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## Adolescent Expectations of Early Death Predict Young Adult Socioeconomic Status

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### Abstract

Among adolescents, expectations of early death have been linked to future risk behaviors. These expectations may also reduce personal investment in education and training, thereby lowering adult socioeconomic status attainment. The importance of socioeconomic status is highlighted by pervasive health inequities and dramatic differences in life expectancy among education and income groups. The objectives of this study were to investigate patterns of change in perceived chances of living to age 35 (Perceived Survival Expectations; PSE), predictors of PSE, and associations between PSE and future socioeconomic status attainment. We utilized the U.S. National Longitudinal Study of Adolescent Health (Add Health) initiated in 1994-95 among 20,745 adolescents in grades 7-12 with follow-up interviews in 1996 (Wave II), 2001-02 (Wave III) and 2008 (Wave IV; ages 24-32). At Wave I, 14% reported 50% chance of living to age 35 and older adolescents reported lower PSE than younger adolescents. At Wave III, PSE were similar across age. Changes in PSE from Wave I to III were moderate, with 89% of respondents reporting no change (56%), one level higher (22%) or one level lower (10%) in a 5-level PSE variable. Higher block group poverty rate, perceptions that the neighborhood is unsafe, and less time in the U.S. (among the foreign-born) were related to low PSE at Waves I and III. Low PSE at Waves I and III predicted lower education attainment and personal earnings at Wave IV in multinomial logistic regression models controlling for confounding factors such as previous family socioeconomic status, individual demographic characteristics, and depressive symptoms. Anticipation of an early death is prevalent among adolescents and predictive of lower future socioeconomic status. Low PSE reported early in life may be a marker for worse health trajectories.

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## Keywords

adolescent behavior/psychology; adolescent health; perceptions of mortality; expectation of early death; socioeconomic status; hopelessness; United States

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While relatively accurate mortality expectations have been observed among adults (Hurd & McGarry, 1995), substantial uncertainty regarding personal mortality has been found among adolescents. Among 15 and 16 year olds in the U.S. National Longitudinal Survey of Youth, mean perceived probabilities of dying in the next year and by age 20 were 18.6% and 20.3%, respectively (Fischhoff et al., 2000). A handful of studies have tied anticipation of an early death during adolescence to an array of risk behaviors. Adolescents who believed they would not live to age 30 were more likely to be out-of-school, to have engaged in suicide planning within the past year, and to have greater impulsive sensation-seeking (Jamieson & Romer, 2008). Studies using data from the U.S. National Longitudinal Study of Adolescent Health (Add Health) have related expectation of death before age 35 (Perceived Survival Expectations, PSE) to future risk behaviors and their consequences like selling drugs, suicide attempt, fight-related injury, unsafe sexual activity, police arrest, and HIV diagnosis (Borowsky et al., 2009; K. Harris et al., 2002) – and recently to cigarette-smoking and fast-food consumption (McDade et al., 2011).

## Hopelessness

Low PSE may reflect an overall tendency to view the future pessimistically and with resignation. Anticipation of an early death may indicate hopelessness. Indeed, there are current movements to incorporate considerations of survival expectations into hopelessness theory. For instance, Bolland added the following item to his hopelessness scale: “I don't expect to live a very long life” (Bolland, 2003). Essential components of hopelessness include the expectation that desired events will not occur, negative events will occur, and nothing can be done to change the course of these events (Beck et al., 1974). The literature on hopelessness has documented that a belief in the inevitability of negative events is a risk factor for future negative events. Among inner-city youth in Alabama, Bolland and colleagues connected hopelessness with violent behavior, teen pregnancy, substance abuse, and unintentional injury (Bolland, 2003). As mentioned above, similar associations have been found between anticipation of an early death and risk behaviors (Borowsky et al., 2009).

One potential consequence of adverse life circumstances and experiences is the promotion of hopelessness, and these perceptions may exert detrimental effects independent of the triggers of low PSE. That is, while factors like low family socioeconomic status (SES) and exposure to violence may promote low PSE, these perceptions irrespective of their origins may have a harmful effect—by influencing behaviors and decision-making. For instance, people who perceive a severely bleak or limited future may respond to challenges with fatalism and less persistence. They may set fewer goals, seek less guidance, and develop or attempt fewer solutions to their problems (Peterson & Barrett, 1987). Establishing a relationship between low PSE in adolescence and future adult SES attainment (even after accounting important correlates of low PSE) may highlight two levers of change: 1) combating hopelessness and related concepts, 2) broad-based interventions aimed towards the creation of environments conducive to healthy youth development (e.g., that are low in poverty, crime, discourage substance use, and allow for academic preparation).

## Correlates of PSE

Identified predictors of low adolescent PSE include health risk behaviors, parental unemployment, low adult and peer connection, and low self-esteem (Duke et al., 2009). Low adolescent PSE are also more prevalent among males, who have higher rates of violence and substance use than females, and racial/ethnic minorities, who experience worse rates of mortality and morbidity (Borowsky et al., 2009). Hence, PSE appear to reflect considerations of physical, psychological, economic and social factors related to health and well-being.

Poor neighborhoods are associated with worse youth outcomes including higher rates of criminality, child abuse and injury (Sellström & Bremberg, 2006). Impoverished environments characterized by low institutional resources, low social controls, and the presence of illegitimate opportunity structures may encourage perceptions of a bleak future. Add Health, initiated in 1994 in response to a U.S. Congress mandate to study adolescent health, follows members of a cohort who were adolescents during the peak in violent deaths occurring in the early 1990s (Supplemental Materials, Appendix A, [INSERT LINK TO ONLINE FILES]). Although homicides and other violent crime have declined since then, this cohort of adolescents may have been particularly at risk for low PSE and associated outcomes. We further examine the influence of neighborhood context measured via neighborhood poverty and crime rates on PSE (in addition to examining perceptions of neighborhood safety and personal violence involvement as correlates of PSE). Moreover, we explore the consistency of predictors on adolescent (Add Health Wave I) and emerging adult (Add Health Wave III) PSE. Predictors of Wave III PSE have not been examined by previous studies.

Duke and colleagues found that increased self-esteem and adult connection predicted transitioning out of low PSE from Wave I to Wave II one year later (Duke, Skay, Pettingell, & Borowsky, 2011b) and that increases in PSE were linked to better outcomes at Wave III including lower depressive symptoms and higher physical activity, civic engagement and education levels (Duke et al., 2011a). We track changes in PSE from adolescence to early adulthood, an endeavor that may increase understanding of the evolution of risk perceptions and perceived vulnerability. We also examine PSE by time spent in the U.S. In the U.S., immigrants experience food insecurity, less timely health care services, limited economic options/unpredictable day labor, and fear of discovery (among undocumented immigrants), along with other stressors specific to adaptation as an immigrant (Hadley et al., 2008). Lower PSE among the foreign born and particularly among new immigrants may reflect uncertainty about the future.

## PSE as a predictor of future socioeconomic status

Most previous studies have not examined the potential for anticipation of an early death to have broader consequences outside of risk behaviors—such as SES attainment. The importance of income and education is highlighted by pervasive health inequities by SES and dramatic differences in life expectancy ranging from 4-10 years across income and education groups (Rogot et al., 1992). However, the related concept of hopelessness has been linked to lower grade point average, less specified academic goals, and less academic counseling (Peterson & Barrett, 1987). Hopelessness may encourage fatalism and passivism as a response to failures and challenges, thereby lowering the likelihood of academic and career success. Similarly, we expect that low PSE will lower commitment to education and training, and correspondingly be related to lower SES in young adulthood.

Recently, using Add Health data, Duke and colleagues found that adolescents who reported low PSE (i.e., a 50-50 chance or less of living to age 35) at Waves I or II compared to those

with high PSE at both waves were less likely to be in school, employed or in the military (single outcome) and less likely to have at least a high school diploma/GED at Wave III (respondents 18-26 years) (Duke et al., 2011a). Nonetheless, education attainment is in flux particularly through early adulthood. Approximately 25% of students who entered a 4-year public college during the 1995-1996 academic year dropped out five years later (Messersmith & Schulenberg, 2008). Additionally, close to 20% delay post-secondary education for 5 or more years (Chevalier & Griffiths, 2004). This is the first study to investigate PSE as a predictor of SES among adults 24-32 years when SES has become more stabilized. This study also examined multiple indicators of SES including education attainment, personal earnings and material hardships.

Furthermore, we examined PSE measured at Wave I (among adolescents) and Wave III (respondents 18 years and older) as predictors of Wave IV SES. Previous Add Health studies have not investigated links between Wave III PSE and future outcomes. However, PSE at Wave III may be informative of adult outcomes for a variety of reasons. First, it is temporally closer to Wave IV outcomes than Wave I PSE—which may increase its relevancy to Wave IV outcomes. Second, adults have more accurate risk perceptions compared to adolescents who overestimate the probability of negative health-related events (Millstein & Halpern-Felsher, 2002). Hence, low PSE at Wave III may be less subject to crude risk perceptions and may signal severe levels of hopelessness.

## Study aims and hypotheses

The primary study aim was to assess the relationship between PSE and future socioeconomic status attainment, independent of important potential confounding factors that relate to worse PSE and worse SES attainment. The secondary study aim was to describe change in PSE and predictors of PSE in order to further understand the highly understudied concept of early death perceptions among youth. This study used data from Add Health to test three hypotheses:

1. With entry into adulthood (Wave III), most people will report high or higher PSE than in adolescence (Wave I).
2. Higher community-level poverty and crime rates, foreign-birth, and less time in the U.S. will be associated with lower PSE at Waves I and III.
3. Low PSE at Waves I and III will be predictive of lower education, lower personal earnings, and experience of material hardships and evictions in young adulthood (Wave IV).

Appendix B ([INSERT LINK TO ONLINE FILES]) contains a conceptual diagram of predictors and potential effects of PSE derived from the current study's proposed relationships and from previous literature on PSE.

## METHODS

### Study population

Add Health is a nationally representative field study of 20,745 U.S. adolescents in grades 7 through 12 during the 1994-1995 school year. The Wave I response rate was 79% (K. M. Harris et al., 2009). Three in-home follow-up interviews of the cohort have been completed: Wave II in 1996 (88% of the eligible cohort at Wave I), Wave III in 2001-2002 (77%), and Wave IV in 2008 (80%). By design, high school seniors at Wave I were not re-interviewed at Wave II, but were included in Waves III and IV. At Wave IV 15,701 respondents aged 24 to 32 years were interviewed. The analytic sample was restricted to respondents with non-

missing survey weights (N= 14,800 with Wave IV cross-sectional weights and N= 9,421 with valid longitudinal weights for analyses that use data from Waves I-IV).

### Variable definition/coding

Variable definitions can be found in Appendix C ([INSERT LINK TO ONLINE FILES]). The main variable of interest was *Perceived Survival Expectations (PSE)*. Respondents were asked at Waves I, II and III, “What are your chances of living to age 35?” Possible responses were: “almost no chance;” “some chance, but probably not;” “a 50-50 chance;” “a good chance” and “almost certain.” Consistent with previous literature, which found detrimental effects associated with PSE 50%, we collapsed PSE equals “50-50 chance” with lower categories (Duke et al., 2011a). Furthermore, we assessed whether more moderate departures from certainty of living to age 35 (i.e., reporting “a good chance”) were also related to detrimental outcomes.

**Wave IV outcomes**—SES in young adulthood was examined via the following Wave IV outcomes: 1) education attainment (< high school; high school/GED; some college/AA degree; 4-year college), 2) annual personal earnings (quartiles), 3) eviction in the past 12 months for not paying rent (yes/no); and 4) experience of material hardships (single dichotomous variable for having experienced any of the following in past 12 months: a time without phone service; didn't pay full amount of rent/mortgage because didn't have enough money; gas/oil/electricity turned off because payments were not made; worried about whether food would run out before had time to buy more).

**Covariates**—The primary goal of this study is to examine the potential long-term relationship between PSE and future SES attainment. The following covariates were selected a priori based upon the literature demonstrating their relationship to PSE and to young adult outcomes (Borowsky et al., 2009; Duke et al., 2011a; Duke et al., 2009; McDade et al., 2011): age (years), sex, foreign-birth, race/ethnicity (white non-Hispanic; black non-Hispanic; Hispanic; Asian non-Hispanic; other single race non-Hispanic; multiracial), parental education (less than high school, high school, some college, college graduate), family structure (two biological parents, two parents, single parent/other), parental public assistance receipt (yes/no), think neighborhood is unsafe (yes/no), block group poverty rate (%), substance use (cigarette use, illicit drug use, binge drinking - coded as separate measures), parental attachment/support, depressive symptoms, and violence involvement (Appendix C, [INSERT LINK TO ONLINE FILES]). The selection of covariates allows consideration of how risk is transmitted across multiple levels of influence (i.e., acknowledges eco-social influences on health). We constructed indices for lack of parental attachment/support, depressive symptoms and violence involvement. For each index, scores were calculated by averaging across items composing the index. We required valid responses for two-thirds of questions composing the indices. Internal consistency of items composing the indices was satisfactory with Cronbach's alphas all above 0.75.

### Statistical analyses

To assess change in PSE (Study Aim 1), we examined differences between Wave I and Wave III PSE via bivariate analyses (cross tabulations). To examine variation in PSE by age, we plotted predicted probabilities of PSE (at Waves I and III) by age estimated via multinomial logistic regression. In analyses restricted to foreign-born individuals, multinomial logistic regression was used to estimate predicted probabilities of Wave I PSE by time spent in the U.S. adjusted for factors that may vary with immigrant cohort—specifically age, gender, race/ethnicity, parental education, parental public assistance receipt and block group poverty rate. Moreover, we assessed predictors of Wave I PSE 50% and Wave III PSE 50% (Study Aim 2) using logistic regression. Predictors were block group



poverty rate, county adult violent crime rates, perceived neighborhood safety, foreign-birth, gender, race/ethnicity, parental education, depressive symptoms, violence involvement and self-rated health.

Finally, we investigated the potential impact of PSE on Wave IV SES, separately for Wave I PSE and Wave III PSE (Study Aim 3). We examined multiple indicators of SES as outcome variables at Wave IV. For polytomous indicators of SES (education, personal earning quartile), we utilized multinomial logistic regression after finding violations in the proportional odds assumption. For dichotomous SES outcomes (eviction, material hardships), we utilized logistic regression. Models controlled for the following factors associated with (or hypothesized to be associated with) Wave I PSE and SES attainment: age, sex, race/ethnicity, foreign-birth, family structure, parental education, parental public assistance receipt, perceived neighborhood safety and Wave I values for block group poverty rate, parental support/attachment, self-rated health, depressive symptoms, substance use and violence involvement. When we examined the relationship between PSE and personal earnings, we additionally controlled for current student status at Wave IV, recognizing that PSE may be related to schooling and that current students may have lower earnings. We investigated the relationship between Wave III PSE and Wave IV SES controlling for the full set of aforementioned covariates with Wave III values where available (block group poverty rate, parental support/attachment, self-rated health, depressive symptoms, substance use and violence involvement).

Among people with valid survey weights, missing data for PSE (<1%) and all Wave IV outcomes (<3%) were low. Missing data for covariates were also low (generally < 2%). Wave III parental support/attachment had the highest rate of missingness (5%). The exclusion of individuals with missing data on PSE, Wave IV outcomes, or covariates resulted in the exclusion of 6-11% of respondents. Sensitivity analyses were conducted using multiple imputation methods to impute data for variables with the most missing data (see Appendix H for a description of imputation methods, [INSERT LINK TO ONLINE FILES]). All summary statistics were produced using STATA®/SE 10 (StataCorp LP, College Station, TX) and weighted to be representative of adolescents in grades 7-12 in the U.S. during the 1994-95 school year. This analysis was exempt from further review by the Public Health-Nursing IRB at the University of North Carolina at Chapel Hill.

## RESULTS

### Descriptive statistics

At Wave I, 14% (95% CI: 13, 16) of adolescents in grades 7-12 reported they had 50% chance of living to age 35 (Table 1). One year later at Wave II, a similar proportion (15%; 95% CI: 14, 17) reported PSE 50%. However at Wave III, when all respondents are 18 years and older, the proportion reporting PSE 50% was much lower (7%; 95% CI: 7, 8). At Wave I, the study population was balanced between the sexes. Two-thirds of respondents were white (65%) with large subpopulations of non-Hispanic blacks (15%) and Hispanics / Latinos (11%). About 6% (95% CI: 5, 9) were foreign-born and 13% (95% CI: 10, 15) had parents with a less than a high school education (Table 1). At Wave IV, 30% of respondents had a college education or greater and mean annual household income was approximately \$34,000 (standard deviation=\$43,000). About one in five (21%) reported material hardships and few experienced an eviction (1.1%) in the past 12 months (Appendix D, [INSERT LINK TO ONLINE FILES]).

## Change in PSE

Changes in PSE were moderate with approximately 9 out of 10 respondents reporting either no change (56%) in PSE from Wave I to Wave III or one level higher (22%) or lower (10%) in PSE. Table 2 displays cross tabulations for Wave I and Wave III PSE. Of the five categories of PSE, “almost certain” had the greatest stability in terms of repeat reports at Wave III (i.e., 82% of people who reported “almost certain” at Wave I also reported “almost certain” at Waves III). Alternatively, among people who reported PSE 50% at Wave I, only approximately 20% reported PSE 50% at Wave III with the remainder reporting higher PSE. Few people (<1%) reported very low PSE (“almost no chance” or “some chance but probably not”) at more than one of the three waves.

At Wave I, older adolescents were less likely to report that they were “almost certain” of living to age 35 and more likely to report lower categories of PSE compared to younger adolescents. At Wave III, age was less predictive of PSE (Figure 1). Results from proportional odds logistic regression indicate that Wave III age was unrelated to Wave III PSE (OR= 1.02; 95% CI: 0.97, 1.06) (not shown). Controlling for experiences that vary with age such as substance use, violence involvement, and depressive symptoms (Millstein & Halpern-Felsher, 2002) left the relationship between PSE and age largely unchanged, and sensitivity analyses in which age was coded more flexibly using indicator variables confirmed the shape of relationships shown in Figure 1. Among the foreign-born, longer duration in the U.S. was associated with increasing predicted probabilities of being “almost certain” or reporting “a good chance” of living to age 35 at Wave I and correspondingly lower predicted probabilities of PSE 50% (Figure 2).

## Predictors of low PSE

People who lived in block groups with high poverty rates (i.e., above the 75<sup>th</sup> percentile) had twice the proportion reporting PSE 50% (21%; 95% CI: 19, 24) compared to those in block groups with lower poverty rates (11%; 95% CI: 10, 13)—although the adjusted odds ratio (AOR: 1.28) was much attenuated (Table 3). Perceiving one's neighborhood as unsafe, violence involvement, depressive symptoms, and lower self-rated health predicted low Wave I PSE. Foreign-born adolescents were more likely to report low Wave I PSE compared to the U.S. born (23% vs. 13%; AOR: 1.57). Black race, “other” race and Hispanic ethnicity were predictive of low Wave I PSE. Among black males, over a quarter (28%; 95% CI: 25, 31) at Wave I reported PSE 50% (not shown) compared to an overall rate of 14% (95% CI: 13, 16) for the Add Health population. At Wave III, similar relationships were detected (Table 3).

## Potential effects of PSE on young adult outcomes (Wave IV)

**Education attainment**—Lower Wave I and Wave III PSE predicted lower educational attainment at Wave IV (Table 4). Reporting that one had a 50-50 chance (versus being “almost certain”) of living to age 35 at Wave I (AOR: 1.73; 95% CI: 1.23, 2.44) or at Wave III (AOR: 2.76; 95% CI: 1.68, 4.52) was related to having less than a high school education versus college education or greater at Wave IV. Controlling for perceived importance of college to the respondent and respondent's parents and the respondent's expectations for college attainment moderately reduced those adjusted odds ratio for Wave I PSE (AOR: 1.47) and Wave III PSE (AOR: 2.42) (not shown). The exclusion of individuals with very low (i.e., two standard deviations below the mean) Wave I Peabody Picture Vocabulary Test scores, a proxy measure of verbal intelligence, resulted in very similar results (not shown).

**Personal earnings, material hardships, eviction**—Wave I and III PSE 50% were related to 36% and 63%, respectively, increase in adjusted odds of having personal earnings in the lowest versus highest income quartile at Wave IV (Table 5). Controlling for current

student status had a negligible impact on effect estimates for personal earnings. Although the proportions of respondents (at Waves I and III) reporting material hardships and evictions increased as PSE decreased, adjustments for potential confounders attenuated relationships such that only Wave III PSE 50% was statistically significantly related to greater experience of material hardships at Wave IV (Table 5). When material hardship was defined as an ordinal variable (range 0 to 4) and ordinal logistic regression was used, very similar adjusted odds ratios were obtained for Wave I PSE and Wave III PSE (not shown).

Analyses stratified by sex revealed a moderately stronger association between Wave I PSE 50% and adjusted odds of less than a high school education versus college or greater among females than males (2.02 vs. 1.56) (not shown). Results remained robust after controlling for teen pregnancy (yes/no), a potential mediator of the relationship between PSE and lower education attainment (females: 2.11 vs. males: 1.63). Controlling for teen pregnancy, among females, Wave III PSE 50% quadrupled (AOR: 4.36; 95% CI: 2.01, 9.48) the adjusted odds of less than a high school education versus a college degree or greater and tripled (AOR: 2.95, 95% CI: 1.51, 5.77) the adjusted odds of having personal earnings in the lowest versus highest quartile.

When the relationship between Wave III PSE and all Wave IV outcomes were examined adjusting for baseline (Wave I) PSE, effect measures were attenuated by 10% (not shown). The strongest predictor of low education attainment was low parental education. Parental receipt of public assistance, family structure other than two biological parents, male sex, depressive symptoms, and lower self-rated health were also related to lower education attainment (Appendix E, [INSERT LINK TO ONLINE FILES]). Similar associations were detected for personal earnings, eviction, and material with the exception of male sex, which was associated with higher personal earnings (Appendix F-G). Moreover, results were robust to multiple imputation of missing data (Appendix H).

## DISCUSSION

Congruent with previous literature, we offer the following conclusions: PSE is informed by psychological and physical health as well as individual, family and neighborhood contexts reflecting lived experiences, exposures and resources. Low PSE is broadly predictive of many different detrimental outcomes in the short-term, as suggested by previous literature on adolescent risk-taking (Borowsky et al., 2009) and as this study demonstrates, in the long-term on adult SES attainment. The utility and efficiency of low PSE as a predictor of future outcomes underscores the importance of examining early-life factors on adult health and the creation of environments conducive to healthy youth development.

The relationship between PSE and age is nuanced. In adolescence, older age is predictive of lower PSE. However, upon reaching adulthood, these expectations rise and remain relatively stable through early adulthood. The decrease in PSE reported by older adolescents at Wave I may signal greater perceived vulnerability among older aged adolescents in response to initial (and subsequently increasing) exposure to adult experiences and risk-taking (Reyna & Rivers, 2008)—although observed age patterns were robust to adjustment for substance use, violence involvement, and depressive symptoms. These observed patterns in PSE contrast with a study that found younger adolescents reported higher perceived probabilities of negative events, such as dying in a strong hurricane, than older adolescents and young adults (Millstein & Halpern-Felsher, 2002). The lower prevalence of low PSE at Wave III compared to Wave I may reflect more developed risk-perceptions of young adults compared to adolescents, and greater confidence in living to age 35 given that Wave III respondents are older. While adolescent mortality expectations are incongruous with actual mortality



rates, studies on subjective mortality expectations among middle/late-aged adults have revealed relatively accurate expectations (Hurd & McGarry, 2002).

This study found that foreign-born adolescents had lower PSE compared to U.S. born adolescents and that greater time in the U.S. was associated with higher PSE. While some health outcomes for foreign-born Americans are better than those for native-born Americans, foreign-born Americans have lower socioeconomic status and worse access to health care (Siddiqi et al., 2009). Greater time in the U.S. may allow for greater familiarity with American culture, norms and systems and for upward mobility (Schoeni, 1997), thereby lowering uncertainty and anxiety about the future. In addition, the experience of immigration itself—which may entail separation from family and friends, dangerous navigation out of one's country of origin or prolonged stay in refugee camps prior to entry into the U.S.—may help explain lower PSE reported by new immigrants (Schreiber, 1995).

Our findings regarding the correlates of low Wave I and III PSE were consistent with previous Add Health studies that explored predictors of Wave I PSE. Borowsky and colleagues connected low Wave I PSE to minority group membership, family structure other than two biological parents, and parental receipt of public assistance (Borowsky et al., 2009). Duke and colleagues found that low Wave I PSE were linked to a wide-range of factors including HIV diagnosis, binge drinking, home gun access, self-esteem, violence involvement and adult connection (Duke et al., 2009). Low PSE efficiently captures aspects of physical, physiological, economic and social landscape that impact perceptions about the future, perceived vulnerability and security.

Low PSE at Waves I and III predicted lower education and income at Wave IV, although stronger effect measures were seen for Wave III PSE. Wave III PSE may be a moderately better predictor of Wave IV SES given its temporal proximity to years characterized by the pursuit of higher education and training. PSE appeared to be a better predictor of SES for females than males, which aligns with previous literature showing depression as a stronger predictor of educational attainment for females than males (Fletcher, 2008). Nonetheless, Waves I and III PSE predicted Wave IV SES independent of corresponding depressive symptoms and important family and neighborhood contextual characteristics such as parental education and neighborhood poverty. Hence, low PSE is predictive of worse SES above and beyond its association with depressive symptoms and with factors typically used to characterize socioeconomic disadvantage.

### Study findings in context

There is a growing literature connecting anticipation of an early death among youths to an array of detrimental outcomes including suicidal behavior, participation in illegal activities, fight-related injury, and unsafe sexual activity (Borowsky et al., 2009; Jamieson & Romer, 2008; Valadez-Meltzer et al., 2005). The results of this study are in alignment with those reported by Duke et al. who found that individuals with low PSE at Waves I or II were less likely to obtain a high school diploma/GED, and to be in postsecondary education, employed or in the military (one outcome) than individuals with high PSE at both waves (Duke et al., 2011a). We supplement the Duke study by examining education attainment later in life when it has become more stabilized and by analyzing multiple levels of education attainment (less than high school, high school, some college, 4-year college or greater). We also investigated additional indicators of economic well-being such as income, material hardships, and experience of evictions. Our study confirms a long-term association between low PSE and detrimental future outcomes.

## Study strengths and limitations

Using nationally representative, longitudinal data on a contemporary cohort of young adults, this study supplements scant existing research on 1) patterns of change in PSE from adolescence to emerging adulthood, 2) predictors of PSE, and 3) the relationship between PSE and future SES attainment. However, this study is subject to several limitations. Examining change in PSE was constrained by the availability of only three waves of data. By design, high school seniors at Wave I were not re-interviewed one year later at Wave II, but were interviewed again at Waves III and IV. Nonetheless, Add Health remains the only survey to have collected data on PSE at multiple time points. Additionally, individuals reported perceived chances of living to age 35 although with later waves; they were older and maybe more inclined to report higher PSE as their actual conditional probability of living to age 35 increased. However, adolescent mortality expectations reported by Add Health and other surveys document an overestimation of mortality risks that are incongruous with actual mortality risk. In the 1997 National Longitudinal Survey of Youth, the reported mean probability of dying by age 20 reported by 15 and 16 year olds was 20.3% (Fischhoff et al., 2000). The actual risk of dying before age 20 for teens is 0.4% (Arias, 2002). Thus, perceived probabilities of survival among youth may be in sharp contrast with actual mortality rates. Moreover, we observed that at Wave I, older adolescents reported lower PSE compared to younger adolescents, even though they were closer to age 35. Furthermore, when PSE was last collected at Wave III, respondents were between the ages of 18-26 and hence even the oldest respondent was approximately one decade from age 35.

We were unable to assess the impact of numeracy on the reporting of PSE. Respondents self-reported on aspects of their SES, which may be subject to reporting bias. However, while it is not uncommon for income data in surveys to be missing at 20% or higher, 98% of Add Health Wave IV respondents reported on annual personal earnings. Finally, loss to follow-up may have biased observed relationships although the distribution of demographic characteristics was similar at Wave I and Wave IV, and survey weights adjust for attrition across waves.

## Conclusions and study implications

Low survival expectations were substantial among adolescents and predictive of wide-ranging detrimental outcomes in adolescence and beyond. Low PSE reported early in life may be a marker/risk factor for worse health trajectories. Elucidation of the mechanism by which PSE influences outcomes is needed. We speculate that low PSE may reflect hopelessness—and that these perceptions may encourage the abandonment of long-term goals for short-term rewards, lower persistence in achieving goals, and increase complacency and recklessness. The alignment of low PSE with low family socioeconomic status, disadvantaged neighborhood context, and racial/ethnic minority group membership suggests that low PSE may have strong origins in social and economic disadvantage, which may entail experience of racial discrimination, limited access to resources and opportunities, and prolonged exposure to environmental hazards. However, PSE may go beyond these factors by efficiently capturing how individuals are interpreting their experiences and circumstances and the conclusions they are drawing about their future. An additional future line of inquiry is to examine the degree to which the effects of certain individual and contextual characteristics are mediated by PSE. The connection between PSE and development of health conditions such as diabetes, hypertension, and obesity—which are on the rise among youth and major contributions to mortality—also merits further consideration. Recently McDade and colleagues related low PSE to fast-food consumption and cigarette smoking (McDade et al., 2011). PSE may be connected to health conditions through its influence on health behaviors and through its indication of psychological stress/anxiety (and their costs on the body). Moreover, while previous studies have connected low

PSE to risk-taking, the endurance of these ties beyond adolescence and emerging adulthood is uncertain. An area of future research is whether the connection between low PSE and risk-taking persists into young adulthood.

Screening for PSE along with other psychosocial factors may assist in the identification of at-risk youth. Its assessment can be incorporated into discussions with youth about their expectations for their future, prospects for education and employment, and current barriers to achieving goals. Continued efforts are needed to equip youths with the necessary skills and resources to meet the demands of their daily lives and enable a belief in a better future. Modes of intervention are suggested by results finding that transitioning out of low PSE is related to increased self-esteem and connection and caring by adult figures (Duke et al., 2011b). Individuals who transitioned out of low PSE from Wave I to Wave II had better outcomes at Wave III including higher physical activity, civic engagement and education levels compared to “persistent pessimists” (Duke et al., 2011a). Interventions may counteract hopelessness and promote positive future orientations by targeting depressogenic inferential styles, problem-solving abilities, and coping skills—and by providing positive adult role models and opportunities to lead and contribute to their communities.

Moreover, because beliefs about the future are informed by evaluations of present conditions, the promotion of positive future orientations necessitates investment in resources that promote youth development. Such efforts may include investment in public education, through greater numbers of teachers, reduced class sizes, after-school programs, and improvements in school infrastructure. Furthermore, lowering the numbers of families living in poverty is a longstanding and critical issue. The National Center for Children in Poverty estimates that 42% of children live in low-income families (up to 200% of the federal poverty line), and 21% live in poor families (Chau et al., 2010). Impoverished environments with low quality schools, few employment opportunities, and high violence are the physical realities that shape perceptions about the future and one's abilities to obtain desired outcomes.

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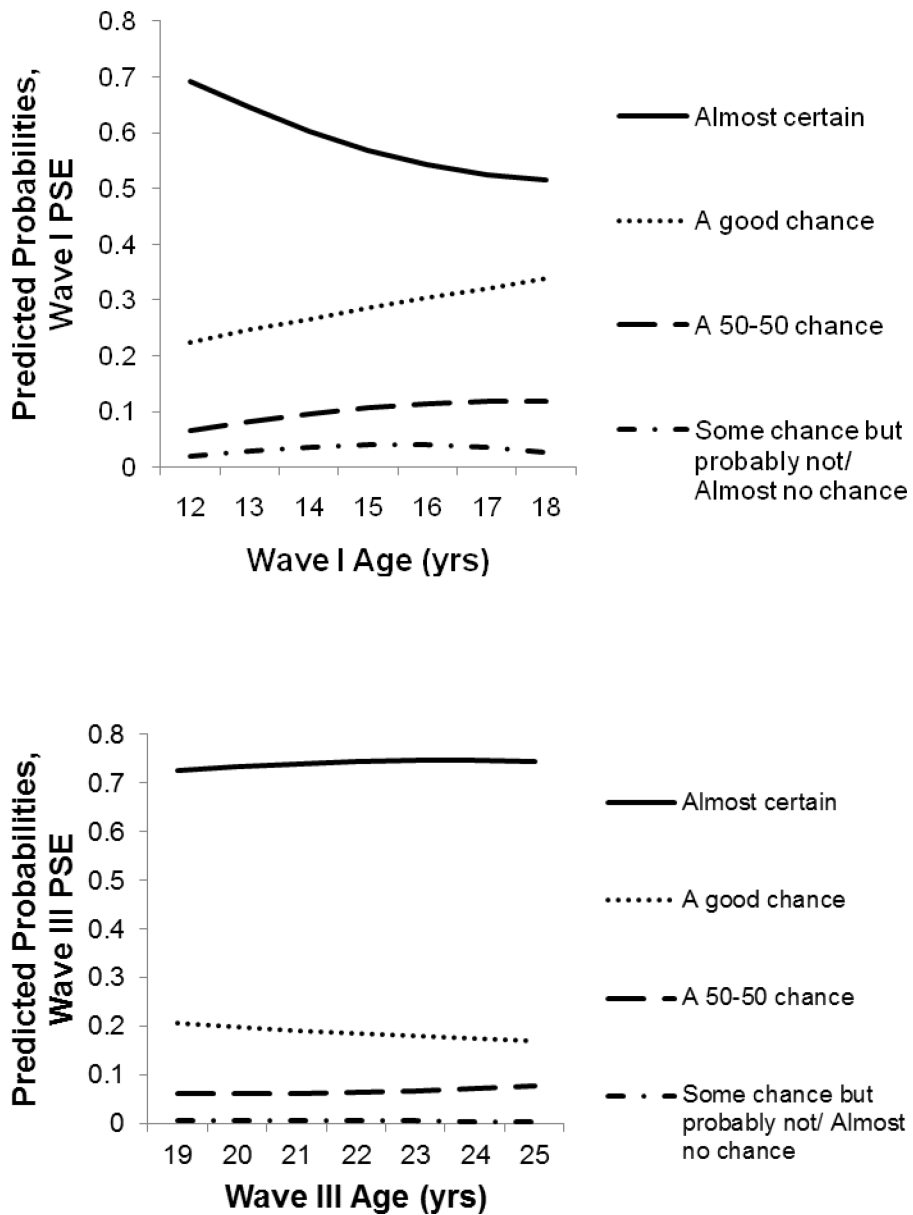
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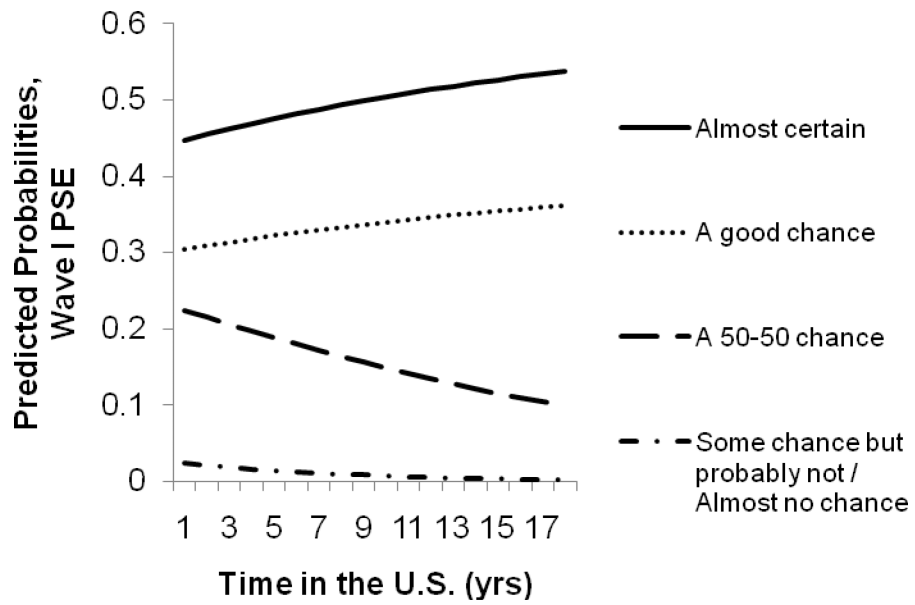
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**Figure 1.** A) Predicted probabilities for Wave I Perceived Survival Expectations (PSE) by Wave I age (N=18326), B) Predicted probabilities for Wave III PSE by Wave III age (N= 14016)



**Figure 2.** Predicted probabilities for Wave I Perceived Survival Expectations (PSE) by time spent in the U.S. among foreign-born individuals; Multinomial logistic regression model adjusted for age, gender, race/ethnicity, parental education, parental public assistance receipt, and block group poverty rate; N=1559

Table 1

Participant characteristics, Add Health

	Wave I (1994-95)	Wave II (1996)	Wave III (2001-02)	Wave IV (2008)
	n	% (95% CI) or Mean (SD) <sup>a</sup>	n	% (95% CI) or Mean (SD) <sup>a</sup>
<b>Perceived Survival Expectations</b>				
Almost certain	10250	57 (55, 59)	7016	74 (72, 75)
A good chance	5775	29 (28, 30)	4336	19 (18, 20)
A 50-50 chance	2065	11 (10, 12)	1670	6.8 (6.1, 7.6)
Some chance but probably not	439	2 (2, 3)	325	0.4 (0.3, 0.5)
Almost no chance	257	1 (1, 2)	169	0.2 (0.1, 0.3)
<b>Covariates</b>				
Age (years)	18919	16 (2)		
Male	9288	51 (50, 52)		
<i>Race</i>				
White, non-Hispanic	9608	65 (59, 70)		
Black, non-Hispanic	3790	15 (11, 19)		
Hispanic	2993	11 (8, 15)		
Asian, non-Hispanic	1247	3 (2, 5)		
Other, non-Hispanic	270	1 (1, 2)		
Multiracial	936	4 (3, 5)		
Foreign-born	1746	6 (5, 9)		
Parents received public assistance	1870	10 (9, 12)		
<i>Parent's education</i>				
Less than high school	2527	13 (10, 15)		
High school	4704	28 (25, 30)		
Some college	5333	30 (28, 31)		
College or greater	6011	30 (27, 34)		
<i>Family structure</i>				
Two biological parents	9686	53 (51, 56)		
Two parents	3444	17 (16, 18)		
			n	% (95% CI) or Mean (SD) <sup>a</sup>
			14800	28 (2)
			6930	51 (49, 52)
			7849	66 (60, 71)
			2975	15 (12, 20)
			2168	11 (8, 15)
			836	3 (2, 5)
			182	1 (1, 2)
			729	4 (3, 5)
			1129	5 (4, 7)

	Wave I (1994-95)		Wave II (1996)		Wave III (2001-02)		Wave IV (2008)	
	n	% (95% CI) or Mean (SD) <sup>a</sup>	n	% (95% CI) or Mean (SD) <sup>a</sup>	n	% (95% CI) or Mean (SD) <sup>a</sup>	n	% (95% CI) or Mean (SD) <sup>a</sup>
Single parent/other	5794	29 (27, 32)						
Think neighborhood is unsafe	2150	10 (9, 12)						
Block group poverty rate	18627	12 (13)	14027		11 (12)			
County adult violent crime per 100,000	18191	222 (155)	13637		165 (117)			
Parental support, Range [1,5]	18526	1.6 (0.6)	13661		1.5 (0.7)			
Violence involvement, Range [0, 1]	18781	0.10 (0.16)	14248		0.04 (0.10)			
<i>Self-rated health</i>								
Fair/poor	1339	7 (6, 8)	650		5 (4, 5)			
Good	4832	26 (25, 27)	3149		22 (21, 23)			
Very good	7431	39 (38, 40)	5805		41 (40, 42)			
Excellent	5300	28 (27, 29)	4716		32 (31, 34)			
Depressive symptoms, Range [0, 3]	18880	0.6 (0.4)	14314		0.5 (0.5)			
30-day cigarette use	18796	5 (10)	14275		9 (13)			
Illicit drug use	5593	30 (27, 32)	4580		34 (32, 36)			
Binge drinking, Range [0, 6]	18875	0.7 (1.3)	14262		1.3 (1.6)			

PSE= Perceived Survival Expectations. Assessed via: "What are your chances of living to age 35?"

<sup>a</sup> Unweighted sample size; Means (Standard Deviations) and Percentages (95% Confidence Intervals) are weighted

**Table 2**  
Cross tabulations of Wave I and Wave III Perceived Survival Expectations (PSE), Add Health

Wave I PSE	Wave III PSE					Totals
	Almost certain	A good chance	A 50-50 chance	Some chance but probably not	Almost no chance	
	n (%) <sup>a</sup>	n (%) <sup>a</sup>	n (%) <sup>a</sup>	n (%) <sup>a</sup>	n (%) <sup>a</sup>	n (%) <sup>a</sup>
Almost certain	<b>6374</b> (47)	1124 (8)	345 (2)	23 (0.1)	14 (0.1)	7880 (57)
A good chance	2825 (19)	<b>1129</b> (7)	336 (2)	20 (0.2)	4 (0.0)	4314 (29)
A 50-50 chance	811(6)	410 (3)	<b>249</b> (2)	10 (0.1)	5 (0.0)	1485 (10)
Some chance but probably not	151 (1)	91 (1)	48 (0)	<b>4</b> (0.0)	6 (0.1)	300 (2)
Almost no chance	107 (1)	46 (0)	26 (0)	4 (0.0)	<b>0</b> (0.0)	183 (1)
Totals	10268 (74)	2800 (19)	1004 (7)	61 (0.4)	29 (0.2)	14162 (100)

PSE assessed via perceived chances of living to age 35

Bolded numbers represent individuals who reported the **same** PSE at Wave I and III; Shaded cells represent participants who reported lower PSE at Wave III than at Wave I

<sup>a</sup>Unweighted sample size; weighted percentages



**Table 3**

Predictors of low Perceived Survival Expectations (PSE), Add Health

	Wave I PSE	50-50 chance	Wave III PSE	50-50 chance
	n=17408		n=13188	
<b>Characteristics</b>	<b>n (%)<sup>a</sup></b>	<b>AOR (95% CI)<sup>b</sup></b>	<b>n (%)<sup>a</sup></b>	<b>AOR (95% CI)<sup>b</sup></b>
<i>Block group poverty</i>				
75th percentile (High)	920 (21)	1.28 (1.09, 1.50)	331 (10)	1.25 (1.04, 1.49)
< 75th percentile	1611 (11)	1.00	682 (6)	1.00
<i>County adult violent crime</i>				
75th percentile (High)	867 (19)	1.08 (0.91, 1.28)	329 (9)	1.12 (0.90, 1.39)
< 75th percentile	1664 (13)	1.00	684 (7)	1.00
<i>Perceived neighborhood as safe</i>				
No	523 (27)	1.45 (1.19, 1.76)	164 (12)	1.25 (0.96, 1.63)
Yes	2008 (12)	1.00	849 (7)	1.00
Age (years)	---	1.03 (0.99, 1.07)	---	1.05 (1.00, 1.10)
<i>Sex</i>				
Male	1331 (15)	1.34 (1.20, 1.50)	575 (9)	1.87 (1.56, 2.25)
Female	1200 (13)	1.00	438 (5)	1.00
<i>Immigrant Status</i>				
Foreign-born	326 (23)	1.57 (1.24, 1.99)	72 (9)	1.28 (0.84, 1.97)
US born	2205 (13)	1.00	941 (7)	1.00
<i>Race/ethnicity</i>				
White, non-Hispanic	820 (10)	1.00	398 (5)	1.00
Black, non-Hispanic	781 (25)	2.02 (1.71, 2.38)	316 (14)	1.91 (1.50, 2.42)
Hispanic	566 (21)	1.29 (1.02, 1.62)	161 (10)	1.20 (0.80, 1.79)
Asian, non-Hispanic	165 (15)	1.17 (0.80, 1.71)	61 (5)	0.67 (0.41, 1.10)
Other single race, non-Hispanic	56 (21)	1.89 (1.26, 2.85)	21 (11)	1.46 (0.68, 3.15)
Multiracial	143 (15)	1.17 (0.82, 1.65)	56 (7)	0.99 (0.65, 1.52)
<i>Parent's Education</i>				

	Wave I PSE	50-50 chance	Wave III PSE	50-50 chance
	n=17408		n=13188	
	n (%) <sup>a</sup>	AOR (95% CI) <sup>b</sup>	n (%) <sup>a</sup>	AOR (95% CI) <sup>b</sup>
< High School	604 (27)	2.15 (1.77, 2.62)	197 (13)	1.89 (1.34, 2.67)
High school	702 (16)	1.49 (1.24, 1.79)	288 (8)	1.44 (1.12, 1.87)
Some college	686 (13)	1.38 (1.17, 1.64)	292 (7)	1.33 (1.06, 1.69)
College graduate	539 (8)	1.00	236 (5)	1.00
<i>Violence involvement</i>				
75th percentile (High)	970 (23)	1.42 (1.29, 1.57)	299 (12)	1.25 (1.14, 1.39)
< 75th percentile	1561 (11)	1.00	714 (6)	1.00
<i>Depressive symptoms</i>				
75th percentile (High)	995 (26)	2.19 (1.90, 2.52)	406 (15)	2.11 (1.77, 2.53)
< 75th percentile	1536 (11)	1.00	607 (5)	1.00
<i>Self-rated health</i>				
Fair/poor	328 (25)	1.68 (1.29, 2.20)	116 (19)	2.78 (2.05, 3.78)
Good	839 (18)	1.46 (1.25, 1.70)	291 (9)	1.45 (1.09, 1.92)
Very good	820 (12)	1.11 (0.94, 1.30)	354 (6)	1.14 (0.90, 1.44)
Excellent	544 (10)	1.00	252 (5)	1.00

PSE assessed via perceived chances of living to age 35

<sup>a</sup>Unweighted sample size; Percentages, Adjusted Odds Ratios (95% Confidence Intervals) are weighted

<sup>b</sup>PSE 50-50 chance versus PSE > 50-50 chance; Logistic regression model controlled for all listed covariates

Table 4

Perceived Survival Expectations (PSE) as a predictor of lower Wave IV educational attainment, Add Health

	Less than High School vs. College		High School vs. College		Some college vs. College	
	% <sup>a</sup>	AOR (95% CI)	% <sup>a</sup>	AOR (95% CI)	% <sup>a</sup>	AOR (95% CI)
<b>Wave I PSE<sup>b</sup></b>						
A 50-50 chance	17	1.73 (1.23, 2.44)	24	1.62 (1.20, 2.17)	42	1.19 (0.93, 1.54)
A good chance	8	1.07 (0.83, 1.39)	19	1.28 (1.07, 1.54)	43	1.04 (0.92, 1.19)
Almost certain	7	1.00	15	1.00	43	1.00
<b>Wave III PSE<sup>c</sup></b>						
A 50-50 chance	19	2.76 (1.68, 4.52)	23	1.94 (1.24, 3.04)	43	1.68 (1.18, 2.40)
A good chance	8	0.89 (0.63, 1.27)	21	1.27 (0.99, 1.63)	42	1.00 (0.83, 1.20)
Almost certain	8	1.00	15	1.00	42	1.00

PSE assessed via perceived chances of living to age 35

<sup>a</sup> Percentages and Adjusted Odds Ratios (95% Confidence Intervals) are weighted

<sup>b</sup> n=13903; Multinomial logistic regression model controlled for age, sex, race/ethnicity, foreign-birth, family structure, parental education, parental public assistance receipt, perceived neighborhood safety and Wave I values for block group poverty rate, parental support/attachment, self-rated health, depressive symptoms, substance use and violence involvement

<sup>c</sup> n=8556; Multinomial logistic regression model controlled for the above-listed Wave III equivalent covariates

**Table 5**  
 Perceived Survival Expectations (PSE) as a predictor of Wave IV income, material hardships and eviction, Add Health

	1st income quartile (lowest) vs. 4th quartile		Material hardships (yes/no)		Eviction (yes/no)	
	% <sup>a</sup>	AOR (95% CI)	% <sup>a</sup>	AOR (95% CI)	% <sup>a</sup>	AOR (95% CI)
<b>Wave I PSE<sup>b</sup></b>		N=13602		N=13883		N=13894
A 50-50 chance	36	1.36 (1.03, 1.79)	26	0.82 (0.67, 1.00)	2.2	1.59 (0.75, 3.33)
A good chance	27	0.95 (0.76, 1.18)	21	0.90 (0.77, 1.04)	0.8	0.76 (0.44, 1.29)
Almost certain	26	1.00	19	1.00	0.9	1.00
<b>Wave III PSE<sup>c</sup></b>		N=8388		N=8548		N=8553
A 50-50 chance	40	1.63 (1.09, 2.44)	31	1.42 (1.09, 1.84)	3.0	2.12 (0.79, 5.69)
A good chance	31	1.23 (0.96, 1.57)	20	0.97 (0.80, 1.18)	0.8	0.78 (0.42, 1.42)
Almost certain	25	1.00	18	1.00	0.8	1.00

PSE assessed via perceived chances of living to age 35

<sup>a</sup>Unweighted sample size; all other statistics are weighted

<sup>b</sup>Logistic regression model controlled for Wave I block group poverty rate, parental education, Wave I parental public assistance receipt, family structure, Wave I parental support/attachment, Wave I CESD depression symptoms, Wave I substance use, Wave I self-rated health, Wave I violence involvement, Wave I perceived neighborhood safety, age, sex, race/ethnicity and foreign-birth

<sup>c</sup>Logistic regression model controlled for all above-listed Wave III equivalent covariates