Adolescent health and its effects on educational attainment: Evidence from two nationally representative longitudinal studies (NLSY79 and NLSY97).

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September 21, 2012

Extended abstract prepared for submission to the Annual Meeting of the Population Association of America, April 2013.

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ABSTRACT

We examine how adolescent health impacts educational attainment among American young adults. Linear models and within-sibling fixed-effects models are used to analyze data from the National Longitudinal Study of Youth 1979 and 1997 cohorts, which included information on the adolescents' health limitations, parental background, cognitive and non-cognitive skills, and subsequent educational attainment. The results indicate that adolescent health limitations and self-rated health are only weakly associated with adult educational attainment. The bivariate relationship is in the expected direction but the substantive effect size is small and fully explained by 'traditional' predictors of attainment like parental background. The results suggest that at the population level, early health does not have a pronounced independent influence on educational attainment. Research on educational determinants of adult health should incorporate individuals' childhood socioeconomic status and individual cognitive and noncognitive characteristics rather than early health as an important confounder.

EXTENDED ABSTRACT

A growing literature has focused on the potential importance of childhood health for adult educational outcomes (Haas & Fosse, 2008; Jackson, 2009; Palloni et al., 2009). Any association between childhood health and educational attainment has important implications for social research and policy in its own right. Additionally, such an association has implications for interpreting the relationship between educational attainment and adult health -- an association among the strongest and most consistent in population health research (Feldman et al., 1989; Preston & Elo, 1995; Rogot et al., 1992; Winkleby et al., 1992). If poor early health reduces educational attainment and is also correlated with later life health, then estimates of the direct effect of education on later adult health will be overestimated. Recent studies have reported significant associations between early-life health and educational attainment. What remains unclear is how important early health is to attainment, as compared to other established factors that have received more attention in the status attainment literature. The current study seeks to fill this gap by assessing the proportion of variance in completed adult education explained by adolescent health, net of richly measured family background and individual characteristics known to influence attainment.

"Traditional" predictors of educational attainment.

Extensive literatures in sociology, psychology, and education research have identified a set of consistently strong predictors of educational attainment. Over four decades ago, the status attainment literature established two key fundamental predictors of attainment: parental socioeconomic status (SES) and the student's cognitive skills (Duncan et al., 1972; Sewell et al., 1970; Sewell et al., 1969). (Duncan et al., 1972; Johnson et al., 1983)(Duncan et al., 1972; Johnson et al., 1983) Academic performance, the influence of significant others, self-esteem, and educational aspirations have been conceptualized as mediators between these two determinants and attainment (Johnson et al., 1983; Sewell et al., 1970). With only a handful of predictors, the Sewell model explained about half of total variance in educational attainment among white young adults, using the Wisconsin Longitudinal Study data. The critical impact of parental SES and cognitive skills on attainment have since been corroborated in classic influential studies, for instance of race (Portes & Wilson, 1976) and sex differences (Alexander & Eckland, 1974) in educational attainment. More current research continues to corroborate the importance of parental background and skills for attainment (Carvalho, 2012; Ermisch & Francesconi, 2001; Heckman et al., 2006; Herd, 2010; Ou & Reynolds, 2008).

Additional research has expanded the list of consistent predictors of educational attainment, including family composition. For instance, the number of siblings, their educational attainment, and birth order have been found to be associated with attainment in most (Altus, 1966; Blake, 1986) though not all studies (Hauser & Sewell, 1985). Being raised by a single or divorced parent is associated with lower attainment, and the association may be particularly strong for some demographic groups (Keith & Finlay, 1988; Krein & Beller, 1988). Personality characteristics such as locus of control and self-esteem play a strong independent role in predicting attainment as well (Flouri, 2006; Portes & Wilson, 1976; Wang et al., 1999). One particularly consistent predictor of attainment is the educational aspiration of the student – the expectation for completing a particular schooling level (Marjoribanks, 2003; Marjoribanks, 2005; Portes & Wilson, 1976).

Many researchers conceptualized these predictors explicitly or implicitly as mediators of the direct effect of family's socioeconomic status on attainment, since parental SES influences the social resources to which the adolescent has access, including high-quality schools and experiences that support the acquisition of cognitive and non-cognitive skills and educational aspirations (Coleman, 1988; Duncan et al., 2010; Sameroff et al., 1998). While questions

regarding the precise causal model of family SES and individual characteristics remain, it is clear that majority of the variance in educational attainment can be explained by parental education and income, sibling and family composition, individual cognitive skills, personality characteristics, and educational aspirations (Andrew & Hauser, 2011; Cameron & Heckman, 2001; Entwisle et al., 2005; Ermisch & Francesconi, 2001; Kao & Thompson, 2003; Marjoribanks, 2005; Ou & Reynolds, 2008; Teachman, 1987). Interestingly, childhood health has historically received little or no attention in this large literature on the determinants of educational attainment.

Early health and educational attainment.

On another front, an emerging literature has begun to examine the association between childhood health and educational attainment, arguing that such early-life factors may play an important role in the intergenerational transmission of socioeconomic inequalities (Carvalho, 2012; Currie, 2009; Palloni, 2006). Two recent papers using the NLSY97, for instance, reported a significant negative effect of poor self-reported adolescent health on timely high school completion and postsecondary enrollment (Haas & Fosse, 2008; Jackson, 2009). In contrast, Palloni and colleagues (2009) found no significant association of childhood health conditions with adult educational attainment in males from the 1958 British Cohort Study. Using the same British data, Case, Fertig, and Paxson (2005) found that extensive health information in childhood and adolescence explained only 2-3% of the variance in education measured by the number of O level exams. This is in contrast to father's SES, which explained nearly 25% of the variance in this outcome. In another influential study using a nationally representative sample of American families, Smith (2009) found no effect of childhood self-rated health on educational attainment. Beyond these studies looking at more general childhood health indicators, several studies have found that specific childhood health conditions may be associated with lower attainment, in particular psychiatric disorders (Breslau et al., 2008; Kessler et al., 1995; Needham, 2009) and early-onset diabetes (Fletcher & Richards, 2012). On the other hand, survivors of childhood cancers (perhaps with the exception of cancers of the central nervous system) were found to have completed as much education as their healthy siblings (Haupt et al., 1994) or the general population (Boman et al., 2010).

This emerging body of research has successfully focused attention on the previously unexplored role of childhood health on adult socioeconomic outcomes, including educational attainment. The mixed results thus far, however, have left unclear the important empirical question of *how much* of the variation in educational attainment at the population level may be due to childhood or adolescent health problems. The current study uses two nationally representative longitudinal data, the NLSY79 and NLSY97, to address this question. We examine the association of adolescent health with adult educational attainment net of a rich set of established predictors to quantify the proportion of variance in completed attainment that can be attributed to adolescent health. The findings have implications for understanding the relative importance of childhood health in determining educational attainment, a critical outcome for the transmission of intergenerational inequality and an independent determinant of social status throughout the adult lifecourse.

METHOD

Data

We use the National Longitudinal Survey of Youth 1979 and 1997 (NLSY79 and NLSY97).

The NLSY79 is a panel dataset of a nationally representative sample of 12,686 young adults who were between 14 and 21 years old at the baseline 1979 interview. This sample was re-interviewed annually until 1994 and every two years thereafter. By the 2006 interview, the last

wave we utilize in our analyses, the respondents were between 41 and 48 years old. Our analysis used information on the adolescents' health, family background, personality characteristics, and basic demographics collected primarily during the 1979 interview and linked these predictors to subsequent educational attainment. Separate analyses also examined how our adolescent health measure predicted mid-life health reported in a special one-time module administered to respondents after they turned 40 (the module was offered from 1998 to 2006). We excluded 190 respondents who reported less than grade school completion, that is, less than 8 completed years of schooling (1.4%), because the adolescent health information would have mostly been collected after they dropped out of school. Additionally, grade-school dropouts comprise such a select group that it could make generalizing to the larger U.S. population problematic. We also excluded 14 respondents who missed all questions on adolescent health limitations, and an additional 145 women who reported health limitations due to a normal pregnancy or delivery because the effect of childbearing on educational attainment is fundamentally different from the effect of adolescent health. The final sample size was 12,337.

The NLSY97 is a panel of 8,984 respondents who were 12 to 17 years old in 1997. The respondents were re-interviewed in 13 rounds, with the last one conducted in 2009-2010 when the sample was between 24 and 30 years old. In preliminary analyses shown here, we excluded respondents who were missing information needed to construct the family, home, and neighborhood risk indices. Our next step will be to determine more appropriate approaches to the missingness.

Measures for NLSY79 analysis.

Adolescent health. In 1979, respondents were asked a series of three yes/no questions about health limitations related to their ability to work. These included "Would health prevent you from working at a job for pay now?," "Does health limit the kind of work you can do?," and "Does health limit the amount of work you can do?" From this series, we created a dichotomous variable coded 1 if a respondent answered yes to any of the three questions and zero otherwise.

Educational attainment. Educational attainment was measured in two ways: the highest grade completed and the highest credential attained. The first measure, available in single years of schooling up to 20, was used as a continuous outcome variable in the main models shown in Table 2. The reason for preferring this specification was to obtain the proportion of variance explained, available only for OLS models for a continuous dependent variable. For fixed-effects models shown in Table 4 and for auxiliary sensitivity analyses, we also used the credential information. The credentials (high school or GED=1, associate's degree, bachelor's degree, or master's degree or higher=4) were included as an ordinal dependent variable; we also dichotomized it using two different thresholds: high school degree or more, and bachelor's degree or more. These three specifications served as an alternative to the linear measure for the years of schooling to assess the robustness of the findings to potential nonlinearities in the years of schooling measure.

Demographics. All models controlled for basic demographic characteristics: age, in single years; gender (male=reference); race/ethnicity, coded as white (reference), black, and Hispanic; Census region of residence in 1979 coded as Northeast (reference), North Central, South, and West; and rural/urban residence in 1979.

Family background. Family of origin status was captured by six covariates. Parental education was defined as the mean educational attainment of the mother and the father, in single years of schooling. If only one parent's educational attainment was available, we used that single data

point. The family's economic status was dichotomized as "below poverty threshold" versus "above poverty" in 1978, the year prior to the baseline. The third variable indicated whether the adolescent lived with both biological parents throughout their childhood and adolescence or not. Another dichotomous covariate captured whether the primary language in the family was English or a foreign language. We also include two pieces of information on the siblings of the respondent: the number of siblings (continuous), and the oldest sibling's educational attainment, which we categorized as less than high school, at least high school education, or the respondent had no older sibling.

Educational aspirations. Educational aspirations were asked in terms of the highest grade the respondent aspired to complete, in single years of schooling. We used this measure in analyses as a continuous covariate.

Personality characteristics. Two scales were administered at the baseline or in 1980. The Rotter locus-of-control scale measured the extent to which respondents believed they had control over their lives (internal control) versus the environment controlled what was happening to them (external control). The scale ranged from 4 to 16, with higher scores indicating an orientation towards an external locus of control. The Rosenberg self-esteem scale, a 10-point instrument administered in 1980, measured the degree of approval or disapproval an individual makes when evaluating oneself. Higher scores indicate higher self-esteem. Both were included as continuous covariates in the regression models.

Indicators of cognitive skills. The NLSY79 included two sets of information that served as measures of cognitive skills: the Armed Forces Qualification Test (AFQT) and high school grades. The AFQT percentile score was calculated from the Armed Services Vocational Aptitude Battery, which was administered in 1980 and comprised skills and knowledge across various areas including arithmetic reasoning, paragraph comprehension, word and mathematics knowledge, and general science. The AFQT scores have been widely used as a measure of cognitive skills among adolescents and young adults (i.e., Heckman & Rubinstein, 2001; Heckman et al., 2006). Grades were reported on a standard scale from A=4 to F=0. We averaged grades for the first 3 mentioned high school classes and included the mean grade as a categorized predictor, with GPA>3 as the reference.

Mid-Life Health. Self-rated health and health limitations were collected in the health module administered to respondents in a special one-time module after they turned 40. Self-rated health was measured on the standard 5-point scale from excellent=1 to poor=5 and used in analyses as a categorical outcome with five levels modeled with ordinal logistic equations. In fixed-effects models shown in Table 4, we also used a dichotomous variable of whether the respondent experienced any limitations in moderate activities as a second measure for mid-life health. These models were estimated in order to assess the predictive validity of the adolescent health measure by relating it to health outcomes after age 40.

Measures for the preliminary NLSY97 analysis are explained briefly below, in Tables 4 and 5.

Analysis

The general approach to analyzing both NLSY79 and NLSY97 included OLS models of completed years of schooling on adolescent health, net of relevant potential confounding and explanatory covariates, logistic regression models of completed credentials, and within-siblings fixed-effects (FE) models of educational attainment to account for the impact of unobserved shared family characteristics.

For the NLSY79 data, we also examined whether the adolescent health limitations were related to mid-life health, using a series of ordered logistic models of self-rated health reported after age 40. This step was important to provide support for the validity of our adolescent-health measure. This analytic stage comprised a series of ordered logistic models of mid-life self-rated health and a set of three FE models of continuous self-rated health, dichotomized self-rated health, and the presence of any activity limitations.

Most covariates had some degree of missingness, from trivial to substantial – for instance, 6.2% of respondents did not have the AFQT scores and over a quarter did not have their high school information available. We present findings where missingness on categorical variables is dealt with by including the 'missing' category as a separate category and observations where continuous variables with missing data are dropped. We conducted extensive sensitivity analyses to determine how robust the main findings are to different methods to dealing with missingness on the covariates. These sensitivity analyses included models where all individuals with any missing covariate were excluded from estimation, models preceded by regression-based imputation on individual covariates, models where all covariates were categorized so the missing observations could be included as a separate category, and also a series of models using full multiple imputation. All findings were substantively similar to those presented here. We used Stata 11.2 for all analyses.

RESULTS

Results from NLSY79

Table 1 shows results from OLS regression models predicting years of schooling as a function of adolescent health limitations, net of different sets of covariates. There was a significant bivariate association between adolescent health limitations and educational attainment: respondents who reported adolescent health limitations completed about a quarter of a year less of schooling than those who did not. The proportion of explained variance, however, was 0.001. All of the basic demographics variables added in Model 2 were significant predictors of attainment, and the effect of adolescent health limitations in these models on educational attainment became marginally stronger. Models 3 and 4 controlled for family-of-origin characteristics. Adjustment for parental SES and basic sibling information attenuated the association of adolescent health limitations, although it remained statistically significant. Parental characteristics were highly significant predictors of attainment and explained some 20-25% of the variance in attainment. Educational aspirations, included in Model 5, were not only a highly significant predictor of attainment net of family-of-origin information, but nearly doubled the proportion of variance explained, to 46%. Moreover, adolescent health limitations were no longer significantly associated with educational attainment in this model. Models 6 through 8 explored the effect of cognitive and non-cognitive characteristics and academic performance, respectively. In all three models, the added covariates had a significant effect on attainment, attenuated the impact of health limitations to a statistical zero, and explained at least some additional proportion of the variance over Model 4. Finally, all covariates were included together in Model 9. With the exception of poverty status and Rotter's locus-of-control scale, all variables were independent predictors of attainment. As with the previous models, adolescent health limitations were not related to educational attainment. The equation in Modal 9 predicted over 53% of the variance in the outcome – a proportion similar to that reported in the literature since the 1960s.

The fixed-effects models in the first four columns of Table 2 took advantage of the sibling structure of the NLSY79. The FE specification eliminates omitted variable bias from shared unobserved family-level characteristics. Although these models did not control for any individual-level characteristics known to predict educational attainment, they showed no

significant association between adolescent health limitations and educational attainment, whether specified in terms of completed years, highest credential, or a dichotomous specification indicating that a respondent completed at least high school or at least a college degree.

Table 3 provides evidence for the predictive validity (and by extension construct validity) of the adolescent health limitation measure. Self-rated adult health, reported more than 20 years after the adolescent health limitation measure was collected, consistently showed a strong relationship association with adolescent health limitations. Respondents who reported having a health limitation in adolescence had 80% higher odds of reporting poorer self-rated health compared to their peers without adolescent health limitations. The effect remained stable and highly significant across all models that adjusted for covariates associated with self-rated health. The final model, Model 7, excluded limitations from the set of predictors. The findings showed that information on adolescent health did not bias the relationship between educational attainment and adult health: the odds ratio associated with one additional year of schooling remained the same between Models 6 and 7 (OR=.9, $p<.001$) with or without adjustment for limitations.

The last three columns of Table 2 confirmed the association between adolescent health limitations and mid-life health using fixed-effects models of adult self-rated health, dichotomized as fair/poor versus good to excellent health, and the presence of any moderate activity limitations at mid-life. Regardless of the specifications of adult health, adolescent health limitations were highly significant in predicting worse health outcomes after age 40.

Preliminary results from NLSY97

Table 4 shows results from OLS regression models predicting years of schooling as a function of adolescent self-rated health, net of different sets of covariates. In models 1-4, there was a significant bivariate association between adolescent self-rated health and educational attainment: for each point on the self-rated scale, average attainment decreased by nearly half a year. The proportion of explained variance was slightly higher than for health limitations in NLSY79: about 2% of the variance in attainment that was explained by SRH across the first several models. Gradual additional adjustment for parental background, measures of family and neighborhood environment, and the students' own characteristics captured by a delinquency index and a standardized mathematics test score, explained all of the SRH link with attainment. In the Model 5, 0% of the variance was explained by SRH and the coefficient for SRH was not statistically significant.

Table 5 shows results from logistic regressions of dichotomized educational attainment measure, whether the respondent completed at least a bachelor's degree. The results are similar to those using years of schooling in the previous table: a bivariate relationship between SRH and college credentials was statistically significant, but with a relatively small proportion of variance explained (about 3%). When we accounted for the 'traditional' predictors of attainment, the SRH effect became not significant.

DISCUSSION

Educational attainment is one of the strongest determinants of adult health. For health, economic, and social policy planning, it is critical to isolate the causal effect of educational attainment on adult health. To achieve this aim, researchers should be appropriately mindful of the possibility that educational attainment may itself be a function of childhood and adolescent health. In recent years, a growing number of studies began to explore this issue and in general, they have identified a connection between early health and educational attainment (i.e., Haas & Fosse, 2008; Jackson, 2009). This paper sought to merge this growing literature with the

extensive traditional status-attainment literature. We asked the question, how well do health limitations and general health experienced during adolescence predict subsequent educational attainment in a nationally representative sample of American respondents? More importantly, what is the link between these two factors after accounting for known predictors of educational attainment like parental background and individual resources?

Looking at the bivariate association, adolescents who reported health limitations also completed less schooling. However, the proportion of explained variance was very low -- adolescent health limitations explained only .1% of the variance in attainment. Moreover, we found little if any association between adolescent health limitations and educational attainment once we accounted for established predictors of educational attainment. After adjusting for parental background, sibling factors, cognitive factors, personality characteristics, and educational aspirations, adolescent health limitations had no relationship to educational attainment. Similarly, fixed-effects models that took into account all family-level information indicated no significant link between adolescent limitations and attainment.

Our results are consistent with a number of recent studies examining the effect of adolescent health on educational attainment, which found only a minor part of the variance in attainment due to early health (Case et al., 2005; Palloni et al., 2009; Smith, 2009). Our findings also corroborated the extensive educational-attainment literature in the importance of the 'traditional' predictors: parental background, educational aspirations, cognitive and noncognitive skills explained over half of the variance in educational attainment, despite the fact that these measures, especially family income, were likely also measured with significant error.

A supplementary analysis aimed at exploring the predictive validity of our measure of adolescent health found that it was consistently and strongly predictive of self-rated health in mid-adulthood. Other studies have also found that indicators of health-induced work limitations are significantly associated with other, more established measures of health, including disability, functional limitations, health impairments, and self-reported health (Bound, 1991; Burkhauser et al., 2002; Johnson & Wolinsky, 1993). More broadly, the link we find between early health measures and later health in adulthood fits well within existing research (Barker et al., 1993; Gluckman et al., 2008; Hayward & Gorman, 2004).

Certainly, these results do not suggest that poor health cannot derail individuals' educational trajectories. Chronic conditions can lead to fatigue, prolonged absences from school, a higher chance of falling behind and repeating a grade, or being assigned to special-education classes (Haupt et al., 1994; Thies, 1999). Academic performance has been shown to be linked to poor health in children (Ding et al., 2009; Eide et al., 2010). These academic indicators are also predictors of lower attainment and dropping out. However, at the population level, adolescent health does not seem particularly important in driving differences in educational attainment. Other social factors, including childhood SES, are the most important predictors of these differences.

It is also possible that adolescent health has a stronger association with occupation than educational attainment. For instance, Smith (2009) found that net of unobserved family characteristics (using FE models), childhood health was not significantly related to education but it was related to adult employment, income, and wealth. The effect of health may be stronger on occupational choices and employment if poor health restricts options to physically demanding jobs, for instance, or if the young adults with chronic illness prefer employment options with better health insurance. This substantive area is particularly important to understand how early health changes social and economic trajectories, and we look forward to more research in this direction.

Conclusion

In the search for the causal links from education to adult health, one of the critical questions is whether educational attainment itself may be a function of early health problems. While it is undeniable that some health conditions or poor health may impact students' educational trajectories, it appears that poor early health explains little of the variance in educational attainment at the population level. Childhood health may act as one of many mediators of parental background on adult socioeconomic outcomes -- in that sense, we urge more research on the complex intergenerational transmission of parental SES, own education, and health.

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Table 1. The effect of adolescent health limitations reported at baseline on subsequent educational attainment, NLSY79.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Adolescent health limitations	-0.25**	-0.28**	-0.19*	-0.19*	-0.10	0.02	-0.08	-0.14	0.03
Age		0.06***	0.04***	0.01	0.01	-0.07***	-0.02*	0.02*	-0.04***
Female		0.31***	0.35***	0.34***	0.27***	0.31***	0.37***	0.17***	0.20***
Black		-0.43***	0.17***	0.27***	-0.07	1.21***	0.21***	0.45***	0.60***
Other		-0.68***	-0.20**	-0.09	-0.15*	0.39***	-0.05	-0.03	0.14*
Parents' education = HS			-1.51***	-1.32***	-0.66***	-0.78***	-1.22***	-1.14***	-0.47***
Parents' education = LHS			-2.34***	-1.93***	-0.91***	-1.09***	-1.76***	-1.61***	-0.59***
Parents' education DK			-2.62***	-2.21***	-1.01***	-1.09***	-1.96***	-1.78***	-0.58***
Lived in poverty			-0.53***	-0.35***	-0.20***	-0.10*	-0.25***	-0.23***	-0.04
Poverty status DK			-0.11	-0.07	-0.07	0.03	-0.07	0.02	-0.01
Not both biological parents			-0.48***	-0.42***	-0.23***	-0.32***	-0.41***	-0.28***	-0.17***
Biological -- DK			-0.79***	-0.80***	-0.74***	-0.61***	-0.75***	-0.66***	-0.62***
Foreign language			0.33***	0.30***	0.10	0.39***	0.32***	0.32***	0.22***
Number of siblings				-0.10***	-0.06***	-0.05***	-0.08***	-0.09***	-0.04***
Sibling has HS				-0.86***	-0.43***	-0.51***	-0.78***	-0.72***	-0.33***
Sibling has LHS				-1.30***	-0.64***	-0.74***	-1.15***	-1.05***	-0.41***
No Sibling				-0.73***	-0.41***	-0.47***	-0.63***	-0.63***	-0.31***
Educational aspirations					0.54***				0.39***
AFQT (1980)						0.04***			0.02***
Rotter locus of control							-0.08***		0.00
Rosenberg self-esteem scale							0.10***		0.02***
Average GPA 0-1								-2.49***	-1.02***
Average GPA 1-2								-1.72***	-0.65***
Average GPA 2-3								-1.11***	-0.41***
Average GPA DK								-1.93***	-0.78***
R^2	0.001	0.036	0.214	0.253	0.464	0.423	0.293	0.339	0.534
adj. R^2	0.000	0.035	0.213	0.251	0.462	0.422	0.291	0.338	0.533
N	12323	12323	12323	12305	12208	11541	11542	12305	11045

* p<.05, ** p<.01, *** p<.001

Models 2-9 also control on region and rural/urban residence.

Table 2. Fixed-effects models predicting educational attainment and adult health, NLSY79

	Models of educational attainment				Models of adult health		
	Years of schooling	Highest degree	HS +	BA +	SRH	Poor/fair health	Any limitations
Adolescent health limitations	1.04	1.04	1.18	1.25	1.32**	2.83***	3.23***
N	12323	9820	819	1318	8230	1060	958

* p<.05, ** p<.01, *** p<.001

Years of schooling, highest degree, and SRH models were estimated using fixed-effects OLS equation. The remaining models were estimated using fixed-effects logistic regression.

Table 3. The effect of adolescent health limitations on mid-adulthood self-rated health

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Adolescent health limitations	1.80***	1.86***	1.87***	1.85***	1.85***	1.74***	
Age		0.98**	0.98*	0.98	1.00	1.01	1.01
Female		1.20***	1.28***	1.26***	1.23***	1.21***	1.21***
Black		1.54***	1.37***	1.27***	1.09	1.21**	1.21**
Other		1.51***	1.28***	1.12	1.03	1.05	1.05
Education, in years			0.84***	0.86***	0.89***	0.90***	0.90***
Parents' education = HS				0.93	0.87*	0.86*	0.86*
Parents' education = LHS				1.13*	1.05	1.04	1.04
Parents' education DK				1.06	1.04	1.05	1.06
Lived in poverty				1.09	1.06	1.03	1.03
Poverty status DK				0.97	0.95	0.96	0.96
Not both biological parents				1.01	1.00	1.00	1.00
Biological -- DK				1.13	1.07	1.09	1.09
Foreign language				1.02	1.02	1.01	1.01
Number of siblings				1.01	1.01	1.00	1.00
Sibling has HS				1.19**	1.19**	1.17*	1.17*
Sibling has LHS				1.33***	1.31***	1.26**	1.26**
No Sibling				1.25***	1.25***	1.22**	1.22**
AFQT (1980)					0.99***	1.00**	1.00**
Rotter locus of control						1.03***	1.03***
Rosenberg self-esteem scale						0.95***	0.95***
Average GPA 0-1						1.13	1.14
Average GPA 1-2						1.16*	1.16*
Average GPA 2-3						1.07	1.07
Average GPA DK						1.16*	1.16*
pseudo R^2	0.002	0.009	0.027	0.029	0.031	0.036	0.035
N	8230	8230	8230	8217	7838	7579	7579

* p<.05, ** p<.01, *** p<.001

Ordered logistic models of self-rated health; models 2-7 also control on region and rural/urban residence.

Table 4. OLS models of educational attainment (completed years) on select predictors, NLSY97 (N=4,024)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Self-rated health	**-0.43*** **	**-0.45*** **	**-0.41*** **	**-0.41*** **	**-0.23*** **	**-0.08**	**-0.06**	**-0.05**
Age		0.02	0.03	0.03	0.08*	0.14***	0.17***	0.20***
Female		0.73***	0.75***	0.75***	0.79***	0.69***	0.56***	0.59***
Race (white)								
Black			-1.00***	-0.96***	-0.13	0.31**	0.23*	0.58***
Hispanic			-0.87***	-0.91***	0.19	0.46***	0.40***	0.56***
Other			0.47	0.43	0.55*	0.68**	0.67**	0.66**
Area (urban)								
Rural				-0.11	-0.01	0.06	0.02	0.06
N/A				-0.62**	-0.23	-0.12	-0.11	-0.16
Region (Northeast)								
North Central				0.03	0.00	-0.01	-0.00	0.07
South				-0.14	-0.13	-0.13	-0.11	-0.06
West				0.01	0.03	-0.06	-0.02	0.11
Mother's education					0.33***	0.23***	0.23***	0.19***
Mother's age[a]					0.06***	0.05***	0.05***	0.04***
Both parents[b]					1.10***	0.75***	0.69***	0.67***
Peers' aspirations[c]						0.17***	0.16***	0.16***
Enrichment index[d]						0.43***	0.44***	0.34***
Physical risk index[d]						-0.22***	-0.22***	-0.18***
Family risk index[d]						-0.21***	-0.17***	-0.13***
Delinquency index[e]							-0.19***	-0.18***
Math score[f]								0.04***
R squared	1.8%	3.5%	6.4%	6.7%	23.1%	29.8%	30.8%	34.9%
R^2 due to SRH[g]	1.8%	2.1%	1.7%	1.6%	0.5%	0.1%	0.1%	0.0%

* p<.05, ** p<.01, *** p<.001

[a] Age of mother when respondent was born

[b] Respondent resides with both biological parents

[c] Proportion of respondent's peers who are likely to attend college in the future

[d] The enrichment, physical risk, and family risk indices capture the adolescent respondent's home and area environments (Moore et al., 1999).

[e] The delinquency index captures multiple behaviors like running away, belonging to a gang, stealing, attacking someone, or drug use, possession, or sale.

[f] The Mathematics Peabody Individual Achievement Test (PIAT) standardized score. The PIAT is a standard measure of academic achievement with high test-retest reliability and concurrent validity.

[g] Part of a model's explained variance that's due to SRH, calculated as difference between the R squared of the shown model minus R squared of a model that omits SRH.

Table 5. Logistic models of earning a bachelor's degree on select predictors, NLSY97 (N=4,024)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Self-rated health	**0.71*** **	**0.69*** **	**0.71*** **	**0.71*** **	**0.79*** **	**0.89***	**0.91**	**0.91**
Age		1.07	1.08	1.08	1.15**	1.21***	1.24***	1.29***
Female		1.76***	1.83***	1.83***	2.09***	1.96***	1.74***	1.84***
Race (white)								
Black			0.37***	0.35***	0.63***	0.92	0.87	1.15
Hispanic			0.44***	0.44***	0.91	1.14	1.09	1.28
Other			1.37	1.42	1.65*	1.88**	1.89**	1.91**
Area (urban)								
Rural				0.84	0.93	1.00	0.96	0.98
N/A				0.56**	0.79	0.79	0.80	0.75
Region (Northeast)								
North Central				0.92	0.91	0.85	0.86	0.93
South				0.92	0.94	0.94	0.96	1.02
West				0.72**	0.71*	0.64**	0.66**	0.74*
Mother's education					1.30***	1.21***	1.21***	1.18***
Mother's age[a]					1.05***	1.05***	1.05***	1.05***
Both parents[b]					2.39***	1.82***	1.75***	1.75***
Peers' aspirations[c]						1.18***	1.16***	1.15**
Enrichment index[d]						1.51***	1.53***	1.37***
Physical risk index[d]						0.83***	0.83***	0.86***
Family risk index[d]						0.82***	0.86***	0.88***
Delinquency index[e]							0.78***	0.79***
Math score[f]								1.03***
R squared[g]	2.8%	5.2%	11.2%	12.0%	30.7%	38.8%	41.3%	45.7%
R^2 due to SRH[h]	2.8%	3.1%	2.6%	2.6%	0.9%	0.1%	0.1%	0.0%

* p<.05, ** p<.01, *** p<.001

[a] Age of mother when respondent was born

[b] Respondent resides with both biological parents

[c] Proportion of respondent's peers who are likely to attend college in the future

[d] The enrichment, physical risk, and family risk indices capture the adolescent respondent's home and area environments (Moore et al., 1999).

[e] The delinquency index captures multiple behaviors like running away, belonging to a gang, stealing, attacking someone, or drug use, possession, or sale.

[f] The Mathematics Peabody Individual Achievement Test (PIAT) standardized score. The PIAT is a standard measure of academic achievement with high test-retest reliability and concurrent validity.

[g] The McKelvey and Zavoina pseudo R squared.

[h] Part of a model's explained variance that's due to SRH, calculated as difference between the R squared of the shown model minus R squared of a model that omits SRH.