were extended to include centered mother-child positive interaction (step 5), the two-way interaction terms between interpersonal measures and friendship quality, on the one hand, and mother-child positive interactions (step 6), and the three-way interaction terms between interpersonal measures, friendship quality, and mother-child positive interactions.

Interactions between Negative Emotionality, Friendship Quality, and Mother-Child Positive Interactions

Contrary to hypotheses, interaction effects did not emerge in the CDI model (Table 7), suggesting that a main effects model best describes the association between age 11 measures of negative emotionality and self-reported depression symptoms; however, the interaction between *emotional lability* and mother-child positive interactions was significant in predicting CBCL scores (Table 8), revealing that associations between *emotional lability* and CBCL scores vary across levels of mother-child positive interactions. In line with hypotheses of the protective role of the parent-child relationship, post-hoc analysis of simple slopes revealed that *emotional lability* predicted CBCL scores more robustly at *low* ($\beta = .58, p <.001$) than *high* ($\beta = .40, p <.001$) levels of mother-child interaction quality (Figure 4).

Interactions between Social-Cognitive Biases, Friendship Quality, and Mother-Child Positive Interactions

In line with study hypotheses, the interaction between *peer victimization*, friendship quality, and mother-child positive interactions was initially significant in both models (Table 9 and Table 10). However, once the models were trimmed of insignificant second- and third-order interaction terms, only the CDI model ($R^2 = .07, F (11, 485) = 3.51, p <.001$) continued to reveal *peer victimization* and depression scores to vary at different levels of friendship quality which in turn also varied at different levels of mother-child positive interaction, $\beta = .24, p <.001$. Post-hoc analysis of simple slopes of *peer victimization* at *low/high* levels of friendship quality and *low/high* levels of mother-child positive interaction revealed that in the context of *high* levels mother-child positive interaction, *peer*

victimization positively predicted CDI depression scores in girls reporting *high* levels of friendship quality ($\beta = .29, p <.01$), whereas this association was not significant for girls reporting *low* levels of friendship quality ($\beta = -.15, p <.16$) (Figure 5a). On the other hand, in the context of *low* levels of mother-child positive interaction, *peer victimization* positively predicted CDI scores only in girls reporting *low* levels of friendship quality (low: $\beta = .28, p <.001$; high: $\beta = -.04, p <.64$) (Figure 5b).

When insignificant two- and three-way interactions were removed from the final model, the *peer* Post-hoc tests of simple slopes of *peer victimization* on CBCL scores were not significant at *low* or *high* friendship quality in the context of either *low* (low friendship quality: $\beta = .08, p = .32$; high friendship quality: $\beta = -.10, p = .21$) or *high* (low friendship quality: $\beta = -.05, p = .62$; high friendship quality: $\beta = .15, p = .18$) mother-child positive interaction. This finding suggests very low effect size.

Interactions between Negative Social Behaviors, Friendship Quality, and Mother-Child Positive Interactions

In line with hypotheses, the interaction between *self-control*, friendship quality, and mother-child positive interaction was significant in the CDI model (Table 11). Significant 3-way interactions did not emerge in the CBCL model. Post-hoc probing of the significant interactions revealed that, contrary to study hypotheses, under conditions of *high* levels of mother-child positive interaction, low levels of *self-control* predict increases in CDI depression symptoms for girls reporting *high* levels of friendship quality ($\beta = .40, p <.001$) but not for girls reporting *low* levels of friendship quality ($\beta = .05, p <.61$) (Figure 6a). This suggests that *high* levels of mother-child positive interaction are protective for girls reporting *low* levels of friendship quality, but might result in relatively higher levels of CBCL scores for girls reporting *high* levels of friendship quality.

Under conditions of *low* levels of mother-child positive interaction, the strength of association between *low* levels of *self-control* and relatively heightened levels of CDI symptoms is more robust in girls reporting *low* levels of friendship quality ($\beta = .24, p <.01$) in comparison to girls reporting *high* levels of friendship quality ($\beta = .19, p <.05$) (Figure 6b). This suggests that *high* levels of friendship quality can be somewhat protective in the context of *low* levels of mother-child interaction quality.

Figure 4. Predicted Mother-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Emotional Liability and Mother-Child Positive Interaction

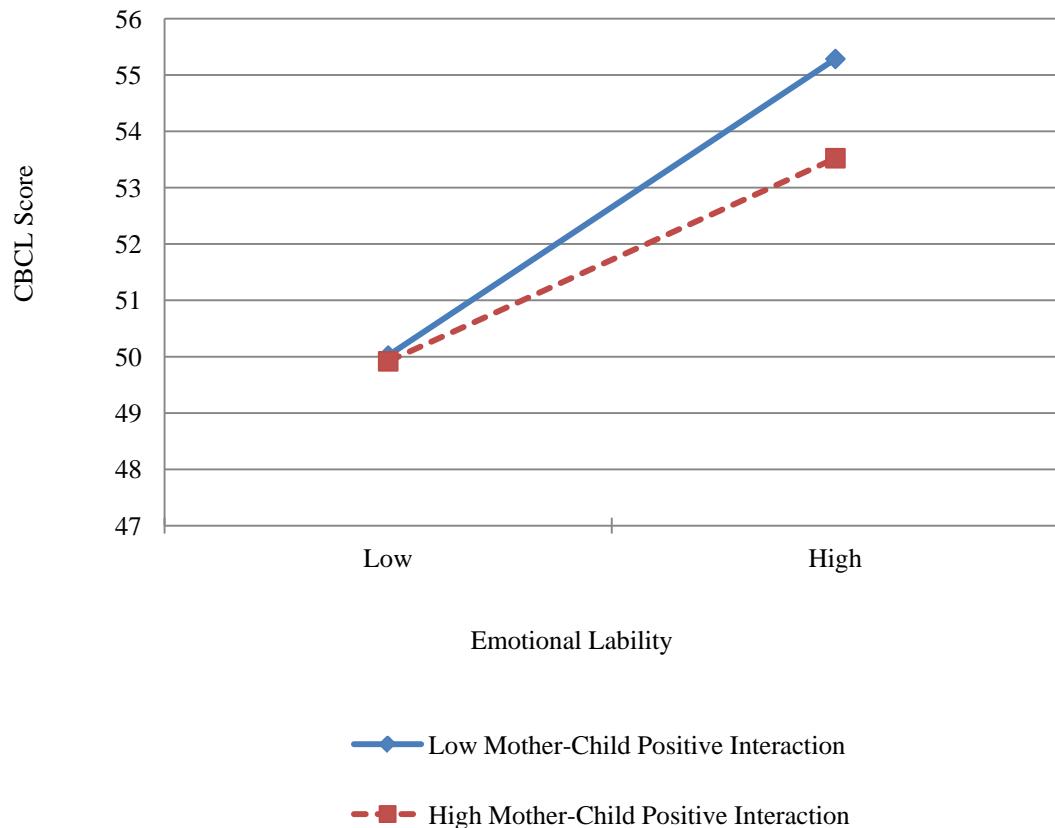


Figure 5. Predicted Adolescent-Reported Scores at Varying Levels (-1 SD and +1 SD) of Peer Victimization and Friendship Quality under Conditions of a) High Mother-Child Positive Interactions and b) Low Mother-Child Positive Interactions

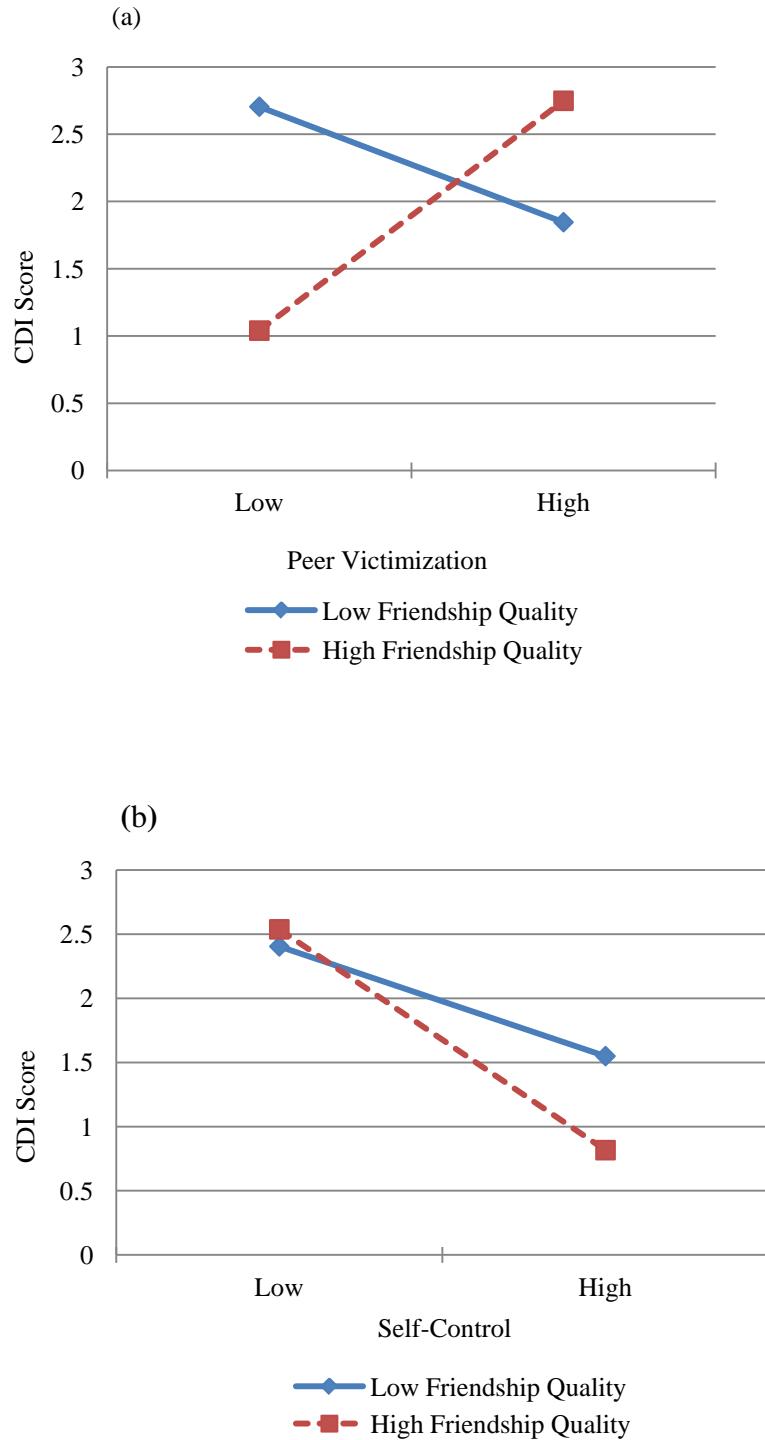
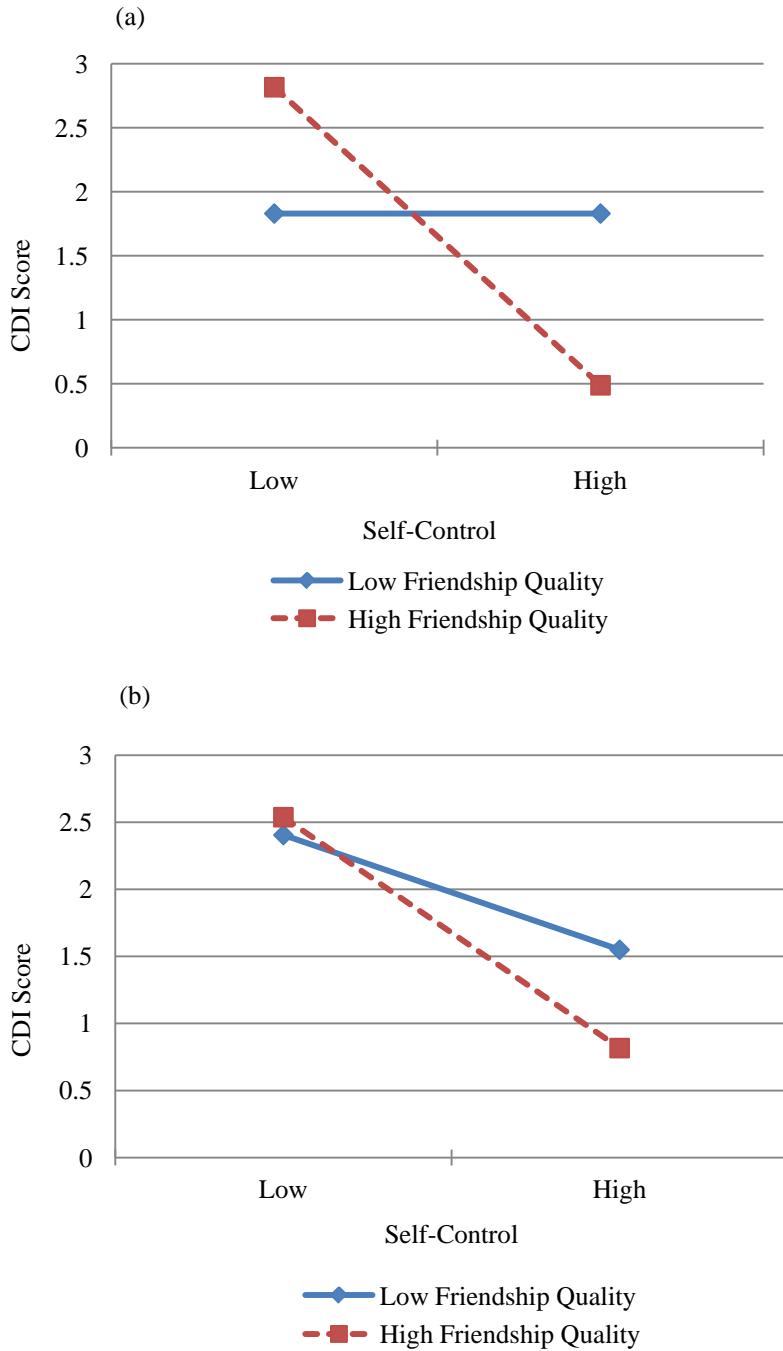


Figure 6. Predicted Adolescent-Reported Scores at Varying Levels (-1 SD and +1 SD) of Self-Control and Friendship Quality under Conditions of a) High Mother-Child Positive Interactions and b) Low Mother-Child Positive Interactions



6.6 HYPOTHESIS 5: DIFFERENCES IN INTERPERSONAL PROCESSES AS A FUNCTION OF PUBERTAL STATUS

Hypotheses examining the moderating effects of pubertal status on the above pathways will be discussed next. To ascertain whether the pathways discussed above show stronger associations in girls in relatively advanced stages of pubertal development in comparison to girls at earlier stages, second-order pubertal status x interpersonal measure interaction terms were added as a third step to the original CDI and CBCL hierarchical regression equations computed in Hypothesis 2. As the interpretation of four-way interaction terms would be complicated and confusing, the above analyses were conducted on the *early* and *mid-to-late* subsamples separately when interaction terms were significant and follow-up analyses revealed significant simple slopes.

Interactions between Negative Emotionality and Pubertal Development

Consistent with hypotheses, pubertal status moderated associations between negative emotionality and depression symptoms as measured by both adolescent- and mother-report; however, interaction effects emerged for *emotional reactivity* only in the adolescent-reported model ($\beta = .17, p <.01$), whereas the interaction between pubertal status and *emotional lability* was significant in the CBCL model only ($\beta = .14, p = .01$),

In terms of the *emotional reactivity* x pubertal status interaction in the prediction of CDI scores, the simple slope was significant for girls in *mid-to-late* pubertal development ($\beta = .33, p <.001$) and indicated that higher levels of *emotional reactivity* prospectively predicted elevations in depression symptoms (Figure 7). In contrast, the simple slope was insignificant for girls in *early* stages of pubertal development ($\beta = .06, p = .260$).

Follow-up analyses examining the CDI model separately in sub-groups of girls classified in *early* versus *mid-to-late* pubertal status confirmed that none of the proposed associations between *emotional reactivity* and CDI symptoms were significant for girls in the *early* stages of pubertal development. In line with hypotheses, significant main effects of *emotional reactivity* and mother-child positive interaction, further qualified by a significant three-way interaction between *emotional reactivity*, friendship quality, and mother-child positive interaction, emerged in the CDI model for girls in *mid-to-late* pubertal development ($\beta = .23, p = .001$). Post-hoc examination of simple slopes of *emotional reactivity* at low/high levels of friendship quality and low/high mother-child positive interaction

on CDI depression symptoms indicated that in the context of *high* mother-child positive interaction, *emotional reactivity* positively predicted CDI depression symptoms in girls reporting *high* levels of friendship quality ($\beta = .45$, $p < .001$), whereas this association was not present in girls reporting *low* levels of friendship quality ($\beta = -.04$, $p = .81$) (Figure 8a). When mother-child positive interaction was *low*, however, *emotional reactivity* positively predicted CDI depression symptoms in girls both reporting *low* ($\beta = .49$, $p < .001$) and *high* levels of friendship quality ($\beta = .30$, $p < .01$), although the stronger effect was for *low* levels of friendship quality (Figure 8b).

In terms of the *emotional lability* x pubertal status interaction in the prediction of CBCL scores, post-hoc examination of the *emotional lability* x pubertal status interaction revealed that the strength of association between *emotional lability* and CBCL scores were stronger for girls in *early* ($\beta = .60$, $p < .001$) than *mid-to-late* ($\beta = .41$, $p < .001$) puberty (Figure 9).

Follow-up analyses examining the CBCL model separately in sub-groups of girls classified in different stages of pubertal development generated models that were similar both to each other and to the original model in terms of significant main effects of *emotional lability* and mother-child positive interactions that were qualified by their two-way interaction. However, only the main effects of *emotional lability* ($\beta = .56$, $p < .001$) remained significant in the final model ($R^2 = .35$, $p < .001$) of the *early* pubertal development sub-sample with insignificant two- and three-way interactions removed. A comparison of the final overall sample ($R^2 = .30$, $p < .001$) and *mid-to-late* sub-sample ($R^2 = .30$, $p < .001$) models suggested stronger interaction effects for the *mid-to-late* subsample ($\beta = -.18$, $p < .01$) than for the overall sample ($\beta = -.10$, $p < .01$). Tests of simple slopes again revealed a pattern in which conditions of *low* levels of mother-child positive interaction ($\beta = .57$, $p < .001$) resulted in stronger associations between *emotional lability* and CBCL scores than conditions of *high* levels of mother-child positive interaction ($\beta = .23$, $p < .001$) (Figure 10). The difference between the *low* and *high* slopes appeared greater for the *mid-to-late* subsample than for the overall sample (see Figure 4). No other significant effects emerged in either the *early* or *mid-to-late* CBCL models.

Interactions between Social-Cognitive Biases and Pubertal Development

Contrary to study hypotheses, pubertal status did not moderate associations between age 11 social-cognitive biases and age 15 adolescent or mother-reported depression measures, $R^2 = .03$, $F(2, 489) = 0.11$, ns and $R^2 = .04$, $F(3, 488) = 0.94$, ns.

Interactions between Social-Cognitive Biases and Pubertal Development

Contrary to study hypotheses, pubertal status did not moderate associations between age 11 negative social behaviors and age 15 adolescent or mother-reported depression measures, $R^2 = .03$, $F(1, 491) = 0.08$, *ns* and $R^2 = .06$, $F(2, 489) = 1.47$, *ns*.

Figure 7. Predicted Adolescent-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Emotional Reactivity and Stages of Pubertal Development.

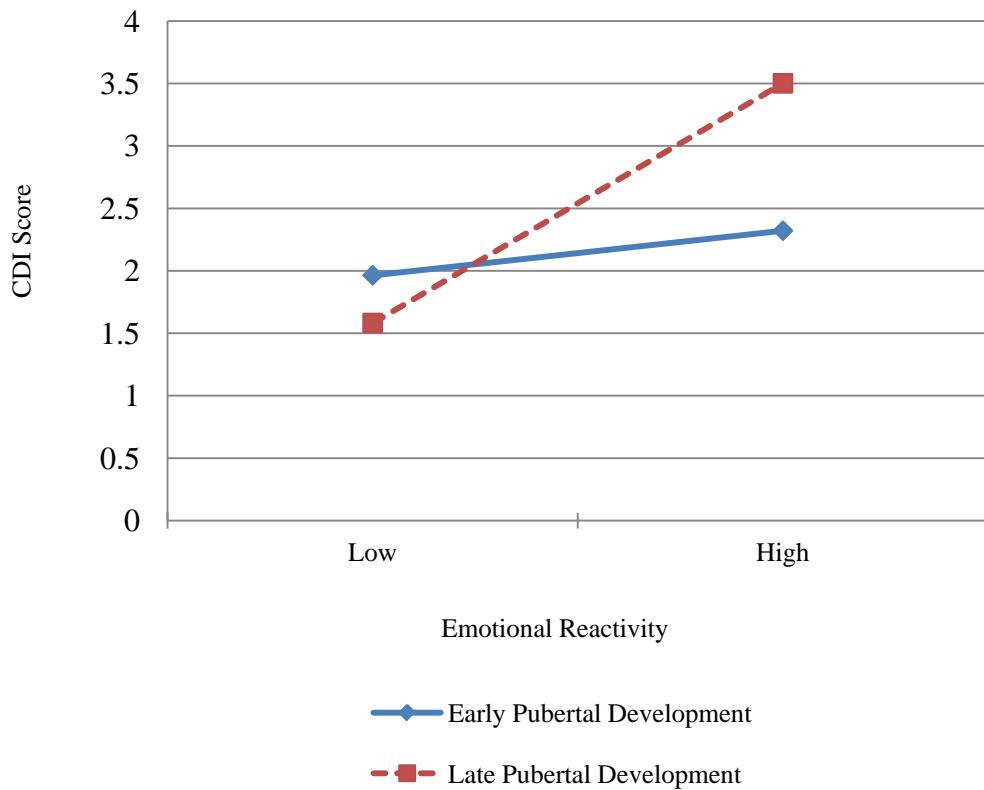


Figure 8. Predicted Adolescent-Reported Scores at Varying Levels (-1 SD and +1 SD) of Emotional Reactivity and Friendship Quality under Conditions of a) High and b) Low Levels of Mother-Child Positive Interactions in Girls in Mid-to-Late Pubertal Development

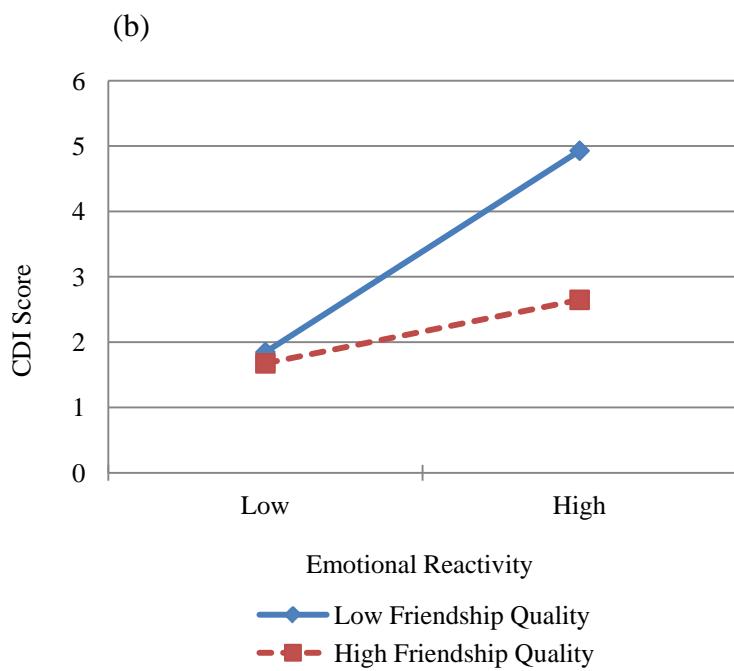
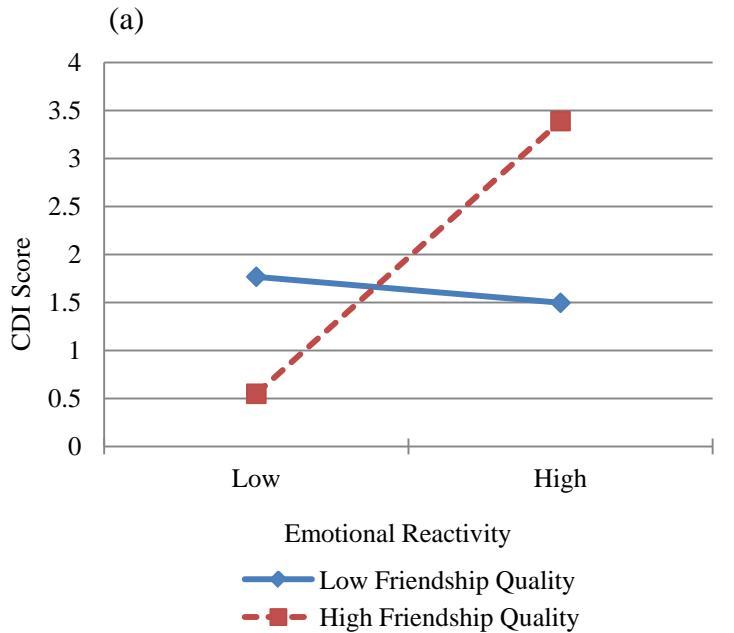


Figure 9. Predicted Mother-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Emotional Lability and Stages of Pubertal Development

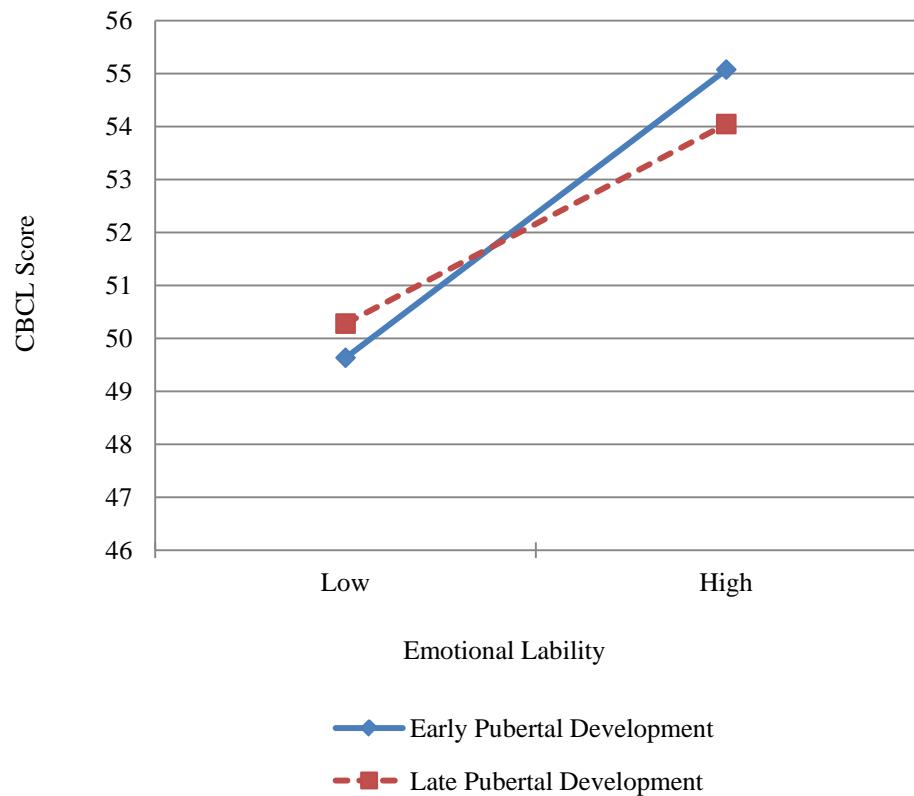
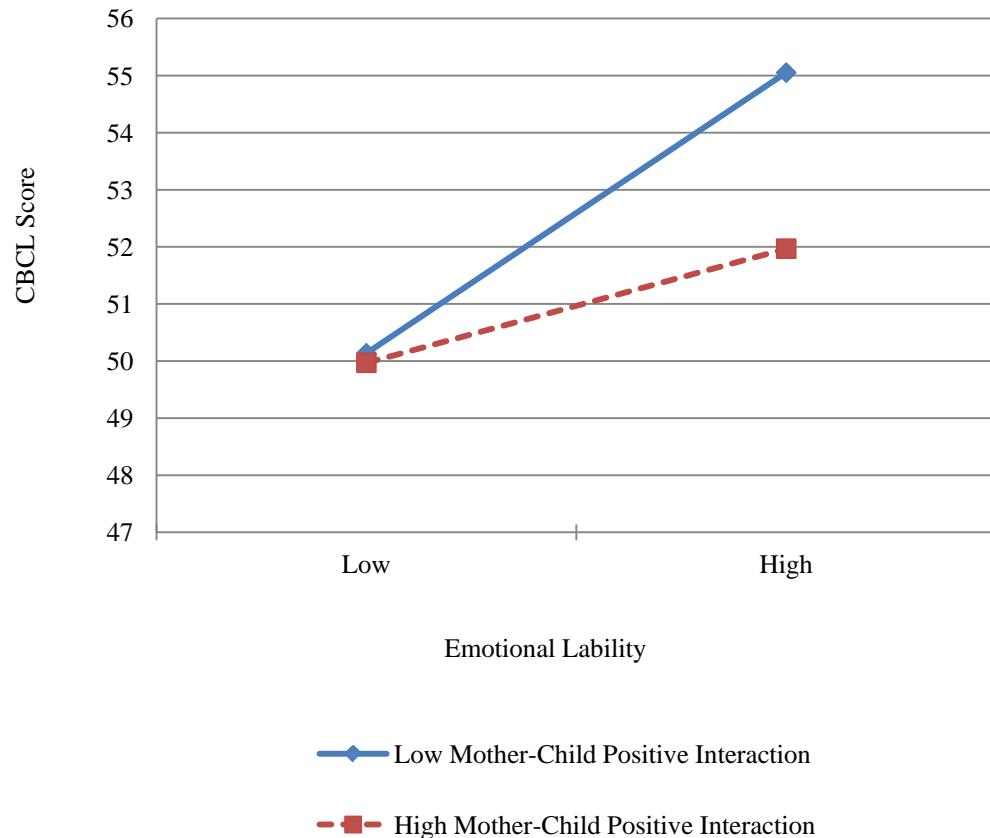


Figure 10. Predicted Mother-Reported Depression Scores at Varying Levels (-1 SD and +1SD) of Emotional Lability and Mother-Child Positive Interaction in Girls in Mid-to-Late Pubertal Development



7.0 DISCUSSION

The goal of the present study was to examine the extent to which deficits in emotional, social-cognitive, and behavioral functioning might precipitate heightened levels of depression symptoms in a community sample of girls followed through the transition to adolescence (ages 11 to 15 years) while also considering the peer, family, and developmental contexts that might attenuate or enhance this pathway. Partial support was found for study hypotheses.

First, the associations between age 11 domains of interpersonal functioning, negative emotionality, social-cognitive biases, and negative social behaviors, were generally low and below hypothesized ‘moderate’ levels. Associations *within* the component measures of these interpersonal domains ranged from low to high and suggested some coherence among the study measures comprising each domain. Second, in line with hypotheses, component measures of negative emotionality, social-cognitive biases, and negative social behaviors obtained at age 11 predicted elevations in depression symptoms age 15 when each domain was examined separately. Only measures of negative emotionality, however, contributed unique variance in models incorporating all three domains simultaneously. Third, as hypothesized, age 11 mother-child positive interaction, age 12 friendship quality, and pubertal development moderated some, but not all, associations between measures of interpersonal functioning and age 15 mother- and adolescent-reported depression symptoms; however, while a few moderated effects were anticipated, others were confusing and will be addressed specifically below.

7.1 ASSOCIATIONS WITHIN AND AMONG NEGATIVE EMOTIONALITY, SOCIAL-COGNITIVE BIASES, AND NEGATIVE SOCIAL BEHAVIOR

Study findings revealed that measures hypothesized to capture features of interpersonal deficits typically manifested in girls' social relationships demonstrated higher levels of coherence for the negative social behavior domain than for the negative emotionality and social-cognitive biases domains. The relatively more robust associations among the measures of negative social behavior are likely the result of several factors. First, domain variables were gathered from measures specifically developed to assess child social competence (SSRS; Gresham & Elliott, 1990) and peer-related behaviors (CRP; Crick, Bigbee, & Howes, 1996; Ladd & Proflet, 1996), and thereby were positioned for at least moderate levels of association. Second, each measure reflected a composite of teacher- and mother-reported information on child social behavior and subsequently each score was a more reliable estimate of the child's behavioral tendencies across a range of social situations.

In contrast, although the *emotional lability* measure was designed to assess emotionality expressed in the context of social situations, many of the *emotional reactivity* items asked parents to rate their child's expressed emotion without the help of contextual cues beyond the valence of the emotion (e.g., "When happy, my child is contented and calm rather than exhilarated and excited" (Item 6)). Further, the *emotional reactivity* measure comprised items assessing both positive and negative expressed emotion, whereas *emotional lability* only included items related to negative emotional states. Finally, this domain relied solely on maternal reports of child emotionality; a more robust measure might have been obtained if data from other informants were available, in addition to assays of biological stress response (e.g., cortisol, salivary alpha amylase) to socially challenging tasks (e.g., Rudolph, Troop-Gordon, & Granger, 2011). The two negative emotionality measures were nonetheless moderately correlated, but the internal reliability of the overall domain may reflect the relatively small number of items on the scales.

Measures within the social-cognitive biases domain demonstrated less coherence than those within the negative emotionality and negative social behavior domains both in terms of patterns of association and internal reliability. A fundamental problem with the assessment of an individual's perceptions of and beliefs about her life is that it necessarily reflects a subjective account of reality. While the internal experiences of external events are very real for the individual, it is difficult to determine the extent to which they represent real versus imagined content and

subsequently the extent to which an individual is ‘biased’ in her interpretation of these events. Although *hostile attribution biases* is a composite measure of the tendency to interpret ambiguous social cues in a hostile manner, the *peer victimization* and *perceptions of support* measures assess how the child perceives her social environment on the basis of *both* ambiguous and unambiguous cues. High scores on the two latter measures, therefore, could reflect either actual or imagined victimization and rejection by peers and, as a consequence, may or may not reflect a social-cognitive ‘bias’. This could account for the low to modest associations between *hostile attribution biases* and *peer victimization and perceptions of support*.

Study hypotheses initially predicted moderate associations among domains of interpersonal dysfunction on the basis that internal processes (i.e., emotional responses), internal representations of social events (i.e., social cognitions), and personal characteristics (i.e., social behaviors) are interdependent attributes of an individual, both in terms of how they develop and eventually manifest. As previously noted, it is the interplay between these three interpersonal domains that is hypothesized to shape child social and emotional outcomes (Crick and Dodge, 1994). Contrary to expectations, however, interpersonal measures demonstrated primarily low to modest associations across domains of functioning. Several factors might explain the poor associations. First, study variables were conceptualized a priori to provide a valid measure of maladaptive interpersonal functioning in the social context of girls during the transition to adolescence; however, although theoretically-grounded, study measures were not specifically developed to examine interpersonal areas of weakness in girls (except for *emotional lability*). As such, it is not surprising that associations amongst the measures are inconsistent and weak.

Second, these findings might reflect ‘actual’ associations amongst interpersonal domains, and might indicate evidence for the unique contribution of each domain to adjustment. Although interrelated, these interpersonal domains are considered to exert influence on development through different pathways. Low levels of association reduce concerns about multicollinearity, and, as a result, indicate that each interpersonal domain has the potential to provide unique information about predictors of later depressive symptoms.

7.2 DIRECT ASSOCIATIONS BETWEEN INTERPERSONAL DOMAINS AND DEPRESSION SYMPTOMS

Consistent with prior literature and study hypotheses, measures of negative emotionality (Wetter & Hankin, 2009; Yang et al, 2008), social-cognitive biases (Bell, Luebbe, Swenson, & Allwood, , 2009; Prinstein et al., 2005), and negative social behaviors (Abela et al., 2006; Borelli & Prinstein, 2006; Prinstein, et al., 2005; Reijntjes et al., 2007; Rose, 2002; 2007), when modeled separately, predicted unique variance in both self-reported and mother-reported depression symptoms at age 15. In general, interpersonal measures explained more variation in mother-reported than adolescent-reported depression symptoms, even when only adolescent-reported measures were included in the model. Notably, associations with mother-reported depression symptoms were frequently qualified by interactions with friendship quality, whereas adolescent-reported depression symptoms were qualified by statistical interactions with both friendship quality and the mother-child relationship, as assessed with observations at age 11. This pattern of results indicates the influence of both parents and peers across both measures of age 15 depression symptoms. As the direct associations between interpersonal measures and depression symptoms were qualified by interactions with friendship quality, mother-child interaction, or pubertal development, findings are discussed briefly below.

Although *emotional reactivity* and *emotional lability* together contributed significant variance to both mother- and adolescent-reported depression symptoms, *emotional lability* emerged as the more robust predictor of age 15 depression symptoms across both models. While the strength of association between *emotional lability* and mother-reported depression symptoms can be explained, in part, by shared informant and item-overlap (5/14), it is also likely that the items assessing positive emotionality dampened or interacted with the effects of the negative emotionality items within the *emotional reactivity* measure in the prediction of both mother- and adolescent-reported depression symptoms (Verstraeten, Vasey, Raes, & Blijlevens, 2008; Wetter & Hankin, 2009). It should also be noted that the main effects of negative emotionality on adolescent-reported depression symptoms were not qualified by either friendship quality or mother-child positive interactions; however, *emotional reactivity* did interact with pubertal development and showed subsequent qualifications by both friendship quality and mother-child positive interactions (see section on pubertal development for more discussion).

Although measures of social-cognitive biases together predicted both mother- and adolescent-reported depression symptoms, peer victimization was the sole significant predictor of adolescent-reported depression and

none of the individual measures predicted unique variance in mother-reported depression symptoms. Moreover, the variance in age 15 depression symptoms explained by the social-cognitive biases measures was minimal in both models (2 – 2.6%). While it has already been postulated that *peer victimization* and *perceptions of support* are poor measures of attributional bias, the *hostile attribution biases* measure, a more accurate measure of social information processing deficits, should have emerged as the most robust predictor of depression symptoms. The social scenarios incorporated in the current measure of *hostile attribution biases*, however, most frequently described instrumental, rather than relational, provocation. Effects of a hostile attributional style on depression symptoms would likely have been more robust if scenarios relevant to adolescent girls, such as those involving social-evaluation or interpersonal rejection had been used (Bell et al., 2009).

Contrary to expectations, *self-control* was the sole negative social behavior to contribute significantly to both mother- and adolescent-reported depression symptoms. *Relational aggression*, one of the interpersonal measures most relevant to the social context of adolescent girls, did not. There are several potential explanations for these findings. First, relationally aggressive behavior has been found to co-vary positively with friendship intimacy (Grotjahn & Crick, 1996) and sense of solidarity (Gottman & Mettetal, 1986), and might improve, rather than erode, friendship quality and subsequently might result in emotional benefits. Second, as noted previously, self-disclosure and relational aggression go hand-in-hand (Murray-Close et al, 2007), and relational aggression may not stand out as an interpersonally annoying behavior, *per se*, especially if everyone else is engaging in it. Third, low *self-control*, or impulsivity, is likely to underlie other noxious interpersonal behaviors that are manifest in the dyadic setting and not adequately captured by the measures in the current study.

When the interpersonal domains were considered simultaneously, social-cognitive biases and negative social behaviors did not contribute significant variance to either mother- or adolescent-reported depression symptoms above and beyond negative emotionality. In the final models, *emotional lability* continued to predict significant variance in mother-reported depression symptoms, and nearly significant levels of variance in adolescent-reported depression symptoms. Given evidence that negative emotionality might be the ‘first link’ (Barrocas & Hankin, 2011) in the chain of events leading to stress generation and the development of depression symptoms and that stress reactivity, in turn, moderates the influence of social experiences on this pathway (Rudolph et al., 2011), it is not surprising that negative emotionality emerged as the strongest predictor of depression symptoms in the current study. However, negative emotionality, conceptualized as an aggregate of high negative

affect, high reactivity, high intensity of emotional reactions, low adaptability, and low approach (Hyde et al., 2008), is more easily measured because of its ‘global’ nature, whereas social-cognitive biases and negative social behaviors specific to adolescent girls are harder to define and measure. As such, it is likely that better measures of the social-cognitive biases and negative social behaviors constructs would demonstrate more robust associations with depression symptoms.

7.3 INTERACTIONS BETWEEN INTERPERSONAL DOMAINS AND FRIENDSHIP QUALITY

In line with theory and research highlighting the paradoxical phenomena of enhanced friendship intimacy and elevated depression rates in girls during the transition to adolescence (Cyranowski, et al, 2000; Rose, 2002; 2007), study findings regarding the moderating role of friendship quality in the development of depression symptoms suggest that friendship features specific to girls may play a dual role in the risk-protective processes of adolescence. Specifically, while having a friendship characterized by high levels of validation, companionship, and disclosure was protective against adjustment difficulties in the contexts of perceived low social support and low quality mother-child interactions, these friendships also appeared to enhance emotional distress in girls with a hostile attributional style and low levels of behavioral inhibition. Together, these results indicate that high quality friendships could function as a source of interpersonal stress, rather than support, for girls demonstrating relatively high levels of social-cognitive biases and negative social behaviors in comparison to their peers. Although seemingly incongruous, these findings offer further support for and might be better explained by behavioral and social-cognitive theories of the development of depression symptoms.

Co-rumination was initially conceptualized by Rose (2002) as a means of consolidating and explaining the twin emergence of enriched friendship quality and emotional upset in girls during the transition to adolescence. The longitudinal examination of these constructs has shown that co-rumination is associated with both improved friendship quality and heightened levels of depression symptoms (Rose et al., 2007). Given the persistent and excessive nature of co-rumination, it stands to reason that girls struggling with behavioral inhibition might engage in frequent and intense discussions of personal problems in the context of their best-friendships and, as a consequence, value their friendship more but continue to struggle with modulating their affective responses to these problems.

Similarly, negative feedback-seeking and excessive reassurance-seeking are also defined as dysfunctional social behaviors that do not successfully alleviate emotional distress (Abela et al., 2006; Borelli & Prinstein, 2006); however, unlike co-rumination, they lead to friendship erosion rather than enhancement (Borelli & Prinstein, 2006; Prinstein et al., 2005). These patterns suggest that self-control might underlie both the activation of negative social behaviors and the persistence of emotion dysregulation. Unfortunately, this study incorporated general, rather than specific, measures of negative social behaviors, and it is impossible to determine whether low self-control was playing a role in the context of the friendship, and if so, how it influenced the quality of the friendship.

Cognitive diathesis-stress generation models of depression stipulate that a negative attributional style predisposes an individual to respond to stressful events with heightened emotional reactivity, which in turn induces the individual to act in ways that might further aggravate the stressful circumstances (e.g., Hankin & Abramson, 2001). As such, it was hypothesized that *low* levels of friendship quality would moderate the association between social-cognitive biases and depression symptoms on the basis of theory and research pointing to the importance of maintaining high quality friendships for adolescent girls. However, both *low* and *high* levels of friendship quality interacted with social-cognitive biases in the prediction of depressive symptoms, suggesting that *high* levels of friendship quality might be a source of interpersonal stress for girls who are vigilant to cues of provocation and rejection. Prinstein and colleagues (2005) reported similar findings in their investigation of social information processing biases in adolescents, whereby, even when they were accepted by peers, adolescent girls who were more likely to perceive hostile intent in socially ambiguous scenarios reported elevated levels of depression symptoms and loneliness.. Rudolph and colleagues (Rudolph & Conley, 2005; Rudolph et al., 2005), in turn, determined that high levels of social-evaluative concerns prospectively predicted higher levels of both depression symptoms and social competence in girls. What could account for the associations between heightened concern about and vigilance to peer rejection and a rise in depression symptoms in adolescent girls in contexts of *high* quality best-friendships, acceptance by the peer-group, and relatively well-developed social skills? Where is the stress?

To date, the developmental literature has focused on developing empirically-validated, objective measures of peer acceptance, rejection, and victimization in order to better understand the predictors, correlates, and outcomes associated with these peer ‘states’ of being. However, although peer acceptance and rejection are measured externally, it is the internal experience of acceptance and rejection that interests researchers most because it accounts for individual differences in the ability to cope with and recover from these experiences. Subsequently, perceptions

and subjective experiences of rejection, rather than the objective evidence thereof, should be the focus of research. These experiences might be driven by both how much a specific relationship is valued (relational evaluation; Leary, 2005) and subsequent estimates of how important, valuable, and close the social partner deems the relationship (perceived relational evaluation). A key component to subjective experiences of acceptance and rejection is the *desired level* of perceived relational evaluation; each individual has an ideal value above which she would like to rest in her social partner's esteem, and when behavioral cues suggest that she falls below this "cut-off", she will feel rejected (Leary, 2005). A conceptualization such as this explains how an individual can perceive and experience rejection even in the absence of any explicit rejection behaviors (Leary, 2005). For example, simply inferring that a loved one does not regard the relationship as valuable, important, or close as much as one would like could lead to rejection experiences. In fact, Leary (2005) contends that *relational devaluation*, in which a relationship has fallen in value for one of the relationship partners, is in many ways more painful than rejection from the start.

Pubertal development and gender intensification together magnify affiliative needs in girls during the transition to adolescence (Cyranowski et al., 2000) and, at the same time, peer relationships ascend in importance and provide the primary context for intimate exchange (Buhrmester, & Prager, 1995). As a consequence, adolescent girls heighten their focus upon the preservation of their current friendships and become more vigilant to social cues of threat of relational loss (Letendre, 2007; Underwood, 2004). As nonverbal forms of communication (e.g., eye rolling, ignoring, tapping feet, whispering) rise in frequency for girls because of fears of the social consequence of overt conflict (Letendre, 2007; Underwood, 2004), social information processing abilities become the primary means of successfully navigating the social environment. Girls must be vigilant to their environment for information on when and how to respond to cues of impending conflict or potential relational loss or *devaluation*; however, because these cues can be subtle, girls with excessive worries and concerns about rejection may be more likely to catch false positives and subsequently feel rejected in the absence of actual rejection. In terms of the current study findings, girls reporting high levels of friendship quality with their best-friend are likely to place great value upon that friendship and if they are more likely to read hostility in ambiguous social cues, they may be more likely to perceive relational devaluation, even in the absence thereof, and experience emotional distress in its wake. It stands to reason that girls who are more attuned to the social environment would have the social competence to develop friendships, even if they are more sensitive to cues of rejection, because they are likely also self-aware and careful to choose appropriate social behaviors (Pickett, Gardner, & Knowles, 2004).

Hostile attribution biases were unrelated to depression symptoms when friendship quality was low, suggesting that Leary (2005) might be accurate in his suggestion that *relational devaluation*, or fear thereof, might be worse than not having a significant social partner at all. It may be that a low quality friendship has less value and, therefore, does not generate great distress if it is perceived as threatened. Alternatively, prior literature has linked a hostile attributional style with aggression (Crick & Dodge, 1994), and it could be that for girls who have difficulty developing high quality friendships, externalizing, not internalizing, problems are associated with higher levels of attribution biases.

Although *high* friendship quality was the more salient context for associations between hostile attribution biases and depression symptoms, *low* friendship quality did moderate associations between perceptions of social support and depression symptoms. Closer examination of the data reveals that higher levels of perceived support might be protective against emotional distress in the context of *low* friendship quality such that feeling more supported attenuates the emotional fall-out of having a friend who might not offer as much companionship, validation, and intimacy as one would like. This highlights the importance of examining interpersonal features that contribute to resiliency in the face of interpersonal stress.

7.4 THE PROTECTIVE ROLE OF FAMILY RELATIONSHIPS

In accordance with a growing literature on longitudinal associations between parent-child relationship quality and the development of depression symptoms in adolescence (Allen et al., 2006; Branje, Hale, Frijns, & Meeus, 2010; Ge et al., 2009; Meadows et al., 2006), positive mother-child interaction quality was inversely related to mother-reported depression scores at age 15. These findings indicate that the psychosocial benefits of experiencing warm, positive, mutually enjoyed mother-child interactions in childhood spill into adolescence. Attachment theorists would suggest that an adolescent with a history of responsive and sensitive parenting might indeed experience higher levels of emotional adjustment because of a well-developed, healthy internal working model of relationships and the self (Sroufe, Egeland, Carlson, & Collins, 2005). This adolescent would likely seek out her mother for emotional support during times of stress (Landman-Peeters et al., 2005; Rose & Rudolph, 2006; Rubin et al., 2004; Taylor et al., 2000) and a responsive and sensitive parent would be likely to act as an effective agent of support for her. An additional

aim of this study was to determine whether a history of positive mother-child interactions could off-set interpersonal risk factors (i.e., interpersonal deficits, low friendship quality) implicated in the development of depression symptoms.

Study findings revealed partial support for the protective influence of a positive mother-child positive relationship on emotional adjustment in the context of interpersonal dysfunction and low levels of child-reported friendship quality. First, while associations between emotional lability and mother-reported depression symptoms remained significant for girls observed to engage in high levels of positive interaction with their mother, this pathway was attenuated in comparison to girls whose relationships with their mothers appeared less positive when observed during mother-child interaction. These results are not surprising given that parent-child interactions serve as a primary avenue for emotion socialization (Sheeber et al., 2001; Stocker et al., 2007). In the parent-child, dyadic setting, parents model emotion coping skills through their own emotional expression and in their response to children's expressed emotion (Stocker et al., 2007), and adolescents demonstrate fewer internalizing symptoms if they have parents who are more accepting and supportive of their negative emotional experiences and limit their own expression of negative emotions (Stocker et al., 2007). Results from the present study indicate that girls who express high levels of negative emotionality in response to social stimuli, and are subsequently at risk for long-term emotional difficulties (Sheeber et al., 2001), are likely to learn how to cope better with these emotions when they have mothers who are supportive, respect their autonomy, and inhibit expression of hostile emotions.

Second, high levels of positive mother-child interactions buffered associations between peer victimization and self-control, on the one hand, and self-reported depression symptoms, on the other, for girls whose best friendships were characterized by low levels of validation, support, and disclosure and high levels of conflict. While an extensive literature has demonstrated that child development flourishes in warm, supportive, and accepting parenting environments (Baumrind, 1991; Chan, 2011; Davidov & Grusec, 2006; McDowell & Parke, 2005) this is one of the first studies to investigate and corroborate positive parent-child interactions as a protective against the negative emotional consequences of detrimental interpersonal processes occurring in the peer environment of adolescent girls. Extant research suggests that mothers who are emotionally supportive (Wenz-Gross et al., 1997) and cultivate a close relationship with their daughters (Ge et al., 2009) promote emotional resiliency in the face of peer difficulties, indicating that unmet social needs can be satisfied in the parent-child relationship where they are likely to benefit from better emotion coaching than they might from peers.

One of the unanticipated outcomes of the present study pertains to the emotional adjustment of girls who reported *high* levels of friendship quality and were observed to engage in *high* levels of positive interactions with their mother. Specifically, *high* levels of mother-child positive interactions enhanced, rather than attenuated, associations between *peer victimization* and *self-control* and self-reported depression symptoms. Although in contradiction to theory and research citing the social-emotional advantages gained from positive peer (Furman & Buhrmester, 1985; Hedges, Boivin, Vitaro, & Bukowski, 1999; Rubin et al., 2004; Rubin, Coplan, Chen, Bowker, & McDonald, 2011) and family relationships (Anderson, Sabatelli, & Kostutic, 2007; Ge et al, 2009; Hillaker et al., 2008; McDowell & Parke, 2009), consideration of these findings within the larger context of the normative developmental changes of adolescence might shed some light on them. First, friendships are the preferred and primary source of emotional support, intimacy, and self-disclosure for adolescent girls (Brown & Klute, 2003; Buhrmester & Prager, 1995; Cyranowski, et al, 2000; Roy, et al., 2000), and they are subsequently more likely to discuss and problem-solve social-emotional difficulties with their friends than their parents. Second, gender-intensification processes are considered to fortify girls' use of emotion-focused coping strategies whereby attention is focused on negative affect and cognitions related to the stressful event (Broderick & Korteland, 2002; 2004). Adolescent girls with serious interpersonal deficits (i.e., problems with *peer victimization* and *self-control*), therefore, are at risk for continuing difficulties because they are likely to seek out advice from their friends, instead of their parents, who might co-ruminate with them instead of generating effective coping strategies. These processes seem to be off-set, however, for girls who are 'forced' to ask their parents for help because they have impoverished friendships, and when friendships are the only source of support.

Consistent with prior research (Gauze et al., 1996; Rubin et al., 2004), *high* friendship quality buffered the effects of *peer victimization* on self-reported depression symptoms when girls were observed to engage in *low* levels of positive interaction with their mother. These findings indicate that having one, high quality source of emotional and social support has beneficial ramifications on adolescent girls' emotional adjustment, especially when she feels she is being bullied by others. Girls were not protected from emotional difficulties related to low self-control, as shown by a similar rise in self-reported depression symptom as their *high* mother-child positive interaction counterparts and reinforcing the hypothesis that adolescent girls' friendships might not be equipped to deal with serious interpersonal deficits.

These findings nonetheless highlight the interdependency of the peer and family environments in predicting adolescent adjustment (Sentse et al., 2010), and underscore the importance of examining their interplay in the study of the risk-protective processes implicated in the development of depression symptoms in girls. To date, parent and peer relationships have primarily been studied as separate influences on adolescent adjustment, and little is known about how they may work in synchrony to shape development across adolescence. Although friendships rise in saliency during adolescence, it remains to be seen whether this translates directly into carrying more stock in emotional adjustment relative to the parent-child relationship or whether they might be even be interchangeable (Sentse et al., 2010). Current findings suggest that the interplay between friendships and parent-child relationships is rich and complex and affords questions more comprehensive than whether positive features in one environment can ‘buffer’ the adverse features present in the other.

7.5 DIFFERENCES IN INTERPERSONAL PROCESSES AS A FUNCTION OF PUBERTAL STATUS

Consistent with research demonstrating that pubertal maturation confers novel or pronounced pathways to depression (Caspi & Moffitt, 1991; Conley & Rudolph, 2009; Forbes et al., 2004; Ge et al, 2001; Rudolph, 2008), measures of negative emotionality interacted with pubertal status in the prediction of both mother- and adolescent-reported depression symptoms. Importantly, and also in accordance with extant literature (Conley & Rudolph, 2009; Rudolph & Troop-Gordon, 2011; Teunissen et al., 2011), these interactions were further qualified by risk-protective processes within the social context. Specifically, friendship quality and/or mother-child interaction quality emerged as moderators of the association between negative emotionality and depression symptoms for girls in *mid-to-late*, but not *early*, stages of pubertal development. *High* levels of positive mother-child interactions were protective against elevated depression symptoms reported by mothers when their daughters were also seen as emotionally labile. In terms of *emotional reactivity*, *high* levels of positive mother-child interactions protected against *emotional reactivity* → adolescent-reported depression symptoms in the context of *low* friendship quality. On the other hand, *high* friendship quality was protective against *emotional reactivity* → adolescent-reported depression symptoms in the context of *low* mother-child positive interactions. As described in the discussion of social-cognitive biases and negative social behaviors, conditions of *positive* mother-child interaction and *high* friendship quality enhanced

associations between *emotional reactivity* and adolescent-reported depression symptoms. Together, these results support the notion that, despite reorganization of the social and family system that accompany pubertal development, parent and peer experiences continue to shape adolescent development together and should be studied as such.

Hypotheses that interpersonal pathways to depression would vary as a function of pubertal development were predicated on the multi-systemic changes that occur during the transition to adolescence and might impart vulnerability to depressogenic pathways. Partial support for this hypothesis was found only for the domain of negative emotionality. One explanation for the lack of significant interactions between social-cognitive biases and negative social behaviors and pubertal status is that, although highly distinctive and distinguishing, pubertal development represents only one area of change. Given evidence of puberty-associated changes in the neurobiological processes underlying emotionality (Forbes et al.; 2004; Silk et al., 2009), it stands to reason that pathways associated with this domain would be sensitive to pubertal development. It is likely that social-cognitive and behavioral measures incorporating an affective component would have also varied as a function of pubertal development. It also stands to reason that these domains might have been sensitive to other measures marking the adolescent transition, such as middle-school transition, time spent with family and friends, gender beliefs.

7.6 LIMITATIONS AND FUTURE DIRECTIONS

The current study has several limitations that deserve further discussion. First, although the availability of a large, community sample of females participating in a multi-wave study affords the opportunity to examine gender-specific constructs and processes over development, relatively few girls demonstrated elevations in depression symptoms and even fewer would have met diagnostic criteria for major depressive disorder. Population-based recruitment methods and sample attrition together lowered the risk for the development of clinically significant depression, or any other childhood disorders. Although power and validity should be improved with replication in a clinical sample, there is some indication that the construct of depression is dimensional in nature (Hankin et al., 2005) and that processes underlying stress and depression may not differ between clinical and sub-clinical

symptoms (Shih et al., 2006). As such, significant, rather than non-significant, findings are likely to be reproduced in a clinical sample.

Second, an attempt to develop and incorporate measures considered to reflect interpersonal constructs and processes specific to adolescent girls is a major strength of this study. However, while the NICHD Early Child Care and Youth Development dataset did include measures of variables that are considered particularly relevant to the social experiences of girls (i.e., relational aggression, prosocial behavior), the majority of instruments in this study were designed to assess functioning in both girls *and* boys and across multiple domains of functioning. Although the breadth of assessment allowed the inclusion of measures across multiple domains and over time, detailed information on behaviors and social-cognitions of girls was lacking. Future research would benefit from the development and validation of measures that gather specific information on how adolescent girls feel, think, and act across a number of social settings (i.e., dyadic vs. group) and contexts (e.g., school vs. home vs. peer). This should move beyond modifying current measures to the development of new measures. Bell and colleagues (2009) recently developed a new measure of social information processing strategies to better assess cognitive styles relevant to internalizing problems, instead of simply adding a few more relationally-oriented stories to current measures. This approach should be incorporated in the study of the development and adjustment of adolescent girls.

Third, while the inclusion of the emotional lability construct, derived from CBCL items, was an attempt to develop a contextually-relevant measure , several items overlapped specifically with later measures of depressive symptoms, while other items overlapped conceptually, if not in specific wording. As such the strength of the association of the “emotional lability” measure with both mother- and adolescent-reported depression symptoms may be an auto-regressive effect, reflecting stability in symptoms from age 11 to 15 rather than independent prediction from heightened emotionality . In addition, the *emotional reactivity* measure included items assessing strong emotional responses to both positive and negative events. It is likely that stronger associations would emerge between *emotional reactivity* and depression symptoms if the positive emotionality items were eliminated from the measure (Wetter & Hankin, 2009) or were incorporated in ways that allowed for the assessment of low positive affect in line with the tripartite model (Wetter & Hankin, 2009).

Fourth, while this one of the first investigations to examine interpersonal functioning across multiple domains simultaneously, further study of how they might interact in the interpersonal context and in the development of depression symptoms is warranted. For example, there is some evidence to suggest that associations

between negative emotionality and depression symptoms might be mediated (Verstraeten et al., 2009). or moderated (Hankin, 2010) by cognitive style Improved measures of maladaptive interpersonal functioning would also ascertain the extent to which these three domains are associated and whether they do work in concert to shape child development.

Fifth, in concordance with literature suggesting that specific, rather than global, measures of interpersonal stress should be examined and that a lack of close friendship could be considered stressful for an adolescent girl, varying levels of friendship quality were examined as potentially stressful circumstances for girls. However, as results suggested, stress is in the eye of the beholder, and subjective measures of interpersonal stress should be incorporated in future research. The constructs of relational evaluation and devaluation present a novel method of conceptualizing and measuring interpersonal acceptance and rejection, and might be particularly relevant to girls who might perceive rejection in the absence of actual rejection. These constructs also capture the degree of ‘value’ a friendship offers a girl and the cost of losing such a friendship.

Sixth, although one of the first investigations to examine the interplay of the peer and family environments in processes leading to the development of depression symptoms, further research on how the peer and parent relationships interact to shape adolescent girls’ adjustment is needed. One of the strengths of the current study was the use of observational data on mother-child interactions; however, future research could also incorporate adolescent-perceptions of the parent-child relationship, and directly compare the quality of peer and parent interactions and relationship perceptions. Further, although a global measure of friendship quality and mother-child positive interactions did reveal significant interactions in the prediction of depression symptoms, examination of the specific qualities and behaviors within those relationships is warranted to better understand how these relationships might influence emotional adjustment.

Seventh, exploring the unique contributions of the father-daughter relationship to the interpersonal processes underlying the development of depression symptoms will likely enhance our understanding of the direct and interactive effects of parenting on adolescent girls’ emotional health. Although little is known about the effects of father-child relationships on adolescent emotional adjustment, there is emerging evidence that adolescents who feel connected to their father have fewer depression symptoms than those who do not (Mueller, Bridges, & Goddard, 2011). Given girls’ developing romantic interest in males, although they spend the majority of time with their same-sex peers, it stands to reason that having a father as both a positive male model and for emotional and instrumental

guidance would attenuate any stress associated with male peers (either real or imagined). Scharf and Mayseless (2008) found that 17-year-old girls who engaged in high levels of positive interactions with their fathers reported having high quality relationships with their romantic partner, whereas positive interactions with their mother related to a delay in sexual activity. These findings suggest that fathers confer unique, and not merely additive, benefits to child adjustment, and highlight the need to explore them further.

Eighth, while the assessment of pubertal development with multi-informant measures likely provided an accurate estimation of pubertal status, future research should consider using other indicators of the adolescent transition. While pubertal development is associated with a number of physical, physiological, and neural changes that influence development, it does not occur in a vacuum. It is not necessarily the change, per se, that confers risk, but the co-occurring contextual factors. For example, a girl who enters the middle stages of puberty and must also attend a new middle school and make new friends is faced with more challenges than a girl in the same stage of puberty but continues in the same school and maintains her current friendships. As such, transitional ‘loading’, whereby indicators of changes occurring within the social context are also taken into account, might be helpful for understanding the role of the transitional era of adolescence in adolescent adjustment.

7.7 SUMMARY AND CLINICAL IMPLICATIONS

In support of stress generation theories of the development of depression symptoms in girls, deficits in emotional, social-cognitive, and behavioral interpersonal functioning, as manifested on the cusp of adolescence, contribute to heightened levels of both mother- and adolescent- reported depression symptoms in middle adolescence. Effects were robust for measures of negative emotionality, especially *emotional lability*, when all interpersonal domains were considered simultaneously, whereas the effects for social-cognitive biases and negative social behaviors were rendered insignificant. Together, these findings suggest that girls who are easily upset in social situations might be particularly vulnerable to a rise in depression symptoms. As expected, the majority of the main effects of interpersonal deficits were moderated by friendship quality and parent-child interaction; however, the risk-protective processes of having a high quality friendship *and* positive mother-child relationship were counter to anticipations,

leading to worse, rather than better, emotional adjustment, in comparison to other girls. Importantly, parent and peer relationships are not interchangeable, as demonstrated by the little protection *high* friendship quality offers a girl whose interactions with her mother are low in positive features and also demonstrates poor self-control. On the other hand, *high* quality mother-child interactions protected against emotional difficulties associated with interpersonal deficits in girls with *low* friendship quality. Together, these findings highlight 1) the continuing salience of the parent-child relationship in adolescent girls' emotional adjustment, even as friendships gain in emotional and social value, and 2) the need to delineate the dynamic interplay of the peer and parenting contexts as they together shape the development of adolescent girls. Findings suggest that the onset of pubertal development interacts with social contextual factors to accentuate processes linking negative emotionality, but not social-cognitive biases or negative social behaviors, and depression symptoms. Future research should examine other indicators of the adolescent transition as they might accentuate pathways to depression. Finally, although replication in a clinical sample is warranted, results shed light on potential areas of interpersonal vulnerability and strength in the emotional adjustment of girls.

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