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Conditional Health-Related Benefits of Higher Education: An Assessment of Compensatory versus Accumulative Mechanisms

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Abstract

A college degree is associated with a range of health-related benefits, but the effects of higher education are known to vary across different population subgroups. Competing theories have been proposed for whether people from more or less advantaged backgrounds or circumstances will gain greater health-related benefits from a college degree. This study draws on data from the National Longitudinal Study of Adolescent Health (Add Health) and recently developed models for analyzing heterogeneous treatment effects to examine how the effect of obtaining a college degree on the self-rated health of young adults varies across the likelihood of obtaining a college degree, a summary measure of advantage/disadvantage. Results indicate that a college degree has a greater effect on self-rated health for people from advantaged backgrounds. This finding differs from two recent studies, and possible reasons for the contrasting findings are discussed.

Introduction

In the contemporary U. S., holding a college degree is associated with a range of health-related benefits. College educated people maintain healthier lifestyles, have fewer functional limitations and are less likely to be disabled, are less likely to suffer from chronic diseases, and have lower rates of mortality (Mirowsky & Ross, 2003). These associations are due in part to selection processes whereby health in childhood and adolescence shapes both educational attainment and health in adulthood (Blackwell, Hayward, & Crimmins, 2001; Haas & Fosse, 2008; Haas, 2006, 2008; Jackson, 2009). Nonetheless, studies adjusting for health selection or addressing health selection via natural experiments or twin studies indicate that higher education leads to improved health (Fletcher & Frisvold, 2009; Lleras-Muney, 2005; Lundborg, 2008; Mazumder, 2008; Mirowsky & Ross, 2003; Warren, 2009).

Obtaining a college degree has both direct and indirect effects on adult health (Mirowsky & Ross, 2003; Rogers, Hummer, & Everett, 2012). Higher education represents an investment

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in human capital, which instills a greater sense of personal control and learned effectiveness that can benefit health (Mirowsky & Ross, 1998, 2003; Ross & Wu, 1995). In addition, a college degree opens up opportunities for a more fulfilling job, better working conditions, and higher income that can support better health (Mirowsky & Ross, 2003). Furthermore, people who obtain college degrees tend to lead healthier lifestyles (Cockerham, 2005; Cutler & Lleras-Muney, 2010; Mirowsky & Ross, 2003).

The health-related benefits of a college degree, however, are known to vary across different population subgroups. Studies have examined whether the effects of education on health and well-being are conditional on sex (Liu & Hummer, 2008; Ross & Mirowsky, 2006), race and ethnicity (Farmer & Ferraro, 2005; Kimbro, Bzostek, Goldman, & Rodríguez, 2008; Liu & Hummer, 2008), age-period-cohort (Dupre, 2007; Goesling, 2007; Lynch, 2003, 2006; Miech, Pampel, Kim, & Rogers, 2011; Mirowsky & Ross, 2008), and parent education (Ross & Mirowsky, 2011). The overall pattern of results suggest that higher education has a greater effect on health for women than men, for whites than minorities, and for native-born than foreign-born. In addition, the gap between those with more and less education appears to be widening over time. Finally, higher education is associated with fewer physical impairments more so for people whose parents have low levels of education than for people who parents have high levels of education.

Studies of the conditional effects of education on health typically focus on one or a small number of factors at a time (e.g., sex, sex and race/ethnicity, or age-period-cohort). An alternative is to examine how the health-related benefits of a college degree are conditional on a summary measure, in particular, the likelihood (propensity) of obtaining a college degree, an important measure of advantage/disadvantage (Brand & Xie, 2010). One study has adopted this approach and found that people with a lower likelihood of completing college benefited more from higher education with respect to cardiovascular disease and mortality than people with a greater likelihood of completing college (Schafer, Wilkinson, & Ferraro, 2013). This study, however, suffers from a few limitations, namely limited and retrospective measures of predictors of college degree attainment and imprecision in the estimates due to small sample sizes and rare events, that suggest additional research is needed to assess the conditional health-related benefits of a college degree.

Our study overcomes these limitations by drawing on data from the National Longitudinal Study of Adolescent Health (Add Health) (Harris et al., 2009) and recently developed models for analyzing heterogeneous treatment effects (Xie, Brand, & Jann, 2012) to examine how the effect of a college degree on self-rated health among young adults varies across the likelihood of obtaining a college degree. The remainder of the article is organized as follows. The next section outlines competing theories – “resource multiplication” and “resource substitution” – of who will be more or less likely to realize greater benefits from a college degree. The following section provides a description of the Add Health data and a brief overview of the model used to analyze how the effect of higher education varies for people with different likelihoods of obtaining a college degree. The fourth section presents the results of the analysis, and the final section offers a broader discussion and contextualizes the results.

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Conditional Health Effects: Accumulative versus Compensatory Mechanisms

Past studies of the conditional effects of education on health have developed two competing theories of which particular population subgroups are likely to gain more from higher levels of education. The first theory, referred to as “resource multiplication” (Ross & Mirowsky, 2006, 2011) or “added protection” (Schafer et al., 2013), draws on a cumulative advantage perspective (Dannefur, 2003; O'Rand, 1996) to posit that higher education will have greater health benefits for people most likely to obtain a college degree (an advantaged subpopulation). This theory could hold if either (1) people from advantaged backgrounds receive more health-related benefits from a college degree than people with disadvantaged backgrounds or (2) a college degree is insufficient to offset earlier health-related disadvantages for people from disadvantaged backgrounds.

There are a couple reasons people from advantaged backgrounds may be able to leverage greater health-related benefits from higher education. Prior to college, people from advantaged backgrounds are more likely to have a preference for healthy lifestyles and the resources to support them than people from disadvantaged backgrounds. The process of obtaining a college degree may solidify and reinforce these healthy lifestyles, which could have a multiplicative effect on overall health (Cockerham, 2005; Freese & Lutfey, 2011). In addition, people from advantaged backgrounds may have better resources and opportunities following college to obtain greater returns to their investment in human capital, which in turn could be used to support healthier behaviors and general health.

There are also reasons people from disadvantaged backgrounds may obtain less health-related benefits from a college degree than people from advantaged backgrounds. A growing body of work indicates that health insults in utero and during childhood development can have long lasting impacts on adult health (Barker, 2004; Ben-Shlomo & Kuh, 2002; Blackwell et al., 2001). People from disadvantaged backgrounds are more likely to experience early health issues, and it may be that the long-term health-related consequences are not offset by a college degree. Furthermore, there is evidence that parents who adopt less healthy behaviors may pass on similar behaviors via social learning processes to their children (Göhlmann, Schmidt, & Tauchmann, 2010; Kral & Rauh, 2010; Richards, Poulton, Reeder, & Williams, 2009). To the extent adolescents from disadvantaged backgrounds are more likely to be exposed to and adopt less healthy behaviors from their parents and that less healthy behaviors learned in adolescence tend to persist into adulthood, it is possible that higher education may be less likely to lead to healthier behaviors and lifestyles for people coming from disadvantaged backgrounds.

The second theory, referred to as “resource substitution” (Ross & Mirowsky, 2006, 2011) or “compensatory leveling” (Schafer et al., 2013), posits that higher education compensates for background disadvantages rather than magnifies background advantages. There are two possible reasons that people from disadvantaged backgrounds may benefit more with respect to health from a college degree than people from advantaged backgrounds. It may be that some of the health related benefits of higher education, such as an improved sense of personal control and learned effectiveness, are more meaningful for people from

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disadvantaged backgrounds. In other words, people from advantaged backgrounds may already have a strong sense of personal efficacy prior to obtaining a college degree and thus have little to gain in this arena from the degree. Similarly, a recent study suggests that the economic returns to a college degree are greater for people from disadvantaged backgrounds (Brand & Xie, 2010). This pattern largely results from the fact that people from a disadvantaged background who do not obtain a college degree have particularly poor labor market outcomes. It is possible that the improved economic and labor market prospects for people from disadvantaged backgrounds who complete a college degree have a more significant impact on health than among people from advantaged backgrounds.

Data and Methods

Sample

Data to analyze potential patterns in the conditional effects of higher education on health come from Waves I and IV of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a nationally representative study of adolescents in the United States in grades 7 through 12 (Harris et al., 2009). The Wave I in-home interview was conducted in 1995 and included a sample of 20,745 adolescents along with 17,713 parents of the adolescents. Wave IV in-home interviews were completed in 2008 and included 15,701 respondents aged 24 to 34. The analysis sample consists of respondents who participated in Wave IV with valid sample weights (N = 14,800) and with complete data on all of the covariates (N = 10,170).

Restricting the sample to respondents with complete data results in the loss of roughly 31 percent of the sample with valid weights, primarily due to missing data for parent income (N = 3,581 respondents missing data), an important covariate. This is not ideal and one would prefer to use multiple imputation to maintain the full sample; however, the estimation of heterogeneous treatment effects has not yet been worked out for multiply imputed data. An alternative strategy is single imputation, but this is known to lead to artificially low standard errors. Nonetheless, an auxiliary analysis was carried out on the complete sample with all missing data imputed based on imputation models using all of the covariates (available upon request). The substantive findings were similar to those reported below, but it was not possible to achieve balance in the means of the covariates for those with and without college degrees. Furthermore, the mean of self-rated health did not differ and the proportion of respondents attaining a college degree was only slightly higher between the cases dropped due to missing data and the cases remaining in the sample, conditional on the covariates other than parent income. Thus, the results of this study are unlikely to be driven by the handling of missing data.

Measurement

The outcome for this analysis is self-rated health at Wave IV. Respondents rated their health on a standard five-point scale ranging from 5 “excellent” to 1 “poor.” Self-rated health is an often used summary measure of an individual's health that has been shown to be a reliable leading indicator of morbidity and mortality (Benyamini & Idler, 1999; Idler & Benyamini, 1997; Jylhä, Volpato, & Guralnik, 2006; Jylhä;, 2009). As one would expect, there is a

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substantial difference in self-rated health between people with and without a college degree (see Table 1). Among those with a college degree, 46 percent reported very good and 27 percent reported excellent self-rated health as compared with 35 percent and 16 percent respectively for those without a college degree.

Whether respondents attained a college degree is based on the highest educational degree obtained reported at Wave IV. Anyone who reported obtaining a four-year college degree or higher degree is counted as completing college. Thirty three percent of Add Health respondents obtained a four-year college degree (31 percent weighted). Given the age range at Wave IV, ages 24 to 34, it is possible that some respondents had not completed their education at the time of the interview. In fact, 11 percent of respondents report being enrolled in college at Wave IV, though it is unclear what proportion of these respondents will ultimately complete a college degree. An auxiliary analysis excluding these respondents was conducted and the same substantive pattern of results emerged.

Obtaining consistent estimates of the effect of completing a college degree on self-rated health rests on the assumption that conditional on a set of covariates the probability of attaining a college degree is independent of self-rated health (known as the conditional independence assumption, ignorability, or selection on observables) (Heckman, 2005; Morgan & Winship, 2007; Rosenbaum & Rubin, 1983). In practice, this assumption is unlikely ever to be strictly met, but a rich set of covariates predicting college degree completion can make the assumption more plausible and less likely to be substantially violated. Add Health includes a wider array of potential predictors of college completion than has been considered in past work (Schafer et al., 2013).

The model to estimate propensities for attaining a college degree includes four conceptually distinct sets of covariates (see Table 1). The first set of covariates includes sociodemographic measures known to be associated with college completion: age at wave IV, sex, race (an indicator for being black), nativity status, region (an indicator for living in the South), and family structure (an indicator for living with a non-biological parent). Additional indicators for race, region, and family structure were considered, but found not to improve the estimation of the propensity scores. The second set of covariates includes family resources: parent education and family income at Wave I. Parent education ranges from 0 “never went to school” to 9 “professional training beyond a 4-year college or university.” Indicators for each level were entered with “professional training beyond a 4-year college or university” as the referent group. Family income is the log of pre-tax income measured in thousands of dollars.

The third set of covariates includes academic measures: GPA, cognitive ability, educational aspirations, and educational expectations. GPA is based on self-reported grades in up to four classes (English or language arts, mathematics, history of social studies, and science) for the most recent grading period at Wave I. The Peabody Vocabulary Test is used as a measure of cognitive ability (Dunn & Dunn, 1981). Educational aspirations and expectations are based on Likert scale items asking respondents how much do you want to go college and how likely is it that you will go to college respectively. The responses range from 1 “low” to 5 “high.”

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The fourth set of covariates includes measures of adolescent health and health behaviors taken from Wave I: self-rated health, BMI, an indicator for ever having smoked regularly, and frequency of alcohol consumption. This is a particularly important set of covariates given the known effects of adolescent health on educational attainment and the lingering effects of adolescent health on adult health (Haas & Fosse, 2008; Haas, 2006; Hayward & Gorman, 2004). Even with these measures, it is possible that one's health status could change between adolescence and young adulthood such that it could affect both college completion and adult health, though other studies have demonstrated a high degree of stability in self-rated health in particular from adolescence through young adulthood (Bauldry, Shanahan, Boardman, Miech, & Macmillan, 2012).

Self-rated health is based on the standard five-point scale ranging from 5 “excellent” to 1 “poor” asked of the respondents at Wave I. BMI is calculated from self-reported weight and height. The indicator for ever having smoked regularly captures respondents who reported ever smoking at least a cigarette every day for 30 days. The frequency of alcohol consumption captures drinking behavior in the last year and ranges from 0 “never” to 6 “almost every day.” It is apparent comparing the weighted means of most of the covariates that there are notable differences between respondents who do and do not complete a college degree.

Analysis

The analysis of variation in the health-related benefits of a college degree follows an approach developed by Xie et al. (2012), adopted in a number of papers by Brand and colleagues examining a range of social outcomes (Brand & Davis, 2011; Brand & Xie, 2010; Brand, 2010; Musick, Brand, & Davis, 2012), and used by Schafer et al. (2013) in analyzing cardiovascular health and mortality. The analysis, referred to as the stratification-multilevel method of estimating heterogeneous treatment effects, proceeds in four steps (Xie et al., 2012). The first step is to estimate propensity scores for completing a college degree using the covariates discussed above (Rosenbaum & Rubin, 1983).

The second step is to group respondents into balanced propensity score strata. Balance within a strata is achieved when the difference in means for all covariates between people who completed and did not complete a college degree are not statistically significant (Rosenbaum & Rubin, 1984). Balance theoretically requires that the distributions of the covariates do not differ between people who completed and did not complete a college degree, but in most applications analysts consider just the means. For this analysis, the threshold for determining whether the means of the covariates differ between the people with and without a college degree is set at $p < 0.001$, which is consistent with past studies in this area (Brand & Xie, 2010; Schafer et al., 2013). Balanced propensity score strata are identified using the algorithm outlined and implemented in the Stata user-written program pscore (Becker & Ichino, 2002). This step also involves identifying the range of propensity scores observed for both people who did and did not complete college degrees (the region of common support). In this analysis, the region of common support ranges from propensity scores of 0.001 to 0.998 and admits the use of all but 103 respondents with propensity scores outside of this range.

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The third step is to estimate the effects of completing a college degree on self-rated health within each propensity score strata (strata-specific treatment effects). This step involves specifying ordered logit models regressing self-rated health on an indicator for completing a college degree within each propensity score strata. Auxiliary models specifying self-rated health as a dichotomous variable ("poor" and "average" vs. "good," "very good," and "excellent") and treating self-rated health as a continuous variable were also estimated and the same pattern of results emerged.

The fourth step is to evaluate a trend across the propensity score strata using variance-weighted least squares to regress the strata-specific treatment effects on the strata rank at level 2. This is the key step in identifying any patterns in the effects of completing a college degree across the propensity score strata. Given that self-rated health is coded such that high values indicate good health, we expect to see positive log odds estimates for the effects of a college degree. If a college degree compensates for background disadvantages, then we expect to see a negative trend in the strata-specific treatment effects, as a negative trend would indicate that the effects of a college degree are greater among respondents with lower propensity scores. Alternatively, if a college degree adds to preexisting advantages, then we expect to see a positive trend in the strata-specific treatment effects.

The propensity score models and the models for heterogeneous treatment effects are weighted by longitudinal sample weights provided by Add Health that address unequal probabilities of selection and sample attrition between Waves I and IV.

Results

Propensity Score Strata

The first two steps of the analysis involve estimating a probit model to obtain propensity scores and identifying balanced propensity score strata. Appendix 1 includes a table with the estimates from the probit model. The balance algorithm provided by Becker and Ichino (2002) identified 12 propensity score strata in which the means of the covariates did not significantly differ between people who did and did not complete a college degree. Table 2 reports the range of propensity scores associated with each strata and the number of cases by college degree completion in each strata. As noted above, 103 respondents had propensity scores that fell outside the region of common support. All of these respondents were people who did not complete a degree and had an estimated propensity of completing a degree below 0.001. Each of the strata are represented by at least 75 respondents for both groups with and without college degrees except for the highest strata (propensity scores ranging from 0.9 to 0.998). Only 15 respondents without a college degree had estimated propensities 0.9 or greater of obtaining a degree. For the estimates of the strata-specific treatment effects, the top two strata are combined to stabilize the estimates.

Treatment Effects

Table 3 reports the average effect of a college degree on self-rated health assuming homogenous treatment effects and the strata-specific treatment effects as log-odds. We see, as expected, that on average people with a college degree report significantly better self-

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rated health (log odds = 0.408, OR = 1.504). The average effect of a college degree, however, masks a significant amount of variation across propensity score strata. Among the first four strata (propensities ranging from 0.001 to 0.2) that capture respondents with a low likelihood of completing a college degree, the estimated effects of a college degree on self-rated health is not significant. As the propensities increase with increasing strata the estimated effects of a college degree become increasingly positive with the one exception of a non-significant estimate for the tenth strata (propensities ranging from 0.7 to 0.8). We find the largest effect of a college degree (log odds = 0.869, OR = 2.385) among the respondents with the highest propensities for attaining a college degree (strata 11 and 12).

Figure 1 provides an illustration of this pattern in the strata-specific effects of a college degree on self-rated health along with the estimated linear trend across the effects. We observe a positive linear trend (b = 0.044) among the strata-specific effects that is statistically significant at the 0.1 level, though the estimate for the tenth strata appears to be an outlier. Estimating non-linear trends is challenging given the small number of strata. Nonetheless, a model allowing for a quadratic trend was estimated, but it did not lead to a better fit with the strata-specific effects. This pattern of strata-specific effects suggests that college education is most beneficial with respect to health for the people most likely to attain a degree and thus serves to augment preexisting advantages.

Discussion

The results from this study provide support for the theory that higher education has more health related benefits for people from advantaged backgrounds than for people from disadvantage backgrounds. In fact, people from disadvantaged backgrounds, as indicated by low propensity scores, appear to realize negligible health-related benefits from a college degree, at least with respect to self-rated health.

There are, however, a couple limitations that are important to keep in mind. The analysis relies on the estimation of propensity scores and the ignorability assumption to obtain consistent estimates of the conditional effects of higher education on self-rated health. Once estimated, the propensity scores are treated as “true propensities” – i.e., they capture individuals' likelihoods for obtaining a college degree without measurement error. This is implausible, but methods for reflecting the fact that the propensity scores are estimated have not yet been developed for stratification-multilevel estimator used in this study. In addition, the ignorability assumption that the observed predictors of college degree attainment are sufficient to ensure that the probability of attaining a college degree is independent of self-rated health is unlikely strictly to hold even with a richer set of covariates than used in past studies. Despite these limitations, the estimate of the average effect of higher education on self-rated health is consistent with past studies and unlikely to exhibit substantial bias.

The pattern of conditional effects observed in our study contrasts with the two past studies that are most similar which found the opposite – that people from disadvantaged backgrounds (as measured by low parent education or a low propensity to attain a college degree) benefited more from higher education than people from advantaged backgrounds (Ross & Mirowsky, 2011; Schafer et al., 2013). There are a few possible substantive

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explanations for the discrepant results: (1) the age range of the respondents varied across the three studies, (2) the birth cohorts varied across the three studies, and (3) the health outcomes varied across the three studies.

The respondents in our study ranged from 24 to 34 years old with the preponderance of respondents (83 percent) falling between 26 and 30. This is a relatively narrow age range as compared with the two past studies with respondents ranging in age from 18 to 95 (note that this study focused on educational attainment more broadly and not just completing a college degree) and 25 to 74 to respectively. Given that the health benefits of a college degree are known to vary over the life course, it is possible that variation in who benefits more from a college degree also varies over the life course. It could be that a different pattern emerges with the onset of chronic diseases among older adults.

In addition, the data, the survey of Aging, Status, and Sense of Control (ACOS) and the Midlife in the United States (MIDUS) survey for the two previous studies respectively were collected in the late 1990s and early to mid-2000s. The combination of the expanded age range and the earlier data collection means that the two past studies also included a much broader range of birth cohorts than in the current study. Given that the health-related benefits of higher education are known to vary across cohorts as well as over the life course, it is also possible that the particular patterns in who benefits the most from a college degree may be changing over time. As the proportion of the population with a college education expands, the marginal returns to a college degree could be decreasing (Xie, 2013). In other words, among earlier cohorts it is possible that people with a low propensity to attain a college degree represent a different population than people with a low propensity to attain a college degree among later cohorts. In particular, people from earlier cohorts with a low propensity of attaining a college degree may have been a subgroup of the population for which higher education was particularly advantageous. Over time, as higher education has expanded, people with a low propensity of attaining a college degree may have come to represent a different subgroup of the population for whom higher education may not be as advantageous. If this scenario holds, it is conceivable that we would identify people from disadvantaged backgrounds gaining the most from higher education among earlier cohorts and the opposite pattern among people from more recent cohorts.

The age range of the respondents in the current study necessitated using a general measure of self-rated health as opposed to the more specific health conditions used in the past two studies – functional limitations and cardiovascular disease and mortality respectively. This difference in health outcomes raises the possibility that the pattern in who realizes greater health-related benefits from higher education depends on which health outcome one considers. Given the complex processes involved in an individual's assessment of self-rated health (Jylhä;, 2009), it is possible that the pattern that people from advantaged backgrounds benefit more from a college degree than people from disadvantaged backgrounds with respect to self-rated health in part reflects cognitive and psychological processes that do not come into play with other types of health outcomes. It is notable, however, that estimates of the main effects of education on health are robust to the different measures of health outcomes used across the three studies. Thus, it seems unlikely that the pattern of who

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benefits the most from higher education could be completely reversed solely due to the ways in which people form assessments of their general state of health.

A final possible statistical explanation for the discrepant results with respect to Schafer et al.'s (2013) analysis is the different specifications of the propensity score models. Although it is not possible to exactly replicate the measures from the MIDUS survey, an auxiliary analysis was conducted that matched Schafer et al.'s propensity model specification as closely as possible. The same pattern of results as reported above emerged (available upon request) – a positive trend across propensity score strata indicating that people from advantaged backgrounds enjoyed greater health-related benefits from a college degree.

The discrepant results between this study and past studies indicate that more research is needed to determine the extent of variation in the health-related benefits of higher education and the particular patterns in who realizes greater benefits. In addition, future research could also examine whether different patterns in the variation in the health-related benefits of a college degree emerge different population subgroups (e.g., by sex or race/ethnicity). A better understanding of who benefits the most with respect to health from a college degree is important from a policy perspective. The two past studies have suggested that college accessibility is an important arena for health policy. Improving opportunities for higher education should lead to improved population health and reduction in socioeconomic-based health disparities, but the extent of the improvement and reduction of disparities depends on who benefits the most from higher education. The results of this study suggest that such policies, though potentially beneficial for a wide array of social outcomes, may not do as much to offset background disadvantages as previously thought.

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Appendix

Table A1

Estimates from probit model regressing completing a college degree on selected covariates (N = 10,170).

	Est	95% CI
Age at Wave IV	0.043***	[0.019, 0.066]
Female	0.130**	[0.046, 0.213]
Black	0.199***	[0.084, 0.315]
Native born	-0.235*	[-0.445, -0.025]
Non-bio parent	-0.286***	[-0.395, -0.176]

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	Est	95% CI
South	-0.125**	[-0.211, -0.039]
Par edu: no school	-2.283***	[-3.141, -1.425]
Par edu: 8th grade or less	-0.681***	[-0.967, -0.395]
Par edu: more than 8th grade, but not high school	-0.880***	[-1.133, -0.627]
Par edu: business/trade/vocational	-1.615***	[-2.452, -0.778]
Par edu: high school graduate	-0.819***	[-0.961, -0677]
Par edu: GED	-1.032***	[-1.299, -0.764]
Par edu: business/trade/vocational after high school	-0.718***	[-0.880, -0.556]
Par edu: attended college	-0.745***	[-0.878, -0.613]
Par edu: graduate from college or university	-0.401***	[-0.532, -0.271]
Ln income	0.240***	[0.176, 0.304]
Adolescent GPA	0.635***	[0.570, 0.700]
Adolescent PVT	0.015***	[0.012, 0.019]
Adolescent aspirations	0.125***	[0.057, 0.193]
Adolescent expectations	0.208***	[0.146, 0.271]
Adolescent smoker	-0.415***	[-0.537, -0.293]
Adolescent self-rated health	0.077**	[0.029, 0.126]
Adolescent BMI	-0.007	[-0.017, 0.003]
Adolescent drinking	0.032*	[0.001, 0.063]
_constant	-6.820***	[-7.747, -5.894]
pseudo R-square	0.321	

Notes:
* $p < 0.05$,
** $p < 0.01$,
*** $p < 0.001$ (two-tailed tests).

The model was estimated using the Wave I/Wave IV Add Health sample weights.

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Research Highlights

- Competing theories of who gains the most health-related benefits from higher education
- A college degree has a greater effect on self-rated health for people from advantaged backgrounds
- Findings differ from recent studies: attention given to age/cohort processes and health outcomes

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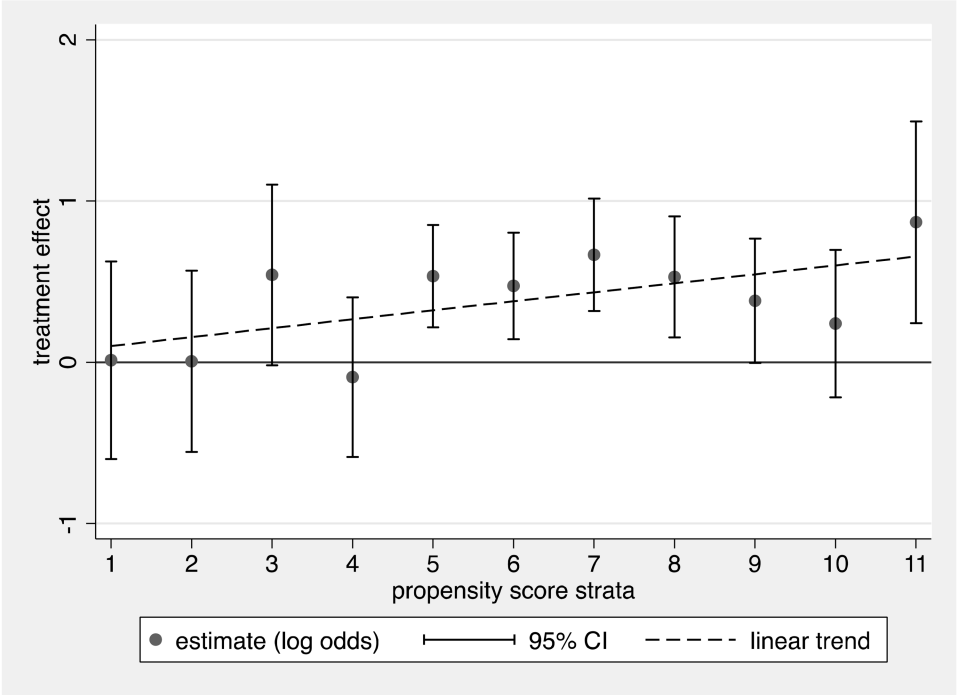

Figure 1.

Strata-specific estimates (log odds) of the effects of a college degree on self-rated health with 95% confidence intervals and a linear trend (dashed line) across the strata. Estimates obtained from ordered logit models (reported in Table 3).

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Table 1

Weighted descriptive statistics for adult self-rated health, college degree, and covariates (N = 10,170)

	College degree		No college degree	
	Unweighted N = 3,400		Unweighted N = 6,770	
	Mean/Pr	Range	Mean/Pr	Range
Adult self-rated health		1-5		1-5
Excellent	0.271		0.157	
Very good	0.456		0.353	
Good	0.239		0.381	
Average	0.029		0.097	
Poor	0.004		0.012	
Demographics				
Age at Wave IV	28.266	24-34	28.260	24-34
Female	0.536	0,1	0.458	0,1
Black	0.101	0,1	0.157	0,1
Native born	0.958	0,1	0.957	0,1
Non-bio parent	0.123	0,1	0.202	0,1
South	0.317	0,1	0.384	0,1
Family background				
Parent education	7.225	0-9	5.593	0-9
Family income (log)	3.941	0-6.91	3.388	0-6.91
Academic factors				
Adolescent GPA	3.323	1-4	2.599	1-4
Adolescent PVT	109.041	17-146	99.741	14-138
Adolescent aspirations	4.836	1-5	4.261	1-5
Adolescent expectations	4.746	1-5	3.892	1-5
Health and health behaviors				
Adolescent self-rated health	1.887	1-5	2.192	1-5
Adolescent BMI	21.764	12.01-54.23	22.774	11.21-63.49
Adolescent smoker	0.107	0,1	0.250	0,1
Adolescent drinking	0.996	0-6	1.120	0-6

Notes: Means and proportions are weighted by the Wave I/Wave IV Add Health sample weights.

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Table 2

Number of cases by college degree completion in balanced propensity score strata

	College degree	No College degree	Total
Strata 1: [0.001, 0.05)	73	1,916	1,989
Strata 2: [0.05, 0.01)	83	908	991
Strata 3: [0.1, 0.15)	94	675	769
Strata 4: [0.15, 0.2)	110	556	666
Strata 5: [0.2, 0.3)	315	848	1,163
Strata 6: [0.3, 0.4)	318	561	879
Strata 7: [0.4, 0.5)	373	465	838
Strata 8: [0.5, 0.6)	414	292	706
Strata 9: [0.6, 0.7)	458	228	686
Strata 10: [0.7, 0.8)	422	127	549
Strata 11: [0.8, 0.9)	496	76	572
Strata 12: [0.9, 0.998)	244	15	259
Total	3,400	6,667	10,067

Notes: 103 respondents are excluded due to lying outside the region of common support.

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Table 3

Estimated treatment effects from ordered logit models regressing self-rated health on completing a college degree (N = 10,035)

	Model 1	Model 2
Average effect	0.408*** [0.285, 0.531]	
Strata-specific effects		
Strata 1: [0.001, 0.05)		0.012 [-0.599, 0.624]
Strata 2: [0.05, 0.01)		0.005 [-0.557, 0.567]
Strata 3: [0.1, 0.15)		0.542 [-0.018, 1.102]
Strata 4: [0.15, 0.2)		-0.093 [-0.587, 0.402]
Strata 5: [0.2, 0.3)		0.534*** [0.216, 0.852]
Strata 6: [0.3, 0.4)		0.474** [0.144, 0.804]
Strata 7: [0.4, 0.5)		0.666** [0.318, 1.014]
Strata 8: [0.5, 0.6)		0.529** [0.155, 0.903]
Strata 9: [0.6, 0.7)		0.382+ [-0.003, 0.766]
Strata 10: [0.7, 0.8)		0.240 [-0.217, 0.697]
Strata 11 & 12: [0.8, 0.998)		0.869** [0.243, 1.494]
Linear trend		
slope		0.044+ [-0.006, 0.093]
constant		0.149 [-0.191, 0.490]

Notes:

+ $p < 0.10$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$ (two-tailed tests)

Estimates are log odds. 95% confidence intervals in brackets. The models were estimated using the Wave I/Wave IV Add Health sample weights. 103 respondents are excluded from this analysis due to lying outside the region of common support. Strata 12 is combined with Strata 11 due to the small number of cases who did not complete a college degree in Strata 12.