

CHILDHOOD ADVERSITY: MEASUREMENT AND IMPACTS ON
ACADEMIC GOALS AND OUTCOMES

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ABSTRACT

CHILDHOOD ADVERSITY: MEASUREMENT AND IMPACTS ON ACADEMIC GOALS AND OUTCOMES

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Exposure to childhood adversity – such as maltreatment, violence, and living in poverty – is related to problems with health and wellbeing across the lifespan. The present research aimed to improve measurement of one form of childhood adversity (maltreatment) and explore the role of adversity in one developmental process (goal setting and appraisals) through which it may impact outcomes. Chapter 1 compared two methods of measuring maltreatment using retrospective self-report items in a nationally representative dataset. Both a cumulative index and a two-factor solution showed evidence of convergent validity, but the latent factors explained more variance in many outcomes even controlling for sociodemographic variables. Chapters 2 and 3 explored the role of adversity in adolescents’ goals for their academic futures and its relation to their actual educational outcomes. In the study described in Chapter 2, adolescents generated personal goals and rated each goal on support for and likelihood of achieving it. Controlling for grades, adolescents with more externalizing problems set fewer academic goals, and adolescents with more adverse childhood experiences and social networks characterized by higher levels of social strain appraised their goals as less supported and less achievable. In addition, adolescents’ appraisals of their academic goals, but not how many academic goals they set, predicted their grades prospectively. Chapter 3 used a quasi-experimental sibling comparison design to test whether adolescent’s appraisals of

their likelihood of going to college influence their later educational attainment. Controlling for grades and IQ, adolescents who had more optimistic college appraisals than their sibling also had higher educational attainment; this was particularly true for youth in higher socioeconomic status families. However, college appraisals were not related to educational attainment among youth living in poverty and with parents with low educational attainment. Together, results of Chapters 2 and 3 suggest that optimistic appraisals of academic goals promote better academic outcomes, but the context of adversity/low socioeconomic status, and relatedly, social strain, dampens the benefits of optimistic goal appraisals. This points to increasing supports to help adolescents exposed to adversity feel that their academic goals are more supported and achievable, and ultimately improve academic outcomes for youth.

TABLE OF CONTENTS

ACKNOWLEDGMENT ii

ABSTRACT..... vi

LIST OF TABLES ix

LIST OF FIGURES x

GENERAL INTRODUCTION..... 1

CHAPTER 1: COMPARING CUMULATIVE INDEX AND FACTOR ANALYTIC APPROACHES TO MEASURING MALTREATMENT IN THE NATIONAL STUDY OF ADOLESCENT TO ADULT HEALTH 6

Abstract..... 6

Method..... 11

Results 19

Discussion..... 23

CHAPTER 2: PSYCHOSOCIAL CORRELATES AND CONSEQUENCES OF ADOLESCENTS’ SELF-GENERATED ACADEMIC GOALS AND APPRAISALS 40

Abstract..... 40

Method..... 45

Results 53

Discussion..... 55

CHAPTER 3: OPTIMISTIC COLLEGE EXPECTATIONS PROMOTE EDUCATIONAL ATTAINMENT: EVIDENCE FROM A QUASI-EXPERIMENTAL SIBLING STUDY..... 69

Abstract..... 69

Method..... 73

Results 78

Discussion..... 81

GENERAL DISCUSSION 93

BIBLIOGRAPHY 100

LIST OF TABLES

CHAPTER 1

Table 1.1 Sample Characteristics, Adjusting for Sampling Weights.....	33
Table 1.2 Factor Loadings for Exploratory Factor Analysis	35
Table 1.3 Evidence for Convergent Validity, Wave III Outcomes.....	36
Table 1.4 Evidence for Convergent Validity, Wave IV Outcomes	38

CHAPTER 2

Table 2.1 Sample Characteristics.....	62
Table 2.2 Bivariate Correlations among Continuous Variables.....	64
Table 2.3 Goal Definitions, Examples, and Descriptive Statistics.....	65
Table 2.4 Maximum Likelihood OLS Linear Regressions Predicting Characteristics of Academic Goals.....	67
Table 2.5 Maximum Likelihood OLS Linear Regression Predicting Grades at Follow-up.....	68

CHAPTER 3

Table 3.1 Descriptives for All Siblings and Monozygotic Twins.....	85
Table 3.2 Pearson's and Intraclass Correlations, Sibling Sample.....	87
Table 3.3 Random Effects Maximum Likelihood Regressions Predicting Educational Attainment, Sibling Sample.....	88

LIST OF FIGURES

CHAPTER 3

Figure 1: College Expectations X Socioeconomic Status.	89
Figure 2: College Expectations X Socioeconomic Status, MZ Twins Only..	91

GENERAL INTRODUCTION

Exposure to toxic stressors in childhood represents a major public health concern. Over 60% of youth are exposed to at least one adverse childhood experience (ACE) such as maltreatment, domestic or community violence, and parental substance use problems or mental illness (Anda et al., 2006; Cronholm et al., 2015; Finkelhor, Turner, Shattuck, & Hamby, 2015). Such ACEs are disproportionately experienced by the 1 in 5 youth growing up in poverty (Evans, 2004; Jiang, Ekono, & Skinner, 2016); 37% of adults who grew up in high poverty urban neighborhoods reported exposure to four or more ACEs during childhood (Research and Evaluation Group at Public Health Management Corporation, 2013). Exposure to ACEs confers risk for health problems, psychopathology, and low academic achievement/attainment (Anda et al., 2006; Chapman et al., 2004; Dube et al., 2003; Dube, Anda, Felitti, Edwards, & Croft, 2002; Lansford et al., 2002). As researchers move beyond establishing that ACEs increase risk for deleterious life outcomes, the need for more advanced measurement, exploration of potential mechanisms of risk, and use of more sophisticated study designs is becoming increasingly apparent.

Measurement of Maltreatment

Maltreatment is one prevalent form of childhood adversity for which measurement is complicated and in need of improvement. Child Protective Services (CPS) investigated or responded to reports of abuse and neglect for over three million children in 2015 (U.S. Department of Health and Human Services, 2017). However, CPS records only capture the “tip of the iceberg” of the prevalence of maltreatment (MacMillan, Jamieson, & Walsh, 2003). Rates are higher when looking at lifetime

prevalence of self-reported maltreatment that may have not been known to CPS; for example, 1 in 4 girls and 1 in 20 boys report that they experienced sexual abuse by the age of 17 (Finkelhor, Shattuck, Turner, & Hamby, 2014). Researchers need methods to more accurately capture exposures to maltreatment below the “tip of the iceberg” to improve research on the prevalence, correlates, mediators, and moderators of maltreatment that may or may not rise to the attention of child protective service workers. Public, nationally representative datasets provide cost-effective opportunities to pursue these research priorities; however, many such datasets (e.g., Add Health, National Comorbidity Survey, National Epidemiologic Survey on Alcohol and Related Conditions) include single-item indicators of abuse and neglect that are not part of a psychometrically reliable and validated measure of maltreatment. As a result, data from the same sample can generate prevalence estimates of maltreatment that vary widely depending on how researchers put together maltreatment indicators.

Two commonly used methods for combining maltreatment indicators are to (1) count types of maltreatment exposures into a ‘cumulative index’ or (2) use factor analysis to identify latent dimensions of maltreatment. However, the predictive utility of these approaches has never been directly compared. Establishing the benefits and disadvantages of various ways of measuring maltreatment is critical for researchers to make informed decisions about how to best operationalize maltreatment for the objectives of their study. Thus, this dissertation sought to compare the predictive utility of two approaches to measuring maltreatment in one large, nationally representative dataset.

Goal Setting and Appraisals

While maltreatment and other forms of adversity are widely recognized as placing children at risk for poor outcomes across the lifespan (Anda et al., 2006; Lansford et al., 2002), the proximal developmental processes through which this effect operates are not well understood. One developmental process that is particularly salient in adolescence is goal setting and pursuit. Goals are a multidimensional construct that involve both the content (e.g., “go to college”) and the individuals’ appraisals of that goal (e.g., how likely they think it is that they will achieve their goal, how much support they have to help them reach their goal). The content and appraisals of youth’s goals can be measured either by asking an open-ended question to elicit personal goals, which participants then rate, or by having adolescents rate pre-defined items (Massey et al., 2008). This dissertation explored the content and appraisals of youth’s goals using both an open-ended goal elicitation procedure (Chapter 2) and a pre-defined goal which adolescents rated (Chapter 3).

Exposure to childhood adversity can hinder adolescent’s goal setting, appraisals, and pursuit. As adolescents move toward the transition to adulthood, their goals and expectations for what their future holds are important for guiding their decisions and behaviors (Massey, Gebhardt, & Garnefski, 2008). Youth exposed to ACEs and/or living in poverty may perceive a lack of financial resources and social capital to help them achieve their academic goals. In addition, youth exposed to unpredictable toxic stressors over which they have no control (e.g., abuse, parental incarceration) can internalize a sense that they lack agency in their life (Ackerman & Brown, 2010; Feiring, Cleland, & Simon, 2009; L. T. Ross & Hill, 2002). Therefore, it is not surprising that youth exposed to adversity report generally feeling more hopeless about their futures (Bolland, 2003),

struggle with forming plans to achieve their goals (Oyserman, Johnson, & James, 2011), and feel more pessimistic about their likelihood of going to college (L. D. Brumley, Jaffee, & Brumley, 2017; Mello & Swanson, 2007; Stewart, Stewart, & Simons, 2007; R. Thompson et al., 2012) compared to their unexposed peers. The present dissertation extended this prior work by exploring the impact of adversity on both the content and appraisals of youth's self-generated goals (Chapter 2), as well as its role in the relation between goal appraisals and educational attainment using a quasi-experimental study design (Chapter 3).

Finally, there is need for use of study designs that can help disentangle whether academic goals influence educational outcomes, or if their association is due to a confounding third variable. Quasi-experimental designs like sibling comparisons can account for unobserved family factors that may shape both academic goals and academic outcomes (Jaffee, Strait, & Odgers, 2012; Lahey & D'Onofrio, 2010). Thus, comparing whether differences in siblings' appraisals of their likelihood of attending college are related to differences in their educational attainment would provide evidence consistent with the hypothesis that goals influence outcomes. This dissertation employed such a design to better understand the nature of the relationship between college-related goal appraisals and educational attainment, and whether the association depends on a family's socioeconomic status.

Aims

Collectively, the current set of studies extends the field's knowledge of how to best measure childhood adversity and its relationship to adolescents' academic goals and outcomes. Chapter 1 compared two methods of measuring maltreatment from

retrospective self-report items in a large, nationally representative dataset (Add Health). In particular, we sought to explore whether a cumulative index or latent factors of maltreatment explain more variance in psychosocial outcomes. Chapters 2 and 3 explored the role of childhood adversity in adolescents' goals for their academic futures and its relation to their actual educational outcomes. Chapter 2 explored psychosocial correlates of self-generated academic goals and appraisals, and tested whether the number of academic goals or how adolescents feel about them predicts their academic performance prospectively. Chapter 3 used a quasi-experimental sibling comparison design to test whether adolescent's college expectations promote educational attainment, and if this relationship is moderated by socioeconomic status. The ultimate goal of this research is to strengthen measurement of childhood adversity to enable more precise research on its impacts, and better understand the role of adversity in adolescents' goals and appraisals to inform targets for intervention.

**CHAPTER 1: COMPARING CUMULATIVE INDEX AND FACTOR ANALYTIC
APPROACHES TO MEASURING MALTREATMENT IN THE NATIONAL
STUDY OF ADOLESCENT TO ADULT HEALTH**

Abstract

Child maltreatment is a complex and multifaceted construct in need of advanced statistical techniques to improve its measurement. The current study compared the predictive utility of a cumulative index to a factor analytic approach for constructing a measure of maltreatment. Data were from Waves III and IV of the National Longitudinal Study of Adolescent to Adult Health (Wave III: $n = 14,800$; Wave IV: $n = 12,288$). As adults, participants retrospectively reported on their childhood experiences of physical abuse, sexual abuse, emotional abuse, physical neglect, supervisory neglect, and social services investigations. Both the cumulative index and a two-factor solution showed evidence of convergent validity, predicting lifetime incidence of homelessness, being paid for sex, and various measures of running away or living apart from biological parents, and prospectively predicting depression, substance use, and criminal behavior. The latent variables, derived from a factor analytic approach, had greater explanatory power for many outcomes compared to the cumulative index, even when controlling for sociodemographic variables. Results suggest that factor analysis is a better methodology than a cumulative index for measuring maltreatment in large datasets when explanatory power for external outcomes is of greatest concern.

Childhood maltreatment represents a major public health concern. Child Protective Services (CPS) investigated or responded to reports of maltreatment for over three million children in 2015 (U.S. Department of Health and Human Services, 2017). It is widely recognized that children who experience maltreatment are at risk for a host of adverse health and psychosocial problems throughout their lifespan (Dube et al., 2006; Horwitz, Widom, McLaughlin, & White, 2001; Jaffee & Maikovich-Fong, 2011; Lansford et al., 2014). There is emerging consensus that maltreatment is a complicated construct requiring advanced statistical techniques to improve its measurement (English et al., 2005; Gabrielli, Jackson, Tunno, & Hambrick, 2017; Jackson, Gabrielli, Fleming, Tunno, & Makanui, 2014). Like many longitudinal, epidemiological studies, the National Longitudinal Study of Adolescent to Adult Health (Add Health) includes single-item indicators of abuse and neglect that are not part of a psychometrically reliable and validated measure of maltreatment. Both cumulative risk and factor analytic approaches have been used to combine these indicators into a measure of maltreatment, but to our knowledge these approaches have never been compared directly. The current study uses Add Health to compare the predictive utility of a cumulative index and a factor analytic approach to measuring maltreatment.

The most common approach to measuring maltreatment in epidemiological studies, including Add Health, is to conceptualize exposure as binary: absent or present in any form. Often, specific maltreatment experiences are dummy coded (0 = *absence*, 1 = *presence of exposure*) and summed to form a cumulative index (Evans, Li, & Whipple, 2013). For example, a child who experienced physical abuse and sexual abuse would receive a cumulative index score of 2, and a child who experienced supervisory neglect

and physical neglect would also receive a score of 2. A cumulative index posits that as stressful life experiences accumulate, outcomes worsen (Evans et al., 2013). This has been supported in numerous studies demonstrating a dose-response association between number of adverse experiences and children's health and wellbeing (Chapman et al., 2004; Danese et al., 2009; Felitti et al., 1998; Hahm, Lee, Ozonoff, & Van Wert, 2010). Cumulative indices provide a more holistic picture of children's experiences than do single risk experiences. Further, particularly in small samples, statistical models that include cumulative indices are better powered than models that include numerous individual risk factors. Last, cumulative indices provide an interpretation with clear practical implications (Evans et al., 2013; Odgers & Jaffee, 2013).

However, cumulative indices have several drawbacks. First, a cumulative index assumes a priori that all indicators tap the same underlying construct of "maltreatment" (Lau et al., 2005); in reality, the indicators may reflect different underlying constructs. Grouping together all maltreatment types masks heterogeneity in their causes and consequences for children's outcomes. Second, each indicator is treated the same (i.e., a child exposed to sexual abuse is statistically treated the same as a child exposed to supervisory neglect) within the cumulative index summary score. Because of this equal weighting, different items are not able to contribute differently to the total score. For these reasons, cumulative indices are unable to disentangle whether some forms of maltreatment are more strongly associated with an outcome than others (Lau et al., 2005). Third, in some cases, various maltreatment indicators may be related to the same outcome through different mechanisms, but this cannot be tested using a cumulative index that collapses all indicators into one sum score (McLaughlin & Sheridan, 2016).

Factor analysis is a more statistically complex approach to measurement that can address some of the limitations of the cumulative index approach. Factor analysis is designed to identify underlying ‘factors’ that are assumed to cause scores on observed indicators (Brown, 2014). Importantly, factor analysis allows maltreatment indicators to be caused by *multiple* factors rather than a single cumulative index. Thus, if some indicators are highly correlated with each other, but not with other indicators of maltreatment, factor analysis allows them to belong to unique factors. This is an improvement over the cumulative index approach which assumes that all indicators reflect a single underlying construct. Second, factor analysis allows the factors to be entered as separate predictors in a model. Assuming a sufficiently large sample size, this is an advantage of factor analysis over the cumulative index, given research suggesting that different types of maltreatment differentially predict outcomes (English et al., 2005). Third, factor analysis allows maltreatment indicators to have different ‘factor loadings’ which allow some indicators to more strongly relate with the underlying factor than other indicators. When used to predict outcomes, indicators with stronger factor loadings will explain more of the variance in the outcome. This is an improvement over a cumulative approach in which each indicator receives the same weight in the overall score, and thus is statistically indistinguishable from other indicators when the cumulative index is used as the predictor in a model.

Although comparisons of cumulative index and factor analytic approaches have not been conducted in the maltreatment literature, a few short-term longitudinal studies have compared the predictive utility of the two approaches to construct a measure of sociodemographic risk (e.g., poverty, low birth weight, large household size, young

maternal age, low maternal education), which is associated with maltreatment (M. Dong et al., 2004; Evans & English, 2002). Burchinal, Roberts, Hooper, and Zeisel (2000) compared a cumulative index and exploratory factor analysis of sociodemographic risk indicators. The latent variables had greater predictive power for children's cognitive development, and were more useful for studying developmental trajectories, than the cumulative index. However, use of a small sample ($n = 87$) limited generalizability of the factor structure to other samples. Hall and colleagues (2010) conducted a similar study in a larger, representative sample of British children ($n = 2,899$). They also found that latent variables were better predictors of children's cognitive development than a cumulative index. The literature on maltreatment would benefit from a similar, comparative approach.

The current study uses data from Add Health to compare the predictive utility of a cumulative index and factor analysis to measure maltreatment. The first aim is to use factor analysis to test whether more than one latent factor exists among the indicators of maltreatment in Add Health. The second aim is to examine the convergent validity of the cumulative index and the latent factor(s). Examining convergent validity is critical to confirm that operational variables can be interpreted in terms of the theoretical constructs they are purported to measure (Calder, Phillips, & Tybout, 1982). Following recommendations for validation by Campbell and Fiske (1959), we will investigate evidence for convergent validity by testing whether the measures of maltreatment are associated with other measures with which they should relate. Thus, we tested whether the cumulative index or the latent factor(s) explains more of the variation in outcomes that are robustly associated with maltreatment in the literature. First, we tested whether

the measures of maltreatment relate to a lifetime history of foster care placement (Oswald, Heil, & Goldbeck, 2009), homelessness (B. Brumley, Fantuzzo, Perlman, & Zager, 2015), running away from home (Edinburgh, Harpin, Garcia, & Saewyc, 2013), being ordered by caregivers to move out (MacLean, Embry, & Cauce, 1999), or being paid by someone for sex (Reid, 2011). Next, we tested whether the maltreatment variables predict outcomes measured prospectively six years later, including depressive symptoms (Mersky & Topitzes, 2010), substance use problems (Hussey, Chang, & Kotch, 2006), and criminal convictions (Lansford et al., 2007; Mersky & Topitzes, 2010).

Method

The current study represents secondary data analysis of Add Health. Add Health study procedures were approved by the Human Subjects Review Committee of the University of North Carolina at Chapel Hill. Wave I data were collected in 1994-1995 from 90,118 seventh to twelfth grade students aged 11 to 17 years sampled from 145 middle and high schools using a stratified, random school selection procedure. Of the students who completed questionnaires in schools, 20,745 students and 17,670 of their parents also completed in-home interviews in 1995. One year later, 14,738 adolescents completed a follow-up in-home interview (Wave II). In 2001-2002, 15,197 participants completed a third in-home interview (Wave III) at which time their ages ranged from 18 to 26 years. Finally, 15,701 participants aged 24 to 32 years completed a fourth in-home interview (Wave IV) in 2007-2008. The current study included analyses predicting outcome variables measured at Wave III ($n = 14,800$) and Wave IV ($n = 12,288$). These sample sizes are different because they represent youth who had data on the variables of interest and the appropriate sampling weights available (Chen & Chantala, 2014). See

Table 1.1 for descriptive statistics on sample characteristics.

Measures

Demographics. Age at Wave I was calculated as the discrepancy between date of birth and the date of the participant's baseline interview. We imputed the age of four participants with missing data using the mean age for the sample. Participants reported their sex, race, and ethnicity at Wave I. At Wave I, caregivers reported on their own level of education, which was dichotomized (0 = *GED, high school diploma, or higher* and 1 = *did not finish high school*).

Poverty status. Caregivers reported annual household income and number of people in the home at Wave I. The 1995 Federal Poverty Line guidelines (US Department of Health and Human Services, 1995) were followed to calculate percent of poverty threshold by dividing income by the poverty threshold that corresponded to the number of people living in the home. Values below 1 indicate that the household is below the Federal Poverty Line, and values above 1 indicate that the household is above the Federal Poverty Line. Percent of poverty threshold was dichotomized for use as a covariate representing poverty status (0 = *equal to or above the federal poverty threshold*, 1 = *below the federal poverty threshold*).

Indicators of maltreatment. We selected items that indicate experiences of childhood abuse and neglect. All items were retrospectively reported by participants. Neglect indicators were only measured at Wave III, emotional abuse was only measured at Wave IV, and physical abuse and sexual abuse were measured at Waves III and IV. We chose to use the Wave III measures of physical and sexual abuse so that most items were measured at the same time point. This decision was made so that the exploratory factor analysis captured shared variance attributable to the construct rather than the time

point at which the construct was assessed. We included a measure of social services involvement because respondents may not think of certain experiences in childhood (e.g., wearing dirty clothes, being left alone for long periods of time) as neglectful, but may remember a social services worker coming to the home and interviewing family members and/or discussions of being removed from the home. For analyses, variables were dummy coded to reflect the absence (0 = *no indication of maltreatment*) or presence (1 = *indication of maltreatment*) of maltreatment as described below.

Physical abuse. At Wave III, participants retrospectively reported on experiences of physical abuse by rating the following item using a 6-point scale of 0 = *never happened* to 5 = *more than 10 times*: “How often had your parents or other adult caregivers slapped, hit, or kicked you?”. To construct a binary variable, we coded presence of physical abuse if they rated these behaviors as occurring 3 or more times (i.e., 0 = *less than 3 times*, 1 = *3 or more times*; Huang et al., 2011; Yun et al., 2011). This provided a rate of physical abuse (14%) that is consistent with the rate reported in other nationally representative studies, such as the National Epidemiologic Survey on Alcohol and Related Conditions (17%; Afifi et al., 2011).

Sexual abuse. Participants used the 6-point scale (0 = *never happened* to 5 = *more than 10 times*) to report on experiences of sexual abuse at Wave III: “Before 6th grade, how often had one of your parents or other caregivers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?”. We coded presence of sexual abuse as occurring 1 or more times (L. D. Brumley et al., 2017; Gooding et al., 2014). This dichotomization produces rates of sexual abuse (approximately 4%) that match those reported in other national, epidemiological surveys,

including the National Comorbidity Survey Replication Adolescent Supplement (NCS-A; McLaughlin et al., 2012).

Emotional abuse. At Wave IV, participants retrospectively reported on childhood experiences of emotional abuse using a 6-point scale (0 = *never happened* to 5 = *more than 10 times*) to rate the item: “Before your 18th birthday, how often did a parent or adult caregiver say things that hurt your feelings or made you feel not loved or wanted?” Presence of emotional abuse was defined as occurring more than 10 times (Gooding et al., 2014). This provided a rate of emotional abuse (10%) consistent with the rate (12%) in the National Survey of Children’s Exposure to Violence (Finkelhor, Turner, Ormrod, & Hamby, 2009).

Physical neglect. At Wave III, experiences of physical neglect (“Before 6th grade, how often had your parents or other adult caregivers not taken care of your basic needs, such as keeping you clean or providing food or clothing?”) were rated using a 6-point scale of 0 = *never happened* to 5 = *more than 10 times*. We coded presence of physical neglect if the respondent rated that these experiences occurred two or more times (0 = *never or once*, 1 = *two or more times*; L. D. Brumley et al., 2017). Because a single instance might capture normative behavior, we coded the item to capture more frequent neglectful behavior. This resulted in a percentage of children who fall into the category of “physical neglect” (7%) that is consistent with estimates from other epidemiological studies such as the National Comorbidity Survey Replication (6%; Green et al., 2010).

Supervisory neglect. At Wave III, participants used a 6-point scale (0 = *never happened* to 5 = *more than 10 times*) to respond to the following item: “By the time you started 6th grade, how often had your parents or other adult caregivers left you home

alone when an adult should have been with you?” Presence of supervisory neglect was defined as occurring more than 10 times (Currie & Tekin, 2012; Snyder & Merritt, 2016). This decision was based on the same logic as for physical neglect. The coding resulted in an estimate of supervisory neglect (7%) that was similar to national estimates of neglect (6%; Green et al., 2010).

Frequency of social services involvement. We included frequency of social services investigations as an indicator of maltreatment (Cronley, Jeong, Davis, & Madden, 2015). At Wave III, participants reported the number of times that social services “investigated how you were taken care of or tried to take you out of your living situation”. We transformed this continuous item into a binary indicator: presence = *1 or more times* and absence = *0 times or missing data* (Suglia, Clark, Boynton-Jarrett, Kressin, & Koenen, 2014).

Lifetime incidence (Wave III) outcomes. At Wave III, participants responded to a series of yes/no questions about adverse life events, which were each coded as 0 = *no* and 1 = *yes*. **Foster care** was assessed by asking “Did you ever live in a foster home?” Participants reported whether **caregivers ever ordered them to leave home** (“Have [did] your parents ever order you to move out of their house?”). Participants were asked whether they were ever **paid by someone for sex**: “Have you ever had sex with someone who paid you to do so?” Participants were asked: “Have you [did you] ever **run away from home**?” Finally, participants reported on past experiences of **homelessness** by responding to the question: “Have you ever been homeless for a week or longer—that is, you slept in a place where people weren't meant to sleep, or slept in a homeless shelter, or didn't have a regular residence in which to sleep?”

Prospective (Wave IV) outcomes. Depressive symptoms, criminal convictions, heavy drinking, and drug use were assessed at Wave IV. **Depressive symptoms** were measured using a modified 9-item version of the Center for Epidemiological Studies Depression Scale (CES-D). Respondents used a 4-point scale of 0 = *never or rarely* to 3 = *most of the time or all of the time*. Items with positive valence are reverse-scored, and then items are summed to form a scale score, with higher scores indicating more severe depressive symptomatology. Internal consistency was adequate in this sample ($\alpha = .81$). **Criminal convictions** were assessed with the question: “Have you ever been convicted of or pled guilty to a crime in adult court?” (0 = *no*, 1 = *once*, 2 = *more than once*). This was dichotomized for analyses such that 0 = *no* and 1 = *one or more times*. **Heavy drinking** was assessed via self-report of the number of days that the participant had five or more drinks in the past 12 months using a 7-point scale (1 = *never* to 7 = *every day or almost every day*). To aid with interpretation, consistent with Mahalik and colleagues (2013), responses were recoded into a continuous variable reflecting days per month of heavy drinking (1 = 0, 2 = 0, 3 = 1, 4 = 3, 5 = 6, 6 = 17, 7 = 23). Similarly, **drug use** was measured using self-report of how often the participant used their “favorite drug” in the past 30 days using a 7-point scale (0 = *none* to 6 = *every day or almost every day*). To facilitate interpretation, scores were recoded to reflect number of days per month of drug use (0 = 0, 1 = 1, 2 = 3, 4 = 8, 5 = 17, 6 = 23; Mahalik et al., 2013).

Data Analysis Plan

Descriptive analyses were conducted in Stata 13.0 and all other analyses were performed in Mplus. All analyses incorporated sampling weights and design characteristic variables to adjust for the stratified and clustered sampling design of Add Health and for differential response and attrition over time. Adjusting for the complex

sampling design allows for the analyses to be nationally representative. In the analytic samples, less than 1% of data were missing on each outcome variable. Simulation studies show minimal differences between various estimators when less than 5% or 10% of data are missing (Bennett, 2001; Y. Dong & Peng, 2013; Schafer, 1999; Schlomer, Bauman, & Card, 2010). Maximum likelihood estimation was used in models predicting continuous outcomes, and weighted-least squares mean and variance adjusted (WLSMV) estimator was used in models predicting binary outcomes (L. K. Muthén & Muthén, 2012).

Two approaches were taken to measure exposure to maltreatment: cumulative index and factor analysis. First, we followed methods of Evans and colleagues (2013) to construct a cumulative index. The binary indicators of exposure to maltreatment were summed to form a cumulative index of exposure to maltreatment. Thus, participants could have a score of 0 to 6 depending on the number of maltreatment experiences they endorsed. Second, we utilized factor analytic methods to test whether the maltreatment indicators represented a latent construct(s). Guidelines suggest that a latent factor with fewer than three items is generally unstable (Costello & Osborne, 2005). Thus, because only six maltreatment items are available in Add Health, we extracted a maximum of two factors so that no factor had fewer than three items. We drew two random subsamples from our dataset and performed an exploratory factor analysis (EFA) on one and a confirmatory factor analysis (CFA) on the other to cross-validate the factor structure. We performed the EFA on the first subsample ($n = 7,147$) to explore whether the six indicators of maltreatment represent one or two latent factors (Kline, 2015). GEOMIN, an oblique factor rotation was used to allow multiple factors to correlate instead of

forcing the factors to be uncorrelated (Costello & Osborne, 2005). The resulting solution from the EFA was then retested using CFA on the second subsample ($n = 7,116$). The factor model was fit with the binary maltreatment indicators rather than the original continuous variables to make a parsimonious comparison between the cumulative index (which necessitates using binary indicators) and factor analysis. We used a WLSMV estimator to obtain absolute and relative fit indices from factor analytic models. This estimator is more appropriate than maximum likelihood estimation (commonly used in traditional factor analysis) to fit CFA models for binary indicators because it does not assume that indicators are continuous and normally distributed (Flora & Curran, 2004). As a supplementary analysis, we fit the CFA (in the CFA subsample) using the continuous indicators and maximum likelihood estimation to see if the factor structure replicated. We evaluated model fit using multiple fit indices including a comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean-square error of approximation (RMSEA), and standardized root mean squared residual (SRMR). Acceptable fit was defined per Hu and Bentler (1999) 2-index presentation strategy such that the SRMR should be less than 0.08, and supplemented by one of the following: either CFI or TLI greater than or equal to 0.95, or RMSEA less than 0.06.

Next, we examined whether the measurement approaches showed evidence of convergent validity for lifetime and prospective outcomes. A series of unadjusted models were run to compare the explanatory power of the cumulative index to the latent factors. This was done in an SEM framework, so the measurement model and analytic model were estimated simultaneously (i.e., in the case of the factor analysis, the latent variables served directly as predictors; B. O. Muthén, 2002). Dependent variables included: foster

care placement, parents ordered you to move out, paid by someone for sex, ran away from home, homelessness, depressive symptoms, convicted of a crime, drug use, and binge drinking. Logistic regressions were estimated for binary outcomes, and linear regression models were estimated for continuous outcomes. Finally, we re-ran the models adjusting for covariates (age, sex, race, ethnicity, caregiver education, and poverty) to rule out potential alternative explanations for the relation between maltreatment and psychosocial outcomes.

Results

See Table 1.1 for a summary of descriptive statistics on all analytic variables.

Approaches to Measuring Exposure to Maltreatment

Cumulative index. Participants reported 0 to 6 ($M = 0.47$, $se = 0.01$) maltreatment experiences. The majority (69%) of participants did not report maltreatment, and 20% reported experiencing one form of maltreatment. Seven participants (0.03%) endorsed all 6 indicators of maltreatment. See Table 1.1 for the proportion of adolescents in the sample who reported 0 through 6 indicators of maltreatment.

Factor analysis. First, EFA was utilized to extract a one- and two-factor solution in a random subsample. The one-factor solution evidenced inadequate fit to the data (SRMR = 0.09, CFI = 0.92, TLI = 0.86, RMSEA = 0.03; Hu & Bentler, 1999), suggesting that the indicators did not represent a single latent construct of maltreatment. In contrast, a two-factor solution evidenced strong model fit across indices (SRMR = 0.03; CFI = 0.99, TLI = 0.95, RMSEA = 0.02; Hu & Bentler, 1999). See Table 1.2 for factor loadings. The first factor of the two-factor solution exhibited strong loadings for

the Physical Abuse ($r = .70$), Emotional Abuse ($r = .66$), and Supervisory Neglect ($r = .57$) items. These indicators had negligible factors loadings on the second factor. The second factor exhibited stronger factor loadings for Sexual Abuse ($r = .86$), Physical Neglect ($r = .54$), and Social Service Investigations ($r = .44$). These indicators had factor loadings less than .40 on the first factor. With this solution, the inter-factor correlation was $r = .43$ suggesting distinct, yet correlated, factors. This two-factor solution was then subjected to CFA in a second random subsample where Factor 1 comprised Physical Abuse, Supervisory Neglect, and Emotional Abuse indicators, and Factor 2 comprised Sexual Abuse, Physical Neglect, and Social Services Investigation indicators. CFA confirmed strong model fit (CFI = 0.98, TLI = 0.95, RMSEA = 0.02) for this solution (Hu & Bentler, 1999).

It was not surprising that Factor 1 was predominately driven by physical abuse and emotional abuse. Physical and emotional abuse are consistently correlated in other studies (M. Dong et al., 2004; Gabrielli et al., 2017; Higgins & McCabe, 2001) and have loaded onto the same factor in a prior study using Add Health data (Tietjen, Karmakar, & Amialchuk, 2017). The combination of physical and emotional abuse has been referred to as a “generalized parental abusiveness” factor (Briere & Runtz, 1988, pg. 338). The interpretation of Factor 2 (Sexual Abuse, Physical Neglect, Social Services Investigations) is less straightforward. These indicators were less frequently endorsed than Factor 1 indicators; therefore, they may have formed their own factor due to relatively low frequency rather than overlapping content (Floyd & Widaman, 1995). Of note, Factor 2 most strongly correlated with experiences of sexual abuse. Factor 2 may represent forms of maltreatment that were less frequently endorsed, albeit potentially for

different reasons such as underreporting due to stigma and shame associated with sexual abuse (Finkelhor & Browne, 1986; Widom & Morris, 1997), or lack of memory due to the young age at which physical neglect most frequently occurs (Mayer, Lavergne, Tourigny, & Wright, 2007; Pinto & Maia, 2013).

The supplementary analysis revealed good fit of the factor solution to the continuous items. The factor structure fit per thresholds for two types of indices (RMSEA = .03, SRMR = .02; Hu & Bentler, 1999). According to a cutoff value close to .95 (Hu & Bentler, 1999), the factor solution derived from the continuous indicators did not fit on the CFI nor TLI indices (CFI = .92, TLI = .85). That the model fit on RMSEA and SRMR satisfies Hu and Bentler's (1999) recommendation to use a 2-index presentation strategy.

Convergent Validity of Cumulative Index and Latent Factor Approaches

Evidence for convergent validity (no control variables). The cumulative index significantly predicted all outcomes except heavy drinking. The index explained 2-7% of the variance in lifetime incidence (Wave III) outcomes, and less than or equal to 2% of the variance in Wave IV outcomes. Overall, the latent factors explained more variance in outcomes compared to the cumulative index; latent factors explained 16-40% of the variance in Wave III outcomes, and 1-6% in Wave IV outcomes. Both latent factors significantly predicted running away from home reported at Wave III, homelessness reported at Wave III, and depressive symptoms at Wave IV. The Physical Abuse, Supervisory Neglect, and Emotional Abuse factor uniquely predicted the likelihood that parents ordered the adolescent to move out of the home. The Sexual Abuse, Physical Neglect, and Social Services Involvement factor uniquely predicted a history of foster

care placement and being paid by someone for sex at Wave III. Neither latent factor significantly predicted being convicted of a crime at Wave IV, nor using drugs at Wave IV. The pattern predicting heavy drinking was somewhat counterintuitive; Factor 1 (Physical Abuse, Emotional Abuse, and Supervisory Neglect) predicted significantly more heavy drinking at Wave IV, and Factor 2 (Sexual Abuse, Physical Neglect, and Social Services Investigation) predicted significantly less heavy drinking at Wave IV. See Table 1.3 for a summary of results.

Evidence for convergent validity including control variables. Next, we re-ran the models detailed above controlling for potentially confounding sociodemographic variables (i.e., age, sex, race and ethnicity, caregiver education, poverty status). Including demographic control variables, the cumulative index significantly predicted all outcomes. The pattern of associations between the latent factors and outcomes was the same when including sociodemographic control variables for foster care, ordered to move out of the home, being paid by someone for sex, running away from home, homelessness, drug use, and heavy drinking. When including sociodemographic covariates, the Physical Abuse, Emotional Abuse, and Supervisory Neglect factor uniquely predicted depressive symptoms and criminal convictions at Wave IV. The covariates contributed to only minor increases in R^2 (1-7%) for all outcomes except for being convicted of a crime. For both the cumulative index and latent factors, the addition of the sociodemographic controls explained an additional 14-15% of the variance in criminal convictions. Moreover, the addition of the covariates explained an additional 11% of the variance in being paid by someone for sex beyond that predicted by the cumulative maltreatment index. See Table 1.4.

Discussion

The current study tested whether more than one dimension could be identified among maltreatment indicators available in Add Health, and compared the predictive utility of these latent factors to a cumulative index of maltreatment. This study answers calls to employ more sensitive and rigorous statistical methods to measure maltreatment (English et al., 2005; Gabrielli et al., 2017; Jackson et al., 2014). We used a nationally representative, longitudinal study (Add Health), which strengthens the external validity of findings. Overall, results support that two dimensions exist among the maltreatment indicators in Add Health, and that the latent factors have greater explanatory power for children's outcomes compared to a cumulative index.

We found that a two-factor solution was a better fit to the six maltreatment indicators than a one-factor solution. Factor 1 comprised Physical Abuse, Emotional Abuse, and Supervisory Neglect, and Factor 2 included Sexual Abuse, Physical Neglect, and Social Services Investigations. Physical and emotional abuse had the highest loadings on Factor 1, which was not surprising given many prior findings that physical and emotional abuse are highly correlated (M. Dong et al., 2004; Gabrielli et al., 2017; Higgins & McCabe, 2001). This finding is also consistent with a prior factor analytic study in Add Health which found support for a one-factor solution based on the three Wave IV items: emotional abuse, physical abuse, and sexual abuse (Tietjen et al., 2017). In their confirmatory factor analysis model, emotional abuse and physical abuse demonstrated high factor loadings ($\geq .80$), and sexual abuse had a lower factor loading of .55. Their analysis differs from the current study in that Tietjen and colleagues used indicators measured at Wave IV, whereas this study used the Wave III physical abuse

indicator which was worded differently than the Wave IV physical abuse item. That physical abuse and emotional abuse also loaded onto the same factor in our study, despite a difference in the wording of the question that assessed physical abuse, supports the robustness of these indicators belonging to the same underlying latent factor. A seminal study referred to the combination of physical and emotional abuse as a “generalized parental abusiveness” factor (Briere & Runtz, 1988, pg. 338).

The interpretation of Factor 2 (Sexual Abuse, Physical Neglect, Social Services Investigations) is less straightforward. Based on prior studies of the overlap between various types of maltreatment (Higgins & McCabe, 2001, for review), it is not entirely clear why sexual abuse and physical neglect loaded on the same factor. Consistent with prior retrospective self-report studies (Green et al., 2010; McLaughlin et al., 2012; Suglia et al., 2014), the prevalence of sexual abuse (4%), physical neglect (7%), and social services investigations (4%) were generally lower than physical abuse (14%), emotional abuse (10%), and supervisory neglect (7%) in this study. Applied studies in factor analysis suggest that less frequently endorsed items may form their own factor regardless of conceptual overlap (Floyd & Widaman, 1995). Thus, Factor 2 may reflect forms of maltreatment that respondents less frequently endorsed, although potentially for different reasons such as underreporting due to stigma and shame associated with sexual abuse (Widom & Morris, 1997), or inability to remember events due to the young age at which physical neglect most frequently occurs (Mayer et al., 2007; Pinto & Maia, 2013). It is important for interpretation to note that Factor 2 was most strongly correlated with endorsements of sexual abuse (Pett, Lackey, & Sullivan, 2003). The literature has drawn attention to the uniqueness of childhood sexual abuse as marked by feelings of shame,

stigma, powerlessness, and boundary violations in a way that is different than other forms of maltreatment (Finkelhor & Browne, 1986). This conceptual distinctness is supported by recent empirical findings that sexual abuse has a more significant impact on mental health than non-sexual maltreatment (Fergusson, Boden, & Horwood, 2008; Fergusson, McLeod, & Horwood, 2013; Lewis, McElroy, Harlaar, & Runyan, 2016). Our findings support that Factor 2 (Sexual Abuse, Physical Neglect, and Social Service Investigation) is correlated ($r = .43$), but distinct from, Factor 1 (Physical Abuse, Emotional Abuse, and Supervisory Neglect).

As expected, we found that the latent factors of maltreatment had greater explanatory power for children's outcomes compared to the cumulative index. This was not surprising given that latent factors retain more information about the maltreatment indicators than the cumulative index by allowing them to load differently on factors (Burchinal et al., 2000). In particular, the latent factors were much stronger predictors of Wave III outcomes compared to the cumulative index. Neither the cumulative index nor the latent factors were strong predictors of Wave IV outcomes, but the latent factors performed marginally better. It is unlikely that this was solely due to shared measurement variance between maltreatment indicators and Wave III outcomes because some outcomes at Wave III and Wave IV were significantly predicted by both latent factors, some only by Factor 1, and some only by Factor 2. Thus, results do not suggest that Factor 1, which included an indicator measured at Wave IV (emotional abuse), better predicts Wave IV outcomes compared to Factor 2. Importantly, control variables did not explain a large amount of additional variance in the outcomes except for criminal convictions. Sociodemographic control variables explained an additional 14-15% of

variance in being convicted of a crime for both the cumulative index and latent factors. This suggests that the maltreatment indicators are not simply proxy variables for sociodemographic risk.

The current findings support using factor analysis instead of a cumulative index to construct a measure of maltreatment when using large, epidemiological datasets. Consistent with prior work, understanding the pattern of a child's maltreatment experiences provided more explanatory power for their outcomes than a count of the types of maltreatment they experienced (English et al., 2005). Because factor analysis relies on the distributions of the variables in the sample, it assumes that the correlations among the indicators in the sample represent those in the population (Burchinal et al., 2000). Thus, researchers using small to moderate-sized samples should use factor analysis with caution, as the resulting latent factors may not replicate in another sample (Guadagnoli & Velicer, 1988). In small or moderate sample sizes, a cumulative index approach would be preferable to factor analysis if there are clear cut-points (e.g., above vs. below the poverty threshold). However, often cumulative indices use empirically defined cut-points, such as the top quartile of the sample (Evans et al., 2013), subjecting such indicators to similar criticisms as factor analysis when used in small samples.

There are a few important limitations and future directions of the current findings worth discussing. First, we were limited to the indicators of maltreatment available in Add Health. Because only six indicators were available, we were only able to test whether a one- or two-factor solution was a better fit to the data. Furthermore, the purpose of this paper was not to validate a particular factor solution, but to compare the explanatory power of factor analytically derived measures of maltreatment versus a

cumulative maltreatment index in a large, nationally representative dataset. Because cumulative indices count the *types* of risk experiences, we did not examine other aspects of maltreatment (e.g., severity, frequency) that have been shown to be important for the measurement of maltreatment (Gabrielli et al., 2017) and prediction of outcomes (English et al., 2005; Jackson et al., 2014). Future work should test for more fine-grained factor solutions in datasets with more indicators and aspects of maltreatment. With additional indicators, however, the likelihood increases that results will suggest a given indicator should be dropped because of low factor loadings (Evans et al., 2013). Future research should be wary to drop indicators because the uncorrelated indicator may represent a unique but important aspect of maltreatment that is not adequately captured by the factor model.

A second limitation of using Add Health is that it relies on adult retrospective self-report of childhood maltreatment experiences. Studies that have compared adult retrospective report of maltreatment to CPS records have found that adults tend to under-report maltreatment (Hardt & Rutter, 2004; Widom & Morris, 1997; Widom & Shepard, 1996). Under-reporting is particularly significant in the case of neglect (Pinto & Maia, 2013). Although neglect is the most common category of child maltreatment recorded by child protection agencies (U.S. Department of Health and Human Services, 2017), the youngest children are at highest risk (Mayer et al., 2007); thus, adults may not recall experiences of neglect from their infancy and early childhood. This may help explain why both neglect measures had relatively smaller loadings on the factors compared to forms of abuse. A recent study revealed small correlations between prospectively and retrospectively measured self-report of maltreatment; however, effect sizes between

maltreatment and outcomes were consistent between prospectively and retrospectively measured maltreatment (Reuben et al., 2016). In addition, Hardt and Rutter (2004) concluded that adults remember concrete events that happened in childhood (e.g., whether sexual abuse occurred), but are less reliable in remembering when those events occurred. Rates of abuse and neglect may be underestimated in Add Health; however, we set the cut-offs so that they were consistent with rates from other epidemiological studies (Afifi et al., 2011; Finkelhor et al., 2009; Green et al., 2010; McLaughlin et al., 2012). Moreover, including an item that reflects social services involvement has additional advantages and disadvantages. It is possibly a highly salient event that adults would remember from their childhood, but its interpretation is complicated by different standards across child welfare agencies for which reports are investigated (U.S. Department of Health and Human Services, 2017).

Third, it is impossible to determine the temporal ordering of the maltreatment experiences and some of the outcomes we included. At Wave III, participants reported whether various forms of maltreatment occurred anytime in their childhood. They were also asked if they were ever (in their lifetime) placed in foster care, ordered to move out of their home, homeless, paid for sex, or if they ran away from home. Thus, some of the outcomes may have predated the maltreatment experiences and we can only conclude that the experiences are correlated. This is not true of all outcomes, however. Experiences of maltreatment predated depressive symptoms, substance use, and criminal convictions measured at Wave IV. Decisions on how to select and operationalize outcomes prioritized clear temporal ordering. For example, even though Add Health respondents reported on arrests, which are likely to be less subject to bias than convictions, it was

impossible to establish whether maltreatment experiences predated arrests using the item available in Add Health. In contrast, we knew that respondents were reporting on maltreatment that occurred before age 18 and criminal convictions that occurred after age 18.

Fourth, we had to use single items available in Add Health to measure maltreatment type and dichotomize each item to build a cumulative index. Using one item to measure each type of maltreatment experience restricts the reliability and generalizability of the findings because one item may not capture the complexity of the construct that it seeks to measure (Gabielli et al., 2017). Because Add Health respondents used a Likert-type scale to indicate how often they experienced specific abusive or neglectful behaviors, we had to impose a threshold to operationalize presence versus absence of maltreatment in order to form a cumulative index. We used cut-points used in prior studies of Add Health, and produced rates of maltreatment that are consistent with other epidemiological studies. However, it is important to note that prevalence estimates vary widely in the Add Health sample depending on how investigators choose to operationalize constructs. For example, reported rates of physical abuse in Add Health range from 8% to 29% (Fang & Corso, 2008; Watts & McNulty, 2013), rates of supervisory neglect range from 8% to 42% (Currie & Tekin, 2012; Hussey et al., 2006), and rates of emotional abuse range from 12% to 48% (Gooding et al., 2014; Tietjen et al., 2017). Our prevalence estimates fell on the more conservative end of estimates identified in prior studies using Add Health data. It is unlikely that alternative cut-points would have changed the pattern of our results, which compared the relative variance explained by a cumulative index to latent factors that were constructed using the

same binary indicators. In addition, to provide a parsimonious comparison to a cumulative index approach, our main analysis used the binary indicators of maltreatment for the factor analysis. In a supplementary analysis, we confirmed that the same factor structure emerged using the continuous indicators of maltreatment.

There is an active debate in the literature regarding whether to conceptualize experiences of adversity and trauma, such as maltreatment, as “formative” or “reflective” indicators (Dovran et al., 2013; Dyregrov, Gupta, Gjestad, & Mukanoheli, 2000; Netland, 2001). Measurement models that treat items as formative indicators, such as in principal components analysis (PCA), group items into composite variables, whereas reflective models such as factor analysis assume that scores on observed indicators reflect an underlying latent construct (Widaman, 2012). This assumption has been criticized by proponents of PCA due to concerns that it is unclear whether underlying experiences of maltreatment cause scores on manifest items (e.g., frequency of being hit/kicked by a caregiver), or if scores on items cause maltreatment (see Netland, 2001 for a similar argument regarding exposure to political violence). While we appreciate this criticism, we employed factor analysis due to theoretical and methodological considerations. We believe that scores on the items can be conceptualized as reflecting underlying latent factors, such as “generalized parental abusiveness” (Briere & Runtz, 1988) or lack of safety and nurturance in the child’s caregiving environment (Bethell et al., 2017). Regarding methodological concerns, PCA assumes error-free measurement whereas factor analysis accounts for measurement error in the model (Snook & Gorsuch, 1989). Measurement error is an unavoidable reality in retrospective recall of childhood maltreatment (Hardt & Rutter, 2004) and must be dealt with in its measurement (Dovran

et al., 2013). In addition, PCA tends to produce inflated loadings when the number of items is low (>10), which can produce misleading results when used in to predict outcomes (Snook & Gorsuch, 1989). In comparison, factor analysis produces more accurate (unbiased) and less variable solutions even in cases where small numbers of items are used (Snook & Gorsuch, 1989), such as in the current study.

There are many large, publically available, nationally representative datasets (like Add Health) with rich phenotypic data that provide cost-effective opportunities to test complex research questions in longitudinal data of a sufficient sample size. To get the most out of these datasets, we need to be informed about how to best measure maltreatment, which is an important public health concern (Anda et al., 2006; Fang, Brown, Florence, & Mercy, 2012; Horwitz et al., 2001). Many of these studies—which sample thousands of participants across counties, states, and sometimes even countries—rely on indicator-level measures of maltreatment retrospectively reported on by adult participants. This leaves researchers with the task of constructing a measure of maltreatment from available indicators. The current study suggests that researchers using large, nationally-representative samples should consider factor analysis to measure maltreatment instead of constructing a cumulative index if the goal is to explain or predict important outcomes. Understanding which measurement strategies can explain a higher proportion of variance in outcomes provides opportunities to estimate better fitting statistical models and increase statistical power to detect small effects. As research on maltreatment moves towards investigating mechanisms and targets for intervention, precise and sensitive measurement is more important than ever to bolster the credibility of findings. Valid and reliable measurement using advanced statistical techniques such as

factor analysis that capture patterns of maltreatment experiences helps ensure that the conclusions drawn from research are accurate and relevant to children who have experienced maltreatment.

Table 1.1
Sample Descriptive Statistics, Adjusting for Sampling Weights

Variable	<i>M (se) or %</i>
Age at Wave I (years)	15.95 (0.12)
Sex (female)	49%
Race and Ethnicity	
White Non-Hispanic	66%
Black/African American	15%
Asian	3%
Hispanic/Latino	11%
Other	5%
Caregiver Education (less than high school)	27%
Poverty Status (below the Federal Poverty Line)	14%
Maltreatment Indicator	
Physical Abuse	14%
Sexual Abuse	4%
Emotional Abuse	10%
Physical Neglect	7%
Supervisory Neglect	7%
Social Services Involvement	4%
Number of Maltreatment Indicators Endorsed	
0	69%
1	20%
2	7%
3	3%

4	<1%
5	<1%
6	<1%
Lifetime Incidence (Wave III) Outcomes	
Foster Care	2%
Ordered to Move Out of Home	11%
Paid by Someone for Sex	3%
Ran Away from Home	8%
Homelessness	4%
Prospective (Wave IV) Outcomes	
Depressive Symptoms	5.24 (0.07)
Convicted of a Crime (≥ 1 time)	13%
Heavy Drinking (days/month)	1.21 (0.03)
Drug Use (days/month)	0.29 (0.02)

Table 1.2

Factor Loadings for Exploratory Factor Analysis

Indicator	Factor 1	Factor 2
Physical Abuse	0.70	0.07
Emotional Abuse	0.66	-0.11
Supervisory Neglect	0.57	0.00
Sexual Abuse	0.00	0.86
Physical Neglect	0.17	0.54
Social Services Investigation(s)	0.38	0.44

Note: Factor loadings $\geq .40$ are in boldface. Inter-factor correlation: $r_{1,2} = .43$.

Table 1.3

Evidence for Convergent Validity, Wave III Outcomes

	Foster Care		Ordered to Move Out		Paid by Someone for Sex		Ran Away from Home		Homelessness	
	OR [CI]	R ²	OR [CI]	R ²	OR [CI]	R ²	OR [CI]	R ²	OR [CI]	R ²
Cumulative Index	1.38 [1.30 - 1.47]	.07	1.41 [1.36 - 1.46]	.08	1.20 [1.12 - 1.27]	.02	1.39 [1.32 - 1.45]	.07	1.38 [1.31 - 1.46]	.07
Cumulative Index with Covariates	1.36 [1.29 - 1.45]	.11	1.41 [1.36 - 1.46]	.09	1.19 [1.12 - 1.28]	.13	1.39 [1.32 - 1.45]	.10	1.38 [1.31 - 1.46]	.09
Latent Factors		.40		.24		.16		.24		.24
Factor 1 ^a	0.81 [0.58 - 1.14]		1.93 [1.54 - 2.42]		0.73 [0.54 - 1.00]		1.38 [1.12 - 1.71]		1.47 [1.18 - 1.83]	
Factor 2 ^b	3.16 [2.28 - 4.38]		1.24 [0.99 - 1.55]		2.23 [1.64 - 3.02]		1.73 [1.37 - 2.20]		1.64 [1.29 - 2.08]	
Latent Factors with Covariates		.42		.25		.20		.26		.25
Factor 1 ^a	0.78 [0.55 - 1.11]		1.98 [1.56 - 2.50]		0.87 [0.63 - 1.21]		1.31 [1.05 - 1.65]		1.43 [1.15 - 1.78]	

Factor 2 ^b	3.21	1.20	1.82	1.82	1.67
	[2.28 - 4.51]	[0.95 - 1.52]	[1.30 - 2.53]	[1.41 - 2.35]	[1.31 - 2.12]

Note. Significant coefficients are in bold; Odds Ratios are significant if the 95% confidence interval (CI) does not contain 1.00.

^a Factor 1 was comprised of Physical Abuse, Emotional Abuse, and Supervisory Neglect indicators.

^b Factor 2 was comprised of Sexual Abuse, Physical Neglect, and Social Services Investigation indicators.

Table 1.4

Evidence for Convergent Validity, Wave IV Outcomes

	Depressive Symptoms		Convicted of a Crime		Drug Use		Heavy Drinking	
	b [CI]	R ²	OR [CI]	R ²	b [CI]	R ²	b [CI]	R ²
Cumulative Index	0.69 [0.56 - 0.82]	.02	1.15 [1.10 - 1.20]	.01	0.07 [0.05 - 0.09]	.00	0.03 [-0.01 - 0.07]	.00
Cumulative Index with Covariates	0.63 [0.51 - 0.76]	.05	1.16 [1.11 - 1.20]	.16	0.08 [0.05 - 0.10]	.02	0.05 [0.00 - 0.09]	.07
Latent Factors		.05		.04		.01		.02
Factor 1 ^a	0.79 [0.19 - 1.40]		1.17 [0.96 - 1.43]		0.09 [-0.04 - 0.22]		0.39 [0.15 - 0.63]	
Factor 2 ^b	0.84 [0.23 - 1.44]		1.20 [0.97 - 1.48]		0.07 [-0.05 - 0.18]		-0.32 [-0.54 - (-0.09)]	
Latent Factors with Covariates		.07		.18		.02		.08
Factor 1 ^a	0.85 [0.21 - 1.49]		1.34 [1.08 - 1.66]		0.08 [-0.06 - 0.21]		0.38 [0.14 - 0.62]	
Factor 2 ^b	0.64 [-0.01 - 1.29]		1.08 [0.87 - 1.34]		0.08 [-0.04 - 0.21]		-0.26 [-0.48 - 0.03]	

Note. Significant coefficients are in bold; unstandardized regression coefficients (b) are significant if the 95% confidence interval (CI) does not contain 0, and Odds Ratios are significant if the 95% CI does not contain 1.00.

^a Factor 1 was comprised of Physical Abuse, Emotional Abuse, and Supervisory Neglect indicators.

^b Factor 2 was comprised of Sexual Abuse, Physical Neglect, and Social Services Investigation indicators.

CHAPTER 2: PSYCHOSOCIAL CORRELATES AND CONSEQUENCES OF ADOLESCENTS' SELF-GENERATED ACADEMIC GOALS AND APPRAISALS

Abstract

Forming and pursuing goals is a critical developmental process in adolescence. Prior work has shown that the types of goals adolescents set (i.e., goal content) and how they feel about them (i.e., goal appraisals) vary by sociodemographic factors, but few studies have examined the effects of psychosocial factors (e.g., externalizing problems, trauma, social support, social strain) on goal content and appraisals. The current study examined psychosocial correlates of adolescents' academic goals and appraisals, and the impact of academic goals and appraisals on later academic performance. Adolescents recruited from urban primary care practices in low-income communities participated in baseline interviews ($n = 99$; 13-16 years old; 50% female), and 80% ($n = 79$) provided follow-up data on their past-semester grades 2 to 3 years later. Linear regressions predicting academic goals and appraisals revealed that, controlling for baseline grades, adolescents with more externalizing problems set fewer academic goals, and youth exposed to more adverse childhood experiences and with social networks characterized by higher levels of social strain appraised their academic goals as less supported and less achievable. In addition, controlling for baseline grades and sex, adolescents' appraisals of their academic goals, but not how many academic goals they had, predicted grades at follow-up. This pilot data supports the need for further exploration into the benefits of helping adolescents feel more supported and likely to achieve their academic goals, particularly by reducing social strain in their social networks.

Adolescence is a developmental period during which youth establish identities and behavior patterns that set the stage for their trajectories across the lifespan (Arnett, 2000; Patton et al., 2016). A report by the Lancet Commission for Adolescent Health states that “the adolescent and young adult years are central in the development of capabilities related to health and wellbeing” (pp. 2426) which include setting goals that foster health and wellbeing, and feeling a sense of agency to pursue and achieve those goals (Patton et al., 2016). Academic goals are especially salient in adolescence and are important for health, wellbeing, academic achievement, and occupational outcomes (Massey et al., 2008). A better understanding of psychosocial factors associated with academic goals, and the characteristics of academic goals that promote positive outcomes, is needed to inform policy and intervention to support adolescents.

Goals are a multidimensional construct that include both the content of the goal (e.g., “Get an A on my math test”) and appraisals of the goal (e.g., How likely am I to achieve this goal? Do I have the support I need to reach this goal?) (Salmela-Aro, 2009). Goal theories have been heavily influenced by Bronfenbrenner’s (2006) bioecological model of development, which proposes that developmental processes such as the formation, appraisal, and pursuit of goals are influenced by characteristics of the individual and his/her social, cultural, and developmental contexts (Little, Salmela-Aro, & Phillips, 2007; Oyserman, Grant, & Ager, 1995; Salmela-Aro, 2009; Schwartz & Drotar, 2006). For instance, individuals who attend a high school in which many classmates are engaged in school (e.g., turn in homework, participate in extracurriculars) and alumnae often go on to attend college may form goals for their own academic performance and feel relatively likely to achieve those goals. On the other hand, an

individual who attends an under-resourced school and whose classmates display fewer signs of school engagement may be less likely to form and pursue academic goals.

The extant literature on academic goals in adolescence has largely focused on exploring sociodemographic characteristics of the person such as age, gender, race and ethnicity---what Bronfenbrenner referred to as readily observable “demand characteristics” (Bronfenbrenner & Morris, 2006). For instance, youth in middle adolescence compared to younger and older youth (Lanz & Rosnati, 2002), and girls compared to boys (Massey, Gebhardt, & Garnefski, 2009), tend to set more academic goals. Controlling for socioeconomic status, adolescents tend to set similar types of goals regardless of race and ethnicity (Phinney, Baumann, & Blanton, 2001). Although sociodemographic individual differences are an important step to better understanding factors that influence goals, bioecological theory pushes researchers to consider additional features of a person and their contexts that drive human development (Bronfenbrenner & Morris, 2006; Tudge et al., 2016; Tudge, Mokrova, Hatfield, & Karnik, 2009).

Other person characteristics such as externalizing problems (e.g., impulsivity, rule-breaking, aggression, and violence; Lahey et al., 2004) may impede academic goal setting, appraisals, and pursuit. Bronfenbrenner and Morris (2006) termed such behavior a “disruptive force” that impedes or disrupts developmental processes. For example, children with externalizing behavior can develop negative, reciprocal interactions with their environments such as coercive interactions with parents, placing them at risk for maladaptive behavior patterns and poor outcomes across the lifespan, including occupational and relationship problems as adults (Caspi, Elder, & Bem, 1987). Youth

with externalizing problems tend to have poor academic adjustment including poor grades, conflictual relationships with teachers, and low school connectedness (Loukas, Cance, & Batanova, 2016; Pakarinen et al., 2017; Van der Ende, Verhulst, & Tiemeier, 2016). Youth with a history of severe externalizing problems (i.e., delinquency) tend to self-generate fewer school-related goals and are more likely than non-delinquent youth to express negative expectations for their futures (e.g., “depressed”, “criminal”, “flunking out of school”; Newberry & Duncan, 2006; Oyserman & Markus, 1990). Together, school problems and setting few positive academic goals may reciprocally influence one another and result in youth feeling pessimistic about their likelihood of achieving academic goals and perceiving a lack of support to help them reach those goals.

Socioeconomic status is a macrolevel contextual factor that can impact proximal developmental processes (Eamon, 2001; Odgers & Jaffee, 2013) including adolescents’ goals and appraisals. For instance, youth living in poverty are more likely than their wealthier peers to attend an under-resourced school and observe high rates of unemployment and low rates of college-bound young adults in their neighborhoods and schools (Evans, 2004). Thus, it is not surprising that youth in lower socioeconomic status environments tend to endorse fewer academic goals (Berger & Archer, 2016), have fewer strategies to attain their academic goals (Oyserman et al., 2011), and feel less likely to achieve their academic aspirations (Mello, 2008; Rethon, Arephin, Klineberg, Cattell, & Stansfeld, 2011; Stewart et al., 2007).

Children who grow up in poverty are also more likely to experience toxic stressors such as adverse childhood experiences (ACEs; Evans & English, 2002; Odgers & Jaffee, 2013). Exposure to ACEs including sexual abuse, neighborhood violence,

parental incarceration, and living with a parent with a mental illness may hinder adolescent goal setting and pursuit in several ways. Children exposed to ACEs do not have control over their exposure to those experiences. These children often internalize and generalize a sense of not having control over their circumstances in any domain in the present or in the future (Ackerman & Brown, 2010; Feiring et al., 2009; L. T. Ross & Hill, 2002). The more ACEs adolescents have experienced, the less likely they report they are to attend college (L. D. Brumley et al., 2017), but it is not known how ACEs impact youth's self-generated academic goals and appraisals.

Although externalizing problems and adverse childhood experiences may hinder goal-setting, other contextual factors may facilitate adolescents' academic goals and optimistic appraisals. For example, social support is broadly associated with children and adolescents' well-being (Chu, Saucier, & Hafner, 2010). Youth who feel more supported by their parents are more likely adopt academic goals (Wentzel, 1998) and achieve their academic goals (Marjoribanks, 1993, 1994; Wall, Covell, & Macintyre, 1999).

Individuals who provide social support may talk with adolescents about their goals and aspirations, discuss plans and strategies to attain them, and provide the resources to help adolescents achieve their goals (Hill & Tyson, 2009). Importantly, having social support may only facilitate academic goals and optimistic appraisals if sources of support are not also sources of psychological distress, often referred to as "social strain" (Rhodes & Woods, 1995). Youth with more social strain in their social network tend to experience poorer adjustment (Barrera, 1981; Kliever, Lepore, Oskin, & Johnson, 1998; Rhodes & Woods, 1995). Thus, the extent to which adolescents' connections to others facilitate

their academic goals may depend on the both the presence of social support and absence of social strain.

This study extends the current state of knowledge on adolescents' academic goals by exploring psychosocial individual and contextual factors that may shape academic goals and appraisals, and testing which characteristics of academic goals are associated with youths' grades. We examined the total number of academic goals that adolescents generated in response to an open-ended question about their personal goals, as well as their appraisals of how likely is it that they will achieve their academic goals and how much support they have to help them reach their academic goals. Based on the existing literature, we formed three hypotheses. First, we hypothesized that most adolescents—regardless of their person and context characteristics—would report academic goals. Second, we hypothesized that youth with higher grades, fewer externalizing problems, less exposure to ACEs, and greater social support (and less social strain) would identify more academic goals, and rate those goals as more achievable and more supported. Third, we expected that adolescents who set more academic goals, feel more likely to achieve them, and feel more supported in pursuing them would have higher grades at follow-up, controlling for their baseline grades.

Method

Participants were recruited between March 2014 and May 2015 from three primary care practices affiliated with a pediatric hospital in a large urban center in the Mid-Atlantic United States. Parents of adolescents age 13-16 years old with an upcoming wellness visit were mailed a recruitment letter and called by a trained research assistant. Adolescents were excluded if, during the recruitment call, their parent did not speak

English, endorsed physical or cognitive concerns that could interfere with the adolescent's understanding the interview questions, or if the adolescent had been diagnosed with an Autism Spectrum Disorder due to concerns that responses to questions about social relationships would have different meaning for youth with Autism. Of the 633 parents who were called, 163 had phone numbers on file that were incorrect or disconnected, and 260 were called 3 times with no response. Of the 210 parents/guardians who were reached by phone, 39 declined to participate because the parent was not interested, 13 declined because their child was not interested, 8 noted concerns with their child's ability to complete the interview and/or an Autism diagnosis, and 4 parent/guardians did not speak English. Of the 157 parents/adolescents who scheduled an interview, 100 attended their wellness appointment and completed the interview. Fifty potential participants did not attend or canceled their appointment and were unable to reschedule, and 7 declined at the time of appointment. Data were destroyed for one participant whose signed consent form could not be located. See Table 2.1 for detailed sample characteristics ($n = 99$). Adolescents were interviewed at their primary care appointment by a clinical psychology doctoral student or research nurse. Interviewers were trained in legal requirements for mandated reporting of child maltreatment and risk assessment. A parent/guardian provided consent and the adolescent provided assent. Interviewers read questions aloud to participants and recorded participant's responses, except for a Computer-Assisted Self-Interviewing procedure used for questions about adverse childhood experiences. Adolescents were compensated with a \$20 gift card.

Follow-up calls were made 2 to 3 years after participants completed the baseline

interview. Sixty-six adolescent participants completed the phone interview, and 13 parents of adolescents who could not be reached completed an abridged phone interview, for a total of 79 cases (80% retention). Reasons for attrition included not being able to reach the participant or parent (e.g., due to disconnected or incorrect phone numbers, no response to 3 calls or texts; $n = 15$), passive refusal (e.g., adolescent hung up multiple times; $n = 2$), parent declined to participate and adolescent was unreachable ($n = 2$), and was not contacted due to declining to participate in a prior follow-up attempt ($n = 1$). The 10-minute phone interview was completed by a clinical psychology doctoral student or a trained undergraduate research assistant. Adolescents were compensated with a \$10 gift card.

Measures

Demographics. Participants' date of birth, sex, race, and ethnicity were obtained from their medical record. Their age was calculated as the discrepancy between their date of birth and the date of their baseline interview. Sex was dummy coded (0 = *male*, 1 = *female*).

Adverse childhood experiences. Participants completed the 30-item Adverse Childhood Experiences Questionnaire. Twenty-six of these items were coded to assess exposure to nine ACEs: physical abuse, physical neglect, sexual abuse, verbal abuse, emotional abuse, domestic violence, parental substance use, household member with mental illness, and having a loved one in prison. This measure has been widely used and has shown predictive validity for numerous health and mental health outcomes (Anda et al., 2006; Dube et al., 2003, 2002).

Prior to answering questions about ACEs, adolescents were reminded about the

limits of confidentiality and that their safety is the top priority. At the end of the questions, a screen alerted the interviewer if the participant endorsed any responses concerning physical neglect in the past two years, physical abuse in the past two years, or sexual abuse (ever). In these cases ($n = 8$), the interviewer queried the adolescent for further details about their response. The interviewer consulted the PI or a licensed psychologist to discuss any concerns for risk. In five instances, adolescents and parents reported abuse that had previously been reported and investigated by Child Protective Services. One of these cases was in active investigation and the interviewer made a report to the child welfare agency to provide the details given by the adolescent in case any details were new. In three cases, the incident did not meet legal definitions of maltreatment and therefore was not reportable. No previously unreported instances of maltreatment emerged during the study.

We followed guidelines developed by the Centers for Disease Control and Prevention (2016) to code ACE items into binary variables representing no or little exposure (0) versus exposure (1) to an ACE. Recent studies on ACEs in urban environments (Cronholm et al., 2015; Wade, Shea, Rubin, & Wood, 2014) have pointed to neighborhood dysfunction as an important variable to incorporate into ACE scales. Thus, we incorporated the Neighborhood Climate scale (Odgers et al., 2009), which is designed to assess neighborhood problems, safety, amenities, and physical environment (e.g., “Is people being drunk and unruly in public a problem in your neighborhood?”) into our ACE index. Adolescents used a 3-point scale (0 = *not a problem*, 1 = *somewhat a problem*, 2 = *a big problem*) to rate 20 items. This questionnaire was used in the international Social Contexts of Pathways in Crime (SCoPiC) study and was originally

adapted from items used in other surveys of neighborhood conditions (e.g., the Project on Human Development in Chicago Neighborhoods) and had excellent internal consistency in this sample ($\alpha = .92$). The top quartile of the distribution (i.e., z-score above 0.35; range = -0.68 to 1.98, $M = 0.00$, $SD = 0.63$) was coded as exposure (1) (Evans et al., 2013). Dichotomized ACE scores were summed to form a cumulative ACE index following guidelines of Evans and colleagues.

Externalizing behavior. Externalizing problems were assessed via the *Adolescent Symptom Inventory-4* (ASI-4; Gadow & Sprafkin, 2008). The ASI-4 is a screening instrument for the behavioral, affective, and cognitive symptoms in a variety of adolescent psychiatric disorders. Items in the ASI-4 are based on the diagnostic criteria specific in the American Psychiatric Association's (1994) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR), and the measure has shown good evidence of internal consistency, test-retest reliability, and convergent validity (Gadow & Sprafkin, 2008). Adolescents rated 15 items assessing conduct disorder symptoms and 8 items assessing oppositional defiant disorder symptoms using a 4-point scale of *Never* to *Very Often*. Items were dichotomized so that 0 = *never or sometimes*, and 1 = *often or very often*, and the number of symptoms endorsed were summed separately for conduct disorder and oppositional defiant disorder, which were highly correlated ($r = .55$). We averaged the z-scores of the conduct disorder and oppositional defiant disorder symptom scales to form a measure of externalizing problems.

Social support. Participants completed the Arizona Social Support Interview Schedule (ASSIS; Barrera, 1981). This interview asks youth to name people who provide

five dimensions of social support: (1) private feelings (i.e. “if you wanted to talk to someone about things that were very personal and private, who would you talk to?”), (2) material needs (i.e. “who can you count on to buy you things that you really need, like a new coat or a new pair of shoes?”), (3) shared positive experiences (i.e. “if something really good happened to you, like you got good marks [grades], won a game, or got to go somewhere special, who would you tell?”), (4) social participation (i.e. “who are the people you like to do fun things with?”), and (5) advice (i.e. “who would you go to if you needed some advice...say if you had a problem with your friends, your school work, or your parents, and you wanted to know what you should do?”). Adolescents were also asked to name “negative contacts” (i.e. “who are the people who make you angry, upset, or really sad?”).

A proportion score was calculated as the number of individuals who were named only in positive categories (i.e., all categories except “negative contacts”) divided by the number of contacts named in any category (positive, negative, or both; Watson & Jaffee, n.d.). Thus, individuals named only as negative contacts or “conflicted” contacts (named in both positive and negative categories) were only included in the denominator (total network size) based on findings that social support from people who are also sources of serious negative feelings is associated with poorer adjustment (Barrera, 1981; Rhodes & Woods, 1995). Thus, the proportion score adjusts for individual differences in the total number of people youth named as social supports. It also reflects the degree to which an adolescents’ social network is free of the converse of social support, often referred to as social strain (Kliewer et al., 1998; Rhodes & Woods, 1995).

Grades. At baseline, adolescents self-reported their past-semester grades in

English, Math, and Science using a 5-point scale (1 = A-, A, or A+, 2 = B-, B or B+, 3 = C-, C or C+, 4 = D-, D, or D+, and 5 = F). Grades were recoded to be consistent with the scale used at follow-up (1 = D or F, 2 = C, 3 = B, 4 = A) and averaged across subjects. At follow-up (which occurred during summer months), adolescents self-reported their past-semester grades or their grades from their last semester of high school ($n = 36$ graduated high school, $n = 5$ dropped out of high school) using a 4-point scale of (1 = *mostly Ds or Fs (Below Average)*, 2 = *mostly Cs (Average)*, 3 = *mostly As and Bs (Very Good)*, 4 = *All As (Excellent)*; Kuncel, Credé, & Thomas, 2005). In 16% ($n = 13$) of cases reached for follow-up, the adolescent could not be reached and their parent reported their grades. In an additional 29 cases, both the adolescent and the parent were reached, but only the report on grades provided by the adolescent was used. We performed a dependent-samples t-test for the 29 cases on which we had both adolescent and parent report to confirm that grades did not differ significantly by reporter (adolescent ($M = 2.52$, $SD = 0.75$) versus parent ($M = 2.33$, $SD = 0.88$); $t(26) = 1.22$, $p = .23$). We also performed an independent-samples t-test to confirm that grades did not differ significantly by high school status (currently in high school ($n = 38$, $M = 2.61$, $SD = 0.75$) versus no longer in high school ($n = 41$, $M = 2.83$, $SD = 0.74$); $t(77) = -1.33$, $p = .19$).

Goal content and appraisals. We used the goal elicitation and rating procedure from the Health-Related Hindrance Inventory (Schwartz & Drotar, 2006), which is based on the Personal Projects Analysis developed by Little and Chambers (2004). Adolescents were provided with a definition of goals and examples of common adolescent goals (Schwartz & Parisi, 2013), and asked to “list your own current personal goals that are important to you.” Next, adolescents were asked to identify their 3 “most important”

goals and use 6-point Likert-type scales to rate these goals on perceived achievability of the goal and support to help achieve the goal. We averaged ratings of achievability for academic goals to form an “achieveability appraisals” variable, and perceived support for academic goals to form a “support appraisals” variable.

Goal coding procedure. Two independent coders used a coding scheme adapted from the Personal Projects Analysis (Little & Chambers, 2004) for adolescent goals (Schwartz & Parisi, 2013). Using this coding scheme, each goal was given a content code (academic, job/occupational, health, body/appearance, interpersonal, intrapersonal, leisure, religion, administrative/maintenance). Goals were also coded for future orientation such that the goal reflected plans beyond high school and/or aspirations for emerging adulthood (Schwartz & Parisi, 2013). Thus, each goal was independently coded by the two coders for content (1 of 9 categories) and future orientation (yes/no). Coders had 94% reliability and easily resolved discrepancies through discussion and review of the codebook. Table 2.3 provides descriptions of the coding categories and example goals from the current sample. The full codebook is available from the authors by request.

Data Analysis Plan

Descriptive statistics were performed in SPSS, and ordinary least squares (OLS) linear regressions using maximum likelihood estimation were performed in MPlus. Maximum likelihood has good properties for handling missing data including when there is up to 25% missing data on the outcome (Allison, 2002). Only participants who both completed the goal interview ($n = 94$) and reported academic goals ($n = 82$) provided appraisal ratings; thus, we had 17% missing data on goal appraisals. We had 20% missing data on follow-up grades due to attrition. All other covariates had less than 5% missing

data. Power analyses suggested that we had approximately 80% power to detect medium sized effects in regressions with 6 predictors (Faul, Erdfelder, Lang, & Buchner, 2007). Correlations among similar constructs reported in prior studies have ranged from small to medium in size (Daniels et al., 2008; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Wall et al., 1999).

Three OLS maximum likelihood linear regressions were performed predicting characteristics of academic goals (i.e., number of academic goals, achievability appraisals of academic goals, and support appraisals of academic goals) from baseline grades, externalizing problems, adverse childhood experiences, and social support. Next, we performed a OLS maximum likelihood linear regression predicting grades at follow-up from sex, baseline grades, number of academic goals, achievability appraisals of academic goals, and support appraisals of academic goals.

Results

See Table 2.1 for means and standard deviations of continuous variables and percentages for categorical variables. As shown in Table 2.2, bivariate correlations were in the expected directions and small to moderate in size (Cohen, 1992). Independent-samples t-tests revealed that follow-up grades differed significantly by sex ($t(64.54) = -4.65, p < .001$) with girls ($M = 3.05, SD = 0.56$) reporting higher grades on average than boys ($M = 2.33, SD = 0.76$). Girls (43/48, 89%) were also more likely than boys (36/51, 71%) to participate in follow-up phone interviews ($\chi^2 = 5.53, p = .02$). Thus, sex was included as a covariate in the model predicting follow-up grades. The other outcomes did not differ by sex and it was not controlled in analyses predicting academic goals,

achievability appraisals, or support appraisals. Age was not significantly associated with participating in follow-up ($t(97) = -1.13, p = .26$) or any outcome variables (see Table 2.2); thus, it was not included as a covariate in any multivariate analyses.

Goal Content

The majority of adolescents (87%) named at least one academic goal. The next most commonly generated goals were job/occupational (63%), leisure (40%), and interpersonal (34%) goals. Eighty-five percent of adolescents named at least one future-oriented goal. See Table 2.3 for example goals from the current sample and descriptive statistics on the goal categories.

Psychosocial Associates of Academic Goals

Table 2.4 displays the results of three maximum likelihood OLS linear regressions predicting academic goals and appraisals from baseline grades, externalizing problems, ACEs, and social support. Not surprisingly, youth with higher grades set more academic goals, though this finding was trend-level ($p = .06$), and appraised their academic goals as more achievable. Adolescents with more externalizing problems generated fewer academic goals. Youth with a greater proportion of social support (and therefore lower proportion of social strain) in their social networks appraised their academic goals as more supported and more achievable. There was a trend-level finding ($p = .06$) that youth exposed to more ACEs appraised their academic goals as less supported.

Appraisals of Academic Goals Predict Later Grades

Table 2.5 describes the results of a maximum likelihood OLS regression predicting grades at follow-up from baseline grades, sex, goal appraisals, and number of academic goals. Externalizing problems, ACEs, and social support were not included in

the model predicting follow-up grades to preserve power and because they were not correlated with grades at the bivariate level (see Table 2.2). Youth with higher grades at baseline, and girls compared to boys, had higher grades at follow-up. Youth who felt more likely to achieve their academic goals, and those who felt they had more support for their academic goals, reported higher grades at follow-up; however, the total number of their academic goals did not relate to follow-up grades.

Discussion

Goals are an important engine of development, particularly in adolescence (Massey et al., 2008), that are shaped by the characteristics of a person, his/her context, and time (Little et al., 2007; Salmela-Aro, 2009). The current study examined psychosocial individual and contextual correlates of adolescents' academic goals and appraisals, and the impact of academic goals and appraisals on later grades. Controlling for grades, youth with more externalizing problems generated fewer academic goals, adolescents exposed to more ACEs appraised their academic goals as less supported, and youth with more social support (i.e., less social strain) appraised their academic goals as more supported and more achievable. In addition, controlling for grades and sex, adolescents' appraisals of their academic goals, but not how many academic goals they set, predicted their grades prospectively.

Our sample of adolescents from predominately low income households and racial/ethnic minority status backgrounds set goals of similar content to adolescents in prior studies (Massey et al., 2009; Schwartz & Parisi, 2013). Like these prior studies, academic goals were the most commonly reported type of goal. In multivariate models, youth with higher grades and fewer externalizing problems generated more academic

goals. It is not surprising that youth with higher grades set more academic goals, and this is likely a bidirectional relationship in which obtaining good grades further elicits academic goal setting. Youth with externalizing behaviors often experience poor school adjustment (e.g., low school connectedness, more conflict with teachers, and disciplinary problems; Loukas et al., 2016; Pakarinen et al., 2017), which likely results in setting fewer academic goals. Such problems also tend to result in poor academic performance (Van der Ende et al., 2016), but we did not observe the expected association between externalizing behavior and grades in this sample. The null finding in this sample may be due to our reliance on self-reported grades. Youth with externalizing problems tend to have lower grades (Van der Ende et al.), and youth with low grades tend to be less accurate in reporting their own grades compared to youth with high grades (Kuncel et al., 2005).

Adolescents with a greater proportion of support, and lower proportion of social strain, in their social networks appraised their academic goals as more supported and more achievable. This finding is consistent with calls for additional research on the quality of relationships, including social support and social strain, in children and adolescents' social networks (Chu et al., 2010). Though only marginally significant ($p = .06$), adolescents who were exposed to more ACEs appraised their academic goals as less supported. This may be in part because youth exposed to ACEs tend to have less access to socially supportive relationships (Jaffee, 2017), and traumatic stress can impair adolescents' ability to effectively communicate their feelings and needs in relationships (Cook et al., 2017). Some studies have shown that perceived social support buffers youth from the adverse effects of toxic stress on mental health (Jaffee, 2017; Miller, Fagan, &

Wright, 2014; Powers, Ressler, & Bradley, 2009). However, for social support to provide stress-buffering benefits, youth exposed to adversity need access to high levels of such support and be able to take advantage of that support. Thus, the current findings suggest that youth exposed to ACEs tend to feel less supported in their academic goals, and therefore may not have sufficient social support to confer stress-buffering benefits.

How youth felt about their academic goals, but not how many academic goals they reported, predicted their grades 2 to 3 years later. As expected, youth who appraised their academic goals as more supported and more achievable at baseline had higher grades at follow-up. However, the number of academic goals that youth generated at baseline was not related to their grades at follow-up. This is particularly interesting given that we used an open-ended goal elicitation procedure, as opposed to measuring adolescents' endorsements of pre-defined goals. This ensures that the academic goals were personally relevant to the respondent (Massey et al., 2008). Thus, even the number of personally relevant academic goals were not as important for later academic performance as youth's appraisals of support and attainability of those goals.

A few limitations should be considered when interpreting the current findings. First, the composition and size of our sample present some limitations. Our sample included predominately adolescents of racial minority status who were recruited in low income communities. Future work should explore the extent to which findings are generalizable to other populations. Due to relatively small sample size and only two time-points, we were not able to test complex models of bidirectional influences of goal processes, individual differences, and contextual factors. Our analyses were restricted to use of multiple regression, which assumes that each predictor exerts an independent

effect on the outcome. This “additive” model is a first step to establish relations between these variables, but a larger sample size and more sophisticated analyses such as cross-lagged longitudinal models are needed to better test our theoretical framework that developmental processes (e.g., goals), individual factors (e.g., externalizing behavior), and contextual factors (e.g., social support, social strain, ACE exposure) interact to influence development (Tudge et al., 2016, 2009). In addition, there are many more person and contextual factors that may impact academic goals and appraisals that should be explored in future work, including self-control, grit, peers’ academic goals and appraisals, and school climate (Church et al., 2001; Duckworth & Gross, 2014; Nelson & DeBacker, 2008).

Second, there were some limitations in our measurement of ACEs and grades. Our measure of ACEs was based on adolescent self-report. Youth completed the measure of ACEs using headphones and a private screen to maximize the likelihood that they would feel comfortable reporting ACE exposure, but it is possible that some did not disclose due to concerns about breaches of confidentiality or trauma-related avoidance symptoms. Future work using additional sources, such as parent-report and child welfare reports of maltreatment, would help strengthen the measure of ACEs. Grades were measured by self-report at baseline, and self- and parent-report (when self-report was unavailable) at follow-up. A meta-analysis found high correlations ($r = .82$ to $.84$) between self-reported and actual grades in Math, English, and Science, suggesting that self-reported grades are reasonably good reflections of actual grades; this was particularly true among youth with higher grades (Kuncel et al., 2005). At follow-up, we substituted parent-report of grades when adolescents were not able to be reached ($n = 13$). This

introduces the possibility that measurement error due to different reporters biased our outcome measure of grades. However, we confirmed that grades did not differ significantly by reporter (parents versus adolescent).

Third, we focused on assessing adolescents' appraisals of their self-identified academic goals due to our study aim to compare the relative contribution of academic goal content and appraisals to grades. There are also ways of sub-dividing the content of goals, for example, into mastery (wanting to learn a skill) versus performance (wanting to do better compared to someone else) goals, and approach (desirable outcomes to pursue) versus avoidance (undesirable outcomes to prevent) goals (Grant & Gelety, 2009). These distinctions as measured by pre-defined scales (as opposed to open-ended goal elicitation procedures as used in this study) have shown that performance and approach goals, but not mastery goals, tend to predict grades (Harackiewicz, Barron, Tauer, & Elliot, 2002). While we did not have the statistical power to examine such sub-domains of academic goal content, future work should explore additional dimensions of academic goal content and test whether psychosocial correlates identified in the current study differentially relate to performance versus mastery goals, and approach versus avoidance goals, and if any of these aspects of academic goal content predict later grades when controlling for goal appraisals.

The current findings have important implications for research, policy, and intervention to improve the wellbeing and academic outcomes of adolescents. An encouraging finding was that adolescents with a greater proportion of supportive relationships, and lower proportion of social strain, in their social network had more optimistic appraisals of their academic goals, which in turn predicted better academic

performance prospectively. This suggests that increasing the proportion of supportive relationships in an adolescent's social network, and reducing social strain, may increase their perceptions of support and achievability of academic goals. Increasing the proportion of social network members who provide positive support (e.g., sharing good news, sharing private feelings, having fun, providing material support) could be accomplished in the context of afterschool or mentoring programs (Rhodes, Grossman, & Resch, 2000; Van Dam et al., 2018; Vandell, Reisner, & Pierce, 2007). Interventions should also help adolescents recognize and reduce social strain in their social network. This could be accomplished by psychoeducation about healthy versus unhealthy relationships, for example, as part of a social-emotional curriculum implemented in middle or high schools or as a topic of discussion for mentors and mentees in a mentoring intervention.

Our findings highlight that increasing social support for academic goals is particularly important for youth exposed to ACEs, who appraised their academic goals as less supported. There is some evidence that increasing social support increases optimism of future expectations among youth exposed to ACEs (Greeson, Usher, & Grinstein-Weiss, 2010). Interventions that target social support for youth exposed to ACEs, such as promoting relationships between natural mentors and youth in foster care (Thompson, Greeson, & Brunsink, 2016), should examine whether changes in adolescents' goals and appraisals mediate intervention effects. In addition, interventions that focus on reducing ACE exposure should measure the impact on adolescents' academic goals and appraisals. For instance, an anti-poverty intervention (New Hope) for low-income adults found that youth of parents who participated in the program had higher future orientation compared

to youth whose parents were randomly assigned to the control group (McLoyd, Kaplan, Purtell, & Huston, 2011). In summary, results suggest that for youth with academic goals, promoting their appraisals of support for and likelihood of achieving their academic goals, such as by increasing their social support and reducing social strain, is potentially more important for their academic performance than helping them set more academic goals.

Table 2.1

Sample Characteristics (n = 99)

Variable	<i>M (SD; range) or %</i>
Demographics	
Age	15.24 (0.88; 13.17 to 16.92)
Sex (female)	50
Race and Ethnicity	
White Non-Hispanic	3
Black/African American Non-Hispanic	87
Asian Non-Hispanic	3
Hispanic/Latino	2
Other	4
Types of Adverse Childhood Experiences	
Parent Substance Use	28
Household Member with Mental Illness	30
Parent/Loved One Incarcerated	33
Mother Treated Violently	13
Verbal Abuse	10
Emotional Abuse	21
Physical Abuse	6
Sexual Abuse	4
Physical Neglect	11
Neighborhood Problems	23
Number of Adverse Childhood Experiences	
0	25
1	26

2	19
3	12
4	10
5	3
6	4
≥7	0
Externalizing Problems (z-score)	0.00 (0.88; -0.64 to 3.30)
Proportion of Social Network Uniquely Positive Goals	0.83 (0.18; 0.10 to 1.00)
Total Number of Goals (all categories)	5.06 (2.21; 1 to 13)
Number of Academic Goals	2.10 (1.30; 0 to 6)
Achievability Appraisals-Academic Goals	4.30 (0.67; 2 to 5)
Support Appraisals-Academic Goals	4.00 (1.11; 0 to 5)
Baseline Grades	2.98 (0.69; 1.33 to 4)
Follow-up Grades	2.72 (0.75; 1 to 4)

Table 2.2

Bivariate Correlations among Continuous Variables

	1	2	3	4	5	6	7	8
1. Age	1.00							
2. Externalizing Problems	-.17	1.00						
3. Adverse Childhood Experiences	.003	.41**	1.00					
4. Proportion of Social Network Uniquely Positive	-.02	-.28**	-.24*	1.00				
5. Number of Academic Goals	.10	-.24*	.02	.03	1.00			
6. Achievability Appraisals-Academic Goals	-.03	-.01	-.12	.16	-.08	1.00		
7. Support Appraisals-Academic Goals	-.16	-.22*	-.32**	.27*	-.23*	.24*	1.00	
8. Baseline Grades	.10	.01	.02	.08	.13	.20†	.06	1.00
9. Follow-up Grades	-.10	-.02	-.15	-.12	-.08	.32*	.20	.38**

† $p < .10$, * $p < .05$, ** $p < .01$

Table 2.3

Goal Definitions, Examples, and Descriptive Statistics

Goal Categories and Definitions ^a	Examples from Current Sample	% that named at least one goal in the category
Academic: school-related goals, activities specifying grades, graduation, and homework	<ul style="list-style-type: none"> • Pass geometry • Finish high school • Less detentions 	87
Job/Occupational: job-related, career aspirations	<ul style="list-style-type: none"> • Get a summer job • Become a veterinarian • Be a professional basketball player 	63
Health: general health or management of an illness	<ul style="list-style-type: none"> • Get more sleep • Cut back on unhealthy foods I eat 	21
Body/Appearance: purposefully changing one's body; altering appearance	<ul style="list-style-type: none"> • Be fit and muscular • Add color to my hair 	16
Relationship: dealing with others on a personal level; communicating or interacting with friends, family, and romantic interests/partners	<ul style="list-style-type: none"> • Have a better relationship with my mom • Stay close with friends • Raise a family 	34
Intrapersonal: pursuing self-improvement of mind, body, or spirituality (psychological as opposed to physical); attitudes and values related only to the self	<ul style="list-style-type: none"> • Control my anger issues • Get better with my attitude 	20
Leisure: activities done for pleasure (e.g., sports, shopping, hobbies)	<ul style="list-style-type: none"> • Practice my guitar more • Play soccer more often • Be on the varsity basketball team next year 	40

Religion: demonstrating religious faith/affiliations; service work with a religious organization	<ul style="list-style-type: none"> • Read every book in the Bible 	1
Administrative/Maintenance: daily chores; upkeep of room, cars, pets; time management and organization	<ul style="list-style-type: none"> • Clean my room • Save money • Move out of the city 	9
Future-oriented goals: could include any of the above goals that indicate plans for future beyond adolescence, and/or expectation to reach a stage of emerging adulthood and beyond	<ul style="list-style-type: none"> • Support my family when I am an adult • I want to have a master's degree • Get into a good college 	85

Note. Valid percentages are presented.

^a Definitions adapted from Schwartz & Parisi (2013)

Table 2.4

Maximum Likelihood OLS Linear Regressions Predicting Characteristics of Academic Goals

Variable	Total Academic Goals			Achievability Appraisals			Support Appraisals		
	b (se)	β	<i>p</i>	b (se)	β	<i>p</i>	b (se)	β	<i>p</i>
Baseline Grades	0.33 (0.18)	0.18	.06	0.30 (0.12)	0.26	.01	0.21 (0.16)	0.13	.20
Externalizing Problems	-0.58 (0.17)	-0.38	.001	0.05 (0.12)	0.05	.66	-0.22 (0.17)	-0.15	.19
Adverse Childhood Experiences	0.13 (0.08)	0.16	.13	-0.02 (0.06)	-0.04	.77	-0.15 (0.08)	-0.20	.06
Proportion of Social Network Uniquely Positive	0.01 (0.66)	.002	.98	1.54 (0.46)	0.36	.001	2.16 (0.66)	0.35	.001
Model R ²	.15			.23			.29		

Table 2.5

Maximum Likelihood OLS Linear Regression Predicting Grades at Follow-up

Predictor	Follow-up Grades		
	b (se)	β	<i>p</i>
Baseline Grades	0.27 (0.09)	0.24	.005
Sex	0.72 (0.13)	0.46	<.001
Number of Academic Goals	-0.08 (0.05)	-0.12	.15
Achievability Appraisals	0.26 (0.09)	0.27	.005
Support Appraisals	0.15 (0.06)	0.22	.02
Model R ²	.55		

Note. Sex was dummy coded with male as the reference category (0).

**CHAPTER 3: OPTIMISTIC COLLEGE EXPECTATIONS PROMOTE
EDUCATIONAL ATTAINMENT: EVIDENCE FROM A QUASI-
EXPERIMENTAL SIBLING STUDY**

Abstract

When adolescents are asked how likely they think it is that they will go to college, does their answer influence what they will actually do? Typically, it is difficult to determine whether optimistic expectations promote academic achievement or just reflect a reasonable forecast of what is likely to happen to them. We used a sample of siblings from the National Longitudinal Study of Adolescent to Adult Health ($n = 1766$) to test whether associations between college expectations and educational attainment remained after accounting for unobserved family factors that may shape both educational expectations and attainment. Controlling for grades and IQ, adolescents who had more optimistic college expectations than their sibling also had higher educational attainment as adults; this was particularly true in higher socioeconomic status families. These findings suggest that optimistic college expectations promote educational attainment, unless youth live in poverty or with parents with low educational attainment.

The ability to imagine possible futures is a fundamental human process (Seligman, Railton, Baumeister, & Sripada, 2013). Forming expectations for the future is a particularly significant developmental task of adolescence that promotes identity development, preparation for transition to adulthood, and behavior that aligns with desired futures (Massey et al., 2008; Nurmi, 1991). Attending college represents a salient future expectation held by many adolescents (Massey et al., 2008) for which goal attainment is readily measurable. Greater educational attainment is increasingly necessary for upward mobility in today's labor market (Autor, 2010) and has significant impacts on health and wellbeing (Gakidou, Cowling, Lozano, & Murray, 2010; Marmot et al., 2008). For these reasons, Healthy People 2020 highlights education as one of five key social determinants of health and calls for research on factors that shape educational attainment (US Department of Health and Human Services & Office of Disease Prevention and Health Promotion, 2011).

Youth who hold more optimistic expectations for their academic futures tend to have higher grades (Khattab, 2015; Rothon et al., 2011) and higher educational attainment as adults (Beal & Crockett, 2010; Marjoribanks, 2003), even controlling for important individual differences including cognitive ability (Lemos, Abad, Almeida, & Colom, 2014) and prior academic achievement (Rothon et al., 2011). Educational expectations may directly promote academic outcomes by motivating adolescents to engage in goal-directed behaviors that help them attain their desired futures. Youth who think it is more likely that they will attend college show more effort in their high school coursework (e.g., by completing assignments, spending time on homework, coming prepared to class, and paying attention; Domina, Conley, & Farkas, 2011) and participate

in more extracurricular activities, which helps explain their relatively greater educational attainment in adulthood (Beal & Crockett, 2010).

However, such correlational studies make it difficult to determine whether optimistic expectations truly motivate adolescents to achieve their goals or if they just reflect a reasonable forecast of what is likely to happen to them, given their circumstances (Kao & Thompson, 2003). In contrast, experimental and quasi-experimental studies allow for stronger causal inference about the role of adolescents' expectations in shaping their educational outcomes. For example, one intervention study found that helping 8th graders develop expectations and strategies for their academic futures improved their academic performance compared to youth randomly assigned to a control group (Oyserman, Bybee, & Terry, 2006).

Such intervention studies examine whether working with adolescents to adopt optimistic educational expectations and relevant strategies can boost academic performance, which is a different question from whether naturally-occurring individual differences in those expectations are related to educational outcomes. Quasi-experimental designs like sibling comparisons can be helpful for the latter question (Jaffee et al., 2012). Comparing full biological siblings can control for unobserved, shared factors *within* the family (e.g., genes, family cohesion), as well as environmental differences *between* families (e.g., racial minority status, income, neighborhood) that can impact college expectations and educational attainment (Lahey & D'Onofrio, 2010).

Monozygotic twins, who share genotype and family environment, provide the most stringent test of whether differences in siblings' expectations promote differences in their educational outcomes. Although the design does not automatically control for

unobserved, nonshared factors within the family (e.g., if one sibling has a higher IQ than the other), these can be included as measured covariates (Lahey & D’Onofrio, 2010). The sibling comparison design has been under-utilized in psychology (Jaffee et al., 2012; Lahey & D’Onofrio, 2010) and represents an ideal opportunity to better understand the nature of the association between college expectations and educational attainment.

Studying the degree to which college expectations may predict educational attainment is complicated by an income-achievement gap that persists throughout children’s school years, resulting in the under-representation of low income students in colleges and universities (Reardon, 2013). Because goals are shaped by opportunities and constraints in an individual’s environment (Massey et al., 2008), it is not surprising that youth from lower income households tend to rate their academic aspirations as less attainable than their wealthier peers (Mello, 2008; Rothon et al., 2011; Stewart et al., 2007). However, many adolescents from low income backgrounds do aspire to attend college (Pettit, Davis-Kean, & Magnuson, 2009), and educational expectations have risen over time with more adolescents from all social backgrounds expecting to go to college now than ever before (Goyette, 2008).

It may be that the degree to which future expectations impact educational attainment varies by socioeconomic status (SES). One possibility consistent with an *overwhelming-risk* hypothesis (Li, Nussbaum, & Richards, 2007) is that optimistic college expectations are associated with higher educational attainment for youth living in middle to high income households, but not poverty (Mahatmya & Smith, 2017). This posits that youth who lack financial resources and social capital may not get to college no matter how much they want or expect to go to college. A second possibility, consistent

with *resource substitution* theory (C. E. Ross & Mirowsky, 2006), is that optimistic college expectations are associated with high educational attainment for youth in poverty, but not youth living in higher income households. In this case, a strong desire to attend college may help adolescents from low-income backgrounds compensate for the lack of social or financial capital that might otherwise prevent them from attending.

The current study uses a sibling comparison design to test whether associations between college expectations and educational attainment remain after accounting for unobserved family factors that may shape both future expectations and educational attainment. We compared same-sex, full biological siblings because sex is correlated with both college expectations and educational attainment (Gakidou et al., 2010; Mello, 2008). We also controlled for intelligence and grades, which can differ among siblings and predict academic expectations (Lemos et al., 2014) and educational outcomes (Duckworth, Quinn, & Tsukayama, 2012; Lleras, 2008). First, we expected that adolescents with more optimistic college expectations, compared to a sibling with less optimistic college expectations, would have higher educational attainment. Second, we hypothesized that family SES would moderate effects of college expectations on educational attainment, although we did not make specific predictions about the direction of the effect given theoretical and empirical grounds for different moderator patterns (Li et al., 2007; Mahatmya & Smith, 2017; C. E. Ross & Mirowsky, 2006). Finally, supplementary analyses tested the hypotheses in a sub-sample of monozygotic twins to provide the most stringent test of whether expectations promote educational attainment.

Method

The current study represents secondary data analysis of The National

Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health study procedures were approved by the Human Subjects Review Committee of the University of North Carolina at Chapel Hill. Wave I data were collected in 1994-1995 from 90,118 seventh to twelfth grade students aged 11 to 17 years sampled from 145 middle and high schools using a stratified, random school selection procedure. Of the students who completed questionnaires in schools, 20,745 students and 17,670 of their parents also completed in-home interviews in 1995. One year later, 14,738 adolescents completed a follow-up in-home interview (Wave II). In 2001-2002, 15,197 participants completed a third in-home interview (Wave III) at which time their ages ranged from 18 to 26 years. Finally, 15,701 participants aged 24 to 32 years completed a fourth in-home interview (Wave IV) in 2007-2008. The current study included siblings who had data available on the outcome variable (educational attainment measured at Wave IV). A total of 6,278 siblings participated in Add Health; 3,908 cases were excluded because siblings were the opposite sex, half-siblings, or unrelated siblings raised in the same household. An additional 604 cases were excluded because one or both siblings did not have data on educational attainment (391 individuals were missing on educational attainment; an additional 213 cases were excluded because although they had data on educational attainment, their sibling did not). Thus, the current analytic sample consisted of 1,766 same-sex full siblings (914 non-twin full siblings, 428 dizygotic twins, and 424 monozygotic twins) from 883 families in which both siblings had non-missing data on educational attainment at Wave IV. Same-sex twin pairs with unknown zygosity were coded as dizygotic. The sample size was considered appropriate based on prior sibling comparison studies in Add Health (Bauldry, Shanahan, Russo, Roberts, & Damian, 2016,

$n = 2,766$ siblings from 1,383 families; Jaffee, Lombardi, & Coley, 2013, $n = 618$ same-sex male full siblings from 309 families). As per Add Health study design, many siblings did not have sample weights, so we did not restrict the sample to individuals with valid sample weights, as has been the convention in other sibling comparison studies in Add Health (Bauldry et al., 2016; Jaffee et al., 2013).

Measures

Demographics. Age was calculated as the discrepancy between date of birth and the date of the participant's Wave I interview. Participants reported their sex, race, and ethnicity at Wave I.

Verbal IQ. At Wave I, participants completed the Adolescent Health Picture Vocabulary Test, which was adapted from the Peabody Picture Vocabulary Test-Revised (Dunn & Dunn, 1981). Raw scores were standardized based on age norms, and converted to percentiles.

Grades. As part of the Wave 1 in-home survey, participants self-reported their letter grades during the most recent grading period in English, Math, History, and Science (1 = *D or lower*, 2 = *C*, 3 = *B*, 4 = *A*). We calculated the average of their grades.

Socioeconomic status. We followed methods previously used with the Add Health data (Goodman, 1999) to measure two indicators of SES: 1) family income and 2) parent's educational attainment.

Family income. Caregivers reported annual household income and number of people in the home at Wave I. The 1995 Federal Poverty Line guidelines (US Department of Health and Human Services, 1995) were followed to calculate percent of poverty threshold by dividing income by the poverty threshold that corresponded to the number

of people living in the home. Next, we followed methods of Goodman (1999) to code percent of poverty threshold into SES gradients (1 = *less than 1.5 times the Federal Poverty Threshold (FPT)*, 2 = *1.5 to less than 2.5 times the FPT*, 3 = *2.5 to less than 4 times the FPT*, 4 = *greater than 4 times the FPT but not in the top 5% of US household incomes*, and 5 = *in the top 5% of the US household incomes*).

Parent education. Parents reported on their highest level of educational attainment and that of their current partner/spouse. Highest educational attainment in the household (parent or parents' partner/spouse) was coded using a 5-point scale (1 = *less than a high school degree*, 2 = *high school degree, GED, or vocational training instead of high school*, 3 = *vocational training after high school, or some college*, 4 = *college graduate*, 5 = *professional training beyond college*; Goodman, 1999).

College expectations. At Wave I, participants used a 5-point scale of 1 (*low*) to 5 (*high*) to rate their college expectations ("How likely is it that you will go to college?").

Educational attainment. Participants reported their educational attainment at Wave IV, which was coded into the same 5 categories as parent education (1 = *less than a high school degree*, 2 = *high school degree, GED, or vocational training instead of high school*, 3 = *vocational training after high school, or some college*, 4 = *college graduate*, 5 = *professional training beyond college*).

Data Analysis Plan

Analyses were conducted in Stata 14.0. Following methods of Begg and Parides (2003) and Rabe-Hesketh and Skrondal (2012), random effects models were computed to estimate whether within- and between-family differences in college expectations are associated with within- and between-family differences in educational attainment. In

contrast to a traditional, Ordinary Least Squares (OLS) regression model, random effects models are more appropriate when analyses involve nested data, such as siblings nested within families. Data for sibling pairs violates the independence assumption inherent to the OLS regression model. Thus, random effects models are used to produce more accurate estimates with adjusted degrees of freedom. The analytic sample included participants with non-missing data on the outcome variable, educational attainment ($n = 1766$). Less than 5% of participants had missing data on the covariates, except for the measures of family SES which had a greater proportion of missing data (i.e., 22% of participants were missing data on family income and 13% missing on parent education). The random effects models were estimated via maximum likelihood (Stata command `mle`), which produces estimates that are consistent, efficient, and asymptotically normal (Allison, 2002).

First, to perform the random effects models, family-average scores were calculated for all covariates by computing the mean of siblings' scores. Next, we used the `xtreg` command to examine the intraclass correlation (ρ), using a random-effects only model which estimates the amount of within-family variance compared to between-family variance. Intraclass correlation values closer to 1 indicate more similar scores within families (and bigger differences between families), and values closer to 0 indicate more variability within families (and smaller differences between families; Rabe-Hesketh & Skrondal, 2012).

Next, random effects models were estimated by using the `xtreg` command to regress educational attainment (Wave IV) on individual college expectations (Wave I), family-average college expectations (Wave I), individual age (Wave I), family-average

age (Wave I), individual verbal IQ (Wave I), family-average verbal IQ (Wave I), family SES (Wave I), and the interaction of individual college expectations and family SES. Interaction terms were probed using the margins command to examine the effect of college expectations at different levels of SES (i.e., family income or parent education). We calculated the proportional reduction in the prediction error variance, which is interpreted in a similar fashion to the proportion of variance explained (R^2), by comparing the estimate of the between-family standard deviation of the random intercept (σ_u) and the within-family standard deviation (σ_e) of each model without and with covariates (Rabe-Hesketh & Skrondal, 2012, pp. 135-136). Finally, we repeated the regression models using only the subsample of monozygotic twins.

Results

See Table 3.1 for descriptive statistics of study variables. As shown in Table 3.2, bivariate Pearson's correlations were in the expected directions, with medium sized correlations (Cohen, 1992) between covariates (except for age) and educational attainment. Table 3.2 also displays intraclass correlations, which fell between .41 and .63, indicating that there was a moderate amount of between- and within-family variability in study variables to justify the examination of both within- and between-family effects. Although college expectations were highly negatively skewed (i.e., 50% of adolescents had optimistic expectations at or above 4.5 on a scale of 1 to 5), the intraclass correlation suggests that siblings were far from perfectly correlated in their expectations. In 51% of the pairs in the sample, both siblings rated their college expectations the same; 30% of pairs were 1 point discrepant, and the remaining 19% of pairs were more than 1 point discrepant. Three percent of pairs in the sample ($n = 23$ pairs) were extremely discrepant

(one sibling rated their likelihood of going to college as “1” and the other rated it as “5”).

Within-Family Effects of College Expectations on Educational Attainment

Random effects regressions were performed predicting educational attainment at Wave IV from age, family-averaged age, verbal IQ, family-averaged verbal IQ, grades, family-averaged grades, college expectations, family-average college expectations, family SES. Model 1 used the family income measure of SES, and Model 2 used the parent education measure of SES. The second step of each model included interaction terms between college expectations and family SES at Wave I (see Table 3.3). Accounting for potentially confounding unobserved variables that differ between families, individuals with more optimistic college expectations at Wave I had higher educational attainment at Wave IV than their siblings with less optimistic college expectations. Family-averaged college expectations were also significant, indicating that children from families with more optimistic college expectations on average had higher educational attainment than children from families with less optimistic college expectations. Regarding control variables, adolescents with higher IQ and higher grades, and families with higher average grades, had higher educational attainment. Finally, youth living in families with higher incomes and higher parental education tended to have higher educational attainment in young adulthood.

The Effect of College Expectations on Educational Attainment Depends on Family SES

The second step of Models 1 and 2 included an interaction term to test whether the effect of college expectations depends on family income (Model 1) and parent education (Model 2). The pattern of results was consistent across the two models. In

Model 1, the interaction of college expectations and family income was significant ($b = 0.06$, $SE = 0.02$, $p = .01$). Post-hoc analyses of the interaction revealed that the association between college expectations and educational attainment was stronger in higher income gradients (see Figure 1a). The association between college expectations and educational attainment was not significant at the lowest income gradient of less than 1.5x the Federal Poverty Threshold ($b = 0.05$, $SE = 0.04$, $p = .21$), but was significant ($p < .01$) for all other income levels, with coefficients ranging from $b = 0.10$ to 0.27 ($p < .001$).

Model 2 replicated the results of Model 1 with an alternative measure of family SES: parent education. As in Model 1, the interaction term was significant ($b = 0.08$, $SE = 0.02$, $p < .001$) such that the strength of the association between college expectations and educational attainment increased as parental education increased (see Figure 1b). The association between college expectations and educational outcomes was only significant for youth whose parents attended at least some college, with unstandardized regression coefficients ranging from 0.12 to 0.28 ($p < .001$). Thus, both ways of measuring SES suggest that the effect of having optimistic college expectations on actual educational attainment may be overwhelmed when living in a low SES environment.

Supplementary Analysis: Monozygotic Twin Subsample

We re-ran the random effects regression models using only the subgroup of monozygotic twins ($n = 424$), thus, fully accounting for shared genetic factors that may influence both college expectations and educational attainment. We included all covariates used in the prior models except for age, because monozygotic twins are the same age. College expectations did not significantly predict educational attainment in the

models without interaction terms. The interaction between income and college expectations was significant ($b = 0.12$, $SE = 0.05$, $p = .01$), however, and showed that college expectations were associated with educational attainment at high, but not lower levels of family income. The association between college expectations and educational attainment was only significant for youth living above 2.5 times the Federal Poverty Threshold ($b = 0.24$ to 0.50 , $p < .01$). The interaction term between college expectations and parental education was also significant ($b = 0.08$, $SE = 0.04$, $p = .04$); college expectations were only associated with educational attainment for youth whose parents graduated from college or attended graduate/professional schooling after college ($b = 0.19$ to 0.27 , $p < .05$). See Figure 2a and 2b for graphs of the interactions.

Discussion

Many adolescents expect that they will go to college, but far fewer attain post-secondary education (Goyette, 2008). It is unclear whether college expectations promote academic achievement, or just reflect realistic forecasting or social norms. Because these possibilities are difficult to tease apart in correlational studies, we used a sibling comparison quasi-experimental design (Jaffee et al., 2012; Lahey & D'Onofrio, 2010). Our findings were most consistent with the possibility that expectations play a causal role in shaping academic futures, particularly for adolescents from higher-SES backgrounds.

Within families, adolescents with more optimistic college expectations went farther in school compared to their sibling with less optimistic expectations. This finding is consistent with prior correlational studies (Beal & Crockett, 2010; Marjoribanks, 2003). Because these siblings grew up in the same household, many potentially confounding factors were eliminated, such as financial resources, geographical proximity

to universities, and how much parents knew about how to navigate the college application process. We also controlled for IQ and grades which can vary among siblings. Thus, our findings are consistent with the possibility that college expectations motivated adolescents to pursue higher levels of education.

In both the main sample of siblings and monozygotic twin subsample, the impact of college expectations on educational outcomes depended on the family's SES. The benefits of optimistic college expectations for educational attainment were greater for adolescents living in families with higher incomes and parental education. However, the association between college expectations and educational attainment was not significant for youth living in poverty (i.e., below 1.5x the Federal Poverty Threshold) and for those whose parents did not attend college. Even if youth growing up in poverty had the same optimistic expectations as their more socioeconomically advantaged peers, those expectations were not related to how far they went in school. Although optimism is helpful when youth have the resources to achieve their academic goals, these data suggest that adolescents living in poverty cannot "pull themselves up" to college by their optimism. This pattern of findings is consistent with a prior study on parental college expectations (Mahatmya & Smith, 2017) and supports the overwhelming-risk hypothesis (Li et al., 2007) that optimistic expectations are overwhelmed under conditions of poverty.

The current findings should be interpreted considering a few limitations. First, causality cannot be definitively established without a randomized experimental design. Sibling comparison is a quasi-experimental design that provides evidence that is consistent with a causal explanation (Jaffee et al., 2012). It does not control for

unobserved, non-shared factors within the family such as if the mother used substances during her pregnancy with one child and not the other (Lahey & D’Onofrio, 2010). For this reason, we included some key measured covariates (i.e., grades, IQ) that can vary between siblings and impact both college expectations and educational attainment. However, the current findings do not rule out the possibility that differences in siblings’ college expectations and educational attainment were explained by non-shared factors, such as if only one sibling had an academic mentor or role model (Eby, Allen, Evans, Ng, & DuBois, 2008). While there likely are some non-shared factors that played a role in observed differences for some sibling pairs, it is unlikely that this could fully explain our findings.

Second, our measurement was restricted to what was available to us in the Add Health dataset. Grades and educational attainment were measured by self-report. One concern may be that some adolescents have an optimistic reporting bias resulting in rating overly optimistic college expectations and over-reporting their grades. Self-reported grades are highly correlated with GPA among students with good grades, but are less accurate among students with poor grades (Kuncel et al., 2005). Thus, it is unlikely that students reported good grades only if they were optimistic. In addition, Add Health assessed expectations for attending college using a single item, as opposed to a psychometrically validated scale. Finally, the measure of IQ available in Add Health is based on the Peabody Picture Vocabulary Test-Revised (PPVT)--an intelligence screener that relies on receptive language to assess vocabulary knowledge. The PPVT is moderately to highly correlated with measures of verbal intelligence, but shows small to moderate correlations with other domains of intelligence, such as fluid reasoning and

processing speed (Bell, Lassiter, Matthews, & Hutchinson, 2001). Fortunately, verbal intelligence is the domain of IQ that is most highly correlated with academic functioning (Glutting, Watkins, Konold, & McDermott, 2006), which was the construct of interest.

The findings have important implications for interventions and policy to increase educational attainment. An encouraging finding is that youth with more optimistic college expectations tend to also have higher educational attainment. However, the degree to which optimistic college expectations predicted educational attainment depended on the family's socioeconomic status. This suggests that optimistic college expectations are insufficient for youth living in poverty and with parents with low educational attainment. Thus, interventions targeting youth living in low socioeconomic status families should emphasize systemic change to support socioeconomically disadvantaged youth to get to and graduate from college.

Table 3.1

Descriptives for All Siblings and Monozygotic Twins

Variable	All Siblings (<i>n</i> = 1766)	Monozygotic Twins (<i>n</i> = 424)
	% or <i>M</i> (<i>SD</i>); Range	% or <i>M</i> (<i>SD</i>); Range
Sibling type		--
Full non-twin	52%	--
Dizygotic twin	24%	--
Monozygotic twin	24%	100%
Age at Wave 1	16.12 (1.65); 11.92- 20.08	16.22 (1.56); 12.83- 19.50
Sex (female)	53%	54%
Race and ethnicity	--	--
White	58%	53%
Black/African American	18%	19%
Asian	5%	3%
Hispanic/Latino	13%	16%
Other or multi-racial	6%	9%
Verbal IQ Percentile at Wave I	50 (30); 1-100	47 (29); 1-100
Grades at Wave I	2.87 (0.76); 1-4	2.87 (0.76); 1-4
College Expectations at Wave I	4.15 (1.15); 1-5	4.15 (1.13); 1-5
Family Income at Wave I	2.31 (1.10); 1-5	2.40 (1.11); 1-5
Below 1.5x FPT	31%	29%
1.5 to 2.5x FPT	25%	20%
2.5 to 4x FPT	28%	33%
>4x FPT and < top 5% of US incomes	15%	17%
Top 5% of US incomes	1%	1%
Highest Parent Education at Wave I	3.06 (1.20); 1-5	3.10 (1.21); 1-5
Less than High School	10%	12%

High School, GED, or Vocational Training instead of High School	23%	18%
Vocational Training after High School or Some College	32%	35%
College Graduate	20%	20%
Professional Training Beyond College	15%	16%
Educational Attainment at Wave 4	3.17 (1.07); 1-5	3.20 (1.04); 1-5
Less than High School	7%	5%
High School Graduate or GED	17%	18%
Vocational Training after High School or Some College	41%	45%
College Graduate	23%	19%
Professional Training Beyond College	13%	14%

Note. Valid percentages are presented and may not add to 100 due to rounding. FPT = Federal Poverty Threshold.

Table 3.2

Pearson's and Intraclass Correlations, Sibling Sample

	Age	IQ	Grades	Family Income	Parent Education	College Expectations	Educational Attainment
Age	.43						
IQ	-.03	.63					
Grades	-.05*	.32**	.46				
Family Income	.05	.33**	.21**	n/a			
Parent Education	-.002	.37**	.22**	.49**	n/a		
College Expectations	-.05*	.25**	.37**	.25**	.28**	.41	
Educational Attainment	.05*	.41**	.49**	.37**	.38**	.42**	.59

Note. The diagonal shows intraclass correlations (ρ), and below the diagonal are Pearson's correlations (r). We did not estimate intraclass correlations for Family Income and Parent Education because these variables did not vary within families.

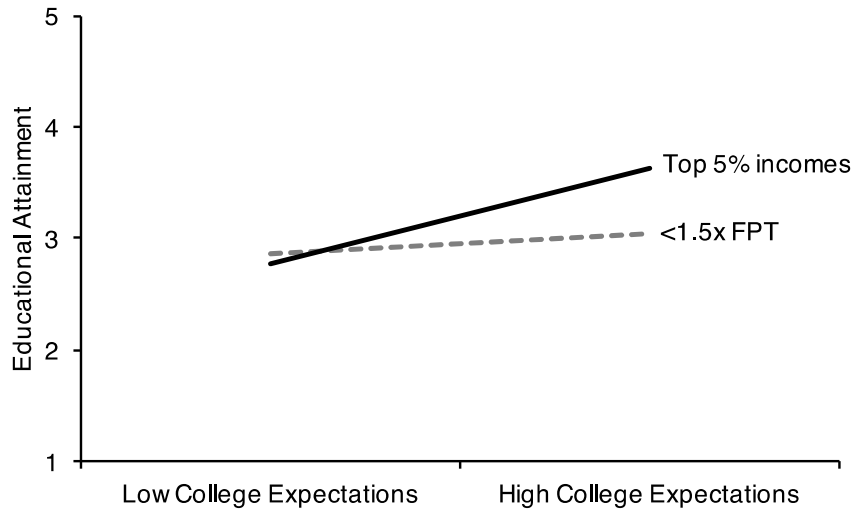
* $p < .05$, ** $p < .001$

Table 3.3

Random Effects Maximum Likelihood Regressions Predicting Educational Attainment, Sibling Sample

Predictor (Wave I)	Educational Attainment at Wave IV					
	Model 1			Model 2		
	b	SE	p	b	SE	p
Age	0.05	0.02	.02	0.04	0.02	.04
Family-Average Age	0.04	0.03	.18	0.04	0.03	.17
Verbal IQ	0.004	0.002	.01	0.005	0.001	.001
Family-Average Verbal IQ	0.002	0.002	.26	0.002	0.002	.39
Grades	0.26	0.05	<.001	0.26	0.05	<.001
Family-Average Grades	0.22	0.07	.001	0.25	0.06	<.001
College Expectations	0.10	0.03	.001	0.09	0.03	.001
Family-Average College Expectations	0.14	0.04	.002	0.13	0.04	.001
Family Income	0.16	0.03	<.001	--		--
Parent Education	--			0.15	0.02	<.001
R ²	.40			.40		

a



b

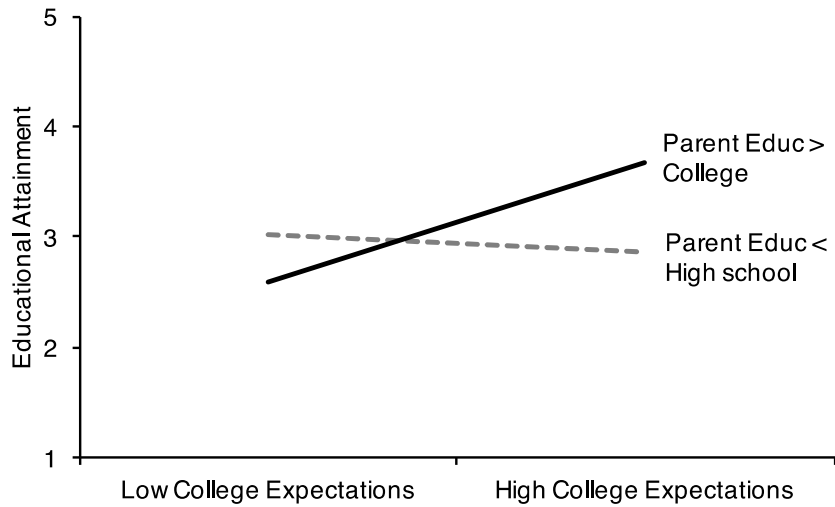
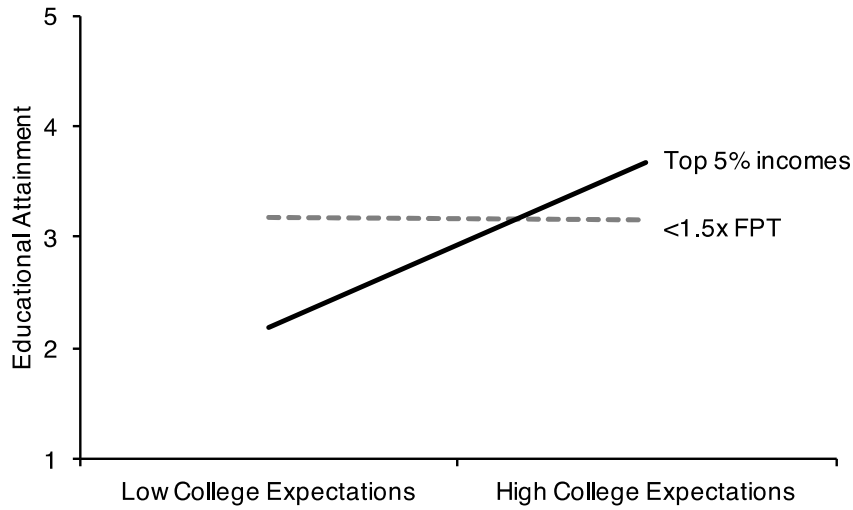


Figure 1. Interactions between college expectations and family socioeconomic status in the analytic sample of same-sex full biological sibling pairs. Socioeconomic status was measured in two ways: (a) family income (FPT = Federal Poverty Threshold) and (b) parental education. Low college expectations were defined as a rating of ‘1’ on the 5-point scale, and high college expectations were defined as a rating of ‘5’ on the 5-point

scale. The slopes of low income (less than 1.5x FPT; Figure 1a) and low parent education (less than high school; Figure 1b) are not significant.

a



b

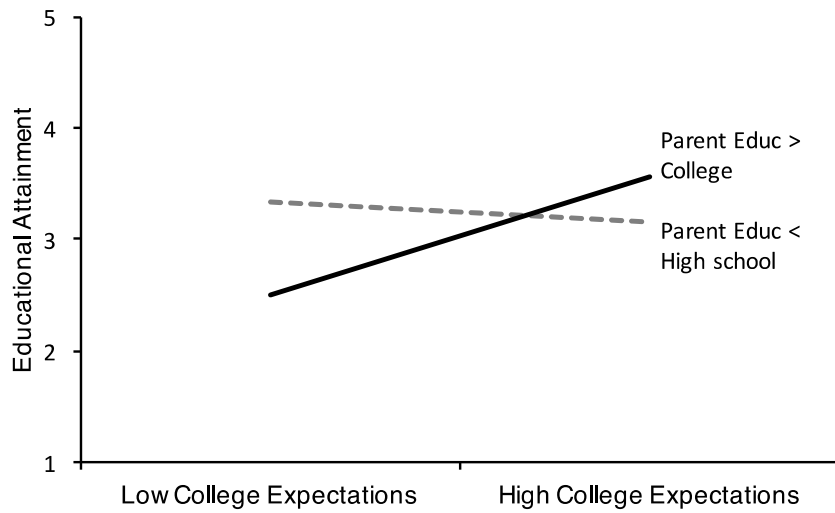


Figure 2. Interactions between college expectations and family socioeconomic status in the sub-sample of monozygotic twins. Socioeconomic status was measured in two ways: (a) family income (FPT = Federal Poverty Threshold) and (b) parental education. Low college expectations were defined as a rating of ‘1’ on the 5-point scale, and high college expectations were defined as a rating of ‘5’ on the 5-point scale. The slopes of low

income (less than 1.5x FPT; Figure 2a) and low parent education (less than high school; Figure 2b) are not significant.

GENERAL DISCUSSION

The current dissertation explored methods of measuring childhood adversity and examined its role in adolescents' academic goals and educational outcomes. This work fills critical gaps as the field calls for more sophisticated measurement of adversity (Jackson et al., 2014; McLaughlin & Sheridan, 2016) and exploring mechanisms of the impact of childhood adversity on later outcomes. Chapter 1 demonstrated statistical benefits of factor analysis over a cumulative index to measure one prevalent and complex form of childhood adversity: maltreatment. Chapters 2 and 3 focused on goal setting and appraisals as a developmental process through which childhood adversity may confer risk for poor outcomes in adulthood. Together, the findings of Chapters 2 and 3 suggest that adolescents' appraisals of support and likelihood of achieving their academic goals predict their later academic performance and educational attainment. These studies also highlight the importance of context (e.g., social support versus strain, ACEs, low socioeconomic status) in understanding how adolescents appraise their academic goals and the impact of those appraisals on their academic outcomes.

Chapter 1 compared a widely-used method ('cumulative index') of measuring maltreatment from retrospective self-report items to a more statistically advanced approach (factor analysis). Results demonstrated that the latent factors explained more variance in important psychosocial outcomes compared to a cumulative index. This suggests that researchers should consider factor analysis when faced with combining indicators of maltreatment in a large, epidemiological dataset and when the study objective is to explain variance in outcomes. This work has implications for measurement of other forms of childhood adversity, and should be used as a roadmap for additional

lines of inquiry on how to construct measures of adversity in datasets that include items that are not part of a psychometrically reliable and valid instrument.

Chapter 2 provided evidence on the psychosocial correlates of adolescents' academic goals and appraisals. Youth with more externalizing problems self-generated fewer academic goals, those exposed to more ACEs appraised their academic goals as less supported, and those who had a higher proportion of social strain in their social networks appraised their academic goals as less supported and less achievable. Moreover, youth's appraisals of their academic goals, but not how many academic goals they generated, predicted their grades prospectively. Finally, Chapter 3 found that adolescents with more optimistic expectations for attending college compared to their sibling also had higher educational attainment, and this effect was dampened among youth living in poverty or with parents with low educational attainment.

These results add to a large body of literature on childhood adversity. That more than one latent factor was identified among the items measuring maltreatment is consistent with other research stressing that distinct patterns in adversity exposure have implications for children's trajectories (English et al., 2005; McLaughlin & Sheridan, 2016). The results of Chapters 2 and 3 are consistent with prior research demonstrating that adolescents' goal appraisals are a mediator of risk posed by ACEs. Brumley, Jaffee, & Brumley (2017) found that adolescents exposed to more ACEs appraised college attendance as a less achievable goal, which in turn was associated with engagement in more violent behavior in young adulthood, even controlling for violent behavior in adolescence and actual college attendance. The current studies add to this work by demonstrating that optimistic appraisals of college attendance promote educational

attainment (Chapter 3) and identifying externalizing problems, ACEs, and social strain as correlates of goal appraisals (Chapter 2).

Future Directions

The research presented in this dissertation points to several directions for future research. First, we identified that youth with a greater proportion of social strain in their social networks appraised their academic goals as less achievable and less supported. Future research should explore whether reducing the proportion of social strain in youth's social networks, particularly for youth exposed to adversity, helps them feel more supported and likely to achieve their goals. Second, we found that youth exposed to more adverse childhood experiences felt less supported in their academic goals, and low socioeconomic status overwhelmed the benefits of optimistic goal appraisals for educational outcomes. Prevention of ACEs and reducing the number of children growing up in poverty is likely to have many positive downstream consequences for health and wellbeing, including more optimistic goal appraisals and greater educational attainment. These two major directions for future research are described in more detail below.

First, future research should explore whether reducing the proportion of social strain, and increasing the proportion of uniquely positive supports, in adolescents' social networks helps them feel more optimistic about their academic goals. Such work could explore mentoring programs (DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011; Van Dam et al., 2018), school-based social emotional curricula (Bierman et al., 2010), and relationship education programs (Ma, Pittman, Kerpelman, & Adler-Baeder, 2014; Morrison, Adler-Baeder, Bub, & Duke, 2018) as avenues to help youth reduce social strain and increase sources of support in their social networks. Such interventions often

include components that could reduce social strain, such as psychoeducation about healthy versus unhealthy relationships and helping youth develop effective communication skills, as well as providing opportunities to form new socially supportive relationships (e.g., with mentors and group facilitators). These programs have been shown to increase interpersonal skills (Bierman et al., 2010; Kerpelman, Pittman, Adler-Baeder, Eryigit, & Paulk, 2009; Schramm & Gomez-Scott, 2012) and should also measure their impact on social strain and goal appraisals. When such programs are implemented with youth exposed to adversity, they should also consider the impact of trauma on adolescents' skills for navigating relationships. Traumatic experiences including abuse, neglect, witnessing domestic violence, and having a parent incarcerated can disrupt development of secure attachments (Cook et al., 2017). Attachment disruptions can result in interpersonal difficulties including problems establishing trust in relationships, maintaining healthy boundaries, and identifying and communicating one's own feelings and needs (Cook et al., 2017). These interpersonal difficulties may adversely impact youth's ability to elicit the support they need to help them reach their goals. Thus, future research on interventions to promote social support should explore including a component to explicitly work with youth to identify people in their social networks who could help them pursue goals, determine when they need help with pursuing their goals, and practice effective strategies to ask for help.

Second, the current findings highlight the need for research on prevention of toxic stressors in childhood. Reducing the number of children growing up in poverty, and preventing exposure to ACEs, would likely result in more optimistic goal appraisals (e.g., McLoyd et al., 2011) and enable those optimistic appraisals to promote better educational

outcomes. The Centers for Disease Control and Prevention points to fostering safe, stable, and nurturing relationships as key to preventing ACEs, such as through home visiting programs, high quality early child care, and behavioral parent training programs (Centers for Disease Control and Prevention, 2016). While more research is needed to understand how communities can best implement these strategies, they are mostly aimed at preventing ACE exposure in early childhood. This is for good reason—the youngest children are at highest risk for fatal child abuse and neglect (U.S. Department of Health and Human Services, 2017). However, there is a relative lack of research on prevention of ACEs among adolescents. Adolescents are at high risk for exposure to some forms of ACEs including sexual victimization (Finkelhor et al., 2015) and dating violence (Hickman, Jaycox, & Aronoff, 2004), and may be more aware of problems in their neighborhood and experiences of discrimination (Wade et al., 2014). There is some research demonstrating that dating violence prevention programs reduce subsequent exposure to interpersonal violence (Foshee et al., 2004). Future work should explore whether interventions that promote safe, stable, and nurturing relationships for adolescents (e.g., natural mentoring interventions for older youth in foster care; Greeson, 2013) also reduce subsequent ACE exposure. This would provide impetus for communities to invest in such initiatives to support adolescents, along with prevention efforts aimed at increasing safe, stable, and nurturing relationships for younger children.

Implications for Policy and Intervention

The findings also have important implications for policy and clinical practice. First, professionals working with youth could capitalize on goals and appraisals as a way to foster adolescents' buy-in to an intervention aimed at improving school engagement

and performance. We found that the majority of youth set academic goals (Chapter 2) and had optimistic expectations for attending college (Chapter 3). Helping youth connect their goals with the behaviors needed to achieve those goals has been shown to improve academic performance (Oyserman, Terry, & Bybee, 2002). Professionals could use adolescents' own personal goals to tailor intervention content and help youth connect their goals with the objectives of the intervention, such as increasing the proportion of homework that is turned in, reducing the number of school absences, and increasing involvement in extracurricular activities. Throughout the intervention, adolescents' appraisals of support and achievability of their goals should be monitored to inform areas in which the adolescent is in need of additional supports.

Second, the current findings highlight the need to think about the role of adversity when considering how resources will be allocated to help youth achieve their academic goals. Chapter 3 shows that optimistic expectations for attending college have greater benefits for educational attainment among youth living in higher socioeconomic status households. This indicates that youth exposed to adversity, such as living in poverty, need additional supports to achieve their academic goals such as going to college. This is consistent with the findings of Chapter 2 that youth exposed to ACEs had a higher proportion of social strain in their social networks and felt less supported in their academic goals. Thus, interventions to promote optimistic appraisals for reaching academic goals (such as going to college) will need to provide additional supports for youth living in low socioeconomic status households. This is consistent with policy efforts to increase supports and reduce barriers to higher education for youth in low income households, such as programs to help former foster youth navigate the college

admissions process and targeting financial aid to students from first generation, low income backgrounds (Perna & Kurban, 2013). Attaining a future as a nation where access to education is equally distributed along class and color lines requires systemic change to support youth exposed to poverty and ACEs in their path to attending and completing higher education.

Conclusion

In sum, the current findings provide novel evidence about measuring childhood adversity and understanding its role in a goal setting and appraisals—a critical developmental process in adolescence that influences academic outcomes. Results suggest that youth exposed to adversity need greater supports to help them feel they can achieve their academic goals and have the social support they need to do so, and enable such optimistic appraisals to influence their educational attainment. Future research should explore ways to capitalize on existing interventions to increase social support and reduce social strain in youth’s social networks, as well as investigate ways to prevent ACEs particularly among adolescents.

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