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Predictors of Depressive Symptoms in Emerging Adulthood in a Low-Income Urban Cohort

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Abstract

This study examined predictors of depressive symptoms in emerging adulthood in a sample of 1,142 individuals (94% African American) who grew up in urban poverty. Data were drawn from a longitudinal study that followed participants from age five and included participant, parent, and teacher surveys, and administrative records. Depressive symptoms were self-reported at age 22–24 using a modified version of the Brief Symptom Inventory (BSI; Derogatis, 1975). Binary logistic regression analyses identified several significant predictors of depressive symptoms in emerging adulthood, including: sex, adverse childhood experiences (ACE) score, socio-emotional adjustment in the classroom, juvenile arrest, and on-time graduation. Significant sex differences were also detected, with the final models fitting the male sample better than the full study or female samples. Implications for future research and intervention are discussed.

Keywords

predictors; depression; early childhood intervention; emerging adulthood

Depression is one of the most common, chronic, and costly disabilities affecting adults worldwide (World Health Organization, 2008). Approximately 15.7 million American adults experienced a major depressive episode in 2014 (Center for Behavioral Statistics and Quality, 2015). Millions of others suffer from subclinical yet functionally impairing symptoms. Despite its high prevalence, depression is widely under-diagnosed and under-treated, with only half of affected adults ever receiving psychological services (González et al., 2010).

Research has also documented socio-economic inequalities in the burden of depression. Individuals of low socioeconomic status have an approximately twofold risk of depression compared to individuals of higher socioeconomic status (Lorant et al., 2003) and are less likely to utilize mental health services (Wang et al., 2005). Individuals living in urban areas are disproportionately affected by poverty and are also at increased risk for depression (Green et al., 2013). Similar patterns are evident among individuals from racial and ethnic minority backgrounds, who are also more likely to experience poverty (Wang et al., 2005).

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These patterns are concerning from two perspectives. First, from a developmental perspective, depression impedes individuals' abilities to succeed at age-salient tasks (Cicchetti & Toth, 1998). Individuals with depression are at increased risk for physical health, social, and occupational problems, and constitute two-thirds of annual reported suicide victims (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; White House Conference on Mental Health, 1999). Second, from a human capital perspective, depression incurs significant costs for the larger community—accounting for \$83.1 billion in direct medical, workplace, and mortality costs annually (Greenberg et al., 2003). Thus, there is a need for research that will reduce the human and economic burdens of depression by identifying its etiologies and identifying intervention targets.

Developmental Conceptualization of Depression

According to developmental models of psychopathology, depression is best conceptualized as the product of interactions between an individual's genes, environment, and previous developmental history (Sroufe, 1997). From this perspective, depression evolves over time as an individual interacts with his or her environment and progressively deviates from normal patterns of development. As such, it is important to study how early life experiences, risk and promotive factors interact to set individuals on probabilistic pathways toward the development of depression (Cicchetti & Natsuaki, 2014). A *risk factor* is associated with higher probability of a negative outcome, whereas a *promotive factor* is directly associated with higher probability of a positive outcome. Promotive factors are distinct from *protective factors*, which involve interacting or moderating processes (Luthar, Cicchetti, & Becker, 2000). Promotive factors, which include individual assets and social-contextual influences, may exert direct effects on outcomes by counteracting or compensating for exposure to risk factors (Zimmerman et al., 2013). These and other multi-level influences are consistent with ecological systems theory (Bronfenbrenner & Morris, 2006) and the resilience framework (Rutter & Rutter, 1993).

Previous research has indicated that three-fourths of all lifetime cases of psychopathology begin by 24 years of age (Kessler et al., 2005). The incidence of major depressive disorder, specifically, significantly increases during puberty and peaks in the twenties (American Psychiatric Association, 2013). Depression during the transition to adulthood, or, emerging adulthood (ages 18 to 25), is thus of particular interest. Arnett (2000) has argued that five major features distinguish the period of emerging adulthood from other developmental periods: (a) extensive *identity exploration*; (b) *instability* as individuals transition into full adulthood; (c) *self-focus*, as emerging adults typically have fewer external obligations and commitments than older adults; (d) a perception of being “*in-between*” adolescence and adulthood; and (e) many *possibilities* for the future. It is possible that some of these features contribute to the heightened risk for depression during this period, particularly for individuals who experienced earlier risk factors. Emerging adults who are not able to focus on their own development due to external obligations (e.g., child-rearing, elder care) or who face significant barriers to pursuing their goals (e.g., limited education, low social support, lack of financial resources) may be at heightened risk for developing emotional problems than their peers.

African American living in urban areas face unique risk and protective factors for depression in emerging adulthood. This population is disproportionately affected by family poverty, neighborhood poverty, prejudice and discrimination, and other risk factors (e.g., Latkin & Curry, 2003; Roxburgh, 2009). However, several positive factors are also particularly salient for this population, including close kinship bonds, strong spiritual orientation, and an emphasis on positive self-esteem and resiliency (LittleJohn-Blake & Darling, 1993). To this end, empirical evidence has supported unique developmental pathways to depression in late adolescence and adulthood for African Americans living in urban areas. For example, Sagrestano, Holmbeck, Paikoff, and Fendrich (2013) reported that increasing levels of family conflict and decreasing levels of parental monitoring were associated with greater depressive symptomology in a sample of low-income African American adolescents. Similarly, Green and colleagues (2013) reported that low maternal education, low socioeconomic status in childhood, and high levels of family conflict in adolescence were associated with higher rates of depression in adulthood in a sample of African Americans from urban Chicago. At the neighborhood level, Hurd, Stoddard, and Zimmerman (2013) reported that rates of neighborhood poverty and unemployment were inversely associated with internalizing symptoms among urban African American adolescents, through pathways of cumulative social support and perceived neighborhood cohesion.

Overall lifetime prevalence rates for major depressive disorder are lower among African Americans than Caucasians and Caribbean blacks; however, it is likely that mental health-related stigma and systemic barriers to healthcare result in under-diagnosis among this group (Williams et al., 2007). African Americans who do develop major depressive disorder experience more severe and chronic symptoms, and less than half ever receive mental health treatment (Williams et al., 2007). These findings underscore the importance of research examining the unique factors associated with depression among African Americans. In particular, there is a critical need for research examining risk and promotive factors at the level of the school, which may be an ideal setting for applied prevention and intervention efforts.

Cumulative Risk and Risk-Protection Models

Cumulative risk and risk-protection models may be particularly well-suited for studying the development of depression by emerging adulthood. Cumulative risk models examine the number of risk exposures, rather than the intensity or patterns of those exposures (Evans, Li, & Whipple, 2013). Many risk factors tend to co-occur in the same individuals (e.g., low parental education, large family size), and previous research has demonstrated that the presence of multiple risk factors increases the probability of negative outcomes. For example, in a longitudinal study of at-risk urban youth, Appleyard, Egeland, van Dulmen, and Sroufe (2004) reported that higher levels of early and middle childhood risk factors (low socioeconomic status, maltreatment, inter-parental violence, family disruption, and high parental stress) were positively associated with behavior problems in adolescence. Pungello and colleagues (2011) similarly reported that cumulative early risk was significantly associated with educational and employment outcomes in emerging adulthood in a high-risk sample.

Meanwhile, researchers working from the risk-protection framework assert that the most effective way to prevent negative outcomes is to eliminate or reduce risk factors, while also increasing or enhancing promotive and protective factors (e.g., adaptive skills, psychological resources) (e.g., Stoddard, Zimmerman, & Bauermeister, 2012). Risk, promotive and protective factors can occur at multiple levels of the social ecology (e.g., home, school, neighborhood; Bronfenbrenner & Morris, 2006). From the risk-protection perspective, the identification of individual risk or promotive factors is likely to be less informative than the examination of multiple risk and promotive factors (Rutter & Rutter, 1993; Sameroff & Mackenzie, 2003).

Risk, Promotive and Protective Factors for Depression

Previous research has identified a host of biological, affective, cognitive, and interpersonal factors associated with depression. The significance of several risk, promotive and protective factors is briefly reviewed below, with emphasis on factors that may be relevant to prevention and intervention efforts.

Demographic

A large body of previous research has supported sex differences in depression in emerging adulthood. The prevalence, incidence, and morbidity of major depressive disorder is higher among females than males starting in early adolescence (American Psychiatric Association, 2013; Nolen-Hoeksema, 2001). A wide variety of factors have been hypothesized to influence this pattern, including differences in adverse childhood experiences (ACEs), socio-cultural roles, coping styles, and biological responses to stress (Nolen-Hoeksema, 2001).

Relatively little work, however, has examined sex differences in patterns of depression among African American populations, and extant findings are mixed. In one study, Kistner, David-Ferdon, Lopez, and Dunkel (2007) reported that African American boys endorsed more depressive symptoms than their female counterparts. However, in another study, Grant and colleagues (2004) reported that female African American adolescents were more likely to endorse depressive symptoms than their male counterparts. There is thus a need for research examining sex-specific pathways to depression among African Americans, particularly during the understudied period of emerging adulthood.

Stress and Adversity

Previous research has indicated that poverty-related stressors predict depression above and beyond individual-level socio-demographic factors such as sex or race (e.g., Matheson et al., 2006; Cutrona, Wallace, & Wesner, 2006). Children living in urban poverty are more likely to live in stressful family and neighborhood contexts, which may increase their risk for developing depression by emerging adulthood (Dashiff, DiMicco, Myers, & Shepard, 2009). These stressors can be acute (e.g., witnessing violent crime) or chronic (e.g., material deprivation, racism).

Empirical evidence also supports a positive relationship between adverse childhood experiences (ACEs) and later depression. Chapman and colleagues (2004) identified a strong graded relationship between cumulative self-reported ACEs (maltreatment; exposure to

substance abuse, mental illness, violent treatment of a maternal figure, and criminal behavior in the household) and adult depression in a large sample. Similarly, in a study examining a large sample of African Americans who grew up in urban poverty, Giovanelli, Reynolds, Mond, and Ou (2016) reported that ACE-affected participants were significantly more likely to report depressive symptoms in emerging adulthood, with an odds ratio of 3.9 for participants reporting four or more ACEs. Research has also linked early ACEs (through age five) to more severe neurodevelopmental repercussions and higher rates of negative outcomes in adulthood, including depression (Giovanelli, Reynolds, Mond, & Ou; Chu & Lieberman, 2010).

Cognitive, Academic, Socio-Emotional, and Behavioral Factors

Several studies have linked cognitive abilities and academic achievement in childhood and adolescence to short- and long-term mental health (e.g., Maughan, Rowe, Loeber, & Stouthamer-Loeber, 2003; McCarty, 2008). Notably, in a meta-analysis of 43 longitudinal studies, Huang (2015) reported a negative relationship between academic achievement and subsequent depression for both sexes, even after controlling for prior depression. Other measures of school failure, including grade retention and delayed high school graduation, have also been linked to increased risk for later mental health problems (e.g., Melkevik et al., 2016; Robles-Piña, Defrance, & Cox, 2008). Previous research has also indicated that special education participants exhibit higher rates of depression in emerging adulthood than their peers, and that this relationship is mediated by academic achievement (Chesmore, Ou, & Reynolds, 2016).

Cognitive and socio-emotional abilities are closely related, and previous research has also demonstrated the salience of socio-emotional skills in childhood and adolescence for later depression. Prosocial skills in early childhood have been linked to long-term mental health outcomes, above and beyond non-cognitive skills and other factors (Jones, Greenberg, & Crowley, 2015). Meanwhile, low emotion regulation, low self-concept, shy and anxious behaviors, and externalizing behaviors in childhood and adolescence have been linked to increased risk of short- and long-term internalizing problems (e.g., Crow, Cross, Powers, & Bradley, 2014; Jaffee et al., 2002; Trzesniewski et al., 2006). Relatedly, youth who engage in criminal behavior have been shown to be at heightened risk for the development of internalizing problems by emerging adulthood (e.g., Vermeiren, 2003).

A small number of studies have examined how cognitive, academic, socio-emotional, and behavioral factors in childhood and adolescence accumulate and interact to influence the risk of developing depression by emerging adulthood. Notably, in a rigorously controlled study of individuals who grew up in urban areas, Masten, Roisman and colleagues (2005) reported that childhood behavioral problems undermined academic achievement by adolescence, and that the latter was associated with elevated rates of internalizing problems by young adulthood. Other work has indicated that academic and social problems in childhood are associated with lower educational attainment and socio-economic status in adulthood, which are linked to increased risk of depression (Lorant et al., 2003). These findings align with Cole's (1991) hypothesis that failures in multiple domains over time accumulate to increase the risk of developing depression.

School and Family Support

Participation in high quality early childhood interventions has been linked to multidimensional wellbeing across the lifespan, including lower rates of adult depressive symptoms. For example, McLaughlin, Campbell, Pungello, and Skinner (2007) reported that participants in the Abecedarian intervention, who grew up in poverty and participated in an educational intervention from infancy through age five, endorsed fewer depressive symptoms in emerging adulthood than control group members. They also reported that intervention participation almost entirely buffered the negative effects of low-quality home environments on adult depressive symptoms. However, this study employed a small sample ($N = 104$) and only examined the relations among depressive symptoms and a few independent variables (early home environment quality, preschool treatment group, sex). Reynolds and Ou (2011) reported similar results in a study that utilized a more comprehensive dataset. They reported that graduates of the Child-Parent Center (CPC) intervention, which provided educational and family support services from preschool through Grade 3, reported fewer depressive symptoms in emerging adulthood than control group members. 79% of the direct effect of CPC participation on depressive symptoms was accounted for by cognitive advantage, family support, school support, motivational advantage, and social adjustment.

Research has also examined the relationship between other measures of school support and later depression. For example, attending high-quality middle and high schools (e.g., magnet schools) may exert salient effects on academic achievement and mental health. Positive perceptions of school climate and connectedness have been linked to better long-term mental health (e.g., Bond et al., 2007; Suldo, McMahan, Chappel, & Loker, 2012). Meanwhile, residential and school mobility, which disrupts academic and social functioning, have been linked to increased risk of poor mental health (e.g., Boon, 2011; Simpson & Fowler, 1994.)

The family is more proximal to the developing individual than the school, and empirical evidence has indicated that family support and parent involvement exert important influences on youths' mental health trajectories (e.g., Suldo, McMahan, Chappel, & Loker, 2012; Stice, Ragan, & Randall, 2004). Supportive, engaged family members may buffer youth against the negative effects of stress and adversity, and help them to develop psychological resources that will reduce their risk of developing depression. On the contrary, stress, adversity, and low family support may confer psychological risk, exacerbating the risk of developing depression by emerging adulthood (e.g., Sagrestano, Paikoff, Holmbeck, & Fendrich, 2003).

Present Study

Taken together, the previously reviewed evidence indicates that cumulative risk factors may increase the probability of developing depression by emerging adulthood. They also suggest that cumulative promotive and protective factors, including early intervention, may mitigate the risk of developing depression in contexts of risk. Yet three notable gaps remain in the literature on pathways to depression in emerging adulthood. First, few studies have examined theoretically informed risk, promotive and protective factors spanning different developmental periods and levels of the social ecology.

Second, few studies have prospectively tracked large cohorts from early childhood to adulthood. Only longitudinal research can identify temporal relations between variables and the processes that link them together. Longitudinal studies with large, well-controlled samples are thus best positioned to identify true effects and to inform prevention and intervention efforts. Finally, work with samples from low-income and racial and ethnic minority backgrounds has been rare. There is a need for research that will identify unique risk, promotive and protective factors for members of these populations, who underutilize mental health services due to systemic and stigmatic barriers (Wang et al., 2005).

The present study aimed to address these gaps by examining predictors of depressive symptoms in emerging adulthood in a low-income, urban sample. This was accomplished by extending prediction models that had previously been applied to data from the Chicago Longitudinal Study (CLS; Chicago Longitudinal Study, 2005) and testing the predictive value for depressive symptoms in the same sample, using a framework incorporating elements of cumulative risk and risk-protection models. The CLS has tracked the development of a large cohort of low-income urban individuals, most of whom are African American, since their Kindergarten year in 1985. Ou, Mersky, Reynolds, and Kohler (2007) and Ou and Reynolds (2008) previously employed comprehensive sets of socio-demographic and educational variables to predict educational attainment, employment, income, and adult crime outcomes within this sample. The present study expanded upon these models to construct a set of predictors that was more comprehensive than those that have been tested in previous studies of pathways to depression, most of which examined single developmental periods and socialecological levels.

Two research questions were addressed: (a) What are the significant predictors of depressive symptoms in emerging adulthood in a low-income, urban sample? and (b) Do the predictors of depressive symptoms in emerging adulthood differ by sex? Consistent with the previous review, we hypothesized that the following factors would be positively associated with depressive symptoms in emerging adulthood: (a) female sex; (b) cumulative family risk index; (c) cumulative ACEs; (d) low perceived competence in childhood; (e) troublemaking behavior in childhood and adolescence; (f) shy and anxious behavior in childhood and adolescence; (g) grade retention in childhood and adolescence; (h) school mobility in childhood and adolescence; (i) special education in childhood and adolescence; and (j) juvenile arrest in late childhood and adolescence. We hypothesized that the following factors would be negatively associated with depressive symptoms in emerging adulthood: (a) early childhood intervention; (b) school-age intervention; (c) academic achievement in childhood and adolescence; (d) parent involvement in childhood; (e) high levels of social-emotional adjustment in the classroom in childhood; (e) magnet school attendance in childhood and adolescence; and (f) on-time high school graduation.

Method

Sample and Design

Data were drawn from the CLS, a prospective investigation of the development of 1,539 children who attended early childhood programs in Chicago. The original sample was evenly split by sex and was representative of the racial and ethnic composition of the

neighborhoods in which participants lived (92.9% African American, 7.1% Hispanic). Intervention group members ($N = 989$) attended the Child-Parent Center (CPC) preschool intervention program at 20 different sites when they were three or four years old. The CPC program provides comprehensive, center-based services to children and families living in high-poverty neighborhoods. Five features are emphasized: (a) early educational enrichment starting no later than age four; (b) a structured language and literacy instructional approach; (c) a parent involvement and education program; (d) provision of health and social services; and (e) continuity between preschool and early elementary school (Reynolds, Temple, & Ou, 2003).

Comparison group members ($N = 550$) attended conventional Kindergarten programs at five randomly selected Chicago Public Schools. Members of both groups attended Kindergarten in 1985–1986. Previous research has confirmed that the two groups are comparable on child, family, and school characteristics, and that the sample is representative of children living in urban poverty (Reynolds & Ou, 2011; Reynolds, Temple, Ou, Arteaga, & White, 2011).

Participants have been prospectively followed through adulthood. Participant, parent, and teacher surveys, as well as school and government records have been collected. Table 1 displays the characteristics of the CLS sample over time. At age 22–24, 74.2% of the original sample ($N = 1,142$) completed a survey about their life experiences. Examination of individual demographic risk factors between ages zero to three revealed that a higher proportion of the attrition sample had mothers who were not high school graduates, grew up in single parent households, and had family incomes below 185% of the federal poverty line compared to the study sample; however, there were no significant differences between the mean risk index scores for the study and attrition samples (Table 1).

Outcome Measures

Depressive symptoms (age 22–24)—Participants completed a five-item modified version of the Brief Symptom Inventory (Derogatis, 1975) as part of the age 22–24 survey. Participants rated how often they had felt “depressed”, “helpless”, “lonely”, “[as if] life is not worth living”, or “very sad” in the past month on a six-point Likert scale, ranging from 0 (“not at all”) to 5 (“almost every day”). Although the BSI measure cannot diagnose clinical depression, individuals who report multiple, frequent, or more severe symptoms on the BSI are likely to be at risk for major depressive disorder and impaired psychosocial functioning. In the present study, the five-item scale demonstrated a reliability of .84, as well as modest correlations with other measures of life satisfaction, optimism, and psychological well-being.

Codes were assigned for frequent presence (“1”) or absence (“0”) of each symptom. Coding was based on factor analyses of the items and the definitions of clinically significant symptomology laid out in the BSI manual. Codes of “1” were assigned if the participant reported feeling “depressed”, “lonely”, or “very sad” “almost every day”. A code of “1” was assigned if the participant reported feeling “hopeless” “a few times per week” or more. Finally, a code of “1” was assigned if the participant reported feeling like “life is not worth living” “two or three times a month” or more. Eight participants who completed the age 22–24 survey but did not fill out the depression index were assigned codes of “0” for each

depressive symptom. These codes were assigned after examining their responses to questions about life satisfaction, optimism, and mental health treatment history on the age 22–24 survey, as well as their responses to questions about depression on high school surveys. The inclusion of these eight participants did not significantly alter study results.

Following Reynolds and colleagues (2007), a final dichotomous variable was created reflecting the overall frequency and severity of participants' self-reported depressive symptoms at age 22–24. This variable indicated the presence ("1") or absence ("0") of at least one frequent, significant depressive symptom, as previously described. A score of "1" on this final dichotomous variable thus indicated that the participant was likely suffering from subclinical, or in some cases, clinical levels of internalizing problems, as well as impaired functioning. The use of a dichotomous variable is consistent with previous BSI research, and is intended to prevent case over-identification (e.g., Derogatis & Lynn, 2000; Shrout & Yager, 1989).

Predictor Measures

These are organized by time sequence, study conceptualization, and developmental stage, including: (a) program and demographic indicators, (b) childhood (primarily early and middle childhood), and adolescence (through late adolescence).

Program and demographic predictors

CPC preschool intervention: Participants who attended the CPC preschool program for either one or two years were coded as "1". All others were coded as "0". This information was drawn from school records.

CPC school-age intervention: Participants who attended the CPC school-age program between Ages six to nine were coded as "1". All others were coded as "0". This information was drawn from school records.

Race: African American participants were coded as "1". Hispanic participants were coded as "0". This information was drawn from school records.

Sex: Males were coded as "1". Females were coded as "0". This information was drawn from school records.

Family risk index: Eight socioeconomic risk factors were dichotomously coded to indicate whether they were present (1) at any point before age three or absent through age three (0): (a) mother was under age 18 at the participant's birth; (b) mother did not complete high school; (c) mother was unemployed or employed part-time; (d) participant lived in a single parent household; (e) participant lived in a household of four or more children; (f) participant lived in a school attendance area where at least 60% of households were impoverished; (g) participant was eligible for Aid to Families with Dependent Children (AFDC) based on family income (below 185% of the federal poverty line); and (h) participant was eligible for free lunch. A socioeconomic risk index for ages zero to three years was then computed by summing the eight dichotomously coded risk factors.

Information for this measure was drawn from parent and participant surveys, the Illinois Department of Public Health, the Chicago Public School Student Information System, and the Illinois Public Assistance Research database. Approximately 10% of cases with missing data were imputed using the Expectation Maximization (EM) algorithm in LISREL (Schafer, 1997). The risk factors comprising the family risk index have been commonly included in previous measures of cumulative socioeconomic risk (e.g., Brody et al., 2013; Evans, 2003; Kim & Brody, 2005; Masten, Miliotis, Graham-Bermann, Ramirez, & Neemann, 1993; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). They are associated with long-term socioeconomic risk and a variety of risk, promotive and protective factors at the family and neighborhood levels that are expected to exert short- and long-term effects on wellbeing.

Adverse childhood experiences (ACEs): Participants completed an ACE checklist during the age 22–24 survey. Most items were comparable to those included on the original ACE Study checklist, which has been linked to depression (e.g., Chapman et al., 2004). Several additional items were also added based on research on common adverse experiences for children living in urban poverty (e.g., Bell & Jenkins, 1993; Conger et al., 1992). Participants indicated whether they had experienced each event and if so, what age range(s) they felt into at the time (zero to five, six to ten, ten to fifteen, or sixteen and up). Six self-reported ACE categories were examined in the present study: (a) prolonged absence or divorce of parents; (b) death of a parent, sibling, or close friend; (c) frequent family conflict; (d) parental substance abuse; (e) witnessing a violent crime; and (f) being a victim of a violent crime. Three additional ACE categories were assessed using court and county records from the Department of Child and Family Services: (a) physical abuse; (b) sexual abuse; and (c) neglect. Each ACE was dichotomously scored for presence (1) or absence (0). These items were then summed to yield a continuous ACE score, with a maximum possible score of nine. The present study only examined ACEs that occurred between ages zero and five years, given their previously discussed severe effects and potential salience for early intervention.

Childhood

Age 5 or 6 cognitive abilities: The Iowa Test of Basic Skills (ITBS Level 5; Hieronymus, Lindquist, & Hoover, 1982) was administered at age five or six (Kindergarten entry). The ITBS assesses developed cognitive abilities and includes assessments of listening and word analyses, vocabulary, and comprehension of mathematical concepts. The test was normed in 1978 and internal consistency reliability has been reported at .94 (Hieronymus, Lindquist, & Hoover, 1982). The present study analyzed participants' composite developmental standard scores. Missing data (approximately 25% of the original study sample) were imputed using the EM algorithm (Schafer, 1997).

Socio-emotional adjustment in the classroom: Teachers provided annual ratings of participants' classroom adjustment from ages six to nine in relation to six items: (a) "concentrates on work", (b) "follows direction", (c) "is self-confident", (d) "participates in group discussion", (e) "gets along well with others", and (f) "takes responsibility for actions". The Child Behavior Checklist (CBCL; Achenbach, 1994) and Teacher-Child

Rating Scale (TCRS; Hightower et al., 1986) were consulted in the development of these indicators. Teachers rated participants on each item on a 5-point Likert scale, ranging from “1” (“poor/not at all”) to “5” (“excellent/very much”). Teacher’s ratings were averaged across grades. Missing data (less than 5% of the original sample, due to teacher non-response) were imputed using the EM algorithm (Schafer, 1997). The reliabilities of the annual scales were .92, .93, and .91, respectively.

Parent involvement in school: Teachers provided annual ratings of parents’ participation in school activities when children were ages six to nine using a five-point Likert scale, ranging from “1” (“poor”) to “5” (“excellent”). Teachers’ ratings were averaged across grades. Missing data (approximately 10% of the original sample, due to teacher non-response) was imputed using socio-demographic measures.

Retention: A dichotomous variable was created to indicate whether participants were ever retained between ages six and nine, based on school records. Individuals who were ever retained during this period were coded as “1”; those who were not were coded as “0”.

Reading achievement: The Iowa Test of Basic Skills battery (ITBS; Level 8 or 9; Hieronymus, Lindquist, & Hoover, 1980) was administered at age eight or nine (spring of the third grade year). The present study examined the developmental standard scores of the reading comprehension subtest, which consisted of 47 items. Missing data (approximately 10% of the original sample) was imputed using mean growth curve modeling. The reliability of the scale exceeded .90.

Shy and anxious behaviors: Teachers completed the T-CRS (Hightower et al., 1986), which included a subscale assessing shy and anxious behavior, for each participant when they were ages 11 through 13 (Grades 6–7). They rated how well each item (e.g., “withdrawn”, “sad”) described the participant on a five-point Likert scale, ranging from “1” (“not at all”) to “5” (“very well”). The present study employed the average of the two annual ratings. Missing scores (approximately 30% of the original sample, due to teacher non-response) were mean-imputed. The reliabilities of the annual subscales were .84 and .79.

Troublemaking behaviors: Participants provided annual reports on their behavior at school and home between ages eight and 12 (Grades 3–6). Between ages eight and 10 (Grades 3 and 4), they rated themselves on four items (“I get in trouble at school”, “I get in trouble at home”, “I follow class rules”, and “I fight at school”) on a 3-point Likert scale, ranging from “1” (“not much”) to “3” (“a lot”). Between ages 10 and 12 (Grades 5 and 6), they rated themselves on the same items on a 4-point Likert scale, ranging from “1” (“strongly agree”) to “4” (“strongly disagree”). A total score was calculated for each year by summing participants’ ratings for all items. Missing data (less than 10% of the original sample) was imputed using the EM algorithm (Schafer, 1997). Total scores were then transformed into Z-scores and averaged across grades. The reliabilities of the annual assessments ranged from 0.43 to 0.61.

Perceived competence: Participants reported on their perceived competence between ages eight and 12 (Grades 3–6). The Classroom Environment Scale (Moos & Trickett, 1974) and

Self-Perception Profile for Children (Harter, 1982) were consulted in the development of the perceived competence measure. Participants rated how much they agreed with each of ten to 12 items (e.g., “I am smart”; “My classmates like me”) on a four-point Likert scale, ranging from “1” (“strongly disagree”) to “4” (“strongly agree”). Despite slight differences in item content across years, the annual scales were significantly correlated with each other ($r = .30$). Missing scores (less than 10% of the original sample) were mean-imputed, and mean z-scores were used in analyses. The reliabilities of the annual scales were .69, .76, .71, and .74, respectively.

Retention: A dichotomous variable was created to indicate whether participants were ever retained between ages nine and 14, based on school records. Individuals who were ever retained during this period were coded as “1”; those who were not were coded as “0”.

School mobility: A dichotomous variable was created to indicate whether participants ever changed schools between ages nine and 14. This information was drawn from grade-by-grade analyses of school records. Individuals who changed schools were coded as “1”; those who did not were coded as “0”.

Magnet school attendance: A dichotomous variable was created to indicate whether participants ever attended magnet schools, which employed selective enrollment policies and required good academic performance, between ages nine and 14. This information was drawn from school records. Individuals who attended these schools were coded as “1”; those who did not were coded as “0”.

Special education placement: A dichotomous variable was created to indicate whether participants ever received special education services between ages six and 14, based on school records. Individuals who received services were coded as “1”; those who did not were coded as “0”.

Adolescence

Reading achievement: Participants completed the Iowa Test of Basic Skills battery (ITBS; Level 14 or 13; Hieronymus & Hoover, 1990) at age 13 or 14 (spring of Grade 8). The present study examined the reading comprehension subtest, which consisted of 58 items. The test was normed in 1988, and the reliability of the scale was .92. Data was missing for approximately 10% of the original sample. These scores were estimated using ITBS scores from previous grades or, if those scores were missing, using the EM algorithm (Schafer, 1997).

Juvenile arrest (by age 18): A dichotomous variable was created to indicate whether participants were ever arrested between the ages of 10 and 18. Individuals who had been arrested as juveniles received a code of “1”; all others received a code of “0”. This information was drawn from record searches for formal petitions for criminal charges, which were conducted at the Cook County Juvenile Court and two additional Midwest locations. Searches were conducted without knowledge of individuals’ intervention statuses, were

repeated twice for 5% random samples, and were compared against computer records. Participants had to reside in Chicago at age 10 or older in order to be included in the sample.

On-time graduation (by age 18): A dichotomous variable was created to indicate whether participants had graduated by age 18, based on school records. Participants who graduated on time were coded as “1”; all others were coded as “0”.

Sequence of Model Predictors—The sequence of variables is based on time precedence, prior model evidence, and theory. Spanning childhood to adolescence, the present study’s process follows prior studies that have assessed ecological, family stress, and risk-protection perspectives (e.g., Ou & Reynolds, 2008; Reynolds, Ou, & Topitzes, 2004; Reynolds & Ou, 2011) as well as life-course models (Alexander et al., 2001; Entwisle, Alexander, & Olson, 1997). Demographic, program, and risk indicators are influential in early life (Model 1). Family and school context factors (e.g., parent involvement and school quality) are especially influential during childhood (Models 2 and 5), followed by key schooling and social competence outcomes (Models 6 and 7) that predict adult life-course outcomes.

Two sequences of the present study’s model are especially noteworthy. First, socio-emotional adjustment in the first three years of elementary school (Model 3) have demonstrated impacts on well-being into adulthood (Ou, Mersky, Reynolds, & Kohler, 2007) and set the stage for later socio-emotional development, including behavioral and internalizing problems. Second, the present study assesses the added value of cognitive skills and achievement at three conceptually distinct stages: age 5 or 6 (Kindergarten entry; Model 2), age 8 or 9, (Grade 3; Model 4), and age 13 or 14 (Grade 8; Model 6). These stages correspond to important developmental milestones. They also correspond to extant conceptions of the etiology of the achievement gap and how it may translate to mental health and other measures of well-being. Prior prediction studies of mental health have not sufficiently assessed the distinct influence of these and other skills.

Statistical Analyses—We conducted binary logistic regression analyses in SPSS. Models predicting depressive symptoms were run for the full, male, and female samples. The use of sex-split models follows the approach used by previous CLS studies (Ou & Reynolds, 2008, 2010a, 2010b; Topitzes, Mersky, and Reynolds, 2011). Differential patterns of predictors by sex are widely observed in life-course studies of human development (Entwisle, Alexander, & Olson, 1997; Laub & Sampson, 2003; Schoon & Eccles, 2014), and reflect socialization differences that warrant separate reporting. Demographic covariates and program participation variables (sex, race, CPC preschool and school-age program participation, family risk index, and ACE score) were entered in Model 1. Cognitive abilities upon kindergarten entry (ITBS composite score) were entered in Model 2. Childhood variables were entered in Model 3–5 based on sequences of variables. Adolescence variables were entered in Models 6 (early adolescence achievement) and 7 (juvenile arrest and on-time graduation). Coefficients were reported as log odds ratios (OR) and all significance tests employed 95% confidence intervals. All models were based on the entire study sample of 1,142 after imputing for missing data as described above. Most variables had a modest amount of missing data and, as found in previous studies with this dataset (e.g., Ou &

Reynolds, 2008), the type of imputation strategy was unrelated to the pattern of findings. Significant factors in the final models influenced symptoms above and beyond the contributions of other variables.

Results

Table 2 describes the key measures. Among the full study sample, 15.2% ($N = 174$) reported one or more frequent depressive symptoms at age 22–24, 50% of whom were male.

Full Study Sample—Table 3 shows the estimates from the logistic regression analysis. CPC preschool participation, family risk index and ACE score significantly contributed to Model 1. After entering Kindergarten achievement to Model 2, only family risk index and ACE score remained significant. Race and age 5 or 6 ITBS score also significantly contributed to Model 2. After entering early childhood variables to Model 3, only family risk index and ACE score remained significant. Socio-emotional adjustment in the classroom between ages six and nine also significantly contributed to Model 3. After entering elementary school achievement to Model 4, family risk index, ACE score, and socio-emotional adjustment in the classroom remained significant. After entering middle childhood and early adolescence variables to Model 5, only ACE score and socio-emotional adjustment in the classroom (ages six to nine) remained significant. ACE score and socio-emotional adjustment in the classroom (ages six to nine) remained significant in Model 6, after entering early adolescence achievement. After entering adolescence variables to Model 7, ACE score and socio-emotional adjustment in the classroom (ages six to nine) remained significant. Sex, juvenile arrest, and on-time high school graduation also significantly contributed to Model 7. The results of the final model including all variables are described below.

Among socio-demographic factors, sex was significantly associated with adult depressive symptoms ($OR = .68$, $CI = .46–1.00$, $p < .05$). This finding indicates that, on average, males were 32% less likely to report one or more frequent depressive symptoms in adulthood than females, when controlling for other factors. ACE score was also significantly associated with adult depressive symptoms ($OR = 1.24$, $CI = 1.00–1.54$, $p < .05$). This finding indicates that, on average, each additional ACE between the ages of zero and five was associated with a 24% increase in the likelihood of reporting one or more frequent symptoms in adulthood.

Among childhood factors, socio-emotional adjustment in the classroom (ages six to nine) was significantly associated with adult depressive symptoms ($OR = .94$, $CI = .89–.99$, $p < .05$). This finding indicates that, on average, each one-unit increase in teacher-rated classroom adjustment was associated with a 6% reduction in the likelihood of reporting one or more frequent symptoms in adulthood. Among adolescence factors, juvenile arrest was significantly associated with adult depressive symptoms ($OR = 2.07$, $CI = 1.40–3.06$, $p < .001$). This finding indicates that individuals who were arrested as juveniles were over twice as likely to report one or more frequent depressive symptoms in adulthood than those who were not arrested as juveniles. Finally, on-time high school graduation was significantly associated with adult depressive symptoms ($OR = .66$, $CI = .43–1.00$, $p < .05$). This finding

indicates that individuals who graduated on time were 34% less likely to report one or more frequent symptoms in adulthood than those who did not graduate on time.

The Cox and Snell R^2 statistic for the final step of the logistic model was .07, indicating that the model accounted for 7% of the variance in depressive symptoms in the full sample.

Predictors for Males—Table 4 shows the estimates from the logistic regression analysis for the male sample. CPC preschool participation, CPC school-age participation, family risk index, and ACE score significantly contributed to Model 1. All of these factors remained significant after entering the Age 5 or 6 ITBS composite score to Model 2. After entering early childhood variables to Model 3, only CPC preschool participation, CPC school-age participation, and ACE score remained significant. Socio-emotional adjustment in the classroom (ages six to nine) also significantly contributed to Model 3. After entering early childhood achievement to Model 4, only CPC preschool participation, CPC school-age participation, and ACE score remained significant. Grade 3 ITBS reading score also significantly contributed to Model 4. After entering middle childhood and early adolescence variables to Model 5, only CPC preschool participation, CPC school-age participation, and ACE score remained significant. All of these variables remained significant in Model 6, after entering early adolescence achievement. All of these variables remained significant in Model 7, after entering adolescence variables. Juvenile arrest and on-time graduation also significantly contributed to Model 7. The results of the final model for males including all variables are described below.

Among socio-demographic factors, CPC preschool participation was significantly associated with depressive symptoms for males ($OR = .43$, $CI = .24-.77$, $p < .01$). On average, male CPC preschool participants were 57% less likely to report one or more frequent symptoms in adulthood than male comparison group members. CPC school-age participation was also significantly associated with adult depressive symptoms ($OR = 2.54$, $CI = 1.43-4.53$, $p < .01$). On average, male CPC school-age program participants were more than two-and-a-half times as likely to report one or more symptoms in adulthood than males who did not participate in the school-age program. Finally, ACE score was significantly associated with adult depressive symptoms ($OR = 1.36$, $CI = 1.02-1.82$, $p < .05$). On average, each additional ACE between the ages of zero and five was associated with a 36% increase in the likelihood of reporting symptoms in adulthood for males.

Among adolescence factors, juvenile arrest was significantly associated with depressive symptoms ($OR = 2.06$, $CI = 1.16-3.65$, $p < .05$). This finding indicates that males who had been arrested as juveniles were over twice as likely to report one or more frequent symptoms in adulthood than males who had not been arrested as juveniles. On-time graduation was also associated with adult depressive symptoms ($OR = .34$, $CI = .15-.78$, $p < .05$). This finding indicates that males who graduate from high school on time were 66% less likely to report one or more frequent symptoms in adulthood than males who did not graduate on time.

The Cox and Snell R^2 statistic for the final step of the logistic model was .15, indicating that the model accounted for 15% of the variance in depressive symptoms in the full sample.

Predictors for Females—Table 5 shows the estimates from the logistic regression analysis for the female sample. CPC school-age participation and family risk index significantly contributed to Model 1. After entering the Kindergarten achievement to Model 2, neither factor remained significant. The Age 5 or 6 ITBS composite score did significantly contribute to Model 2. After entering early childhood variables to Model 3, the Age 5 or 6 ITBS composite score was no longer significant. Socio-emotional adjustment in the classroom (ages six to nine) did significantly contribute to Model 3. This factor remained significant in Models 4 and 5, after entering early childhood achievement and middle childhood and adolescence variables, respectively. Special education placement also made a significant contribution to Model 5. Classroom adjustment and special education placement remained significant in Model 6, after entering early adolescence achievement. Both of these factors remained significant in Model 7, after entering adolescence variables. Juvenile arrest also significantly contributed to Model 7. The results of the final model for females including all variables are described below.

Among childhood factors, socio-emotional adjustment in the classroom (ages six to nine) was significantly associated with depressive symptoms in emerging adulthood for females ($OR = .92$, $CI = .85-1.00$, $p < .05$). This finding indicates that, on average, every one-unit increase in teacher-rated classroom adjustment was associated with an 8% reduction in the likelihood of reporting one or more frequent symptoms for females. Special education placement was significantly associated with symptoms for females ($OR = .35$, $CI = .13-.98$, $p < .05$). This finding indicates that, on average, females who were ever placed in special education between ages six to fourteen (Ages 6 to 14) were 65% less likely to report one or more frequent symptoms in emerging adulthood than females who had never been in special education during that time period.

Among adolescence factors, juvenile arrest was significantly associated with depressive symptoms ($OR = 1.99$, $CI = 1.12-3.53$, $p < .05$). This finding indicates that, on average, females who had been arrested as juveniles were nearly twice likely to report one or more frequent symptoms than females who had not been arrested as juveniles.

The Cox and Snell R^2 statistic for the final step of the logistic model was .06, indicating that the model accounted for 6% of the variance in depressive symptoms in the full sample.

Additional Analyses—Several analyses were conducted to assess the robustness of findings. First, a dichotomous variable indicating whether any of the family risk index's individual risk factors were missing was entered into the models along with the family risk index. Inclusion of this variable did not alter the pattern of results, indicating that imputation of the family risk index did not alter the results. In addition, two alternative measurements of family risk were compared against the continuous risk index. In the first alternative family risk measurement, each individual risk factor comprising the risk index was entered into the model. The only risk factor that significantly contributed to the model was mother being unemployed or employed part-time. In the second alternative family risk measurement, the continuous family risk index was replaced with a dichotomous variable indicating the presence of four or more risk factors. This replacement yielded similar patterns of results to

the continuous risk index. These results suggest that the use of a cumulative, continuously scored family risk index was appropriate.

Similarly, each individual ACE was entered into the model, in lieu of the ACE index. These replacements yielded similar overall patterns of results. Using the full ACE index (ages zero to 18 years) also yielded similar overall patterns of results. These results suggest that the use of a cumulative index of ACEs occurring between the ages of zero and five likely did not mask salient effects of a specific or later ACE on depression in emerging adulthood.

A propensity score variable predicting participants' probability of participating in the age 22–24 survey was also created in order to assess whether sample attrition or selection bias affected results. The propensity score was calculated with a one-step linear regression model including the following predictors: sex, race, CPC preschool and school-age participation, family risk index, missing risk index, age 5 or 6 ITBS composite score, classroom adjustment (ages six to nine), school mobility (ages five to nine), age 13 or 14 reading achievement, activity in Chicago Public Schools for six or more years, and last known address being in Illinois. Inclusion of this propensity score variable yielded similar patterns of results, suggesting that attrition and selection bias did not alter results (see Appendix A1).

Discussion

This study examined the impact of a comprehensive set of predictors on depressive symptoms in emerging adulthood in a large sample of primarily African American individuals who grew up in low-income, urban areas. Results are discussed in regards to the full study sample model and sex-split models.

Full Study Sample

Hypothesized risk factors—We hypothesized that female sex, cumulative family risk index, cumulative ACE score, low perceived competence in childhood, trouble-making behavior in childhood and adolescence, shy and anxious behavior in childhood and adolescence, grade retention in childhood and adolescence, school mobility in childhood and adolescence, special education in childhood and adolescence, and juvenile arrest in late childhood and adolescence would be positively associated with depressive symptoms in emerging adulthood. In the full sample, females were more likely to endorse depressive symptoms in emerging adulthood than males. This is consistent with our hypothesis and with previous research indicating that adult females are twice as likely to experience depression as males due to differences in exposure to adversity, biological stress reactivity, and other factors (e.g., Nolen-Hoeksema, 2001).

Second, higher cumulative ACE scores were associated with increased likelihood of depressive symptoms. This finding is consistent with our hypothesis and aligns with previous research indicating a dose-response relationship between ACE scores and adult depression in adulthood, and is consistent with research reporting that exposure to adversity and trauma in the first years of life exerts particularly deleterious effects on development (e.g., Chapman et al., 2004; Chu & Lieberman, 2010). It is also noteworthy that in the present study, ACE score was a significantly better predictor of depressive symptoms than

the family risk index score. This finding again supports the unique repercussions of ACEs for child development and adult wellbeing, above and beyond the contributions of socio-demographic risk factors.

Third, juvenile arrest was associated with an increased likelihood of depressive symptoms in emerging adulthood. This finding is consistent with our hypothesis and with research indicating heightened rates of depression among incarcerated juveniles (e.g., Grisso, Vincent, & Seagrave, 2005). The present study adds to knowledge in this area by indicating that the risk of depression may continue into emerging adulthood, and that this risk also applies to individuals who were arrested (but not necessarily incarcerated) as juveniles. This finding may partially reflect the risk factors for juvenile arrest, many of which have also been identified as risk factors for depression in non-offending samples—for example, negative parenting, family violence, association with deviant peers, and low academic achievement (e.g., Loeber & Farrington, 2001). It is also likely that the link between juvenile arrest and adult depressive symptoms is partially attributable to the repercussions of juvenile arrest. Individuals who are arrested as juveniles are at heightened risk for a host of negative outcomes, notably including low educational attainment (e.g., Kirk & Sampson, 2013). Low educational attainment, in turn, has been linked to lower occupational prestige and increased mental health problems (e.g., Lorant et al., 2003). In sum, it is likely that many juvenile offenders are already at heightened risk for depression prior to arrest, and that they are at even higher risk following arrest.

Hypothesized promotive factors—We hypothesized that early childhood intervention, school-age intervention, academic achievement in childhood and adolescence, parent involvement in school in childhood, high socio-emotional adjustment in the classroom in childhood, magnet school attendance in childhood and adolescence, and on-time graduation would be negatively associated with depressive symptoms in emerging adulthood. In the full sample, higher levels of classroom adjustment were associated with lower likelihoods of depressive symptoms in emerging adulthood. This finding is consistent with our hypothesis and aligns with previous research reporting links between classroom functioning (e.g., behavior, concentration, peer relations) and childhood internalizing problems (e.g., Edelsohn, Ialongo, Werthamer-Larsson, Crockett, & Kallam, 1992). The present study extends this line of work by demonstrating that early classroom functioning, as measured by a brief teacher-report measure, predicts the risk of depressive symptoms through emerging adulthood. These findings are also consistent with the Dual Failure Model of depression (e.g., Patterson & Stoolmiller, 1991), which posits that low levels of adaptation skills in early childhood may initiate a cascade of negative evaluations by parents, teachers, and peers; low self-concept; academic failure, and ultimately, internalizing problems.

Second, on-time high school graduation was associated with a decreased likelihood of depressive symptoms in emerging adulthood. This finding is consistent with our hypothesis. Individuals who graduate on time likely have higher levels of academic, parental, personal, and psychological resources, whereas those who fall behind are more likely to experience various depression risk factors in childhood, adolescence, and emerging adulthood (e.g., low socioeconomic status, delinquency, dropout, lower occupational prestige) (Alexander, Entwisle, & Kabbani, 2001; Ensminger & Slusarcick, 1992). Thus, graduation status can be

conceptualized both as the product of developmental cascades across childhood and adolescence, and as a contributor to additional cascade effects as the individual transitions into adulthood (Masten, Roisman, et al., 2005).

Predictors by Sex

Male sample—In the male sample, CPC preschool participation was associated with significantly lower likelihood of depressive symptoms in emerging adulthood. This result is consistent with our hypothesis on education and other indicators of well-being (Reynolds et al., 2007, 2011). However, despite the benefits of CPC preschool, participation in the school-age program was associated with significantly higher likelihood of depressive symptoms in emerging adulthood for males. This result is inconsistent with our hypothesis and with previous research on the multidimensional benefits of CPC participation and the expected dose-response relationship between length of participation and positive outcomes. One possible explanation is that CPC participation heightens male children's expectations for school quality, academic and personal success. These high expectations may be frustrated after the program ends if the child's subsequent school environments are of lower quality or the child does not perform as highly as expected, increasing his long-term risk for internalizing problems. This hypothesis aligns with findings from the Abecedarian Project, which found that early childhood educational intervention was positively associated with perceived scholastic competence in adolescence, which in turn predicted global self-worth (Campbell, Pungello, & Miller-Johnson, 2002).

Female sample—In the female sample, special education placement (ages six to fourteen) was associated with significantly lower likelihood of depressive symptoms in emerging adulthood. This finding is consistent with our hypothesis. There has been relatively little previous research on the relationship between special education placement and depression. However, this finding suggests that when girls with special needs receive appropriate support services at school, their risk of developing internalizing problems is significantly decreased. This finding could also reflect the higher levels of support that girls with special needs receive from their families and schools relative to children who do not have special needs.

Sex differences—Notably, more predictors included in the final model were significantly associated with depressive symptom for the male sample than for the female sample. The Cox and Snell R^2 statistic for the final step of the prediction model for the male sample (Table 4) was more than twice as large as the same statistic for the full and female samples (Tables 3 and 5, respectively), indicating that the model explained greater variation in depressive symptoms for males than females. One possible explanation for this result is that the current dataset did not include measures of biological stress reactivity, nor more nuanced assessments of self-concept, victimization, or coping styles, all of which have been hypothesized to be related to the increased prevalence of depression among females (Nolen-Hoeksema, 2001). A second possible explanation is that, compared to females, African American males' risk of developing depression by emerging adulthood is more closely linked to issues surrounding early school quality and educational attainment. African Americans of both sexes commonly face systemic racism and adversity in school and other settings; however, African American males in particular are disproportionately disciplined,

placed in special education, suspended, and expelled (e.g., U.S. Department of Education, 2000, 2014). High quality early childhood programs may buffer against African American males' long-term risk of depression by enhancing their cumulative academic and psychological resources and initiating positive developmental cascades. Meanwhile, as previously discussed, high school graduation status may initiate positive or negative developmental cascades as these individuals transition into adulthood. These sex-related predictor patterns and the interplay between educational attainment and depression should be investigated in future research.

Comparisons to Previous Research

Among the significant predictors of depressive symptoms in the present study, juvenile arrest (full study, male, and female samples), socio-emotional adjustment in the classroom (full study and male samples), and special education placement (female sample) were also significant predictors of educational attainment in previous studies (Ou, Mersky, Reynolds, & Kohler, 2007; Ou & Reynolds, 2008). This indicates that, while there is a different prediction pattern across the two outcomes, several risk, promotive and protective factors have cross-domain salience and should receive additional attention in research and intervention.

More broadly, it is noteworthy that a number of predictors that have been previously linked to adult depression did not significantly contribute to the final models of the present study (e.g., academic achievement, parent involvement, child self-concept, middle school behaviors). These findings may, in part, reflect relatively low means and levels of variation for certain variables (e.g., academic achievement, parent involvement), or measurement limitations (e.g., measuring parent involvement at school but not at home). However, they may also indicate that the risk and promotive processes underlying the development of depression among African Americans from low-income, urban areas is different from those affecting other groups. This is an important possibility to consider, given that this population has been traditionally understudied. Additional research is needed to replicate and expand upon these findings.

Applied Significance

The results of the present study have several potential implications for practitioners working with youth in educational, clinical, and social settings, particularly in contexts of urban poverty. In regards to early childhood, ACEs between the ages of zero and five years significantly predicted depressive symptoms two decades later, above and beyond the family risk index. This finding underscores the importance of educating parents, teachers, and others about ACEs and trauma-informed strategies for parenting, teaching, and caregiving. It also underscores the potential benefits of screening for ACEs in schools and healthcare settings, particularly in high-poverty areas where the prevalence of ACEs may be elevated.

Given that CPC preschool participation was associated with lower rates of depressive symptoms for males, early childhood programs and practices to enhance school readiness skills may be beneficial for promoting long-term mental health (Reynolds et al., 2007; Takanishi & Kauerz, 2008). From preschool through high school, schools that create

nurturing learning environments and that facilitate development in multiple domains may be especially influential in protecting youth from further risk, particularly in contexts of family and neighborhood poverty (Reynolds, Hayakawa, Candee, & Englund, 2016).

The results of the present study also indicate that brief teacher ratings of classroom adjustment may be useful tools for identifying elementary school children who are at short- and long-term risk for behavioral and emotional problems. These children may benefit from targeted socio-emotional intervention. Teachers may also benefit from additional training on how to support students who are exhibiting behavioral and emotional problems (Jennings & Greenberg, 2009). This study's results also indicate that, beginning in early adolescence, youth who are arrested as juveniles or who fall behind in the timeline to graduation are at risk for developing depressive symptoms by emerging adulthood. These individuals would be good candidates for mental health screenings and targeted socio-emotional and academic support services.

Study Limitations

Despite many strengths, several limitations should be acknowledged. First, the experiences of study sample, who were primarily African American and grew up in urban Chicago in the 1980s, may not generalize to those of other groups. There is thus a need for follow-up work with individuals from different racial and ethnic backgrounds, geographic contexts, and generational cohorts.

Second, it is possible that members of the CLS' attrition sample were more socioeconomically disadvantaged and thus, more likely to experience depressive symptoms in emerging adulthood than those participants who were not lost between waves. This would affect the present study's prediction estimates. However, Table 1 indicates that the present study's sample was comparable to the original CLS sample, with a slightly lower percentage of males and a slightly higher percentage of African Americans. Although there were some differences in the prevalence of individual risk factors between ages zero and three, the study and attrition samples did not significantly differ in regards to mean risk index scores. Furthermore, the inclusion of a propensity score predicting participants' probabilities of participating in the age 22–24 survey did not significantly alter the pattern of results (see Appendix A1).

Third, while the BSI has demonstrated good reliability and validity, it is likely that participants underreported their depressive symptoms—a pattern which has been found in previous work (e.g., Eaton, Neufeld, Chen, & Cai, 2000; Hunt, Auriemma, & Cashaw, 2003). Hypothesized reasons for underreporting include: social desirability bias, feelings of shame or embarrassment, stigma surrounding mental health issues, and cultural mistrust towards researchers and the American health care system stemming from the historical victimization of certain groups (Ward, Clark, & Heidrich, 2009). Some researchers have suggested that males are more likely to underreport mental health symptoms than females (e.g., Vrendenburg, Krames, & Flett, 1986); others, however, have reported mixed or insignificant results (e.g., Hunt, Auriemma, & Cashaw, 2003). Future studies may benefit from assessing mental health with multiple methods (e.g., structured clinical interviews, different checklists).

Fourth, the present study's retrospective ACE measure has some methodological limitations. Empirical evidence suggests that false-positive recall of ACEs is rare however, adult participants may not have memories of early childhood ACEs, or may have been reluctant to disclose certain adverse experiences (Hardt & Rutter, 2004). Furthermore, while the present study's ACE measure was similar to measures that have been used in major ACE studies, it may not have comprehensively covered all ACEs (e.g., poverty-related ACEs). Thus, it is possible that the true prevalence of ACEs and the strength of the association between ACEs and depressive symptoms were under-estimated.

Finally, while the longitudinal design of the present study is a major strength, it is important to acknowledge that the causal relations among variables cannot be conclusively assessed. It is plausible that other variables that were not available in the CLS dataset (e.g., parental psychopathology, early parent-child interaction patterns) may have influenced the pattern of outcomes over time. Given the comprehensiveness of the model tested, our findings appear to be robust and are less likely to be due to specification error. However, it would be beneficial for future research to study the significant predictors that were identified in the present study in conjunction with other theoretically informed risk, promotive and protective factors.

Conclusion

This study marks an important step in understanding the risk and promotive factors for depressive symptoms in emerging adulthood among individuals living in low-income, urban areas. A comprehensive array of predictors was studied within the context of a cumulative risk and risk-protective framework, including many that had not previously been studied in tandem. Several significant predictors emerged in the final models, including: sex, ACE score, socio-emotional adjustment in the classroom, juvenile arrest, and on-time high school graduation for the full study sample; CPC preschool and school-age participation, ACE score, juvenile arrest, and on-time graduation for males; and socio-emotional adjustment in the classroom, special education placement, and juvenile arrest for females. Given the greater number of predictors for males, the explanatory power of the model favored males.

The relatively low number of significant predictors in the final models suggest that the predictors and developmental processes leading to adult depressive symptoms among low-income, urban individuals from racial and ethnic minority backgrounds may be different than those at play for other groups. Additional research is needed to clarify the processes that link risk and promotive factors in childhood and adolescence to depressive symptoms in emerging adulthood for specific populations. Research of this nature will enhance scientific knowledge about the etiologies of depression, and may inform interventions that will reduce its human and economic burdens.

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Appendix A

Table A1

Logistic Regression Odds Ratio Predicting One or More Frequent Adult Depressive Symptoms, including Propensity Score Predicting Inclusion in the Study Sample – Full Study Sample (N = 1142)

Predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Program and demographic							
Sex (1 = male)	1.17	1.14	.92	.91	.89	.89	.67*
Race (1 = African American)	2.66	2.95*	2.58	2.49	2.52	2.52	2.65
CPC preschool participation (1 = yes)	.67*	.77	.79	.79	.81	.81	.80
CPC school-age intervention participation (1 = yes)	1.10	1.12	1.17	1.22	1.26	1.26	1.25
Family risk index (ages 0–3)	1.18 **	1.16 **	1.12*	1.11	1.09	1.09	1.07
ACE score (ages 0–5)	1.29	1.38*	1.46*	1.46*	1.44*	1.44*	1.37*
Propensity score	1.09	2.33	4.64	5.00	5.50	5.48	6.16
Childhood							
Age 5 or 6 ITBS composite score	—	.97 **	.99	.99	.99	.99	.99
Ever retained (ages 6–9) (1 = yes)	—	—	.97	.86	.87	.85	.73
Socio-emotional adjustment in classroom	—	—	.92 ***	.93 **	.93 **	.93*	.94*
Parent involvement in school (ages 6–9)	—	—	.90	.91	.93	.93	.95
Age 8 or 9 ITBS Reading Score	—	—	—	.99	.99	.99	.99
Ever retained (ages 9–14) (1 = yes)	—	—	—	—	1.14	1.12	1.02
Ever changed schools (ages 9–14) (1 = yes)	—	—	—	—	1.25	1.24	1.19
Perceived competence (ages 8–12)	—	—	—	—	1.02	1.03	1.04
Troublemaking behavior (ages 11–13)	—	—	—	—	1.08	1.08	1.00
Shy and anxious behavior (ages 11–13)	—	—	—	—	1.01	1.01	1.00
Ever attended magnet school (ages 9–14) (1 = yes)	—	—	—	—	.78	.79	.87
Ever in special education (ages 6 to 14) (1 = yes)	—	—	—	—	.82	.80	.79
Adolescence							
Age 13 or 14 ITBS Reading Score	—	—	—	—	—	1.00	1.00
Juvenile arrest (by age 18) (1 = yes)	—	—	—	—	—	—	2.07 ***
On-time graduation (1 = yes)	—	—	—	—	—	—	.65*

p < .05,

**

p < .01,

p < .001

Appendix B

Table B1

Correlations Between Outcome and Predictor Measures

Measure	1.	2.	3.	4.	5.	6.	7.	8.
1. One or more frequent depressive symptoms	—	—	—	—	—	—	—	—
2. Sex (1 = male)	.04	—	—	—	—	—	—	—
3. Race (1 = African American)	.06*	−.01	—	—	—	—	—	—
4. CPC preschool participation (1 = yes)	−.06*	−.06*	.02	—	—	—	—	—
5. CPC school-age participation (1= yes)	−.01	−.03	.03	.38**	—	—	—	—
6. Family risk index (ages 0–3)	.10**	−.03	.09**	.00	.00	—	—	—
7. ACE score (ages 0–5)	.08**	.10**	.03	.02	.04	.02	—	—
8. Age 5 or 6 ITBS composite score	−.10**	−.03	.10**	.28**	.16**	−.13**	.07*	—
9. Ever retained (ages 6–9) (1 = yes)	.08**	.14**	−.01	−.13**	−.14**	.13**	−.04	−.29**
10. Socio-emotional adjustment in classroom (ages 6–9)	−.20**	−.24**	−.06*	.14**	.12**	−.15**	.029	.37**
11. Parent involvement in school (ages 6–9)	−.13**	−.11**	−.01	.20**	.18**	−.20**	−.04	.25**
12. Age 8 or 9 ITBS Reading Score	−.16**	−.17**	−.04	.16**	.20**	−.22**	.03	.44**
13. Ever retained (ages 9–14) (1 = yes)	.07*	.11**	.04	−.05	−.03	.05	.03	−.06
14. Ever changed schools (ages 9–14) (1 = yes)	.07*	.05	−.03	−.13**	−.17**	.10**	.10**	−.12**
15. Perceived competence (ages 8–12)	−.09**	−.12**	−.03	.07*	.03	−.06*	−.07*	.18**
16. Troublemaking behavior (ages 11–13)	.09**	.21**	.01	−.09**	−.06	.13**	.05	−.15**
17. Shy and anxious behavior (ages 11–13)	.08**	.08*	.11**	−.04	−.03	.16**	−.02	−.16**
18. Ever attended magnet school(s) (ages 9–14)	−.06*	−.10**	.05	.15**	.18**	−.17**	−.04	.24**
19. Ever in special education (ages 6–14) (1 = yes)	.04	.15**	.02	−.12**	−.08**	.02	−.03	−.19**
20. Age 13 or 14 ITBS Reading Score	−.15**	−.18**	−.04	.16**	.13**	−.21**	.05	.43**
21. On-time high school graduation (1 = yes)	−.16**	−.20**	−.02	.09**	.08**	−.21**	−.07*	.14**
22. Juvenile arrest (by age 18)	.17**	.38**	.02	−.06*	.00	.11**	.14**	−.04

Measure	9.	10.	11	12.	13.	14.	15.
10. Socio-emotional adjustment in classroom (ages 6–9)	−.38**	—	—	—	—	—	—
11. Parent involvement in school (ages 6–9)	−.252**	.539**	—	—	—	—	—
12. Age 8 or 9 ITBS Reading Score	−.50**	.63**	.39**	—	—	—	—
13. Ever retained (ages 9–14) (1 = yes)	.01	−.21**	−.09**	−.20**	—	—	—
14. Ever changed schools (ages 9–14) (1 = yes)	.09**	−.11**	−.20**	−.14**	.11**	—	—
15. Perceived competence (ages 8–12)	−.11**	.39**	.25**	.28**	−.11**	−.16**	—
16. Troublemaking behavior (ages 11–13)	.14**	−.34**	−.21**	−.27**	.12**	.11**	−.47**
17. Shy and anxious behavior (ages 11–13)	.10**	−.30**	−.22**	−.25**	.10**	.07*	−.22**

Measure	9.	10.	11	12.	13.	14.	15.
18. Ever attended magnet school(s) (ages 9–14)	-.10**	.10**	.14**	.22**	-.05	-.17**	.05
19. Ever in special education (ages 6–14) (1 = yes)	.18**	-.31**	-.17**	-.27**	.12**	.04	-.12**
20. Age 13 or 14 ITBS Reading Score	-.43**	.62**	.37**	.69**	-.22**	-.16**	-.31**
21. On-time high school graduation (1 = yes)	-.36**	.37**	.29**	.35**	-.22**	-.17**	.16**
22. Juvenile arrest (by age 18)	.15**	-.20**	-.15**	-.18**	.08**	.10**	-.17**

Measure	16.	17.	18.	19.	20.	21.	22.
17. Shy and anxious behavior (ages 11–13)	.10**	—	—	—	—	—	—
18. Ever attended magnet school(s) (ages 9–14)	-.10**	-.03	—	—	—	—	—
19. Ever in special education (ages 6–14) (1 = yes)	.12**	.11**	.00	—	—	—	—
20. Age 13 or 14 ITBS Reading Score	-.31**	-.27**	.22**	-.32**	—	—	—
21. On-time high school graduation (1 = yes)	.24**	-.16**	.18**	-.14**	.40**	—	—
22. Juvenile arrest (by age 18)	.22**	.10**	-.10**	.12**	-.22**	-.31**	—

p < .05,

**

p < .01,

p < .001

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Highlights

- Predictors of depression in emerging adulthood were studied in a low-SES cohort.
- Adverse childhood experiences and classroom adjustment were significant predictors.
- Juvenile arrest and on-time graduation were also significant predictors.
- The final model fit the male sample better than the full study or female samples.
- Results may inform early intervention and mental health screening.

Table 1

Child Characteristics of the Original and Study Samples in the CLS

Characteristics	Original sample (N = 1,539)	Study sample (N = 1,142)	Attrition sample (N = 397)	p value
Percent males	49.58	45.71	60.71	.00
Percent African American	92.98	94.13	89.67	.00
Percent CPC preschool participants	64.26	65.67	60.20	.05
Percent CPC school-age program participants	55.00	56.40	52.00	.13
Family Risk Index, ages zero to three (maximum possible = 8)	4.52	4.48	4.64	.20
Percent mother under age 18 at participant's birth	16.2	17.0	13.9	.16
Percent mother not a high school graduate	54.3	52.5	59.2	.02
Percent mother unemployed or employed part-time	66.3	65.6	68.5	.30
Percent single parent household	76.5	75.0	80.6	.03
Percent household had four or more children	16.6	17.6	13.9	.09
60% or greater poverty in school attendance area	76.0	76.3	75.1	.63
Percent eligible for AFDC	62.8	61.1	67.5	.03
Percent eligible for free lunch	83.8	83.3	85.1	.43
Age 5 or 6 ITBS Composite Score	47.37	47.99	45.58	.12

Table 2

Description of Key Variables

Variables	<i>N</i>	Range or %	<i>M</i>	<i>SD</i>
Program and demographic				
Percent African American	1,142	94.13%	—	—
Percent males	1,142	45.71%	—	—
Percent CPC preschool participation	1,142	65.67%	—	—
Percent CPC school-age participation	1,142	56.40%	—	—
Family risk index	1,142	0.00 – 7.00	4.48	1.70
ACE score (ages 0–5)	1,142	0.00 – 6.00	.35	.71
Childhood				
Age 5 or 6 ITBS composite score	1,142	28.00 – 83.00	47.99	8.98
Percent ever retained (ages 6–9)	1,142	17.10%	—	—
Socio-emotional adjustment in classroom (ages 6–9)	1,142	8.01 – 30.25	19.53	4.66
Parent involvement in school (ages 6–9)	1,142	.82 – 5.00	2.63	1.00
Age 8 or 9 ITBS reading score	1,142	50.00–145.00	97.63	16.04
Percent ever retained (ages 9–14)	1,142	6.90%	—	—
Percent ever changed schools (ages 9–14)	1,142	60.4%	—	—
Perceived competence (ages 8–12)	1,142	–3.62–3.35	.01	.95
Troublemaking behavior (ages 11–13)	1,142	–1.732–2.65	.01	.75
Shy and anxious behavior (ages 11–13)	1,142	6.00–22.00	9.79	3.37
Percent ever attended magnet school (ages 9–14)	1,142	10.70%	—	—
Percent ever received special education services (ages 6–14)	1,142	14.20%	—	—
Adolescence				
Age 13 or 14 ITBS reading score	1,142	79.00 – 212.00	146.02	21.09
Percent ever arrested as juveniles (by age 18)	1,142	31.70%	—	—
Percent graduated from high school on time	1,142	45.60%	—	—
Percent Reporting 1+ Frequent Symptoms (age 22–24)				
Full study sample	1,142	15.20%	—	—
Male sample	522	16.70%	—	—
Female sample	620	14.00%	—	—

Table 3

Logistic Regression Odds Ratio Predicting One or More Frequent Adult Depressive Symptoms – Full Study Sample (N = 1142)

Predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Program and demographic							
Sex (1 = male)	1.17	1.15	.93	.92	.90	.90	.68*
Race (1 = African American)	2.66	2.97*	2.62	2.52	2.56	2.56	2.69
CPC preschool participation (1 = yes)	.67*	.77	.80	.80	.81	.82	.81
CPC school-age intervention participation (1 = yes)	1.10	1.13	1.18	1.23	1.27	1.27	1.25
Family risk index (ages 0–3)	1.18**	1.16**	1.13*	1.11*	1.10	1.10	1.07
ACE score (ages 0–5)	1.29**	1.32**	1.34**	1.34**	1.31*	1.31*	1.24*
Childhood							
Age 5 or 6 ITBS composite score	—	.97**	.99	.99	.99	.99	.99
Ever retained (ages 6–9) (1 = yes)	—	—	.97	.86	.88	.86	.74
Socio-emotional adjustment in classroom	—	—	.92***	.93**	.93*	.93*	.94*
Parent involvement in school (ages 6–9)	—	—	.90	.91	.93	.93	.95
Age 8 or 9 ITBS Reading Score	—	—	—	.99	.99	.99	.99
Ever retained (ages 9–14) (1 = yes)	—	—	—	—	1.13	1.12	1.01
Ever changed schools (ages 9–14) (1 = yes)	—	—	—	—	1.25	1.24	1.18
Perceived competence (ages 8–11)	—	—	—	—	1.02	1.02	1.03
Troublemaking behavior (ages 11–13)	—	—	—	—	1.08	1.08	1.00
Shy and anxious behavior (ages 11–13)	—	—	—	—	1.01	1.00	1.00
Ever attended magnet school (ages 9–14) (1 = yes)	—	—	—	—	.78	.79	.87
Ever in special education (ages 6–14) (1 = yes)	—	—	—	—	.83	.81	.80
Adolescence							
Age 13 or 14 ITBS Reading Score	—	—	—	—	—	1.00	1.00
Juvenile arrest (by age 18) (1 = yes)	—	—	—	—	—	—	2.07***
On-time graduation (1 = yes)	—	—	—	—	—	—	.66*
Cox & Snell R ²	.03	.03	.05	.05	.06	.06	.07

p < .05,

p < .01,

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Table 4

Logistic Regression Odds Ratio Predicting One or More Frequent Adult Depressive Symptoms – Males Only (N = 522)

Predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Program and demographic							
Race (1 = African American)	6.15	6.29	5.52	5.25	5.76	5.91	6.32
CPC preschool participation (1 = yes)	.39***	.45**	.44**	.44**	.45**	.46**	.43**
CPC school-age intervention participation (1 = yes)	2.02**	2.01*	2.15**	2.43**	2.48**	2.45**	2.54**
Family risk index (ages 0–3)	1.17*	1.16*	1.11	1.07	1.07	1.05	1.04
ACE score (ages 0–5)	1.41*	1.41*	1.44**	1.45**	1.44*	1.47**	1.36*
Childhood							
Age 5 or 6 ITBS composite score	—	.98	1.00	1.01	1.01	1.01	1.00
Ever retained (ages 6–9) (1 = yes)	—	—	1.28	.97	1.01	.95	.78
Socio-emotional adjustment in classroom	—	—	.90**	.94	.94	.95	.95
Parent involvement in school (ages 6–9)	—	—	.89	.89	.90	.91	.95
Age 8 or 9 ITBS Reading Score	—	—	—	.98*	.98*	.98	.98
Ever retained (ages 9–14) (1 = yes)	—	—	—	—	1.12	1.13	1.00
Ever changed schools (ages 9–14) (1 = yes)	—	—	—	—	1.32	1.28	1.24
Perceived competence (ages 8–12)	—	—	—	—	1.14	1.15	1.18
Troublemaking behavior (ages 11–13)	—	—	—	—	1.24	1.24	1.10
Shy and anxious behavior (ages 11–13)	—	—	—	—	.99	.99	.98
Ever attended magnet school (ages 9–14) (1 = yes)	—	—	—	—	.85	.88	1.13
Ever in special education (ages 6–14) (1 = yes)	—	—	—	—	1.12	1.07	1.05
Adolescence							
Age 13 or 14 ITBS Reading Score	—	—	—	—	—	.99	.99
Juvenile arrest (by age 18) (1 = yes)	—	—	—	—	—	—	2.06*
On-time graduation (1 = yes)	—	—	—	—	—	—	.34*
Cox & Snell R ²	.06	.07	.10	.11	.11	.12	.15

p < .05,

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p < .01,

p < .00

Table 5

Logistic Regression Odds Ratio Predicting One or More Frequent Adult Depressive Symptoms – Females Only (N = 620)

Predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Program and Demographic							
Race (1 = African American)	1.75	2.01	1.91	1.92	1.86	1.85	1.99
CPC preschool participation (1 = yes)	1.21	1.32	1.38	1.38	1.37	1.37	1.44
CPC school-age intervention participation (1 = yes)	.60*	.64	.64	.63	.65	.65	.63
Family risk index (ages 0–3)	1.16*	1.14	1.12	1.12	1.11	1.11	1.10
ACE score (ages 0–5)	1.11	1.16	1.17	1.17	1.13	1.13	1.10
Childhood							
Age 5 or 6 ITBS composite score	—	.97*	.98	.98	.98	.98	.98
Ever retained (ages 6–9) (1 = yes)	—	—	.59	.60	.63	.65	.57
Socio-emotional adjustment in classroom	—	—	.93*	.93*	.92*	.92*	.92*
Parent involvement in school (ages 6–9)	—	—	.88	.88	.91	.91	.92
Age 8 or 9 ITBS Reading Score	—	—	—	1.00	1.01	1.00	1.00
Ever retained (ages 9–14) (1 = yes)	—	—	—	—	1.29	1.32	1.20
Ever changed schools (ages 9–14) (1 = yes)	—	—	—	—	1.26	1.27	1.22
Perceived competence (ages 8–12)	—	—	—	—	.92	.92	.92
Troublemaking behavior (ages 11–13)	—	—	—	—	.97	.98	.95
Shy and anxious behavior (ages 11–13)	—	—	—	—	1.03	1.04	1.03
Ever attended magnet school (ages 9–14) (1 = yes)	—	—	—	—	.77	.76	.80
Ever in special education (ages 6–14) (1 = yes)	—	—	—	—	.34*	.36*	.35*
Adolescence							
Age 13 or 14 ITBS Reading Score	—	—	—	—	—	1.00	1.01
Juvenile arrest (by age 18) (1 = yes)	—	—	—	—	—	—	1.99*
On-time graduation (1 = yes)	—	—	—	—	—	—	.81
Cox & Snell R ²	.02	.02	.04	.04	.05	.05	.06

p < .05,

**

p < .01,

p < .001