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DEVELOPMENT OF COGNITIVE VULNERABILITY FOR DEPRESSION IN  
YOUTH: SEX, EMOTIONAL MALTREATMENT, AND DEPRESSION PREDICT  
NEGATIVE COGNITIVE STYLE

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A Dissertation

Presented to  
the Faculty of Social Sciences  
University of Denver

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In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Philosophy

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by

Jessica R. Technow

August 2016

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Title: DEVELOPMENT OF COGNITIVE VULNERABILITY FOR DEPRESSION IN YOUTH: SEX, EMOTIONAL MALTREATMENT, AND DEPRESSION PREDICT NEGATIVE COGNITIVE STYLE  
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### **Abstract**

Hopelessness theory is a prominent cognitive theory of depression that has been shown to predict depression in youth. However, research has yet to elucidate normative mean-level development of the cognitive risk factor in hopelessness theory from childhood through adolescence. The current study utilized a multi-wave design and hierarchical linear modeling (HLM) analyses to examine mean-level negative cognitive style growth and stability in late childhood, early adolescence, and mid-late adolescence. Participant sex, emotional maltreatment, and major depression were also tested as predictors of negative cognitive style. For three years, youth (N = 681, ages 7-18 at baseline) were assessed every 1.5 years with measures of negative cognitive style and emotional maltreatment and every six months with semi-structured diagnostic interviews for major depressive episodes. Results showed decreasing trajectories of negative cognitive style in late childhood and mid-late adolescence and a marginally increasing trajectory in early adolescence. Sex differences emerged in the early adolescent cohort with girls increasing in negative cognitive style over time while boys decreased. Emotional maltreatment was associated with higher negative cognitive style in all cohorts. In the mid-late adolescent cohort, major depressive episodes over the course of the study were associated with higher negative cognitive style, and baseline history of major depression predicted an increasing trajectory of negative cognitive style over time.

These findings give insight into the development of this important risk factor for depression and how sex differences in depression prevalence may emerge, as well as have implications for identifying youth who may be targets for depression prevention interventions to interrupt first onsets of depressive episodes and depressive recurrences.

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## **Chapter One: Introduction**

Rates of depression prior to adolescence are relatively low, affecting only about one to two percent of children. Thereafter, clinical depression rates have been shown to climb dramatically between the ages of 15 to 18. There is a powerful six-fold increase in depression prevalence for this age group over that in childhood (Costello, Erkanli, & Angold, 2006; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Hankin et al., 1998; Kessler, Avenevoli, & Merikangas, 2001) and prevalence rates remain at comparably high rates throughout adulthood (Kessler, Chiu, Demler, & Walters, 2005). The rising prevalence of new onsets of depression from childhood into adolescence underscores the importance of examining the etiology of this disorder from childhood to early adulthood, encompassing the critical adolescent developmental period.

The purpose of this dissertation was to closely examine hopelessness theory's cognitive vulnerability for depression in youth, negative cognitive style. Cognitive risk factors are thought to still be stabilizing in youth (Hankin & Abela, 2005), but to date no previous research has demonstrated the developmental trajectory of negative cognitive style from childhood through adolescence. The current study utilized participants from three developmental cohorts—late childhood, early adolescence, and mid-late adolescence—to examine the normal developmental trajectory of negative cognitive style across youth. The current research then examined three predictors of negative cognitive



style—sex, childhood emotional maltreatment, and major depressive episodes—to determine how they affect the development of negative cognitive style across youth.

### **Cognitive Theories of Depression**

Hopelessness theory (Abramson, Metalsky, & Alloy, 1989) is a prominent cognitive theory of depression that seeks to explain causal mechanisms in the development of depression. According to cognitive theories, cognitive vulnerabilities lead to maladaptive negative thoughts and subsequently to depression. Cognitive vulnerabilities to depression have been proven effective at predicting prospective increases in depression across many age groups (Abramson et al., 2002; Abela & Hankin, 2008; Garber, 2010; Ingram, Miranda, & Segal, 2006; Lakdawalla, Hankin, & Mermelstein, 2007; Scher, Ingram, & Segal, 2005).

Cognitive theories of depression (e.g. Abramson et al., 2002; Clark & Beck, 1999; Zuroff, Santor, & Mongrain, 2004) posit that maladaptive cognitive patterns increase an individual's chance for developing a clinically significant depressive episode following negative life events. More specifically, these patterns are negatively biased, self-referent cognitions that are triggered by a negative event and lead to an inappropriate level of distress and depressive affect, which is hypothesized to eventually spiral into clinical depression.

Hopelessness theory postulates that individuals with a negative cognitive style are at greater risk for depression after encountering stressors. Specifically, those exhibiting a negative cognitive style have a tendency to make stable, global attributions about the causes of negative events, infer negative implications about the self, and anticipate negative consequences following the event (Abramson et al., 1989). After a stressful life

event, individuals at risk are hypothesized to generate such negative inferences, which in turn lead to hopelessness, and finally to increases in depressive symptoms.

Previous research has provided support for hopelessness theory in youth (for recent reviews, see Abela & Hankin, 2008; Gibb & Coles, 2005; Hankin, Snyder, & Gulley, 2013; Lakdawalla, et al., 2007). For example several studies have shown that youth with higher negative cognitive style (e.g. Abela & McGirr, 2007; Hankin, 2008; Hankin, Abramson, & Siler, 2001; Hilsman & Garber, 1995; Southall & Roberts, 2002) are more likely to experience increases in depressive symptoms following negative life events than adolescents with lower negative cognitive style. However, despite strong support for hopelessness theory in youth depression, important limitations and gaps in knowledge persist.

Cognitive risks may still be forming during childhood and stabilizing into a more enduring depression risk during adolescence (Hankin & Abela, 2005). Mean-level stability reflects the degree of change in a trait on average over time. Few studies have examined mean-level stability in cognitive vulnerability for depression in any age group. Those that have suggest that cognitive risks stabilize by adulthood. Hankin, Fraley, and Abela (2005) examined data from a 35-day daily diary study with undergraduates and found that negative inferences about stressors exhibited mean-level stability. Studies in youth have yielded mixed results. A meta-analysis of cross-sectional studies indicated differences in hopelessness theory negative cognitive style in different developmental stages (Mezulis, Hyde, & Abramson, 2006), but other studies have found no mean change in adolescents (Garber, Keiley, & Martin, 2002). Hankin (2008) examined

negative cognitive style in 6<sup>th</sup> to 10<sup>th</sup> graders over a five-month period, and found that negative cognitive style demonstrated mean-level stability.

To date, no prior studies have illustrated the normative mean-level development of hopelessness theory cognitive risk from childhood into late adolescence. The closest study to examine mean-level development of a cognitive risk across childhood and adolescent developmental periods conducted a meta-analysis of the self-serving attributional bias (Mezulis, Abramson, Hyde, & Hankin, 2004). The self-serving attributional bias leads individuals to attribute positive events to themselves but dismiss negative events as attributable to other causes (Heider, 1976). Thus, the self-serving attributional bias essentially illustrates the opposite of a cognitive vulnerability to depression, and demonstrates an interpretation of events that is protective against psychopathology. Mezulis and colleagues (2004) demonstrated that boys' level of self-serving attributional bias remained stable from childhood through adolescence into adulthood. Girls, however, demonstrated a decline in the bias in early adolescence, and showed a smaller magnitude of bias than boys through late adolescence. If negative cognitive style shows a similar pattern, girls would show increases in negative cognitive style in early adolescence, while boys would not, and girls would maintain an overall higher negative cognitive style through mid-late adolescence.

The depression sex difference is one of the most well established findings in the depression field. Girls report major depressive disorder at a rate about twice that of boys (Essau, Lewinsohn, Seeley, & Sasagawa, 2010; Hankin, Wetter, & Cheely, 2008; Hilt & Nolen-Hoeksema, 2009). Girls also typically report more depressive symptoms than boys (Twenge & Nolen-Hoeksema, 2002). The gender ratio usually emerges around puberty

(Angold, Costello, Erkanli, & Worthman, 1999; Angold, Costello, & Worthman, 1998; Cohen, Cohen, Kasen, & Velez, 1993; Essau, Conradt, & Petermann, 2000; Hankin et al., 1998), with the greatest increase in sex differences occurring between the ages of 15 and 18 (Essau et al., 2000; Hankin et al., 1998).

Hopelessness theory posits that negative cognitive style precedes development of the first onset of depression, as negative cognitive style leads to the development of the negative cognitions that are a proximal and sufficient cause for experiencing a depressive episode. It thus may be that a sex difference in negative cognitive style may preclude the sex difference in depression prevalence, which would thus imply that a sex difference in negative cognitive style would emerge in early adolescence. This would be consistent with the sex difference seen in the self-serving attributional bias (Mezulis et al., 2004). Previous research examining sex differences in negative cognitive style have yielded mixed results. Hankin and colleagues (2001) found no sex difference in cognitive vulnerability in a sample of middle to late adolescents. Hankin and Abramson (2002) found sex differences in negative cognitive style in a sample of high school students and demonstrated that negative cognitive style mediated the sex difference in depression. Neither of these studies examined change in negative cognitive style over time. Mezulis and colleagues (2010) examined negative cognitive style in adolescents from age 11-15, and found that girls had a greater rate of growth of negative cognitive style than boys over this age range and displayed significantly higher negative cognitive style than boys at age 15. While this study importantly demonstrated growth trajectories in early adolescence, it remains unknown whether these sex differences begin in childhood or early adolescence, and whether they extend through mid-late adolescence.

Further research is needed to model the development of negative cognitive style in youth, across important developmental periods. The current study sought to address this gap in the literature by utilizing hierarchical linear modeling of multi-wave data from a community sample. The rising prevalence of depression in adolescence (Costello et al., 2006; Costello et al., 2003; Hankin et al., 1998; Kessler et al., 2001), suggests that, in general, there would be an upward trend of cognitive risks for depression across sexes. However, given the emergence of sex difference in depression in mid adolescence (Hankin & Abramson, 2001) and the findings by Mezulis and colleagues (2004), I hypothesized that girls would demonstrate a larger increase in cognitive risks than boys in early adolescence, and maintain this sex difference through mid-late adolescence. I did not expect there to be sex differences in the late childhood sample.

Another important consideration of stability in cognitive vulnerabilities for depression is how an individual's level of risk changes over time. Previous research has demonstrated that within-person fluctuations in adolescent cognitive vulnerabilities over time do occur (Garber & Flynn, 2001; Hankin, 2008a; Hankin & Abramson, 2002; Nolen-Hoeksema, Girgus, & Seligman, 1992). Given that adolescents' cognitive risks are still stabilizing (Hankin & Abela, 2005), factors that influence their development are critical to study. If research can determine predictors of intra-individual change during adolescence, steps can be taken to reduce risk before it crystallizes into an enduring trait. The current study focuses on emotional maltreatment and history of depression as two predictors of change in negative cognitive style over time.

## **Maltreatment**

Childhood maltreatment and other adverse childhood events have long been known to be associated with poor outcomes in youth and in adulthood (Anda et al., 2006). Among these outcomes include a higher rate of delinquency in adolescence (Smith, Ireland, & Thornberry, 2005), higher rates of disorganized attachment in children (Stronach et al., 2011), fewer prosocial behaviors such as leadership and sharing in children (Cicchetti & Toth, 2005), and altered HPA axis functioning (Cicchetti & Rogosch, 2001). Fry, McCoy, & Swales (2012) conducted a review and found childhood maltreatment to be associated with negative physical health, including headaches, stomach pain, sleep disturbances, and overall lower health, along with a higher risk for exposure to future violence and high-risk sexual behaviors. Data from the National Survey of Adolescents indicates that negative outcomes of childhood maltreatment include higher rates of drug use, depression, and PTSD (Saunders, Kilpatrick, Hanson, Resnick, & Walker, 1999). Data from the National Comorbidity Study-Revised have demonstrated that childhood adversities are associated with first onset of DSM-IV disorders and suggest that childhood adversity is associated with up to 44% of childhood-onset mental disorders (Green et al., 2010), while data from the WHO World Mental Health Surveys indicated that childhood adversities account for 30% of all disorders across countries (Kessler et al., 2010). Thus, there is a clear and established link between childhood adversities and negative outcomes in youth and adults.

There is also an established link between childhood maltreatment and depression. Individuals with a history of childhood maltreatment are at greater risk of meeting criteria for a depressive episode at any point in life (Kessler, 1997). Additionally, Nanni, Uher, &

Danese (2012) conducted a meta-analysis and found that individuals with a history of childhood maltreatment were twice as likely to experience recurrent and persistent depressive episodes and were at elevated risk for showing a lack of response or remission during treatment for depression. Within the broad spectrum of maltreatment, specific forms of maltreatment have been linked to depression. There is a well-established association between childhood sexual maltreatment and depression (for reviews see Beitchman et al., 1992; Browne & Finkelhor, 1986; Dhaliwal, Gauzas, Antonowicz, & Ross, 1996; Maniglio, 2010; Putnam, 2003). For example, Fergusson, Horwood, and Lynskey (1996) found that, in a birth cohort of 1,000 New Zealand children, youth with a history of sexual abuse had an increased odds ratio of 4.6 for major depression. There is a link between childhood physical maltreatment and youth depression. Approximately 8% of children and adolescents documented as physically abused have current diagnoses of major depressive disorder and 40% have lifetime major depression diagnoses (Kaplan, Pelcovitz, & Labruna, 1999). Lansford, Dodge, Pettit, and Bates (2002) followed youth longitudinally for 12 years, and found that adolescents with a history of physical maltreatment experienced depression at a rate twice that of their non-maltreated counterparts. While physical and sexual maltreatment have been associated with depression, emotional maltreatment in particular is important for cognitive vulnerability to depression.

### **Emotional maltreatment.**

Childhood emotional maltreatment includes spurning, terrorizing, isolating, exploiting, or corrupting (Goldman, Salus, Wolcott, & Kennedy, 2003), and a growing body of literature has demonstrated associations between childhood emotional

maltreatment and depressive symptoms (Alloy et al., 2006; Brown, Cohen, Johnson, & Smailes, 1999, Rich, Gingerich, & Rosen, 1997). Additionally, research has begun to show that emotional maltreatment is uniquely associated with depressive symptoms when compared with physical and sexual abuse. Hankin (2005) examined the prospective relation between childhood sexual, physical, and emotional abuse and depressive symptoms in undergraduates. They found that emotional abuse in youth specifically predicted prospective elevations in depressive symptoms. Boudewyn and Liem (1995) also examined the association between emotional maltreatment and depressive symptoms in undergraduates and found that, after controlling for a history of childhood sexual maltreatment, young adults who reported emotional maltreatment in youth had higher levels of depressive symptoms than individuals without a history of emotional maltreatment. Additionally, Gibb and colleagues (2001) found a significant relationship between levels of reported emotional maltreatment in youth and depression diagnoses in young adults, while there were no significant relations between a history of sexual or physical abuse and depression diagnoses. Taken together, findings suggest that emotional maltreatment in youth in particular is important for understanding depression risk, and is thus examined in the current study.

Hopelessness theory includes hypotheses that adverse events in youth may contribute to the development of cognitive vulnerabilities to depression. Rose and Abramson (1992) suggested a pathway by which youth maltreatment may lead to the development of negative cognitive style. In the context of maltreatment, children may come to make hopelessness-inducing (e.g. stable, global) attributions about its occurrence. Over time, these cognitions may crystallize into a negative cognitive style.



Rose and Abramson (1992) further hypothesized that emotional maltreatment should be more likely to lead to the development of negative cognitive style than physical or sexual maltreatment, because the depressive cognitions (i.e. “You’re so stupid, you’ll never amount to anything”) are directly supplied to the child by the abuser. By contrast, with physical and sexual maltreatment, the child must derive his/her own attributions, and may have a greater opportunity to make more benign inferences.

Consistent with Rose and Abramson’s (1992) hypothesis, studies have provided support for the link between maltreatment in youth and cognitive risks for depression in adults. Rose, Abramson, Hodulik, Halberstadt, and Leff (1994) found that the cognitive styles of depressed inpatient adults were more negative in patients with a history of childhood sexual abuse and/or negative family control (i.e. harsh or rigid discipline, parents’ perfectionistic standards for the child, overprotective behaviors, and isolation from social contact outside of the family) than in individuals without this history. Gibb (2002) conducted a meta-analysis of the existent literature on emotional maltreatment and cognitive vulnerabilities, and found there to be a combined effect size of .16, thus showing a significant relationship between emotional maltreatment and cognitive risk for depression. Gibb found a small but also significant relation between childhood sexual maltreatment and cognitive styles, but that relation was significant only among relatively older individuals. They found no evidence for a significant relation between childhood physical maltreatment and cognitive risk. Gibb, Alloy, and Abramson (2003) examined the relation between emotional maltreatment in youth and negative cognitive style in undergraduates, and found that memory of specific emotional maltreatment events predicted a more negative cognitive style.

Few studies have examined how emotional abuse in childhood predicts changes in youths' negative cognitive style, and those that have utilized two-time-point designs (Gibb & Alloy, 2006; Padilla Paredes & Calvete, 2014). Gibb and Abela (2008) examined the relation between childhood emotional abuse and negative cognitive style over two time-points in a high-risk sample of children of parents with a history of depression and in a community sample of children. They found that reports of emotional abuse over the previous year predicted increases in negative cognitive style over one year in the high-risk sample and over two years in the community sample. However, a two-time-point design is not ideal for rigorously examining prospective change and trajectories in an outcome (Curran & Willoughby, 2003). The current study sought to expand and fill important gaps in the literature by examining how childhood emotional maltreatment predicts negative cognitive style in youth, and by assessing emotional maltreatment every 18 months for the duration of the study. Emotional maltreatment was examined as a time-varying predictor of negative cognitive style, and baseline emotional maltreatment was utilized to allow for a prospective assessment of the relationship between emotional maltreatment and trajectories of negative cognitive style over time.

### **History of Depression**

Depression can be a highly recurrent disorder, with at least 50% of those who recover from one episode having at least one more episode during their lifetime (American Psychiatric Association, 2000; Post, 1992). Research has consistently reported a link between cognitive vulnerabilities and risk for recurrence (Burcusa & Iacono, 2007). In a study of initially non-depressed undergraduates, Iacoviello, Alloy, Abramson, Whitehouse, and Hogan (2006) found that individuals with high cognitive vulnerabilities

to depression experienced significantly more episodes of depression over the 2.5-year follow-up than individuals with low cognitive risks for depression. Mongrain and Blackburn (2005) found that negative attributions predicted depression recurrence over a 16-month period in previously depressed participants, even after controlling for number of previous depressive episodes. Additionally, cognitive vulnerability similarly predicts first onset and recurrence of depression (Alloy et al., 2006). Given the established link between depression recurrence and cognitive risks, it makes sense that depression would also have an effect on a developing cognitive risk.

Williams, Watts, MacLeod and Mathews (1988) proposed that negative self-referential material is extensively rehearsed and elaborated during depressive episodes strengthening the likelihood that this material might contribute to a recurrence of depression. Teasdale and Dent (1987) also hypothesized that dysphoric mood states activate negatively biased interpretations of experience and, in individuals with a history of depression, these negative cognitive processes more easily exacerbate the dysphoric mood state which could subsequently lead to a depression recurrence. Little evidence for the effect of depression on cognitive vulnerability has generally been found in adult populations (see Burcusa & Iacono, 2007, for review). However, children and adolescents might be more susceptible to the effects of depression history on cognitive risk, because their cognitive styles are still developing. Studies that have examined youth at the beginning and end of depressive episodes have noted stability over time. For example, Voelz, Walker, Pettit, Joiner, and Wagner (2003) assessed psychiatric inpatient children and adolescents upon admission to and discharge from the hospital, and found stability in negative cognitive style. However, it is likely that youth were still depressed,

just less acutely so, upon discharge, as the mean number of days between the two assessments was 8.68 days. Additionally, it is important to assess cognitive vulnerabilities when participants are in their natural environment, as cognitive style assessed at discharge may be reflecting the therapeutic environment and the true vulnerability may subsequently reappear (Haefffel et al., 2005). Nolen-Hoeksema and colleagues (1992) assessed a sample of third-graders every six months for five years and found that children with high levels of depressive symptoms (although not technically diagnosed depressive episodes) experienced a change toward a more negative cognitive style. Continuing depression was not accounting for this difference, as in general children with a higher number of depressive symptoms at one time were actually more likely to show a decrease in symptoms over time. The relationship between depressive episodes and changes in negative cognitive style has never been examined from childhood through adolescence. The current study sought to fill this important gap in the literature by examining how depression history affects change in negative cognitive style over this important developmental period. The association between time-varying experience of a depressive episode and negative cognitive style was assessed, as well as the prospective relationship between baseline history of depression and trajectories of negative cognitive style over time.

### **Methodological Considerations**

As previously mentioned, two-time-point designs do not allow for rigorous study of prospective change and trajectories in an outcome, such as changes in cognitive vulnerabilities for depression (Curran & Willoughby, 2003). It is important to repeatedly assess participants using a multi-wave prospective design (Curran & Willoughby, 2003).

Additionally, multi-wave designs allow for more accurate assessment of depressive episodes that cannot be ascertained as precisely in cross-sectional or two time point designs, which require retrospective recall and can skew prevalence rates. This is critical for optimized accuracy in the history of depression predictor for changes in negative cognitive style. Finally, research supports the need for multi-wave assessments with relatively short time frames in order to maximize accuracy of diagnostic data (Costello et al., 2006; Moffit et al., 2010). Costello and colleagues (2006) recommended measurement of depression using a six months or less recall time frame to yield accurate and precise rates of disorder.

The current study utilized an accelerated longitudinal design, to allow for examination of changes in negative cognitive style from childhood through adolescence. Accelerated longitudinal designs greatly increase the value of short-term longitudinal studies, by allowing for collection of repeated measurements of independent age cohorts and temporally overlapping the cohort data (Duncan & Duncan, 2012; Tonry, Ohlin, & Farrington, 1991). Its clear advantage is that data spanning an extended developmental period can be collected within a shorter period of time, with smaller longitudinal time frames within each sequential cohort together providing data to cover the full range of the developmental period of interest (Watt, 2008).

Measurement of depression is also important to address, as it is unclear whether self-report questionnaires tap clinical depression, per se, rather than more transient psychological distress (Coyne, 1994). Additionally, the ongoing debate concerning depression continuity (i.e., dimensional versus categorical classification) points to the need to use diagnostic interviews to assess clinically significant depressive episodes

(Coyne, 1994; Hankin, Fraley, Lahey, & Waldman, 2005; Pickles & Angold, 2003; Vredenburg, Flett, & Krames, 1993).

### **The Current Study**

The aim of this research is two-fold. First, I examined mean-level growth in hopelessness theory negative cognitive style from childhood through adolescence. I also examined whether trajectories of negative cognitive style varied for boys versus girls. Second, I examined how childhood emotional maltreatment and experience of major depressive episodes predicted negative cognitive style. Youth were assessed regularly over three years, with measures of negative cognitive style and emotional maltreatment every 18 months and semi-structured depression interviews every six months.

For the first part of the current research, I hypothesized that negative cognitive style would generally increase across the sample with age. More specifically, I hypothesized that negative cognitive style would remain stable in the late childhood cohort, increase in the early adolescent cohort, and level off into stability in the mid-late adolescent cohort. Given the sex difference in depression (Hankin & Abramson, 2001), I hypothesized that girls would demonstrate an increase in negative cognitive style in the early adolescent age group, which precedes the mid adolescent rise in depression prevalence and emergence of the prevalence sex difference. I hypothesized that girls would maintain this sex difference and demonstrate higher negative cognitive style than boys during mid-late adolescence. For the second part of the current research, I hypothesized that higher levels of emotional abuse would be associated with increases in negative cognitive style over time. Youth who experience major depression would also increase in their negative cognitive style over time.

## **Chapter Two: Method**

### **Participants**

Participants were recruited for the current study at University of Denver in Denver, CO and Rutgers University in New Brunswick, NJ. Participants were recruited through letters sent home with students in participating school districts to families surrounding University of Denver and Rutgers University with a child in third, sixth, or ninth grades. Of the families to whom letters were sent, 1,108 parents called the laboratory for more information. Inclusion criteria required that the parent and child be fluent in English, the child did not have a psychotic or autism spectrum disorder, and the child's IQ was above 70. The final sample consisted of 681 youth (373 girls), along with one of their caretakers. There were 205 third graders, 248 sixth graders, and 225 ninth graders. The average age of the sample at baseline ranged from 7-18 years old (mean = 11.6 years, SD = 2.4 years). See Table 1 for demographic characteristics of the sample. Non-Hispanic Caucasians comprised 39.4% of the sample, 46.0% of the sample identified as African American, 4.3% as Latino/Hispanic, 1.9% as Asian/Pacific Islander, and 7.8% as other/mixed ethnicity and race. At baseline, 18.6% of the sample received free or reduced lunch at school and 6.7% of the sample received food stamps.

### **Procedure**

The youth and caretaker visited the laboratory for comprehensive in-person assessments at baseline, 18 months, and 36 months. Caretakers provided written consent

for their children's participation and youth provided written assent. After the initial in-person assessment, regular phone follow-up assessments occurred every six months for three years. Both youth and their caretaker were interviewed every six months with a semi-structured diagnostic interview (Schedule for Affective Disorders and Schizophrenia for School-age Children (K-SADS; Kaufman, Birmaher, Brent, Rao, & Ryan, 1997), Mood Disorders section, see below). At baseline, 18 months, and 36 months, youth completed the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002) and Childhood Trauma Questionnaire—Emotional Abuse Subscale (CTQ-EA; Bernstein et al., 1994; Bernstein et al., 2003). Retention rate from baseline to 36 months was 93%. Parents completed a demographic questionnaire at baseline. The institutional review boards at University of Denver and Rutgers University approved the research procedures. Parents and adolescents were compensated monetarily for participating in the study.

## **Measures**

**Negative cognitive style.** Negative cognitive style was measured using the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002). The ACSQ assesses negative cognitive style from hopelessness theory in youth, including negative inferences for cause, consequence, and the self. The ACSQ consists of six negative hypothetical events (three achievement and three interpersonal) relevant to youth (e.g., *You take a test and get a bad grade*"; "*Your boyfriend or girlfriend breaks up with you*"). For each hypothetical scenario, youth were asked to write down one cause for the event and rate on a 7-point Likert scale the degree to which that cause is internal,



stable, and global (negative inferences for causal attributions), the likelihood that further negative consequences will result from the event, and the degree to which the occurrence of the negative event indicates that they are flawed. Scores were averaged to arrive at a negative cognitive style composite. Research has reported high levels of reliability, factor structure consistent with hopelessness theory, and validity (Hankin & Abramson, 2002; Hankin, 2008).

**Emotional maltreatment.** Emotional maltreatment was measured using the Childhood Trauma Questionnaire—Emotional Abuse Subscale (CTQ-EA; Bernstein et al., 1994; Bernstein et al., 2003). The CTQ is a 4-item self-report questionnaire. Each item was rated on a 5-point Likert scale, with response options ranging from “never true” to “very often true.” Scores were calculated by summing responses, with higher scores indicating higher levels of emotional abuse. The CTQ has demonstrated excellent psychometric properties in both clinical and nonclinical samples, including high levels of criterion-related validity and therapists’ ratings of abuse (e.g., Bernstein, Ahluvalia, Pogge, & Handelsman, 1997; Bernstein et al., 1994; Bernstein et al., 2003; Scher, Stein, Asmundson, McCreary, & Forde, 2001).

**Major depressive episodes.** Depression was assessed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present Version (K-SADS, Kaufman et al., 1997). The K-SADS is a well-validated semi-structured clinical interview designed to arrive at DSM-IV (American Psychiatric Association, 1994) diagnoses. The K-SADS Mood Disorders section was administered separately to the youth and the caretaker and was used to assess current and past depressive episodes.

Diagnostic interviews were audio and/or video recorded. Interviewers and graduate students were trained to conduct the diagnostic interviews by licensed clinical psychologists. Diagnostic interviewers completed an intensive training program for assigning diagnoses based on the Diagnostic and Statistical Manual of Mental Disorders (4<sup>th</sup> ed.; DSM-IV; American Psychiatric Association, 1994). The training program consisted of approximately 40 hours of didactic instruction, listening to audio recordings of K-SADS administration, and doing practice interviews. The principal investigators at each site held weekly supervision sessions and reviewed interviewers' notes and tapes. The interviewers interpreted the youth and parent reports and arrived at an estimate that best captured the youth's psychopathology (Klein, Dougherty, & Olino, 2005). Consensus meetings were also held to resolve discrepancies. Diagnostic interrater reliability was good ( $\kappa = .91$ ) based on approximately 20% of interviews being reviewed for reliability. For the current study, youth participants were deemed to have a depressive episode if they met DSM-IV criteria for major depressive disorder (MDD) definite or MDD-Probable (four threshold symptoms with at least two weeks duration). The K-SADS has been shown to yield reliable diagnoses of depressive disorders (Chambers et al., 1985) and is frequently used in clinical studies of depression in youth.

### **Statistical Approach**

Hierarchical linear modeling (HLM 6.0; Raudenbush, Bryk, & Congdon, 2004) was used to examine growth trajectories of negative cognitive style and emotional abuse and major depressive episode experience as predictors of the intercept and slope. T-tests were first conducted to assess whether the cohorts could be combined in the classic

accelerated longitudinal design of overlapping cohorts with planned data missingness. Significant differences emerged both between the 3<sup>rd</sup> and 6<sup>th</sup> grade cohort for the negative cognitive style outcome measure overlap ( $t(408) = 8.014, p < .001$ ) and the 6<sup>th</sup> and 9<sup>th</sup> grade cohort overlap ( $t(424) = 5.543, p < .001$ ). I was thus unable to combine the cohorts in the accelerated longitudinal design and therefore analyzed the data all together to examine trends across all youth and separately for each grade cohort to closely examine negative cognitive style trajectories over time in each individual developmental period. All data were analyzed using Full Information Maximum Likelihood (FIML).

To test hypothesis 1, that negative cognitive style would remain stable in the late childhood cohort, increase in the early adolescent cohort, and level off into stability in the mid-late adolescent cohort, a linear growth term was first added to each model. If the linear growth term was significant, a quadratic term was added to determine the best illustration of the growth in negative cognitive style. Model fit between the linear model and quadratic model was examined by comparing the deviance statistics of the two models in a chi-square test (Scientific Software International, 2016). If the chi-square test revealed no significant improvement in model fit by the quadratic term, further analyses were performed using only the linear growth term for parsimony. Once the best fit of the data was established through deviance statistic comparison, sex was added to the model at level 2 to test hypothesis 2 that girls would demonstrate an increase in negative cognitive style in the early adolescent age group and maintain this sex difference and thus demonstrate higher negative cognitive style than boys during mid-late adolescence.

Hypothesis 3, that emotional maltreatment would predict negative cognitive style, was tested by adding emotional maltreatment as a time-varying variable to level 1 of the analyses. Emotional maltreatment was centered on 4, which is the lowest possible score on the CTQ. Separate analyses tested prospective effects of emotional maltreatment by adding baseline CTQ scores to the model at level 2. An example of the model testing emotional maltreatment over time predicting negative cognitive style thus looked as follows:

Level 1 Model

$$ACSQ_{ti} = \pi_{0i} + \pi_{1i}(time_{ti}) + \pi_{2i}(CTQ_{ti}) + e_{ti}$$

Level 2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}(SEX) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(SEX) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

An example of testing whether baseline emotional maltreatment prospectively predicted change in negative cognitive style over time was as follows:

Level 1 Model

$$ACSQ_{ti} = \pi_{0i} + \pi_{1i}(time_{ti}) + e_{ti}$$

Level 2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}(SEX) + \beta_{02}(CTQ_{bsl}) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(SEX) + \beta_{12}(CTQ_{bsl}) + r_{1i}$$

Hypothesis 4 predicted that experiencing major depression would be associated with higher negative cognitive style. This was tested by adding depression to the model

as a time-varying predictor at level 1. The MDD variable was created as a dichotomous time-varying variable, such that each participant had a “0” as their score until they endorsed experiencing a major depressive episode, at which point they scored “1” and continued to have “1” as their score through the end of the study. Additionally, HLM operates as such that time-varying variables need to have the same number of time points as the outcome variable, and thus the seven depression time points were compressed into three. For example, if a participant denied a history of depression at baseline but endorsed a major depressive episode at the 12 month follow up, they received a “1” for the 18 month data point and the 36 month data point. A participant who entered the study with a history of depression had “1” at the baseline, 18 month, and 36 month data points for MDD. The analysis with MDD as a time varying predictor looked as follows:

Level 1 Model

$$ACSQ_{it} = \pi_{0i} + \pi_{1i}(time_{it}) + \pi_{2i}(MDD_{it}) + e_{it}$$

Level 2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}(SEX) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(SEX) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

Separate analyses then tested depression as a prospective predictor of change in negative cognitive style over time by adding baseline depression history at level 2:

Level 1 Model

$$ACSQ_{it} = \pi_{0i} + \pi_{1i}(time_{it}) + e_{it}$$

## Level 2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}(SEX) + \beta_{02}(MDDbsl) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(SEX) + \beta_{12}(MDDbsl) + r_{1i}$$

## Chapter Three: Results

### Preliminary Analyses

Of the 681 participants, 317 (46.5%) were from the Rutgers site and 364 were from Denver. There were 205 participants in the 3<sup>rd</sup> grade cohort, 248 in the 6<sup>th</sup> grade cohort, and 225 in the 9<sup>th</sup> grade cohort. Please see Table 2 for descriptive data from the sample. The average ACSQ for the sample was 2.8 (SD = .8) at baseline, 2.7 (SD = .9) at 18 months, and 2.6 (SD = .9) at 36 months. The average CTQ for the sample was 7.2 (SD = 2.5) at baseline, 7.0 (SD = 2.9) at 18 months, and 7.1 (SD = 3.1) at 36 months. At baseline, 7.6% of the participants already had experienced at least one major depressive episode. A quarter of the sample (25.3%) experienced at least one major depressive episode by the end of the study. There were significant effects of sex on whether participants had experienced major depression at baseline ( $t(666) = 2.322, p = .021$ ) and by the end of the study ( $t(517) = 2.753, p = .006$ ). There were developmental cohort effects on average negative cognitive style ( $F(2, 676) = 40.469, p < .001$ ), emotional maltreatment ( $F(2, 599) = 20.688, p < .001$ ), history of major depression at baseline ( $F(2, 677) = 19.953, p < .001$ ), and experiencing major depression by the end of the study ( $F(2, 518) = 414.891, p < .001$ ).

### Mean-Level Growth

All participants across each grade cohort were included in the combined sample to examine negative cognitive style across all youth. A base model with a linear time slope

in level 1 was run to determine the average intercept and slope for all participants. See Table 3 for results of the linear and quadratic growth models. Negative cognitive style was the outcome variable for all analyses. In the combined sample, the intercept was 2.879 ( $p < .001$ ). There was a significant linear slope of  $-.166$  ( $p < .001$ ), indicating decreasing negative cognitive style over time. Thus, a quadratic time variable was entered at level 1, but it was not significant ( $\beta_{quad} = .038, p = .404$ ) and the chi square deviance test did not indicate improved model fit by adding the quadratic growth term ( $\chi^2(1) = .696, p > .500$ ). Participants' age at baseline entered into the model at level 2 predicted the intercept and slope of negative cognitive style, such that older age was associated with a higher negative cognitive style at baseline ( $\beta_{ageint} = .063, p = .007$ ). Older age was associated with a less steep decline in negative cognitive style over time ( $\beta_{ageslope} = .039, p = .002$ ).

In the late childhood sample, the intercept was 2.834 ( $p < .001$ ) and there was a significant linear slope of  $-.282$  ( $p = .011$ ), which indicates a general decreasing linear trend in negative cognitive style over late childhood. See Figure 1 for an illustration of the growth curve results. A quadratic term was added to the model at level 1 to test for exponential growth, but it was not significant ( $\beta_{quad} = -.042, p = .819$ ) and the chi square test of model fit revealed no significant improvement in model fit by adding the quadratic growth term to the model ( $\chi^2(1) = .103, p > .500$ ). In the early adolescent sample, the base model revealed an intercept of 3.070 ( $p < .001$ ) and a nonsignificant linear slope ( $\beta = .009, p = .921$ ). Thus, quadratic growth curve analyses were not pursued in the early adolescent cohort. Finally, in the mid-late adolescent sample the base model with linear



time had an intercept of 3.365 ( $p < .001$ ). The average linear slope for negative cognitive style over time was  $-.158$  ( $p = .008$ ), indicating decreasing cognitive risk over time in the mid-late adolescent cohort. There was no significant quadratic slope for negative cognitive style over time ( $\beta_{quad} = .037, p = .707$ ) and the chi square test of model fit revealed no significant improvement in model fit by adding the quadratic growth term to the model ( $\chi^2(1) = .142, p > .500$ ). Thus, all further models utilized a linear slope variable in level 1.

### **Sex as a Predictor of Negative Cognitive Style**

Sex was added to all models as a predictor of the intercept and slope at Level 2. See Table 4 for full details of the sex analyses. In the combined sample, sex did not significantly predict the intercept of negative cognitive style, but it did have an effect trending towards significance on the slope of negative cognitive style over time ( $p = .058$ ). Boys' negative cognitive style decreased over time, ( $\beta_{boys} = -.346$ ). Girls' negative cognitive style also decreased over time, but at a slower rate than the boys' ( $\beta_{girls} = -.230$ ). In the late childhood sample, sex was not a significant predictor of the intercept or slope ( $\beta_{sexint} = -.303, p = .540; \beta_{sexslope} = .136, p = .555$ ). Sex significantly predicted the slope but not the intercept in the early adolescent sample, such that boys' negative cognitive style decreased over time ( $\beta_{boys} = -.014$ ) while girls' increased over time ( $\beta_{girls} = .015; \beta_{sex} = .319, p = .042$ ). See Figure 2 for an illustration of the effect of sex on negative cognitive style in the early adolescent cohort. Sex was not a significant predictor of the intercept or slope in the mid-late adolescent sample ( $\beta_{sexint} = .366, p = .156; \beta_{sexslope} = -.182, p = .136$ ).

## Emotional Maltreatment

Emotional maltreatment was first assessed as a level 1 time-varying covariate. Baseline emotional maltreatment was then entered at level 2 to test prospective effects of emotional maltreatment on negative cognitive style. See Table 5 for details of all analyses. In the combined sample, level 1 emotional maltreatment significantly predicted negative cognitive style ( $\beta_{CTQ} = .072, p < .001$ ), such that higher levels of emotional maltreatment were associated with higher negative cognitive style. Level 2 baseline emotional maltreatment marginally predicted the intercept ( $\beta_{CTQ_{int}} = .058, p = .060$ ). In late childhood, level 1 emotional maltreatment significantly predicted negative cognitive style ( $\beta_{CTQ} = .046, p = <.001$ ), and baseline emotional maltreatment at level 2 significantly predicted the intercept ( $\beta_{CTQ_{int}} = .165, p = .003$ ), such that higher baseline maltreatment was associated with higher negative cognitive style at baseline. Baseline emotional maltreatment also predicted the slope in the late childhood cohort, such that higher levels of emotional maltreatment at baseline predicted decreasing negative cognitive style over time ( $\beta_{CTQ_{slope}} = -.070, p = .006$ ). In the early adolescent cohort, level 1 maltreatment predicted negative cognitive style ( $\beta_{CTQ} = .093, p = .011$ ), such that higher levels of emotional maltreatment were associated with higher negative cognitive style. Baseline emotional maltreatment at level 2 did not predict the intercept or slope of negative cognitive style in the early adolescent cohort. Finally, in mid-late adolescents, level 1 emotional maltreatment marginally predicted negative cognitive style ( $\beta_{CTQ} = .047, p = .066$ ). Baseline emotional maltreatment was not a significant predictor of the intercept or slope in mid-late adolescents. Further analyses examined interactions

between sex and emotional maltreatment. There were no significant interactions between sex and emotional maltreatment in the combined sample or in any developmental cohort.

### **Major Depression**

Major depression was first assessed as a level 1 time-varying covariate. In separate analyses, baseline report of experiencing a major depressive episode was entered at level 2 to test prospective effects of depression on negative cognitive style. See Table 6 for details of all analyses. In the combined sample, level 1 depression significantly predicted negative cognitive style ( $\beta_{MDD} = .325, p = .001$ ). Level 2 baseline MDD history predicted the intercept of negative cognitive style, such that a having a history of depression at baseline predicted higher negative cognitive style at baseline ( $\beta_{MDDint} = .428, p = .008$ ). In both the late childhood and early adolescent cohorts, neither level 1 MDD nor level 2 baseline MDD significantly predicted negative cognitive style. In the mid-late adolescent sample, level 1 MDD marginally predicted negative cognitive style ( $\beta_{MDD} = .210, p = .089$ ). Level 2 baseline MDD significantly predicted negative cognitive style slope, such that participants with a history of depression at baseline had negative cognitive styles that increased over time ( $\beta_{MDDslope} = .092, p = .008$ ), while those without a history of depression decreased in negative cognitive style over time ( $\beta_{noMDD} = -.199, p = .022$ ).

Further analyses examined sex x MDD interactions and MDD x emotional maltreatment interactions to predict negative cognitive style. There were no significant interactions between sex and major depression in the combined sample or any developmental cohort. There were also no significant interactions between major

depression and emotional maltreatment in the combined sample or any developmental cohort.

### **Multi-Predictor Analyses**

Analyses including all predictors within the same model were conducted. When level 1 emotional maltreatment and major depression and level 2 sex were tested within the same analysis with the combined sample, all three variables were significant predictors of negative cognitive style ( $\beta_{CTQ} = .068, p < .001$ ;  $\beta_{MDD} = .294, p = .002$ ;  $\beta_{sex} = .119, p = .014$ ). These results were not replicated in the developmental cohort samples, likely due to insufficient power with the reduced sample size. When emotional maltreatment, major depression, and sex were simultaneously entered into the model at level 2 using the combined sample, baseline history of major depression marginally predicted the intercept ( $\beta_{MDD} = .295, p = .058$ ), and baseline emotional maltreatment significantly predicted the intercept ( $\beta_{CTQ} = .085, p < .001$ ). Sex marginally predicted the slope ( $\beta_{sex} = .109, p = .069$ ). In the late childhood sample, with all predictors entered into the model at level 2, baseline emotional maltreatment significantly predicted the intercept ( $\beta_{CTQ} = .224, p < .001$ ), as well as significantly predicted the slope, but in the wrong direction, such that higher emotional maltreatment at baseline predicted decreasing slope over time ( $\beta_{CTQ} = -.092, p = .001$ ). History of depression had a negative effect on the intercept, such that youth with a previous depressive episode at baseline had a lower intercept ( $\beta_{MDD} = -.107, p = .016$ ), and baseline depression history marginally predicted the slope ( $\beta_{MDD} = .400, p = .063$ ). In the early adolescent sample, when all variables were entered in the model at level 2, only sex emerged as a significant predictor of the slope

( $\beta_{sex} = .323, p = .027$ ). In the mid-late adolescent sample, sex marginally predicted the slope, such that girls experienced a more negative slope over time ( $\beta_{sex} = -.227, p = .067$ ), and a history of depression at baseline had a significant positive effect on the slope ( $\beta_{CTQ} = .278, p = .011$ ).

## **Chapter Four: Discussion**

The purpose of the current study was to examine mean-level growth in hopelessness theory negative cognitive style from childhood through adolescence, as well as predictors of negative cognitive style, including sex, emotional maltreatment, and experiencing a major depressive episode. The current study is the first to examine negative cognitive style from childhood to late adolescence, and the broad age range of the sample allowed for examination of questions related to mean-level development of and emergence of sex differences in this depression risk factor, as well as how different stressful experiences, in particular emotional maltreatment and major depression experience, contribute to development of this risk factor across youth. Following a community sample of 681 youth in three different developmental stages, I examined negative cognitive style, emotional maltreatment, and major depression experience over the course of three years. Using hierarchical linear modeling, I was able to articulate mean-level change and stability in negative cognitive style over a broad age range and describe how participant sex, emotional maltreatment, and depression experience affects growth in negative cognitive style. Below I summarize my findings and their contribution to the field's understanding of negative cognitive style development in youth.

### **Mean-Level Growth**

I first hypothesized that negative cognitive style would remain stable in late childhood, increase in early adolescence, and level off in mid-late adolescence, showing a

general increasing trend with age. Results partially supported this hypothesis. As shown in Figure 1, analyses revealed that, while negative cognitive style at baseline increased with age, negative cognitive style decreased over time within the late childhood and mid-late adolescent cohorts. In the early adolescent cohort, negative cognitive style remained stable over the course of the study. No previous studies have examined negative cognitive style stability from late childhood through mid-late adolescence; however research has examined mean-level growth particularly in adolescence. Garber and colleagues (2002) examined negative cognitive style in a sample of youth in grades 6-11, and found that the cognitive style slope for their sample was not significantly different than zero, indicating stability over these years. However, they utilized a high-risk sample consisting primarily of children of depressed mothers, which may impact depression risk factors in the children. The current study utilized a community sample, which increases generalizability to the population. Nonetheless, the current study's analyses replicate Garber and colleagues' (2002) findings in the early adolescent cohort. Examination of Figure 1 suggests that, while the analysis in the mid-late adolescent cohorts shows change over time in negative cognitive style, actual change over the entire adolescent developmental period is likely to be low. Future research with the current sample should seek to fully replicate the results by Garber and colleagues (2002) by combining the adolescent cohorts.

Interestingly, negative cognitive style was shown to decrease over time in both the late childhood and mid-late adolescent cohorts, which is inconsistent with the hypotheses that negative cognitive style would remain stable for these age groups. It is

possible that these cohorts are demonstrating regression to the mean, which has been seen in other studies of cognitive vulnerabilities. For example, Romens, Abramson, and Alloy (2009) found that a high risk sample of older adolescents and young adults demonstrated decreasing trajectories of negative cognitive style over five years, which they conceptualized as indicating regression toward the mean.

### **Sex Differences**

The second hypothesis was that there would be no sex difference in negative cognitive style growth in the late childhood cohort, but girls would demonstrate an increase in negative cognitive style in the early adolescent age group and maintain this sex difference and demonstrate higher negative cognitive style than boys during mid-late adolescence. Results partially supported this hypothesis. There were no sex differences in the late childhood sample and sex differences emerged in the early adolescent cohort, in which girls increased in their negative cognitive style over time while boys decreased. These results are consistent with other child and adolescent cognitive style studies that show no sex difference in childhood negative cognitive style but a sex difference in adolescent cognitive style with girls being more negative (Abela, 2001; Hankin & Abramson, 2002; Mezulis et al, 2006; Nolen-Hoeksema, Girgus, & Seligman, 1991; Thompson, Kaslow, Weiss, & Nolen-Hoeksema., 1998), and replicates the longitudinal results of Mezulis and colleagues (2010), who demonstrated increasingly negative cognitive style over time in early adolescent girls. The current research thus demonstrates sex differences in growth in negative cognitive style in the important developmental period before depression prevalence increases dramatically, and exhibits a potential



mechanism for sex differences in depression prevalence. This finding has particularly important clinical implications for depression prevention work in youth, as it highlights early adolescent girls as a focal group for targeted cognitive prevention efforts. Future research should examine how preventive interventions, aimed at modifying youths' cognitive processing of stressors (e.g., *Coping with Stress*; Clarke, Hawkins, Murphy, Sheeber, Lewinsohn, & Seeley, 1995), may reduce negative cognitive style, principally in early adolescent girls.

Several factors may be contributing to increasing negative cognitive style in early adolescent girls. From a biological standpoint, girls begin to show higher rates of depression after reaching Tanner Stage III (Angold et al., 1998), and most girls reach Tanner Stage III between 10 and 13 years of age (Marshall & Tanner, 1969; Sun et al., 2002). This matches the age range of the early adolescent sample, with the majority of the sample falling between 10.9 and 12.1 years old at baseline. Thus, it is possible that puberty is contributing to increases in negative cognitive style in the current sample. Additionally, the physical changes, in particular increased body mass, associated with puberty have been shown to lead to greater body dissatisfaction and depressive symptoms in girls (Compian, Gowan, & Hayward, 2009), which may contribute to higher negative cognitive style.

During early adolescence youth begin to orient more toward their friendships as a source of emotional support and identity and begin to seek support less from their parents (Helsen, Vollebergh, & Meeus, 2000). From a stress standpoint, adolescent girls have been shown to generate significantly more stress than boys, experience more

interpersonal stress in the parent-child and peer domain, and experience more peer conflict than boys (Rudolph & Hammen, 1999). Additionally, cliques and adolescent peer networks begin to increase in power in early adolescence. Girls report higher levels of intimacy in their friendships than boys, and girls are more likely to be part of a clique (Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 1995). Cliques can create positive and negative experiences, such as if one is excluded. It may be that the higher levels of stress that early adolescent girls experience, within the context of changing primary sources of emotional support and orienting toward a more peer-centric worldview, may contribute to higher negative cognitive style in early adolescent girls.

Finally, from a societal standpoint, early adolescent girls may become more aware of sexism in early adolescence. To perceive discrimination, one must have a cultural understanding of gender and gender stereotypes, an awareness of others' discrimination, an ability to compare how others are treated compared to oneself, and an ability to make moral judgments about fairness (Brown & Bigler, 2005). One tends to achieve these cognitive requirements in middle childhood (Leaper & Brown, 2008). Brown and Bigler (2004) showed that girls were capable of accurately detecting sexism in vignettes around age 10. Leaper and Brown (2008) demonstrated that most adolescent girls (between the ages of 12 and 18) endorsed at least one previous experience of sexual harassment, academic sexism, and athletic sexism. Thus, already having the cognitive capacity to detect sexism, early adolescence may be a time where girls begin to recognize their own personal experiences of sexism. This could lead to development of higher negative cognitive style in early adolescent girls.

Interestingly, no sex differences were found in the intercept or slope of negative cognitive style in the mid-late adolescent cohort. This is particularly puzzling given the sex difference in the early adolescent slope, which would theoretically lead to a significant effect of participant sex on at least the baseline negative cognitive style, and thus intercept, in the mid-late adolescent cohort. While the lack of sex differences is surprising, previous research with adolescents has been inconsistent. Some researchers have reported no sex difference in cognitive style (Gladstone, Kaslow, Seeley, & Lewinsohn, 1997), whereas others find that by age 15 girls do display a more negative cognitive style (Hankin and Abramson, 2002; Mezulis et al., 2010). Regardless, the lack of sex differences in the mid-late adolescent cohort in the current study is perplexing. It is possible that the higher baseline intercept in the mid-late adolescent cohort as part of the regression to the mean pattern washed out the sex differences established in the early adolescent cohort.

### **Emotional Maltreatment**

I hypothesized that experiencing emotional abuse would be associated with higher negative cognitive style over time. Results generally supported this hypothesis for time-varying emotional maltreatment within whole sample analyses and in all developmental cohorts. Emotional abuse measured over time was positively associated with negative cognitive style in the late childhood and early adolescent cohorts. This effect trended towards significant in the mid-late adolescent sample. The consistency of this finding across all age groups points to the powerful impact emotional abuse has on negative cognitive style in youth, and supports the Rose and Abramson (1992) theory that

emotional maltreatment likely contributes to development of cognitive risk for depression, as negative cognitions are directly supplied to the child by the abuser. Previous research has examined the effect of emotional maltreatment on cognitive style largely with adults (Alloy et al., 2004; Gibb, Alloy, Abramson, & Marx, 2001; Gross & Keller, 1992, Moll, 1992). Gibb (2002) reviewed the literature and found a small effect size between childhood emotional maltreatment and adult cognitive style. Few studies have examined the effect of emotional maltreatment in youth samples. Gibb and Alloy (2006) studied 4<sup>th</sup> and 5<sup>th</sup> graders and found that emotional maltreatment was associated with an increase in negative attributions about causes of events over a 6-month period. Gibb and Abela (2008) examined a high-risk sample of teenagers of depressed parents and a community sample in a two time point design and found that emotional maltreatment was associated with an increase in negative cognitive style. Padilla Paredes and Calvete (2014) found that parental emotional abuse and peer bullying at time 1 predicted increases in negative cognitive style at time 2 in a sample of adolescents. The current study replicates and extends these findings by examining changes in negative cognitive style over three years and by utilizing a multi-wave study design. The current study thus represents one of the first rigorous tests of emotional maltreatment on development of negative cognitive style from late childhood through late adolescence and points to a need to identify youth who have experienced emotional maltreatment as having a high risk for development of cognitive risk and thus depression. Future studies should examine the potential mediational relationship of emotional abuse, negative cognitive style, and depressive episodes.

Interestingly, baseline emotional maltreatment was associated with a higher baseline negative cognitive style in the late childhood cohort as well as a more negative slope over time, indicating decreasing negative cognitive style. As children's cognitive styles are most variable before age 12 (Garber & Flynn, 2001; Gotlib, Lewinsohn, Seeley, Rohde, & Redner, 1993; Nolen-Hoeksema et al., 1986, 1992), it is possible that younger children are more transiently affected by negative life events, including emotional maltreatment. Thus, experiencing emotional maltreatment would lead to a higher spike in negative cognitive style, followed by a steeper decline as the child recovers. This is the pattern seen in the current study's late childhood cohort. Prospective effects of baseline emotional maltreatment were not found in either the early adolescent or mid-late adolescent cohort.

### **Major Depression**

Finally, I hypothesized that experiencing a major depressive episode would be associated with increases in negative cognitive style over time. Results of analyses with the entire sample supported this hypothesis, as experiencing a major depressive episode was associated with higher negative cognitive style. In analyses within each developmental cohort, the significant effect of major depression on negative cognitive style did not emerge until mid-late adolescence. In the mid-late adolescent cohort, major depression over the course of the study was marginally associated with increases in negative cognitive style. However, the prospective analysis of depression history at baseline demonstrated that youth who had experienced at least one major depressive episode by study onset showed increasing negative cognitive style over time. The

emergence of this effect only in the mid-late adolescent cohort was unsurprising given the relatively low incidence of depression before that age group (Hankin et al., 1998). The current findings lend support to the scar hypothesis, which posits that episodes of depression lead to lasting psychological changes (Williams et al., 1988). During depressive episodes, negative self-referential cognitive material is extensively rehearsed (Lewinsohn, Steinmetz, Larson, & Franklin, 1981), which may lead to increases in negative cognitive style. Although research in adults has shown little effect of depression on cognitive risk (Burcusa & Iacono, 2007), which is likely due to adult cognitive styles being more crystallized and less susceptible to being influenced by experiences, research in youth has shown effects of depressive symptoms on negative cognitive style (Gibb & Alloy, 2006). For example, children with high levels of depressive symptoms were found to experience a change toward a more negative cognitive style over five years (Nolen-Hoeksema et al., 1992). Garber and colleagues (2002) utilized latent factor growth modeling to examine trajectories of depressive symptoms and cognitive style in early-late adolescence, and found that youth who entered the study with low levels of depressive symptoms and who continued to experience low levels of depressive symptoms over time had negative cognitive styles that decreased. Youth who entered the study with high levels of depressive symptoms and had positive slopes of depressive symptoms had negative cognitive styles that increased over time. The current study is consistent with and extends these findings by examining the effect of clinically significant major depressive episodes. According to the current research, this powerful experience has an impact on the still-stabilizing cognitive styles of youth.

The current finding is noteworthy, because it demonstrates a process by which individuals may be put at risk for depressive recurrences and long-term impairment and consequences. Present estimates suggest that 50-60% of people who experience a first depressive episode go on to have a second one, 70-80% of those with a second episode experience a third, and 90% of individuals who have had three episodes of depression go on to suffer further recurrences (American Psychiatric Association, 2000; Solomon et al., 2000). Given the high rate of recurrence and associated distress and impairment, it is essential to elucidate mechanisms that may sustain risk for recurrence. The current study demonstrated that mid-late adolescents with a history of depression showed increases in negative cognitive style prospectively. It is possible that increasing negative cognitive style following a depressive episode contributes to the high rate of depressive recurrence. Future research should examine this potential mediation relationship between a first episode and a depressive recurrence.

### **Multi-Predictor Findings**

Analyses were run in which all predictors were entered into the models simultaneously. Analyses examining all variables within the combined sample and within the developmental cohort samples generally were concordant with previously discussed analyses. Importantly, baseline emotional maltreatment continued to predict higher baseline negative cognitive style and decreasing cognitive style over time in the late childhood sample, which points to the unstable nature of children's cognitive styles (Garber & Flynn, 2001; Gotlib, Lewinsohn, Seeley, Rohde, & Redner, 1993; Nolen-Hoeksema et al., 1986, 1992). Sex remained a significant predictor of the slope in the

early adolescent sample even while including baseline emotional maltreatment and baseline depression history in the model, which underlines the robustness of this finding. In the mid-late adolescent sample, the baseline depression history finding held even when including emotional maltreatment in the model, such that baseline major depression significantly predicted the slope. These results increase overall confidence in the stability of the significant predictors of sex and major depression within the early adolescent and mid-late adolescent samples, respectively.

A contradictory finding emerged in the late childhood sample in the multi-predictor analysis, such that a baseline history of depression was associated with lower negative cognitive style at baseline, and was trending towards predicting higher negative cognitive style over time. This finding is puzzling, but may be a demonstration of the variability seen in negative cognitive style in this age group. Additionally, older age at baseline predicted higher baseline negative cognitive style and a less steep decline in negative cognitive style over time, pointing to a general increasing trend of negative cognitive style with age. It is possible that youth in the late childhood developmental period who experienced depression particularly contribute to this increasing trend.

### **Strengths and Limitations**

Several strengths of the current study should be noted. First, the multi-wave design allowed for more accurate assessment of negative cognitive style, emotional maltreatment, and depressive episodes that cannot be ascertained as precisely in cross-sectional or two time point designs, which require retrospective recall. Research supports the need for multi-wave prospective assessments with relatively short time frames in



order to maximize accuracy of diagnostic data (Costello, et al., 2006; Moffit et al., 2010). The current study assessed youth negative cognitive style every 18 months, emotional maltreatment every 18 months with a 6-month recall timeframe, and depressive episode occurrence every six months. The frequency of depression assessment in particular allowed for more accurate and precise measurement of youth depression experience (Costello et al., 2006). Additionally, use of the K-SADS to assess diagnostically significant episodes of depression assures accuracy of measurement of episodes meeting diagnostic criteria. The ongoing debate concerning depression continuity (i.e., dimensional versus categorical classification) points to the need to use diagnostic interviews to assess clinically significant depressive episodes (Coyne, 1994; Hankin et al., 2005; Pickles & Angold, 2003; Vredenburg et al., 1993), which the current study utilized for the history of depression variable. Finally, regarding measurement of emotional maltreatment, the CTQ-EA used in the current study is a subscale of the Childhood Trauma Questionnaire, which has been utilized as a “gold standard” self-report measure to validate other abuse measures (Tonmyr, Draca, Crain, & MacMillan, 2011).

Several limitations of the current study should be noted. First, self-report measures were used to assess negative cognitive style and emotional maltreatment. Self-report measures are not without worth, as individuals are capable of reporting on their thoughts, attributions, and personal histories (Haefel & Howard, 2010). It is possible that more sophisticated methods of measurement, such as contextual stress interviews, (i.e. Hammen et al., 1987) or using multiple reporters, such as siblings (e.g., Bifulco, Brown,

& Harris, 1994), may improve ability to gather accurate data about emotional maltreatment (Tonmyr et al., 2011). Additionally, a self-report problem inherent to working with emotional maltreatment include that children may be unwilling to disclose due to concerns about repercussions (Crowley, Mikulich, Ehlers, Hall, & Whitmore, 2003; Kantor et al., 2004). Additionally, the measurement of emotional maltreatment utilizing a 6-month recall timeframe with 18-month periods between data collection led to gaps in emotional maltreatment measurement. Future studies would benefit from increased frequency of measurement of emotional maltreatment. Second, the current study examined normative trajectories of negative cognitive style over youth and how emotional maltreatment and major depressive episodes affect negative cognitive style. Future research may benefit from tests of the transactional relationship between negative cognitive style, emotional maltreatment, and depression.

## **Conclusion**

The current study sought to illustrate normative mean-level growth from late childhood through mid-late adolescence in an important cognitive risk factor for depression. Sex differences were examined, and critical differences in growth in negative cognitive style by sex were found in the early adolescent period of development, which precedes the rise in depression prevalence and emergence of sex differences in depression prevalence in mid-late adolescence. Importantly, this is the first study to examine the impact of emotional maltreatment on the development of negative cognitive style across late childhood through mid-late adolescence, and the first study to explicate how experiencing a major depressive episode leads to changes in negative cognitive style in

youth. Results provide insight into the development of this critical and well-established risk factor for depression as well as increase understanding of youth who may be best helped by depression prevention efforts. Pinpointing youth at high risk for developing negative cognitive style may help target those likely to suffer from depression in an attempt to stop depression before it develops and help these children avoid unnecessary suffering and debilitation.

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## Appendix A: Tables

Table 1

*Demographic Characteristics of Sample*

Characteristic	Percent (n) or median
Gender	
Female	54.8% (373)
Male	43.3% (295)
Grade	
Third	30.1% (205)
Sixth	36.4% (248)
Ninth	33.0% (225)
Race/Ethnicity	
White	39.4% (268)
African American	46.0% (313)
Hispanic	4.3% (29)
Asian/Pacific Islander	1.9% (13)
Other/mixed ethnicity and race	7.8% (54)
Caregiver's marital status	
Married	75.8% (516)
Single	7.2% (49)
Divorced or separated	15.0% (102)
Widowed	1.3% (9)
Annual income	\$85,000
Free/reduced lunch	18.5% (126)

Table 2

*Descriptive Statistics Overall and by Sex and Cohort*

Variable	Full Sample <i>M (SD)</i>	Girls <i>M (SD)</i>	Boys <i>M (SD)</i>	Late Childhood <i>M (SD)</i>	Early Adolescence <i>M (SD)</i>	Mid-Late Adolescence <i>M (SD)</i>
Baseline age	11.6 (2.4)	11.7 (2.4)	11.5 (2.4)	8.6 (.7)	11.5 (.6)	14.4 (.7) <sup>+</sup>
Negative cognitive style	2.8 (.8)	2.8 (.8)	2.7 (.8)	2.5 (.7)	2.7 (.7)	3.1 (.8) <sup>+</sup>
Emotional maltreatment	7.2 (2.5)	7.4 (2.6)	7.1 (2.4)	6.3 (2.3)	7.3 (2.6)	7.9 (2.4) <sup>+</sup>
MDD at baseline	7.6%	9.9%	5.1%*	1.9%	4.4%	16.4% <sup>+</sup>
MDD by study end	25.3%	30.1%	19.6%*	15.6%	20.8%	39.6% <sup>+</sup>

Note: Full Sample N = 681; girls n = 373, boys n = 295; Late childhood n = 205; Early adolescence n = 248; Mid-late adolescence n = 225; Negative cognitive style assessed by the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002); Emotional maltreatment assessed by the Child Trauma Questionnaire-Emotional Abuse Subscale (CTQ-EA; Bernstein et al., 2003); MDD at baseline = history of major depressive episode at baseline as diagnosed via Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS; Kaufman et al., 1997); MDD by study end = participant experienced major depressive episode by the end of the study as diagnosed by the K-SADS administered repeatedly every 6 months

\* denotes significant sex difference  $p < .05$ . <sup>+</sup> denotes significant cohort difference  $p < .05$ .

Table 3

*Results of Growth Curve Modeling of Negative Cognitive Style across Youth*

Model	All Combined		Late Childhood		Early Adolescence	Mid-Late Adolescence	
	Linear <i>b</i> (SE)	Quadratic <i>b</i> (SE)	Linear <i>b</i> (SE)	Quadratic <i>b</i> (SE)	Linear <i>b</i> (SE)	Linear <i>b</i> (SE)	Quadratic <i>b</i> (SE)
Fixed Effects							
Intercept, $\gamma_{00}$	2.879 (.056)***	2.892 (.059)***	2.834 (.260)***	2.820 (.264)***	3.070 (.170)***	3.365 (.123)***	3.377 (.127)***
Time, linear, $\gamma_{10}$	-.166 (.031)***	-.243 (.099)*	-.282 (.127)*	-.198 (.291)	.009 (.085)	-.158 (.058)**	-.232 (.180)
Time, quadratic, $\gamma_{20}$		.038 (.046)		-.042 (.131)			.037 (.096)
Random Effects							
$\sigma^2_e$	.317 (.563)	.372 (.610)	.195 (.441)	.193 (.440)	.444 (.667)	.280 (.529)	.279 (.528)
$\sigma^2_{u0}$	.452 (.672)***	.411 (.641)***	.988 (.994)***	.989 (.995)***	.317 (.563)*	.447 (.669)***	.448 (.669)***
$\sigma^2_{u1}$	.056 (.236)***	.056 (.237)***	.183 (.429)***	.184 (.430)**	.003 (.056)	.012 (.111)	.013 (.113)
Deviance	1579.602	1578.906	110.506	110.402	152.720	292.837	292.689
Chi square statistic		$\chi^2(1)=.696$		$\chi^2(1)=.103$			$\chi^2(1)=.142$

Note: Results from Hierarchical Linear Modeling (HLM 6.0; Raudenbush, et al., 2004);

\* $p < .05$ ; \*\*  $p < .01$ ; \*\*\* $p < .001$

Table 4

*Sex Differences in Negative Cognitive Style Intercept and Slope*

Model	All	Late	Early	Mid-Late
	Combined	Childhood	Adolescence	Adolescence
	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
<b>Fixed Effects</b>				
Intercept, $\gamma_{00}$	2.840 (.175)***	3.013 (.401)***	3.077 (.289)***	3.137 (.193)***
Time, linear, $\gamma_{10}$	-.346 (.098)**	-.362 (.199)	-.159 (.089)	-.045 (.101)
Sex x intercept, $\gamma_{01}$	.025 (.112)	-.303 (.523)	-.014 (.370)	.366 (.247)
Sex x time, $\gamma_{11}$	.116 (.061) <sup>+</sup>	.136 (.259)	.319 (.153)*	-.182 (.121)
<b>Random Effects</b>				
$\sigma^2_e$	.317 (.563)	.195 (.441)	.422 (.650)	.280 (.529)
$\sigma^2_{u0}$	.452 (.672)***	.966 (.982)***	.342 (.585)*	.446 (.668)***
$\sigma^2_{u1}$	.053 (.229)**	.179 (.423)***	.000 (.023)	.011 (.107)
Deviance	1574.202	110.161	149.517	289.887
Chi square statistic	$\chi^2(2)=5.400$	$\chi^2(2)=.345$	$\chi^2(2)=3.203$	$\chi^2(2)=3.083$

Note: \* $p < .05$ ; \*\*  $p < .01$ ; \*\*\* $p < .001$ ; <sup>+</sup>  $p=.058$ , trending towards significance

Table 5

*Effects of Emotional Maltreatment on Negative Cognitive Style*

Model	All Combined		Late Childhood		Early Adolescence		Mid-Late Adolescence	
	EM Level 1 <i>b</i> (SE)	EM Level 2 <i>b</i> (SE)	EM Level 1 <i>b</i> (SE)	EM Level 2 <i>b</i> (SE)	EM Level 1 <i>b</i> (SE)	EM Level 2 <i>b</i> (SE)	EM Level 1 <i>b</i> (SE)	EM Level 2 <i>b</i> (SE)
Fixed Effects								
Level 1								
Intercept, $\gamma_{00}$	2.373 (.119)***	2.533 (.192)***	2.688 (.323)***	1.786 (.439)**	2.423 (.352)***	2.589 (.576)***	2.806 (.261)***	3.025 (.392)***
Time, $\gamma_{10}$	-.229 (.047)***	-.143 (.097)	-.310 (.128)*	.162 (.229)	-.252 (.147)	-.517 (.240)*	-.066 (.100)	-.211 (.178)
CTQ, $\gamma_{20}$	.072 (.013)***		.046 (.012)***		.093 (.035)*		.047 (.025)+	
Level 2								
Sex x intercept, $\gamma_{01}$	-.016 (.107)	-.026 (.144)	-.332 (.463)	-.447 (.367)	-.050 (.344)	-.007 (.337)	.301 (.247)	.347 (.247)
Sex x time, $\gamma_{11}$	.132 (.062)*	.189 (.073)**	.115 (.241)	.197 (.191)	.378 (.198)+	.324 (.143)*	-.142 (.122)	-.210 (.127)
CTQbsl x intercept, $\gamma_{02}$		.058 (.023)+		.165 (.046)**		.070 (.068)		.015 (.044)
CTQbsl x time, $\gamma_{12}$		-.021 (.021)		-.070 (.024)**		.051 (.035)		.023 (.020)
Random Effects								
$\sigma^2_e$	.299 (.547)	.345 (.588)	.168 (.410)	.195 (.441)	.404 (.636)	.400 (.632)	.261 (.511)	.280 (.529)
$\sigma^2_{u0}$	.405 (.636)***	.387 (.622)***	.862 (.928)***	.543 (.737)***	.282 (.531)*	.319 (.565)**	.418 (.646)***	.414 (.644)***
$\sigma^2_{u1}$	.067 (.253)***	.045 (.211)**	.209 (.457)***	.102 (.320)**	.000 (.014)	.003 (.054)	.023 (.151)	.001 (.035)
Deviance	1531.765	1530.021	107.735	101.975	143.236	142.018	286.417	287.899

Note: EM = Emotional maltreatment as assessed by the Childhood Trauma

Questionnaire—Emotional Abuse Subscale (CTQ-EA; Bernstein et al., 1994; Bernstein et al., 2003); EM Level 1 = Analyses of time-varying emotional maltreatment over the

course of the study entered in level 1 of the HLM analysis; EM Level 2 = Analysis of time-invariant emotional maltreatment entered in level 2 of the HLM analysis utilizing baseline emotional maltreatment to test prospective effects of emotional maltreatment on growth of negative cognitive style over the course of the study; CTQbsl = Baseline emotional maltreatment; \* $p < .05$ ; \*\*  $p < .01$ ; \*\*\* $p < .001$ ; + $p = .06-.07$ , trending towards significance

Table 6

*Effects of Major Depression on Negative Cognitive Style*

Model	All Combined		Late Childhood		Early Adolescence		Mid-Late Adolescence	
	MDD Level 1	MDD Level 2	MDD Level 1	MDD Level 2	MDD Level 1	MDD Level 2	MDD Level 1	MDD Level 2
	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
Fixed Effects								
Level 1								
Intercept, $\gamma_{00}$	2.861 (.174)***	2.823 (.175)***	2.688 (.323)***	3.080 (.428)***	3.070 (.289)***	3.075 (.332)***	3.106 (.197)***	3.089 (.208)***
Time, $\gamma_{10}$	.376 (.098)***	-.350 (.097)**	-.310 (.128)*	-.377 (.213)	-.205 (.100)+	-.155 (.106)	-.100 (.102)	-.199 (.084)*
MDD, $\gamma_{20}$	.325 (.094)**		.046 (.012)		.231 (.264)		.210 (.123)+	
Level 2								
Sex x intercept, $\gamma_{01}$	-.005 (.111)	-.017 (.110)	-.332 (.463)	-.229 (.547)	-.034 (.337)	-.013 (.349)	.305 (.240)	.355 (.250)
Sex x time, $\gamma_{11}$	.116 (.061)+	.106 (.061)+	.115 (.241)	.118 (.272)	.345 (.148)*	.319 (.152)*	-.153 (.116)	-.215 (.121)
MDDbsl x intercept, $\gamma_{02}$		.428 (.160)**		-.236 (.540)		.009 (.355)		.091 (.240)
MDDbsl x time, $\gamma_{12}$		.010 (.081)		.054 (.269)		-.014 (.122)		.291 (.104)**
Random Effects								
$\sigma^2_e$	.321 (.567)	.317 (.563)	.168 (.410)	.194 (.441)	.413 (.642)	.422 (.650)	.282 (.531)	.272 (.522)
$\sigma^2_{u0}$	.429 (.655)***	.424 (.651)***	.862 (.928)**	.953 (.976)***	.330 (.574)*	.342 (.585)**	.427 (.653)***	.471 (.686)***
$\sigma^2_{u1}$	.051 (.227)**	.051 (.226)**	.209 (.457)***	.179 (.423)***	.002 (.041)	.001 (.023)	.002 (.048)	.001 (.038)
Deviance	1563.571	1554.151	107.735	109.925	148.961	149.513	288.129	294.267

Note: MDD = Major depression as measured by the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS; Kaufman et al., 1997); MDD Level 1

= Analyses of time-varying major depression over the course of the study entered in level 1 of the HLM analysis; MDD Level 2 = Analysis of time-invariant major depression entered in level 2 of the HLM analysis utilizing baseline depression history to test prospective effects of depression on growth of negative cognitive style over the course of the study; MDDbsl = history of major depressive episode at baseline; \* $p < .05$ ; \*\*  $p < .01$ ; \*\*\* $p < .001$ ; + $p = .06-.09$  trending towards significance



## Appendix B: Figures

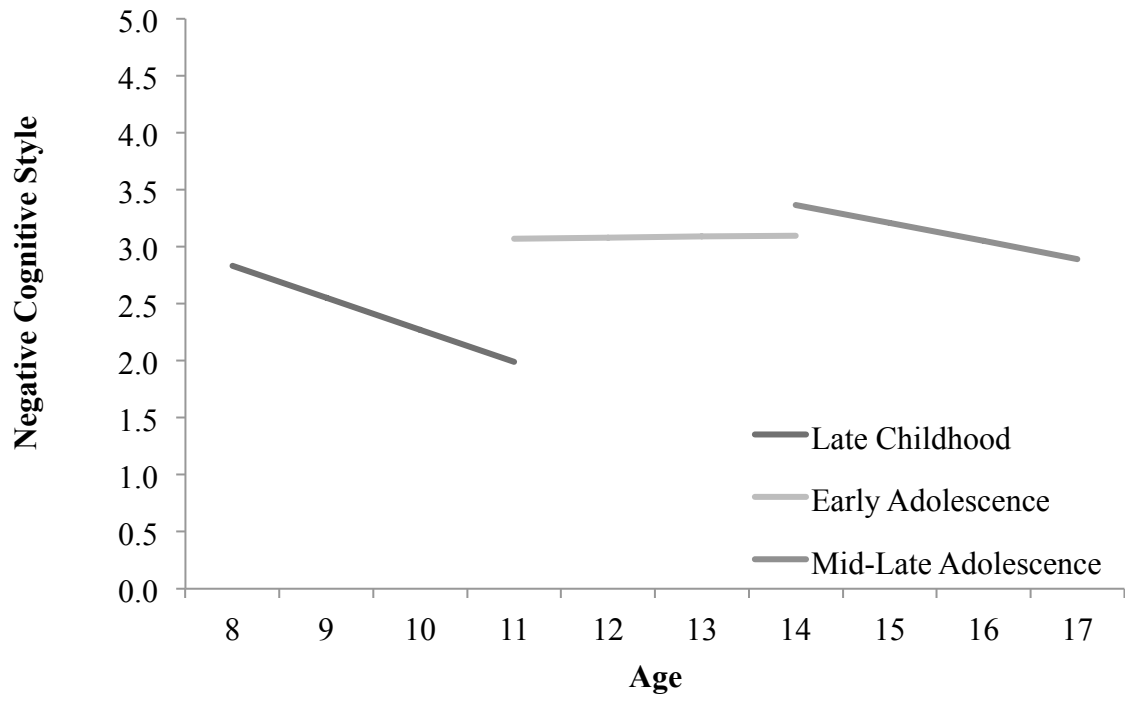


Figure 1. Growth trajectories of negative cognitive style in late childhood, early adolescence, and mid-late adolescence



Figure 2. Sex difference in growth of negative cognitive style in early adolescence