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Adverse Childhood Experiences (ACEs) and Timely Bachelor's Degree Attainment

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ABSTRACT

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It is well established that adverse childhood experiences (ACEs) are linked to health and emotional outcomes. But less is known about the relationship between ACEs and educational attainment—a potentially important feature of educational stratification in America. Using the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative youth study of 7-12th grade students in the 1994-95 school year, I investigate whether ACEs is linked to post-secondary attainment and examine the role of health and socio-emotional factors as mediators. Results confirm that there is a graded relationship between ACEs and timely bachelor's degree attainment. I find that an additional ACE decreases the odds of timely bachelor's degree attainment by about 17%, even after accounting for other related factors.

Keywords: timely bachelor's degree attainment, ACEs, physical health, depression, mediation

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INTRODUCTION

Traditional sociological explanations of educational attainment and achievement have focused on the role of ascription in generating inequality (Grusky and Weisshaar 2018), yet it has long been recognized that many social-psychological factors likely influence the gap in educational outcomes (Sewell, Haller, and Portes1969). Scholars find evidence for the link between social-psychological factors and educational attainment but limited studies examine the cumulative impact of several of these factors on educational attainment (Fletcher 2008; Fletcher 2010; Needham 2009). Relatedly, the ecobiodevelopmental framework points to early traumatic childhood experiences—exposure to toxic stress—as fundamentally changing neurobiological processes that impact child development and life outcomes (Danese and McEwen 2012; Shonkoff, Boyce, and McEwen 2009; Shonkoff 2012). One such lens from which to study cumulative impact is ACEs—a scale measuring exposure to negative child experiences from birth to age 18, including abuse, neglect, and dysfunctional home environments. Several studies in the cumulative risk literature have studied the impact of child adversity on multiple outcomes including academic achievement and educational attainment (Swanson, Valiente, and Lemery-Chalfant 2012). However, child adversity is more broadly defined in the cumulative risk literature (Evans, Li, and Whipple 2013)—an overarching term—whereas the ACEs scale is a consistent set of measures the Centers for Disease Control and Prevention (CDC) and ACE study use to analyze the cumulative impact of adverse experiences on life outcomes. ACE studies suggest that ACEs may be a stratifying mechanism for class, and race but also influence life outcomes above and beyond these factors (Dube, Cook, and Edwards 2010; Font and Maguire-Jack 2016; Giovanelli et al. 2016; Mersky and Janczewski 2018; Steele et al. 2016; Youssef et al. 2017). For this reason, I explore the role ACEs play in connection to educational attainment.

One conceptual contribution of the ACE measure is its additive approach to conventional measures of disadvantage in childhood. In this way, the combination of the negative experiences is thought to be more detrimental than isolated incidences. ACE categories includes ten categories which are each highly correlated in the literature (Dong et al. 2004). In addition, research finds that responses to such categories are stable and statistically reliable over time (Dube et al. 2004). ACEs research generally find a "dose-response" or cumulative effect of an additional ACE on outcomes such as physical health, chronic depression, and psychological well-being (Chartier, Walker, and Naimark 2010; Felitti and Anda 2010; Nurius et al. 2015; Steele et al. 2016).

To date, research examining the impact of ACEs on educational outcomes often focus on academic performance (e.g. GPA, repeating a grade, language and literacy skills, math skills, etc.) and school engagement (Bethell et al. 2014; Jimenez et al. 2016) and are often limited to outcomes in adolescence (Giovanelli et al. 2016; Morrow and Villodas 2018). My contribution is to document the potential role of ACEs for timely bachelor's degree attainment in young adulthood and explore likely mediators of this relationship. To understand how ACEs may impact educational attainment, I first review what is known about ACEs and educational outcomes. Then, I introduce a conceptual model which theorizes a direct impact of ACEs on timely bachelor's degree completion with potential mediators such as physical health and depression. This model will guide the literature review and my analysis. As part of my analysis, I use multivariate logistic regression models to investigate the impact of ACEs on timely bachelor's degree completion and test whether physical health or mental health mediate the relationship between ACEs and timely bachelor's degree attainment.

BACKGROUND

ACEs and Cumulative Effect

Adverse Childhood Experiences (ACEs) is a cumulative measure of negative, traumatic experiences that have occurred during childhood first introduced by Kaiser Permanente in the Original ACE study conducted between 1995 and 1997 (Dube et al. 2001; Felitti et al. 1998; Mersky, Topitzes, and Reynolds 2013; Monnat and Chandler 2015). The 10-category ACEs scale is a component of a larger literature that examines the effect of multiple risk factors or cumulative risk on social outcomes (Kraemer, Lowe, and Kupfer 2005; Elder 1998). Research looking at ACEs has repeatedly found that, unlike previous research looking at one or two of these adverse experiences, there is an added dimension when adverse experiences are analyzed cumulatively. Scholars find that if one ACE has occurred, it is likely that others have co-occurred and therefore caution in interpreting the findings of single adversity studies (Dong et al. 2004; Felitti et al. 1998; Kessler, Davis and Kendler 1997; Lamers-Winkelman, Willemen, and Visser 2012; McLaughlin et al. 2012). As Mersky, Topitzes, and Reynolds (2013) and Felitti et al. (1998) find, there is a graded relationship between exposure to ACEs and health and mental health outcomes in early adulthood and later on—traumatic experiences are not isolated events but likely co-occur with others (Dong et al. 2004; Felitti et al. 1998). This effect is not unlike the "cumulative risk" and "cumulative disadvantage" literature that finds that various risk factors co-occurring negatively impact the life course—the accumulation of negative life experiences impacts life outcomes over and above an individual experience. Thus, even though it has been well documented that parental suicide, child abuse and neglect, parental incarceration, and parental substance abuse disrupt educational trajectories there is an important cumulative effect to consider.

The ACEs literature consistently finds evidence supporting a dose-response relationship between ACEs and outcomes, such as physical and mental health, as well as risky behaviors. Scholars find that an additional ACE increases the likelihood of reporting increased heart disease by 20%, however, after introducing covariates into the analysis, the likelihood decreased by 10% (Dong et al. 2004). Similarly, scholars also find an association with cumulative ACEs and array of health measures, where an additional ACE is linked to poor health and reporting multiple health problems (Chartier et al. 2010). For example, for an additional ACE, the odds of having multiple health problems increases by 22% compared to individuals with an ACE score of 0. Moreover, scholars find that ACEs affects other outcomes beyond physical health and well-being. Anda et al. (2006) echo similar findings concerning physical and socioemotional well-being, yet find a graded relationship between ACEs and early intercourse, promiscuity, sexual dissatisfaction, anger management, and substance use and abuse, even after controlling for age, sex, and educational attainment. Anda et al. (2004) find a graded relationship between ACEs and adult worker performance, with subjects with higher ACEs scores more likely to report job and financial problems. More recently, scholars have also explored the impact of ACEs and unemployment among adults in the US. Liu et al. (2013) find that compared to individuals with no ACEs, individuals with one or more ACEs were at a significant increased risk of unemployment.

As I will show, some research has begun to examine the link between ACEs and educational outcomes such as academic performance and educational attainment, but no known ACE study has used nationally representative, longitudinal data to examine this link. To illustrate how I have conceptualized the importance of ACEs, I use Figure 1 to structure the literature review and analysis that follows. First, I review what we know about ACEs and educational

attainment. Next, I discuss the direct links between individual ACE components and educational attainment. Following this, I explain the impact of ACEs on socio-emotional well-being and health, and afterwards, their respective influence on educational attainment.

[Figure 1 about here]

ACEs, Academic Performance, and Educational Attainment

Given limited research on ACEs and educational attainment (years of education), I review what is known about ACEs and a related outcome—educational achievement. Research finds that academic achievement is linked to educational attainment, as educational attainment is a marker for the ability to excel academically that relies on school engagement and the accumulation of knowledge over time (Balfanz, Herzog, and Iver 2007; Morrow and Villodas 2018). For instance, Bethell et al. (2014) find that there is lower school engagement among US children with exposure to adverse childhood experiences. Other studies also find associations between ACEs and below-average academic performance in math and literacy skill development in early childhood (Jimenez et al. 2016). Findings of ACEs studies on academic performance suggests that ACEs also adversely influence educational attainment, as does other research on cumulative risk, which finds a relationship between exposure to a greater number of childhood risk factors and fewer years of education (Horan and Widom 2015).

Morrow and Villodas (2018) examine the cumulative effect of ACEs on the likelihood of dropping out of high school and find that an additional ACE increases the odds of dropping out of high school increase by 9 percent. They find that ACEs directly and indirectly affect high school dropout rates. Factors such as reading score at age 16 and internalizing and externalizing behavior problems mediate the relationship between ACEs and dropping out of high school. Similarly, in a low-income, urban cohort, Giovanelli and colleagues (2016) find that participants

with ACEs were worse off compared to participants that did not experience any ACEs in early adulthood. Specifically, as the number of ACEs increases, the odds of high school graduation decreases; in addition, they are also at increased risk for depression, juvenile arrest, and are less likely to hold a skilled job in young adulthood (Giovanelli et al. 2016). Individuals with high ACE scores completed fewer years of education, on average; half a year of education less compared to individuals with lower ACE scores (Giovanelli et al. 2016). In addition, no significant relationship existed with college attendance at a 4-year college; however, the authors hypothesized that this may have been due to the small percentage of college-goers in the sample (Giovanelli et al. 2016). While studies find that individuals exposed to child adversities are more likely to obtain less education (Dube et al. 2010), I add to these studies by using a U.S. nationally representative sample of adolescents and by taking a closer look at college graduation by focusing on timely bachelor's degree attainment. Unlike Giovanelli et al. (2016), who use a Chicago Longitudinal Study of low-income sample of minority participants, and Dube et al. (2010), who use a state survey (Texas BRFSS), this study will be the first to examine the cumulative impact of ACEs on timely college completion. Because research on ACEs and educational attainment is scarce, below I give an overview on individual ACE indicator and their direct link to educational attainment.

Direct Effects

Abuse, neglect, and maltreatment

With child abuse and neglect affecting over 1 million children in the U.S. each year, scholars have studied the negative consequences of exposure to childhood abuse and neglect (Gelles and Perlman 2012). There is long-standing evidence that child abuse and neglect are threats to the life trajectories of children and adolescents exposed to them (Currie and Widom

2010; Gelles and Perlman 2012; Horan and Widom 2015; Mersky and Topitzes 2010; Nikulina, Widom, and Czaja 2011; Widom 2014; Zielinski 2009).[1] Currie and Widom (2010) find that neglected and/or abused (including physical and sexual abuse) children completed fewer years of education in adulthood compared to adults not affected by child abuse and neglect. Similarly, Tanaka et al. (2015) find that severe child physical abuse is significantly negatively associated with years of education in young adults while non-severe physical abuse and sexual abuse were not. However, no significant relationship persisted between severe physical abuse, non-severe physical abuse, or sexual abuse and failure to graduate from high school among young adults after controlling for family background, parental mental health, and child characteristics. Additional studies echo similar findings.

Boden, Horwood, and Fergusson (2007) find that before including controlling for potential confounding factors, exposure to childhood sexual and physical abuse are significantly linked to high school graduation, attending university, and completing a university degree. Although the direct links between abuse and neglect and educational attainment are mixed, there is support that abuse and neglect directly impact educational attainment or that abuse and neglect may matter when studied with other co-occurring ACEs indicators. For instance, because these studies control for parental mental health and other family background measures that are included in the ACEs scale, these findings do not consider these factors as predictors of educational attainment, especially not in the ACEs cumulative framework.

[1] Also commonly referred to in the literature as child maltreatment—an general term for physical abuse, sexual abuse, and neglect, or some combination of the three.

Parental separation and divorce

There is consistent evidence that family transitions such as parental divorce and single parenthood are stressful and disruptive experiences, and that children are generally better off on many outcomes, among them educational attainment, in a married (stable) two-parent biological family than children in any other family type (Amato 2010; Amato and Anthony 2014). For example, in their review of the literature on father absence, McLanahan, Tach, and Schneider (2013) find that father absence has a causal impact on a child's educational attainment—as a father's absence decreases the likelihood of high school graduation while the direct effect of parent separation on college attainment may be modest.

Work by Wojtkiewicz and Holtzman (2011) lends support for the indirect and direct impact of family structure on child's educational attainment. After including potential confounding variables, the likelihood of graduating from high school they find no difference between individuals living in mother-only and stepfamily households compared to two-biological parent households. Looking at the overall college graduation outcome (i.e., not taking into consideration college attendance given high school graduation or college graduation given college attendance in the analysis), Wojtkiewicz and Holtzman (2011) find that those living in mother-only families are as likely as those living in two-biological parent households to graduate college, while those living in stepparent families are less likely to graduate college compared to those living in two biological parent households (Wojtkiewicz and Holtzman 2011). Similarly, in the full models for four-year college attendance given high school graduation, those living in stepparent families are significantly less likely than those living in two parent households to attend college, and those living in mother-only families were no different than those living in two-biological parent households to attend four-year colleges given high school graduation.

Finally, Wojtkiewicz and Holtzman (2011) find that those living in stepfamilies and mother-only families are less likely to graduate from college given four-year college attendance compared to those living in two biological parent households. Fomby (2013), using the Add Health, find that early family instability is negatively linked to college enrollment but may not be linked to college graduation. In general, the family literature finds evidence for a direct link between family structure and educational attainment, with children from two-parent households being better off than children in other family formations. Hence, this suggests that living in unstable families negatively impacts educational attainment independent of other factors but therefore should be considered alongside additional adverse factors to their cumulative impact on educational attainment.

Mental illness in household

Parental mental health issues are linked to child outcomes from early childhood through young adulthood (Stein et al. 2014; Amrock and Weitzman 2014; Smith 2004; Lewinsohn, Olino, and Klein 2005; Hirshfeld-Becker et al. 2012). However, much of this literature has examined child socioemotional well-being and adjustment outcomes while scarce research investigates the impact of parental mental illness or family-member suicide attempts on educational attainment. Notably, research by Ensminger and colleagues (2003) find that offspring sons of women with persistent depressive symptoms are two times more likely to drop out of high school compared to sons of women with no psychological distress.

Parental incarceration

Another component of the ACEs indicators is parental incarceration. Research finds that parental incarceration affects spouse and children (Wildeman, Schnittker, and Turney 2012). The available literature largely finds consistent evidence that parental incarceration negatively affects

offspring on a variety of indicators in the life course directly, such as attention problems, illegal drug use, and mental health (Dallaire and Wilson 2010; Geller et al. 2012; Hagan and Dinovitzer 1999; Mears and Siennick 2016). Regarding offspring's educational attainment, scholars find that parental incarceration directly influences educational attainment. For example, Mears and Siennick (2016) using the Add Health, find that parental incarceration in adolescence is linked to fewer years of formal education among other adverse outcomes. Similarly, Miller and Barnes (2015) find that offspring whose parent was incarcerated prior to age 18 are 48 percent less likely to have graduated from college in young adulthood, even when including controls. Foster and Hagan (2009) also find evidence of causal effects between paternal incarceration and education attainment, with paternal incarceration negatively linked to years of education.

In summary, the literature on ACE individual indicators suggests that there are potential direct and cumulative links between ACE indicators and educational attainment. As discussed previously, ACEs studies find that an additional ACE negatively impacts life outcomes. However, there is little research exploring the association between the cumulative ACEs score and timely bachelor's degree attainment. Furthermore, below, I review the ties between ACEs and potential mediators such as physical health and depression.

ACEs, Socioemotional-welling being, Health, and Educational Attainment

Collectively, there is evidence suggesting that ACEs may impact educational attainment directly, but it may also be mediated by socio-emotional and health outcomes. Past research has linked ACEs to adult psychological well-being and substance abuse in young adulthood through various mechanisms such as stress and socio-emotional well-being while ACEs research investigating high school dropouts finds that reading achievement and externalizing problems are pathways through which ACEs affects dropping out of high school (Douglas et al. 2010; Morrow

and Villodas 2018; Nurius et al. 2015). Less is known about the pathway through which ACEs may be operating in connection with educational attainment or if ACEs directly affects college attainment. Below, I explore the relationship between cumulative ACEs with socio-emotional health and general health, and then I explore their link with educational attainment.

ACEs and socioemotional well-being

The current literature suggests that ACEs is associated with socioemotional well-being. Socio-emotional well-being relates to "both one's social skills, or ability to competently meet the demands of one's social environment, and psychological well-being, which includes feelings of self-worth, mastery, and purpose" (Hurd, Varner, and Rowley 2013:583). Studies find that the additive component of adverse experiences impacts suicide attempt, depression, and psychological well-being among children and adolescents (Anda et al. 2006; Anderson et al. 2002; Nurius et al. 2015; Chapman et al. 2004; Turner, Finkelhor, and Ormrod 2006; Youssef et al. 2017). However, other research finds mixed support for this link (Lamers-Winkelman et al. 2012). Lamers-Winkelman and colleagues (2012) find a link between number of ACEs and child and adolescent trauma when reported by the parent but not when it was self-reported by the child or adolescent; in addition, there was no direct link found between ACEs and emotional or behavior problems. However, this sample consisted of children referred to social welfare institutions whose primary caregivers were victims of Intimate Partner Violence, and therefore may not be representative of ACEs impact on socioemotional outcomes (Lamers-Winkelman et al. 2012). The authors also find that the children had high levels of adjustment problems compared to the average adjustment problems found in the population, suggesting that the ACEs findings may not be nationally representative. Other scholars find that ACEs is directly

associated with panic reactions, depressive symptoms, anxiety and hallucination, and being at risk for depressive disorders in adulthood (Anda et al. 2006; Chapman et al. 2004).

Recent research also signals mixed support for the relationship between ACEs and socioemotional well-being. McLaughlin (2012) finds no cumulative ACEs effect on first onset of psychiatric disorders among a sample of adolescents. On the other hand, Nurius et al. (2015) find that the ACEs score significantly and uniquely impacts perceived well-being, psychological distress, and missed days of work/activities due to mental health conditions or emotional problems, even after controlling for predictors. Moreover, Font and Maguire-Jack (2016) also find links between ACEs and being diagnosed with a depressive disorder, among other negative outcomes.

Socioemotional well-being and educational attainment

Research finds a modest direct association between socioemotional well-being and educational attainment. Studies find that emotional well-being is associated with educational attainment (Fletcher 2010; Fletcher 2008). For example, using the Add Health, Needham (2009) finds that depressive symptomatology in adolescence is associated with increased odds of dropping out of high school and decreased odds of enrolling in college. Depression is also associated with a decreased likelihood of enrolling at a 4-year college, but not a 2-year college (Fletcher 2008). Fletcher (2010) finds that a standard deviation increase in depressive symptoms, not a clinical diagnosis measure of depression, increases the likelihood of dropping out of college by 25-30 percent, given high school completion. Research conducted by Hunt, Eisenberg, and Kilbourne (2010) also finds that some mental health disorders such as bipolar disorder, antisocial personality disorder, and other substance abuse disorders influence college

completion, but major depression did not after introducing sociodemographic and family structure variables.

In addition, research on mental health and academic achievement lends support that mental health also affects educational attainment. For instance, mental health problems are associated with a greater likelihood of failing one or more classes the following school year (Needham, Crosnoe, and Muller 2004). Needham et al. (2004) find that despite partial mediation by absenteeism, trouble with homework, and individual-level teacher attachment, emotional distress continued to be associated with academic failure, albeit marginally significant. McLeod, Uemura, and Rohrman (2012) examine multiple indicators of mental health problems and find that attention problems are significantly associated with high school GPA while depression was no longer significant in the full model. High school GPA being directly linked to educational attainment (French et al. 2015).

ACEs and health

Unlike the link between ACEs and educational outcomes, the literature finds strong support for the link between ACEs and an array of health outcomes across the life span (Anda et al. 2006; Bethell et al. 2014; Felitti et al. 1998; Larkin, Shields, and Anda 2012; Tietjen et al. 2012). For example, ACEs is linked to long-term health and the likelihood of reporting having fair or poor health (Chartier et al. 2010; Dube et al. 2010; Gilbert et al 2015). Flaherty et al. (2013) find that exposure to numerous ACEs uniquely predicts poor health and any health problem at age 14. Much of the ACEs literature has also explored the impact of ACEs on specific health conditions and diseases.

For instance, Dong et al. (2004) find that even though psychological factors and others substantially mediated the relationship between ACEs and the risk for heart disease, the direct

relationship persisted. Font and Maguire-Jack (2016) find a graded relationship between ACEs and obesity, as do Burke et al. (2010) among an urban pediatric sample. Other studies find that ACEs is linked to biological changes that affect long-term outcomes such as aging and health (Danese and McEwen 2012). Brown et al. (2010) find a marginal direct link between ACEs and lung cancer after including smoking in the analysis. ACEs has also been linked to having trouble falling asleep or remaining asleep in adulthood, which are known to lead to chronic diseases and unhealthy behaviors (Chapman et al. 2011).

Health and educational attainment

Returning to the conceptual model (Figure 1), the pathway between ACEs and education may operate through the link between health and educational attainment. A majority of research looking at health and education has narrowed in on the link between education on adult health and life trajectory. Economists have studied how education positively influences a variety of outcomes including health and life quality (Johnson et al. 2016; Eide and Showalter 2011). Far fewer studies focus on the impact of health on educational attainment. Yet, scholars find evidence that suggests that health does influence educational attainment (Needham et al. 2004). For example, we know that childhood and adolescent health impact academic performance (Eide and Showalter 2011). In addition, Sabia (2007) finds that among 14-17 years old, a higher BMI leads to a lower GPA. Using the Add Health, Rees and Sabia (2011) find associations between migraines and high school GPA, high school graduation, and college attendance. Fletcher (2011) finds that low birth weight leads to several adverse educational outcomes including a higher probability for early grade retention, usage of special education services, and a greater likelihood to report a learning disability. Research by Maslow et al. (2011) finds that chronic illness

impacts an array of social outcomes including marriage, having children, living with parents, lower mean income, and lower odds of college graduation.

Moving Forward

The current literature suggests growing evidence for the link between ACEs and educational attainment, yet a national representative, longitudinal study of its link has not been conducted. As there is a more established literature documenting the relationship between ACEs and health and socio-emotional well-being, these factors will become important mediators to include in my analyses. I will test the relationship between ACEs and timely bachelor's degree attainment and then model the mediating role of physical and socioemotional wellbeing in the association between ACEs and timely bachelor's degree attainment.

METHODS

Data and Sample

Data for this study come from the National Longitudinal Survey of Adolescent Health (Add Health), an ongoing nationally representative study that first sampled 90,000 US adolescents in grades 7-12 during the 1994-95 school year. The Add Health collects data on social, economic, physical, behavioral, and psychological life aspects to study how context matters for young adulthood outcomes. The sampling design consisted of a multistage, stratified, school-based, cluster design of 132 middle and high schools across the US (Chen and Chantala 2014). A stratified sample of 80 high schools were selected from a list of schools having at least an 11th grade and a minimum of 30 students enrolled. Feeder middle schools were also included. These high schools were found to be representative in terms of region, urbanity, size, school type, and ethnicity. Nearly all participating schools hosted an in-school questionnaire. For the in-home sample, researchers selected students at random. All students named on the school roster,

regardless of whether they completed an in-school questionnaire or not, were eligible for selection into the in-home sample.

Wave I of the in-home interview was collected between April and December 1995, when participants were 11 to 19 years of age (N=20,745) (Chen and Chantala 2014). A parent, in most cases the mother, and a school administrator were also interviewed at Wave I. A year later, Wave II in-home was collected between April and August 1996 with approximately 15,000 respondents. Researchers did not interview follow-up at Wave II with students that were in 12th grade at Wave I. Wave III was collected between August 2001 and April 2002, when respondents were between 18 and 26 years old (N=15,100). The most recent follow-up, Wave IV, was collected in 2008 when participants were 24 to 32 years old (N=15,701). Wave III and Wave IV follow-ups include adolescents interviewed as part of the original Wave I sample. Response rates were 79%, 88.6%, 77.4%, and 80.3%, respectively across the four waves (Harris 2013).

Analytic Sample

I account for the stratified and clustering design of the data, by using the Add Health recommended svy prefix in Stata 15, in addition to the appropriate cross-sectional weights, primary sampling unit variable, and strata in the analysis. The cross-sectional weights include wave I respondents who are also interviewed at wave IV (Chen and Chantala 2014). After applying the weights, there are 14,800 cases with weights. Similar to other research, I investigate timely bachelor's degree given high school completion (Wojtkiewicz and Holtzman 2011). Close to 1300 cases are not included in the sample because they did not graduate from high school as indicated in Wave IV or if respondents that stated they had at least obtained a bachelor's degree

for highest education achieved at Wave IV but did not give the year they received their degree. The final sample size for the analysis is 13500 cases.

MEASURES

Educational Attainment

Timely bachelor's degree completion

Similar to Fomby (2013), I define bachelor's degree completion by age 24—a group that has been defined as "fast starters," choosing postsecondary education over family formation and the like. construct the binary outcome variable—timely bachelor's degree attainment—using Waves III and IV of the Add Health. At Wave IV, participants were asked what their highest level of education achieved to date was. Response choices included: 1 "8th grade or less," 2 "some high school," 3 "high school graduate," 4 "some vocational/technical training (after high school)," 5 "completed vocational/technical training (after high school)," 6 "some college," 7 "completed college (bachelor's degree)," 8 "some graduate school," 9 "completed a master's degree," 10 "some graduate training beyond a master's degree," 11 "completed a doctoral degree," 12 "some post baccalaureate professional education (e.g., law school, med school. nurse)," and 13 "completed post baccalaureate professional education (e.g., law school, med school, nurse)." First, I recode responses 7 and above to 1 and responses 6 and below to 0.

At Wave IV, participants were asked to list their eight most recent degrees received, and the year they received the degree or certificate. To construct timely bachelor's degree attainment for Wave IV, I create a binary variable from the responses to whether their most recent degree was a bachelor's degree. If it was a bachelor's degree, I used the year they received their degree and their birth year to calculate whether they received their degree by age 24. I calculated their age subtracting the year they received their degree from their birth year given in the Add Health

at Wave IV. If they were 24 years old or younger when they received their bachelor's degree, then they were coded as 1 for timely bachelor's degree. However, if they received a degree but did not complete it by age 24, then they were coded as 0.

At Wave III, respondents were asked "What degrees or diplomas they had received?" As separate questions, degrees were listed and respondents marked whether they had received it or not (1=yes; 0=no). The degrees or diplomas included: GED or high school equivalency degree, high school diploma, associate or junior college, bachelor's degree, master's degree, doctoral degree, and professional degree. Respondents were also asked in what month and year they received their degree. To create the overall timely bachelor's degree variable for Wave III, I used the responses to whether they had received a bachelor's degree, what year and month they received it in, and their birth month and birth year as reported in Wave III. Similar to what I did in Wave IV, I first subtracted the year they received their bachelor's degree from their birth year to calculate their age when they completed their bachelor's degree. However, because wave III also included their birth month, I subtracted the month they received their degree from their birth month. If this was negative, then I subtracted a year from the year. Then, I created a timely bachelor's degree variable with Wave III, coding those that were 24 or younger as 1 and everyone else as 0.

Finally, I create an overall timely bachelor's degree variable for the entire sample. I give priority to Wave IV responses and then fill in the missing using Wave III responses. Because there were respondents that had received a bachelor's degree, but I was not able to calculate their age at the time they received their degree, I left them out of the analysis (approximately 950 cases). Those coded as zero in the overall timely bachelor's degree were respondents that had a bachelor's degree but they had not received in a timely manner, and other participants that had at

least a high school diploma but had not received a bachelor's degree or any other graduate or post-graduate degree at Wave IV.

ACEs Measure

I construct the ACEs scale using Waves I, III, and IV of the Add Health. I use Anda's condensed version of the CDC's ACEs questionnaire to create the current ACEs scale. (See Table 1 for Anda's questionnaire.) The ACEs measures ask about key adverse events before the age of 18. The Add Health asked respondents questions regarding emotional, physical, and sexual abuse, neglect, parental fights and arguments, household substance abuse, parental warmth, parental separation or divorce, mental illness in the home, and parental incarceration. Below, I further explain the measures that I use to create the 10 ACEs component indicators in the current research. See Table 1 for a summary of these measures alongside the ACE questionnaire.

[Table 1 about here]

Emotional abuse

Abuse and neglect questions in young childhood and adolescence were asked in waves III and IV. Emotional abuse before age 18 was assessed retrospectively at wave IV. Respondents were asked "Before your 18th birthday, how often did a parent or other adult caregiver say things that really hurt your feelings or made you feel like you were not wanted or loved?" Response choices included: 1) one time, 2) two times, 3) three to five times, 4) six to ten times, 5) more than ten times, and 6) this never happened. I created a dichotomous variable coding one time or more as 1 and "this never happened" to 0. Unlike other abuse and neglect measures, this question was not asked in wave III of the Add Health.

Physical abuse

In wave III respondents were asked if by the time they started 6th grade their parents or other adult caregivers ever slapped, hit, or kicked them, and how often, if it ever happened. Responses were categorized as 1 if this occurred at least one time and 0 for "this never happened."

Sexual abuse

At wave III, sexual abuse occurring before the 6th grade was assessed. Study participants were asked if and how often their parents had or other adult caregivers touched them in a sexual way, forced them to touch him or her in a sexual way, or forced them to have sexual relations. Reponses were dichotomized to 1 if this occurred at least one and 0 if it never happened.

Emotional neglect

The next domain is familial bonding. At wave I respondents were asked on a scale of 1 strongly agree to 5 strongly disagree how much they agreed with "Most of the time your mother is warm and loving toward you" and "Most of the time, your father is warm and loving toward you." Binary variables were created for each question, participants that responded strongly disagree for either the mother or father were coded as 1 while responses strongly agree to disagree on the likert scale for both mother and father were coded as 0. If the respondent did not have either a father or mother in the household, then the item only used the present parent's response for emotional neglect.

Physical neglect

Neglect in childhood was asked retrospectively at Wave III. Participants responded to "By the time you started 6th grade, how often had your parents or other adult care-givers left you home alone when an adult should have been with you?" and "By the time you started 6th grade,

how often had your parents or other adult care-givers not taken care of your basic needs, such as keeping you clean or providing food or clothing?" Response choices for both included: 1) one time, 2) two times, 3) three to five times, 4) six to ten times, 5) more than ten times, and 6) this never happened. These responses were dichotomized for each response with 1 being at least one time and 0 "this never happened." After recoding these variables, if either response was a 1, neglect was coded as 1. However, if responses to both were 0, then neglect was coded as 0.

Parental separation or divorce

As part of Wave I, in the parental questionnaire, the parent respondent was asked whether the youth's biological mother lives in the household (1=yes, 0=no). In a separate question, they were asked if the youth's biological father lives in the household. If the parent responded no to both or either biological mother and father living in the home, the parental separation or divorce measure was coded as 1. However, if the in the parental questionnaire the respondent stated that both the biological mother and father were living in the home, parental separation or divorce was coded as 0.

Mother treated violently

In the parental questionnaire, parents also responded to "How much do you fight or argue with your current spouse or partner?" The response scale was 1 "a lot", 2 "some", 3 "a little", and 4 "not at all" or 7 "legitimate skip [*no current spouse or partner*]". To most closely align with the CDC measures and guidelines and the ACE questionnaire, I create a binary variable from this measure with 1 being cases that indicated that they fought or argued a lot with their current spouse of partner and 0 for those that responded some, a little, or not at all. If the parent respondent had no current spouse or partner, these cases were recoded to 0.

Household substance abuse

Alcoholism was assessed at wave I as part of the parental questionnaire. Respondents were asked if the youth's biological father was an alcoholic and or if the youth's mother was an alcoholic. Response choices for each was a binary variable, 1 "yes" or 0 "no."

At wave I, adolescents were asked about the availability of illegal drugs in their home. Response choices included 1 "yes" or 0 "no."

To follow the CDC definition of household substance abuse and the ACE questionnaire, I combined the responses to parental alcoholism and illegal drug availability in the home to create a dichotomous variable, household substance abuse. If the responses to either parental alcoholism or illegal drug availability was 1 "yes," then household substance abuse was coded as 1. If responses for both parental alcoholism and illegal drug availability are coded as zero, then household substance abuse is also zero.

Mental illness in household

At Wave I, as part of the parental questionnaire, respondents were asked if they were currently happy, in addition to being asked regarding their current spouse or partner's happiness. Respondents answered 1 "yes" or 0 "no" for each question (or 7 "legitimate skip [no current spouse or partner] for the current spouse or partner's happiness). The responses were then reverse coded to indicate that the respondent was unhappy (1) or happy (0). Following this, I combined both responses; if either respondent was coded as 1 or if the main respondent was unhappy and they had no current spouse or partner, then they were generally unhappy (1). Moreover, if both the respondent and the current spouse or partner were (0) or the respondent was happy and they had no current spouse or partner, then they were categorized as generally happy (0).

In the adolescent questionnaire, at wave I, respondents asked whether (1=yes; 0=no) "any of your family tried to kill themselves during the past 12 months?"

To create an ACE indicator, I combine the generally unhappy and happy variable (created from the respondent and the current spouse or partner's response, if they had a current spouse or partner) (see above for more details) and whether they had a family [member] who tried to kill themselves during the past 12 months. If the response for either the generally happy or unhappy variable is 1 or if family had tried to kill themselves during the past 12 months, then ACEs component indicator—mental illness in household—is 1.

Criminal household member

At wave IV, the young adult sample is asked about their parents' parental incarceration history. They were asked, "(Has/did) your biological mother ever (spent/spend) time in jail or prison?"; "(Has/did) your (mother figure) ever (spent/spend) time in jail or prison?"; "(Has/did) your (father figure) ever (spent/spend) time in jail or prison?" and; "(Has/did) your (father figure) ever (spent/spend) time in jail or prison?" Participants answered "yes" (1) or "no" (0) for each question. Respondents were also asked how their age [in years] at the time the respective parent went to jail or prison. For the ACE component indicator, I first combine responses to biological mother and mother figure and then do the same but for the biological father and the father figure. Below I further detail how I create the criminal household member ACE indicator.

To create a general measure for whether a parent ever went to jail or prison, similar to what other studies have done (Hagan and Foster 2012; Mears and Siennick 2016; Nichols, Loper, and Meyer 2016), I used the biological mother, mother figure, biological father, and father figure questions mentioned above in addition to the age of the respondent when this happened. Because many of the questions used in this study to create the ACE indictors ask about traumatic

experiences before the 6th grade, I only consider parental incarceration that occurs after the child's birth up until the age of 12. Because the age of the child is asked for all four parent incarceration questions, I follow the same cutoff for all four measures. Hence, for the respondent age, I create a new binary age variable where ages 13 or older and "not yet born" are coded as 0 and responses from "less than 1 year" to "12 years" are coded as 1.

First, I create a general maternal incarceration variable and a general paternal incarceration variable. For each biological mother and mother figure incarceration questions, I create binary variables for whether they were incarcerated or not (1 = yes; 0=no). For the mother figure incarceration question, I also recode all legitimate skips (7) to 0. Following this, I create the general maternal incarceration variable. If the respondent stated that either their biological mother or their mother figure went to jail or prison and the binary age variable is equal to 1 (indicting before age 13 but after birth), then the general maternal incarceration variable is coded as 1. If the respondent stated that, their biological mother went to jail or prison but the binary age variable is 0 and the mother figure also went to jail or prison but the binary age variable is also 0 then maternal incarceration is coded as 0. I followed the same steps in creating the general paternal incarceration variable.

After creating both the general maternal incarceration and the general paternal incarceration variables, I created the criminal household member ACE indicator. If either the general maternal incarceration variable or the general paternal incarceration variable were coded as 1, then criminal household member is coded as 1. If both measures were coded as 0, then criminal household member is coded as 0.

ACEs Score

To create an ACEs score, and following the ACEs literature, I create a scale that adds the 10 ACE components above, resulting in a range of zero ACEs to a maximum possibility of ten (Dube et al. 2001; Felitti et al. 1998; Gilbert et al. 2015; Shin et al. 2009; Shin, Miller, and Teicher 2013).

Control Variables

My research includes potential confounders of the ACEs-timely bachelor's degree attainment association and are drawn primarily from Waves I and IV (see Table 2 for a summary of the description of the variables). Similar to other research examining ACEs and educational attainment (Giovanelli et al. 2016; Skalamera and Hummer 2016), I control for highest parental education reported, public assistance receipt, and logged income at wave I. In addition, I control for adolescent's aspirations and expectations for college attendance at Wave I (Fomby 2013; Hossler and Stage 1992; Moody 2001), students' age at Wave 4, which I create using the respondent's year and month of birth and available information on month and year of the wave I interview, as well as sex and race at wave I (Doyle and Kao 2007). The AHPVT raw scores, the Add Health abridged version of the Peabody Vocabulary Test, known in the literature to be a proxy for cognitive ability, parent-reported measure of whether the student has a learning disability at Wave I are also included (French et al. 2015).

Potential Mediators

Depression

The socioemotional measure is depression and it is measured at Wave I. In the Add Health, depression is measured by the Center for Epidemiologic Studies Depression scale for Children (CES-DC), a reliable and valid scale measuring depression symptoms in the general

population and among adolescent samples (Shin et al. 2013; Faulstich et al. 1986). The scale includes 10 items regarding how often during the past week the respondent felt bothered, could not shake off the blues, felt as good as other people, felt distracted, depressed, too tired to do things, happy, enjoyed life, and felt that people disliked them. Responses choices included: 0 "never or rarely," 1 "sometimes," 2 "a lot of the time," and 3 "most of the time or all of the time." Responses to feeling as good as others, happy, and enjoying life were reverse coded to align with the sentiment of the other responses. The alpha reliability coefficient is 0.80.

Physical health

I include self-rated physical health measure from wave I. Participants rated their overall general health on a scale from 1 "excellent," 2 "very good," 3 "good," 4 "fair," and 5 "poor." I reverse-coded this question so that a higher value coincided with better general health.

Missing Values

For measures such as sexual and physical abuse, since they were also asked in Wave IV, albeit from somewhat of a different reference period, I use Wave IV to replace the missing at Wave III. In addition, when the questions used to create the depression scale were missing at Wave I, I used Wave II responses to replace the missing, when available. Because there was a large quantity of missing information from the parent survey questions that I used to create the parental separation or divorce ACE indicator, I also used the student reported household roster to fill in the missing from the parent survey. Lastly, I use multiple imputation to fill in the missing in my data by creating 20 datasets. As part of the multiple imputation equation, I include all the variables that I use in my analysis, including the dependent variable (Rubin 1996). However, I only use the non-imputed cases from the dependent variable in the analysis.

Analysis Plan

Below I present weighted descriptive statistics for the current sample, including a distribution of ACEs scores. For my analysis I use logistic regression for my analysis given that the dependent variable is dichotomous, representing whether students received their bachelor's degree in a timely matter or not. Next, in Table 3, I present block models and the full model for my analysis. Model 1 is the bivariate model, which shows the relationship between ACEs and timely bachelor's degree, with the controls. In Model 2, I examine the relationship between physical health, and depression, including controls, and timely bachelor's degree attainment but exclude the main independent variable—ACEs—to examine whether the potential mediating factors have a significant relationship with the dependent variable in the absence of the independent variable. In the remaining models, Models 3, 4, and 5, I test whether physical health and or mental health mediate the relationship between ACEs and timely bachelor's degree attainment. Moreover, I use Sobel-Goodman's mediation test to more formally test my hypothesis. The main evidence for mediation in the analysis is that the effect of the independent variable on the dependent variable is reduced in the presence of the mediator (cite UCLA website).

RESULTS

[Table 2 about here]

[Figure 2 about here]

Table 2 provides a summary of the weighted descriptive statistics for all the variables in the analysis. Table 2 reveals that close to 26 percent of the sample has graduated in a timely manner by Wave IV. The ACEs means is 2.11, which is higher than the original ACE study mean (CDC website). Figure 2 displays the weighted distribution of ACEs as it is typically

illustrated in the ACEs literature (in five categories; 0, 1, 2, 3, and 4 plus)[2]. About one-third of the sample has at least one parent that holds a bachelor's degree or higher degree. Approximately 8 percent of the households receive public assistance. Overall, this sample has high aspirations and expectations to go to college. Close to 13 percent of the sample had some type of learning disability. The average age at Wave IV is about 29 years old, half of the sample is male, and 66 percent of the sample identify as only white.

[Table 3 about here]

Are ACEs associated with timely bachelor degree attainment? From Table 3 Model 1, we see that there is a relationship between ACEs and timely bachelor's degree attainment. The relationship is significant, and I find that for an additional ACEs, the odds of timely bachelor degree attainment decreases by 18% despite including controls.

Does physical health or socioemotional well-being mediate the relationship between ACEs and timely bachelor's degree attainment? I find that neither overall physical health nor depression mediate the relationship between ACEs and timely bachelor's degree completion. Models 3, 4, and 5 in Table 3 suggest this; I find that including physical health and depression into the analysis does not largely reduce the odd ratio. In Model 2, I find that physical health and depression have a significant association with timely bachelor's degree attainment in the absence of ACEs. In Model 3 and Model 4, depression and physical health, respectively, have a significant relationship with the odds of timely bachelor's degree completion, after introducing ACEs. However, the odd ratios do not drastically change across the 3 models, indicating that physical health and depression do not mediate the relationship between ACEs and timely

[2] In comparison to the ACEs study (CDC) this sample has more ACEs. In the CDC study 36% percent had no ACEs. I hypothesize that this may be because of the age of the sample. The CDC sample is older and there levels of education are higher. The data used in the ACEs study is not nationally representative or longitudinal. In addition, I believe that recall bias may play a factor in reporting.

bachelor's degree completion. I also test this by using the Sobel-Goodman's mediating test. In the full model, Model 5, an additional ACE significantly decreases the odds of timely bachelor's degree attainment by 17 percent.

Additional Findings

In Table 3, Model 5, we also see that having a parent with at least a bachelor's degree significantly increases the odds of timely bachelor's degree attainment. In addition, we see that higher family income increases the odds of timely bachelor's degree attainment by close to 60%. However, I find that public assistance does not affect timely bachelor's degree attainment. Having high aspirations and expectations to attend college increase the likelihood of timely bachelor's degree attainment. Not surprisingly, having a learning disability significantly decreases the odds of timely bachelor's degree attainment while having higher cognitive ability increases the odds of completion. Similar to the literature, I find that males are significantly less likely to graduate from college on time, and that older individuals are less likely to graduate on time from college. Lastly, I find that adolescents that identify as being only white (racially) are significantly less likely to graduate on time from college (albeit marginally).

DISCUSSION

Until now, there has been little research examining ACEs and bachelor's degree attainment (Giovanelli et al. 2016). In addition, there has been no ACEs study using nationally longitudinal data to examine the relationship of ACEs on timely bachelor's degree attainment. The current study adds to the literature on ACEs in that I find that ACEs significantly matters for timely bachelor's degree attainment, thus suggesting that ACEs matter for outcomes beyond health and well-being. I find that an additional ACEs is associated with a 17 percent decrease in the odds of timely bachelor's degree completion.

My findings may provide better indicators to understand how educational inequality forms. And for scholars who examine ACEs, I provide new evidence for its long reaching impact beyond health and well-being. Since traumatic issues are likely to co-occur and have a cumulative impact on educational outcomes, organizations and programs that solely focus on one issue will most likely negate the cumulative impact on outcomes such as education. Hence, programs seeking to decrease academic achievement gaps and improve educational attainment outcomes for all students, according to my research, need to employ a multifaceted approach in dealings with these issues. Moreover, this research sheds light on the need of interventions in childhood, as I find lasting impacts of child adverse experiences on timely bachelor's degree attainment.

Although research in ACEs finds considerable direct links between ACEs and physical health and socioemotional well-being, surprisingly, I find that the former do not mediate the relationship between ACEs and timely bachelor's degree completion. A reason for this may be that other aspects of socio-emotional well-being such as externalizing behavior or anxiety and mood disorders may have greater impact on timely bachelor's degree attainment than does depression (Morrow and Villodas 2018). In regards to physical health, there may be other aspects of physical health that would mediate the relationship between ACEs and educational attainment more than the self-rated physical health measure I use in my analysis.

Despite the research findings, this study has limitations. The ACE Questionnaire and the questions that I use from the Add Health to construct the ACEs scale do not match in their entirety. For instance, for the domain mother treated violently, the Add Health asks the respondent how often the parent respondent and their current spouse or partner fight or argue while the ACE Questionnaire asks about the mother being treated violently (physically). Another

limitation is that there may be an omitted variable bias—I have not accounted for a variable that would explain the relationship between ACEs and timely bachelor's degree attainment. Nonetheless, this study contributes to the literature on ACEs as it uses a large, nationally representative sample to find the link between ACEs and educational attainment. Given how critical bachelor's degree attainment for social mobility, policy aimed at minimize ACEs may increase educational opportunities for a large portion of the U.S. population.

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TABLES

Table 1. ACE Questionnaire and ACE Add Health Measures

Domain	ACE Questionnaire	ACE Add Health Measures	Wave	Current study
	While you were growing up, during your first 18 years of life:			
Emotional abuse	1. Did a parent or other adult in the household **often**… Swear at you, insult you, put you down, or humiliate you? **or** Act in a way that made you afraid that you might by physically hurt? Yes No	Before your 18th birthday, how often did a parent or other adult caregiver say things that really hurt your feelings or made you feel like you were not wanted or loved? 1 one time 2 two times 3 three to five times 4 six to ten times 5 more than ten times 6 this never happened	IV	1= 1 time or more 0= 6 this never happened
Physical Abuse	2. Did a parent or other adult in the household **often**… Push, grab, slap, or throw something at you? **or** Ever hit you so hard that you had marks or were injured? Yes No	Before the time you started 6th grade, how often had your parents or other adult care-givers slapped, hit, or kicked you? 1 one time 2 two times 3 three to five times 4 six to ten times 5 more than ten times 6 this never happened	III	1= 1 time or more 0= 6 this never happened
Sexual Abuse	3. Did an adult or person at least 5 years older than you **ever**…	Before the time you started 6th grade, how often had your parents or other adult care-givers touched you in a sexual way, forced you to touch him or her	III	1= 1 time or more

	Touch or fondle you or have you touch their body in a sexual way? **or** try to actually have oral, anal, or vaginal sex with you? Yes No	in a sexual way, or forced you to have sexual relations? 1 one time 2 two times 3 three to five times 4 six to ten times 5 more than ten times 6 this never happened		0= 6 this never happened
Emotional Neglect	4. Did you **often** feel that… No one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other? Yes No	Most of the time, your mother is warm and loving toward you. or Most of the time, your father is warm and loving toward you. 1 strongly agree 2 agree 3 neither agree nor disagree 4 disagree 5 strongly disagree	I	1= 5 strongly disagree 0= 1 strongly agree – 4 disagree
Physical Neglect	5. Did you **often** feel that… You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your patents were too drunk or high to take care of you or take you to the doctor if you needed it?	By the time you started 6th grade, how often had your parents or other adult care-givers left you home alone when an adult should have been with you? or By the time you started 6th grade, how often had your parents or other adult care-givers not taken care of your basic needs, such as keeping you clean or providing food or clothing?	III	1= 1 time or more 0= 6 this never happened

	Yes No	1 one time 2 two times 3 three to five times 4 six to ten times 5 more than ten times 6 this never happened		
Parental Separation or Divorce	6. Were your parents **ever** separated or divorced? Yes No	Constructed using parental questionnaire	I	1 = both biological parents living in home 0= All other family structures
Mother Treated Violently	7. Was your mother or stepmother: **Often** pushed, grabbed, slapped, or had something thrown at her? or **Sometimes or often** kicked, bitten, hit with a fist, or hit with something had? or **Ever** repeatedly hit over at least a few minutes or threatened with a gun or knife? Yes No	How much do you fight or argue with your current (spouse/partner)? 1 a lot 2 some 3 a little 4 not at all	I	1 = 1 a lot 0 = 2 some – 4 not at all
Household Substance Abuse	8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?	Alcoholism… (His/her) biological father has?	I	1 = 1 yes 0 = 0 no

	Yes No	or (His/her) biological mother has? 0 no 1 yes or Are illegal drugs easily available to you in your home? 0 no 1 yes		
Mental Illness in Household	9. Was a household member depressed or mentally ill or did a household member attempt suicide? Yes No	In general, are you [main parent respondent] happy? or In general do you think (he/she) [main parent respondent's partner or spouse] is happy? 0 no 1 yes or Have any of your family tried to kill themselves during the past 12 months? 0 no 1 yes	I	1 = 1 yes 0 = 0 no

Criminal Household Member	10. Did a household member go to prison? Yes No	(Has/did your biological mother ever (spent/spend) time in jail or prison? or (Has/did) your biological father ever (spent/spend) time in jail or prison? or (Has/did) your (mother figure) ever (spent/spend) time in jail or prison? or (Has/did) your (father figure) ever (spent/spend) time in jail or prison? 0 no 1 yes	IV	1 = 1 yes 0 = 0 no

Table 2. Description of Variables (weighted)

		Mean	SD
Dependent Variable: BA			
Timely Bachelor's Degree Attainment	BA=1 No BA=0	0.26	--
Independent Variable: ACES			
Adverse Childhood Experiences			
ACES: Scale that includes 10 measures; physical, emotional, and sexual abuse; several home environment measures, parental incarceration and family structure		2.11	1.61
Physical and Socioemotional Well-being			
General Health Self-reported health at Wave 1; ranges from 1 "poor" to 5 "excellent"		3.89	0.90
Depression	Scale of 10 measures; self-reported at Wave 1	0	0.90

Table 2. Description of Variables (cont.)

		Mean	SD
Highest Parental Education Level Highest education level received by either parent at Wave 1.		Less than HS=0.10 HS=0.38 Some College=0.20 BA/S or higher=0.33	--
Family Income Parent reported household income before taxes (logged) at Wave 1		10.42	0.88
Public Assistance Currently receiving public assistance (parent-reported at Wave 1)		0.08	--
College Going			
Aspirations	How much do you want to go to college; scale 1 to 5	4.44	1.02
Expectations	How likely is it that you will go to college; scale 1 to 5	4.17	1.14

Table 2. Description of Variables (cont.)

		Mean	SD
Other Controls			
Learning disability Have specific learning disability; parent-reported at Wave 1	Yes=1 No=0	0.13	--
Cognitive Achievement Add Health Vocab Test administered at Wave 1; scores range from 14 to 146		65.24	10.67
Child Age	Current age in years; ranges from 25 to 34	28.96	1.86
Child Sex	Male=1; Female=0	0.51	0.50
Child Race	White=1; Nonwhite=0	0.66	0.47

Table 3. Logistic regression (Odd Ratio) results of Timely Bachelor's Degree by ACEs

	Model 1	Model 2	Model 3	Model 4	Model 5
ACEs	0.821***		0.828***	0.831***	0.833***
	(0.018)		(0.019)	(0.019)	(0.019)
Physical and Socioemotional Wellbeing					
General Health		1.393***		1.389***	1.378***
		(0.058)		(0.057)	(0.058)
Depression		0.915*	0.897**		0.959
		(0.033)	(0.032)		(0.037)
Highest Parental Education Level					
Less than HS	0.794	0.832	0.800	0.804	0.806
	(0.162)	(0.168)	(0.164)	(0.165)	(0.166)
High School	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)
Some College	1.043	1.003	1.039	1.026	1.025
	(0.105)	(0.101)	(0.105)	(0.104)	(0.104)
Bachelor's degree or higher	2.555***	2.526***	2.553***	2.510***	2.511***
	(0.235)	(0.235)	(0.236)	(0.237)	(0.237)
Family Income	1.584***	1.683***	1.594***	1.585***	1.588***
	(0.119)	(0.128)	(0.120)	(0.119)	(0.119)
Public Assistance	0.803	0.717	0.810	0.803	0.805
	(0.181)	(0.163)	(0.184)	(0.182)	(0.183)
College Going					
Aspirations	1.449***	1.404***	1.435***	1.419***	1.415***
	(0.097)	(0.094)	(0.096)	(0.094)	(0.094)
Expectations	2.049***	2.020***	2.021***	1.971***	1.962***
	(0.135)	(0.135)	(0.134)	(0.130)	(0.129)
Other Controls					
Learning Disability	0.311***	0.315***	0.313***	0.328***	0.329***
	(0.050)	(0.051)	(0.051)	(0.054)	(0.054)
Cognitive Achievement	1.051***	1.051***	1.051***	1.052***	1.052***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Child Age	0.906***	0.911***	0.913***	0.907***	0.910***

	(0.021)	(0.022)	(0.022)	(0.022)	(0.022)
Child Sex	0.679***	0.644***	0.662***	0.635***	0.629***
	(0.050)	(0.048)	(0.049)	(0.047)	(0.047)
Child Race	0.800*	0.833	0.795*	0.793*	0.792*
	(0.076)	(0.080)	(0.076)	(0.076)	(0.076)
Constant	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	13,500	13,500	13,500	13,500	13,500

FIGURES

Figure 1. Conceptual Model

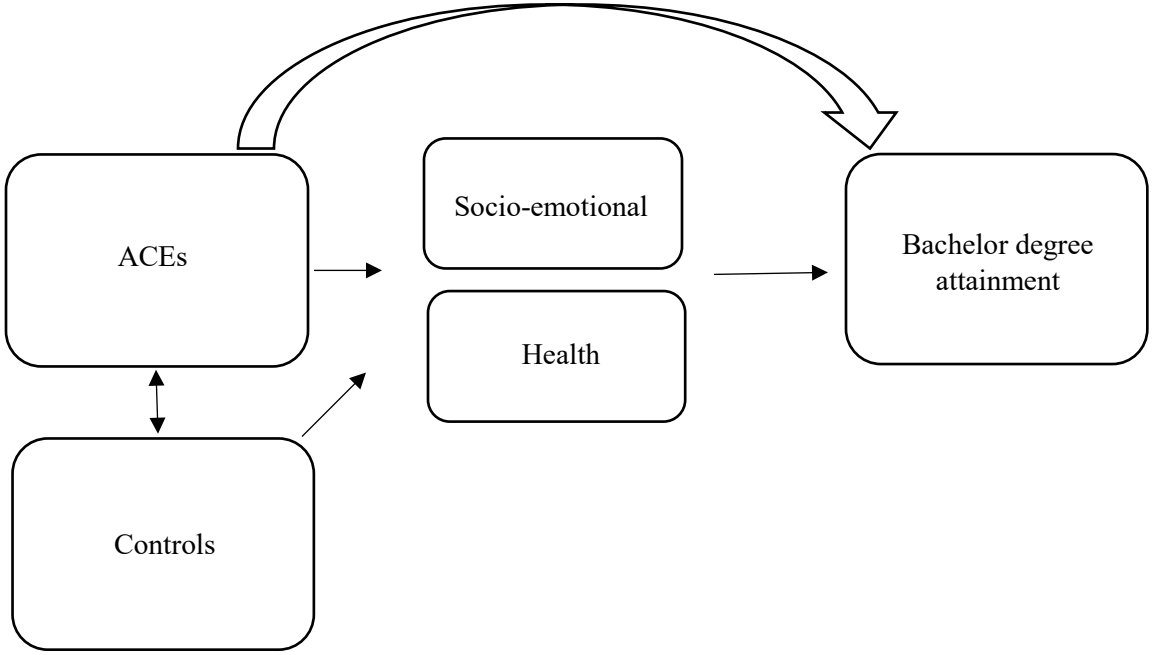
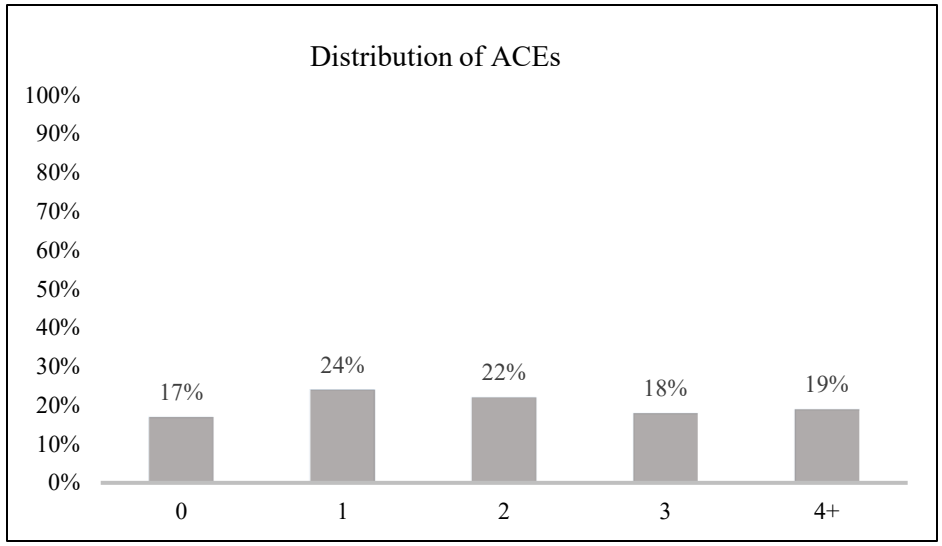


Figure 2. Distribution of ACEs Scores (weighted)



N=13,500