



Higher education and health at midlife: Evaluating the role of college quality[☆]

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ABSTRACT

Using the longitudinal data from the National Longitudinal Survey of Youth-1979 linked with external data on college characteristics ($N = 7056$), this study illustrates an independent stratifying role of college quality in shaping health. College quality has significant and positive influences on physical health, and this positive association tends to strengthen across 40 and 50. By contrast, attending higher-quality colleges is not associated with mental health at either age 40 or age 50. Decompositions were conducted to assess the extent to which early life and demographic characteristics, employment and economic conditions, health behaviors, and family relationships account for observed patterns. Our study highlights the necessity for future research on education and health to incorporate characteristics of schools attended; reveals variation in the college quality-health nexus by specific health outcomes; and provides new insights into understanding health inequalities across the life course.

1. Introduction

The positive association between educational attainment and health is well established. As one “fundamental cause” of health, voluminous studies have consistently revealed that education is related to lower risks of mortality and morbidity and better self-rated and physical health (Link & Phelan, 1995; Mirowsky & Ross, 2003; Ross & Wu, 1995, 1996). Over recent decades, educational attainment has become an increasingly stronger predictor of adult health, especially in the U.S. (Goesling, 2007; Miech et al., 2011; Montez & Friedman, 2015). In particular, individuals with college education and above have increasing advantages in life expectancy and health conditions compared to their counterparts who do not have a college degree (Cutler & Lleras-Muney, 2006).

Prior research on education and health has extensively studied the *quantity* of education, usually measured with years of schooling or highest degree completed (Ross & Wu, 1995, 1996). This approach reflects an exclusive focus on the final attainment of education, while ignoring other important aspects of education, which may vary among

those with equal attainment. Such aspects include the *quality* that individuals experienced during the process of obtaining their education (Zajacova & Lawrence, 2018). For higher education, quality is often measured based on institutional characteristics like competitiveness and resources. Prior research has demonstrated that higher education institutional quality plays an independent role in stratifying individuals' life chances such as labor market outcomes (Gerber & Cheung, 2008) and health behaviors (Fletcher & Frisvold, 2011). Therefore, it is possible that the quality of higher education would serve as an important factor in shaping health inequality – both among the college-educated and between the college and non-college populations. Focusing on the quality of education thus contributes another dimension to the conceptualization of education in research on the relationship between education and population health disparities (Zajacova & Lawrence, 2018).

There are two additional opportunities to move the literature on the linkage between education and health towards a comprehensive understanding of the consequential relationship between the two. First, for

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many previous studies, one implicit assumption is that education is always good for individuals' health (e.g., Mirowsky & Ross, 2003).¹ However, scholarly (Byrd & McKinney, 2012) and anecdotal² evidence reports that college students in more competitive colleges are exposed to more academic pressure and often exhibit more mental health difficulties. Therefore, the education-health linkage might look different when we specifically consider college quality and distinguish between mental and physical health outcomes. Second, although the association between education obtained in young adulthood and health varies with age (Ross & Wu, 1996), fewer studies examine the life course pattern in the relationship between early educational experiences and health outcomes at midlife. Midlife is a pivotal but relatively neglected life stage that balances growth and decline and connects earlier and later life periods (Lachman et al., 2015), in which health inequality between individuals with different levels and qualities of education may begin to emerge and then unfold into late life.

In this study, we contribute to the literature on education and health in the abovementioned ways by studying college quality and midlife health in the U.S. Using data from the National Longitudinal Survey of Youth 1979 and the Integrated Postsecondary Education Data System, we examine how the quality of colleges individuals attended during young adulthood is associated with their physical and mental health at ages 40 and 50. We ask four research questions: First, is college quality related to individuals' physical and mental health at midlife? Second, are the relationships different between physical and mental health? Third, to what extent are observed patterns accounted for by selection, employment and economic conditions, health behaviors, and family relationships? Finally, how do these relationships change between age 40 and 50?

2. Background

2.1. Education and health: theoretical issues and prior research

Three theoretical perspectives guide research on the associations between education and health. First, viewing education as a key dimension of socioeconomic status (SES), the fundamental cause theory posits that SES factors are fundamental causes of health: they determine individuals' access to material and nonmaterial resources such as financial security, neighborhood safety, interpersonal connections, health behaviors, and health care and insurance, all of which protect or enhance health (Link & Phelan, 1995). Second, human capital theory conceptualizes formal education as an investment that produces returns via increased productivity (Becker, 1962). Increased schooling improves individuals' knowledge, skills, reasoning, effectiveness, self-control, and other abilities and resources that promote health (Mirowsky & Ross, 2003). Third, the credentialing or signaling theory also states that education is beneficial for health, but primarily through the symbolic value of completed degrees for obtaining advantaged labor market positions like good jobs and high income, rather than the real skills and abilities brought by education per se (Collins, 1979).

Empirical research consistently shows that more-educated people have longer life expectancy, lower risks of mortality and morbidity, and

¹ Many such studies examine the relationship between education and health among the general population. However, recent research on racial inequality reports negative association between education and health among Black young adults (Gaydosch et al., 2018).

² For a few examples, see "Why elite colleges were bad for my mental health" <https://medium.com/invisible-illness/why-elite-colleges-were-bad-for-my-mental-health-ae0ebfa59669>; "The Ivy League, mental illness, and the meaning of life" <https://www.theatlantic.com/education/archive/2014/08/qa-the-education-of-our-college-elite/377524/>, and "Why are students at university so stressed?" <http://www.theguardian.com/education/2019/may/31/why-are-students-at-university-so-stressed>.

better physical and mental health (Link & Phelan, 1995; Mirowsky & Ross, 2003; Ross & Wu, 1995, 1996). Moreover, education has a growing importance in stratifying individuals' health. In the U.S., educational attainment has become an increasingly stronger predictor of adult health over recent decades (Goesling, 2007; Miech et al., 2011; Montez & Friedman, 2015). Scholars has also devoted more attention to health disparities between those who have a college degree and those who do not, finding that individuals with college education and above have increasing advantages in life expectancy and health conditions compared to their counterparts without a college degree (Cutler & Lleras-Muney, 2006; Montez & Hayward, 2014).

2.2. Why and how might college quality matter for health?

The large volume of research on education and health operationalizes education in terms of years of schooling or degrees completed (i.e., educational attainment). Extending this focus to other aspects of the educational process, such as its quality, helps better conceptualize education in studies of its relationship to health (Zajacova & Lawrence, 2018). We focus on college quality – distinctions among institutions within the large and highly stratified higher education landscape in the U.S., measured by factors such as acceptance rate, students' scores on standardized tests like the SAT and ACT, and colleges' financial resources (Black & Smith, 2006).

Over and above educational attainment, college quality may influence individuals' health, either in a direct manner or indirectly via several pathways. For example, as predicted by human capital theory, better college quality could directly provide individuals more information, guidance, role modeling, and better skills as to how to keep good health. Further, consistent with the fundamental cause theory and the credentialing theory, an important source of college quality's potential benefits for health is the improved employment and economic prospects for individuals who attended higher quality institutions (Gerber & Cheung, 2008). Prior research has reported significant positive effects of attending a better-quality college on individual earnings (Behrman et al., 1996; Black & Smith, 2004; Monks, 2000), spousal earnings (Black et al., 2005), and household income (Long, 2008).

Recent studies also indicate that attending a selective college has both short and intermediate term effects on promoting healthy behaviors during and following college attendance for young adults (Fletcher & Frisvold, 2011). More specifically, research have emphasized the importance of peer cultures and social group norms in affecting young adults' health behaviors—such as smoking, binge drinking, drug use—on college campus (Barnett et al., 2014; Eisenberg et al., 2014). To the extent that higher quality colleges are more likely to enroll students from high-SES background (Walpole, 2003), who tend to be healthier, lead a healthier lifestyle, and have healthier diet, there could be a positive peer effect in promoting healthy behaviors among those attending higher-quality colleges. Health behaviors formed in college may last into midlife and therefore shape health at this life stage. Higher-quality colleges are also more capable to offer health-related resources (such as gyms, health trainings, and health/nutrition classes) that encourage people to actively utilize health services/care. These health-related resources together with a positive peer culture in promoting health among higher-quality colleges attendees could contribute to a positive association between college quality and health outcomes. Additionally, graduates from more selective and prestigious colleges are more competitive in the marriage market in finding partners and keeping a stable family life (Kaufmann et al., 2013), which can promote individuals' happiness and health behaviors (Waite, 1995).

On the other hand, it is still possible that relationships between college quality and health could be partly or entirely driven by self-selection. Individuals' cognitive and noncognitive abilities, health endowments, and early-life family background may simultaneously account for individuals' likelihoods of attending higher quality colleges and better (or worse) health conditions (Conti et al., 2010). This same

logic drives research that has found that college quality's effects on labor market outcomes are entirely attributable to selection (Dale & Krueger, 2011), although the bulk of studies in the college quality literature find effects that persist net of selection.

Only very few studies have investigated how college quality (or related higher education institutional characteristics) affects people's health conditions in the U.S.³ An earlier study by Ross and Mirowsky (1999) examined the association between educational selectivity and physical functioning and self-rated health, using a sample of adults aged 18–95 from the 1995 Survey of Aging, Status, and the Sense of Control. Among those with a college degree or higher, they measured selectivity of the institution where respondents obtained the highest degree based on grade point average and SAT/ACT scores of entering freshmen and the percentage of applicants accepted. Their results revealed that college selectivity had a small net positive association with physical functioning and perceived health, part of which could be accounted for by work and economic conditions, social psychological resources, and health lifestyle (particularly the latter two).

More recently, Fletcher and Frisvold (2014) estimated a long-term relationship between college quality and health using data from the Wisconsin Longitudinal Study. They matched colleges where respondents obtained their bachelor's degree with information about college selectivity from Barron's Profiles of American Colleges, based on the median SAT scores, high school rank, and high school grade point average of freshmen. Their analyses found robust and large effects of graduating from a selective college in the 1960s on reducing respondents' probabilities of being overweight in their 60s, net of health endowments, ability, and other family and individual factors. The authors also tested underlying mechanisms, such as occupational characteristics, income and wealth, marriage market outcomes, and midlife health, but found little evidence that the observed college quality-health effect operated through these channels.

2.3. Life courses patterns of physical and mental health at midlife

Prior research has already emphasized the importance of a life course perspective in examining health inequality, where the relationship between education and health varies with age (Brown et al., 2016). Previous studies have focused on educational attainment rather than educational quality, and have devoted more efforts to the earlier and later periods of life than to the middle years (ages 40 to 59). From a developmental perspective, midlife is a pivotal life stage that connects earlier and later periods of the life course in shaping individuals' health and well-being (Lachman et al., 2015). In particular, the relationship between educational quality and health may exhibit differential evolving patterns for physical and mental health during midlife. The benefits of attending more selective colleges on health behaviors in young adulthood (Fletcher & Frisvold, 2011) may persist or even enlarge into midlife – leading to differential physical functioning that further compounds into modest to large disparities in physical health during late life (Fletcher & Frisvold, 2014; Ross & Mirowsky, 1999).

Many studies focusing on the quantity of education and health implicitly assume that all pathways between years of schooling and health outcomes are positive. Just like Mirowsky and Ross (2003:31) write, “[I]f there are consequences of having a college education that negatively impact health we have yet to find them.” This pattern may also exist in the relationships between college quality and health, wherein attending higher quality of college improves both physical and mental health. Nevertheless, the life course pattern in the college

quality-mental health link may differ from that for physical health. Midlife is often depicted to be a period marked by crisis and stress (Lachman, 2004). Heightened psychological distress and lowest life satisfaction/happiness at midlife are particularly true for those with financial strains such as low-income groups (Lang et al., 2011).

However, it is possible that middle-aged high-status social groups like those who attended higher quality colleges could also experience increasing stress and mental disorders from the multitude of demands and responsibilities from work, family, and the societal environment (Lachman, 2004). For instance, studies supporting the stress of higher status hypothesis demonstrate that individuals with higher-status occupations report significantly higher average levels of work-to-home conflicts than their peers in lower-status jobs (Schieman et al., 2006; Schieman & Glavin, 2011). To the extent that people attending higher quality colleges are more likely to engage in high-status work, such as professional and executive jobs, better college quality may be associated with more conflicts and thus psychological stress during midlife.

Additionally, previous research has demonstrated that the process of relative deprivation is associated with an increased chance of worse mental conditions, such as depression, anxiety, or panic disorders (Eibner et al., 2004; also see review by Adjaye-Gbewonyo & Kawachi, 2012). Midlife is a life stage where the achievement gap (in terms of income, wealth, career success, etc.) might be particularly large for those attending higher quality colleges. It is unavoidable for some people to make comparisons with their more successful peers from college and feel relatively deprived, which may further produce frustration, stress, or anxiety that directly deteriorate mental well-being. Moreover, if their perceived social status within a small peer/friend group is lower relative to that in a broader social milieu, such negative status inconsistency might be a source of deteriorated mental well-being (Andersson, 2018). All discussed above indicate that mental health at midlife might not be positively stratified by college quality as is the case for physical health, and advantages in mental health of attending higher quality colleges might not emerge until late life, when, for example, early-to-mid career professional stress/frustration may give way to financial security late in the career and into retirement.

Taken as a whole, existing evidence, especially large-scale quantitative analyses, is still lacking regarding the relationship between college quality and health, particularly mental health (Uecker & Wilkinson, 2020). Using a more comprehensive measure of college quality and nationally representative cohort data, we contribute to the existing literature by quantifying how college quality affects both physical and mental health and exploring the underlying mechanisms. We also take a life course perspective to investigate the relationships between college quality and health during midlife (i.e., ages 40 and 50), attending to potential differences between physical and mental health in their associations with college quality over this ten-year period.

3. Data and methods

3.1. Data and sample

Our data come from the National Longitudinal Survey of Youth 1979 (NLSY79). The NLSY79 is a nationally representative sample of 12,686 young men and women (6403 men and 6283 women) born during the years 1957 through 1965 and living in the U.S. when the survey began. The first interview was conducted in 1979 when youth were aged 14–22 years old. Follow-up interviews were conducted annually from the base year through 1994 and then biennially thereafter. Data from 1979 to 2016 survey year are currently available for analysis. The NLSY79 collects extensive information about respondents' family background,

³ Although there is a larger body of literature on school quality and health inequality more generally (Dudovitz et al., 2016; Frisvold & Golberstein, 2013; Garcia & Moorman, 2021), we focus specifically on studies examining college quality in higher education and health outcomes in the U.S., despite emerging attention on this topic in Europe (Bann et al., 2017).

educational experiences, marriage and family, labor market behavior, income and wealth, and health behaviors and conditions.

We first restricted our analytical sample to those who participated in and had complete information on physical and mental health at both ages 40 and 50 ($N = 7507$). We further excluded respondents who indicated that they attended college but did not have a valid record when matching with external data on college quality for the colleges they reported (see details in the next section). This left us with an analytical sample of 7056 respondents (3477 men and 3579 women). Among this sample, the percentage of missing values on all covariates (see next section) ranged from 0.14% for family structure at age 14–21.07% for exercise behavior at age 38 or 39. We used multiple imputation with chained equations and *mi estimate* in Stata to generate and analyze five imputed datasets (White et al., 2011). Listwise deletion yielded substantially similar results (available upon request).

3.2. Measures

3.2.1. Physical and mental health

We examined respondents' self-reported physical and mental health at ages 40 and 50. Each was evaluated using the computed Short-Form 12 (SF-12) version 1 component summary score for the respective type of health. Each evaluation contained twelve questions (see Online Appendix A), used to assign scores ranging from 0 to 100, with higher scores indicating better health and 50 corresponding to the average health of a U.S. adult (National Longitudinal Surveys, 2018).

3.2.2. College quality

In each survey wave from 1984 to 2012, respondents reported the name and location of the college they currently or most recently attended, if any. Respondents who had attended more than one college were able to provide information on up to three most recent colleges in each survey wave. The restricted-use version of the dataset provided by the Bureau of Labor Statistics includes the detailed Federal Intra-agency Committee on Education (FICE) or the Integrated Postsecondary Education Data System (IPEDS) code for all colleges that a respondent attended. Based on these codes, we were able to match respondents' colleges attended with external measures of these colleges' quality.

Following prior practice (Dillon & Smith, 2017), we first constructed a one-dimensional index of college quality for four-year colleges using data from the IPEDS Institution Universe in 2008, provided by the National Center for Education Statistics (NCES).⁴ This college quality index was a composite score based on four quality measures: the 75th percentile of SAT average score (or ACT score converted to the SAT scale) of entering students, the percent of applicants rejected, the average salary of all faculty engaged in instruction, and the undergraduate faculty-student ratio. By estimating the first principal component across these four quality measures, we used the factor loadings to construct a weighted average of these standardized quality measures for any college that has at least two measures (see detailed statistics of the college quality index in Online Appendix B).

We classified four-year colleges into three categories based on their quality rankings, the 1st-60th percentiles, the 61st-90th percentiles, and the 91st-100th percentiles (see Online Appendix C for examples of four-year colleges in these bins, including a set of examples from the state of California). Analyzing college quality in bins allowed us to capture nonlinearity in its effects on health outcomes. In the parlance of the more familiar Barron's competitiveness categories, our three bins were comparable to grouping colleges into bins of 1) Non- or Less

Competitive, 2) Competitive, 3) Very, Highly, or Most Competitive. The bins also corresponded well to a priori or lay notions of relative college quality.

After matching every four-year college that respondents ever attended to these three categories, we used the college quality of the most recent college⁵ that respondents attended at/before age 35 to predict health at ages 40 and 50, which helped reduce reverse causality. The large majority of community colleges did not report information on college quality indicators. We thus classified two-year (or fewer) community colleges into a fourth quality category of "community college." When comparing health across the whole spectrum of educational attainment, we also included respondents who did not attend four-year or community college into a group of "non-college." Results presented below are substantively similar regardless of whether we consider respondents' last college attended, first college attended, or average quality of all colleges attended.

3.2.3. Highest grade completed

We sought to measure whether and to what extent college quality influenced health, net of educational attainment. To do so, we included the highest grade respondents had ever completed, a continuous measure ranging from 0 (none) to 20 (8th year college or more). Results using an alternative categorical measure of educational attainment (0–11 years, 12 years, 13–15 years, and 16 years and more) were substantially similar. We therefore present results from the more parsimonious models using the continuous measure.

3.2.4. Early life and demographic characteristics

To adjust for selection, we considered a series of early life and other demographic characteristics that are simultaneously associated with respondents' quality (as well as quantity) of education and their health at midlife. These variables included respondents' sex, race/ethnicity, mothers' and fathers' education (highest grade completed), whether the respondent lived with both parents at age 14, and respondents' cognitive ability measured in 1980 (their percentile score on the Armed Forces Qualifying Test). We also included in this group a variable measuring whether the respondent lived in the south one or two years before their health was measured.

3.2.5. Employment and economic conditions

We considered three groups of potential pathways through which college quality might influence midlife health. The first group of variables was adulthood employment and economic conditions measured one or two years before age 40 or 50. Respondents' work status was a categorical measure based on their weeks worked and weekly work hours: not working; full-year and full-time work (worked ≥ 50 weeks and ≥ 40 h per week); full-year and part-time work (worked ≥ 50 weeks and < 40 h per week); and part-year work (< 50 weeks). Logged household income was the logarithm of total net family income in the previous calendar year (in \$1,000, adjusted for inflation at 2015 values) from multiple sources for household members related to the respondent by blood, marriage, or non-marital partnership. Following recent studies of

⁴ While respondents in the 1979 started their colleges earlier than 2008, 2008 was the first year when IPEDS reported faculty-student ratios focused only on undergraduates. By using IPEDS data in 2008, one implicit assumption is that qualities of four-year colleges do not change substantially over the past decades since 1970s.

⁵ We do not measure whether a respondent completed a degree at a given college. We instead investigate college quality effects net of years of schooling completed and other covariates, following established conventions in the literature on college quality (Black et al., 2005). By using variables for the quality of most recent college attended and the respondent's highest year of schooling completed, we assume that the respondent concluded their higher education career at that school, even if they did not receive a degree. For respondents who completed a degree at their last college attended, the credential story applies. For those who did not complete a degree, we assume a "dose-response" scenario in which any time spent at a given college is assumed to influence later outcomes, even if this effect is smaller than the effect of spending more years at the college and/or earning a degree from it (Black et al., 2005).

wealth effects on health (Boen et al., 2020), we also included household net worth, in quartiles to facilitate inclusion of negative values. Following prior practice (e.g., Percheski & Gibson-Davis, 2020), both household income and wealth (before taking quartiles) were adjusted by the square root of household size to account for the economies of scale. Union membership was a dichotomous indicator of whether respondents were covered by a union or employee contract.

3.2.6. Health-related behaviors

The second group of potential pathways between college quality and health was health-related behaviors, measured one or two years before age 40 or 50. Respondents were asked about whether they smoked on a daily or occasional basis (versus not at all). Alcohol consumption was a three-category measure based on the number of drinks on an average day: none, modest (1–2 drinks), and heavy (3 or more drinks). Exercise referred to whether respondents engaged in vigorous activities everyday (or three times or more each week), every week, or less frequently (on a monthly or yearly basis, including never or being disabled). Lastly, health insurance was a dichotomous indicator of respondents being covered by any kind of health insurance or health care plan.

3.2.7. Family relationships

The third group of potential pathways between college quality and health was respondents' family relationships, again measured one or two years before age 40 or 50. These included marital status (married; never married and unpartnered; never married but partnered; divorced/separated and unpartnered; divorced/separated but partnered; widowed and unpartnered; widowed but partnered) and number of children in the household.

3.3. Analytical strategy

Our primary analyses include two parts. First, we present descriptive statistics of health outcomes and covariates by tiers of college attendance and quality (i.e., including the non-college category), separately for age 40 and 50. Within each age group, we conducted statistical tests for differences in health outcomes and other covariates across two comparisons: 1) non-college (reference group) versus tiers of college quality and 2) community college (reference group) versus tiers of four-year college quality. Across age, we also compared changes in health outcomes and covariates between age 40 and 50 for each tier of college attendance and quality.

Second, we used OLS regression to examine the relationships between college quality and physical and mental health, as well as the explanatory power of each group of pathway variables. To quantify mechanisms underlying any college quality gradient in health, we used the Karlson-Holm-Breen (KHB) method (Karlson et al., 2012). After conditioning on highest grade completed, we decomposed the total health disparities by college quality into direct and indirect effects via each group of pathway variables. These decompositions are not designed to estimate causal relationships, meaning the term "effects" should not be given a causal interpretation.

4. Results

4.1. Descriptive statistics

Fig. 1 displays the average values of respondents' health outcomes by categories of college attendance and quality at age 40 and 50. College quality gradients in health and changes in these gradients reveal distinctively different patterns for physical and mental health. First, a positive association between college quality and physical health holds at both 40 and 50: compared to individuals who did not attend college, community or four-year college attendance was correlated with significantly higher self-rated physical health, and such often increased significantly as college quality increased. The positive college quality

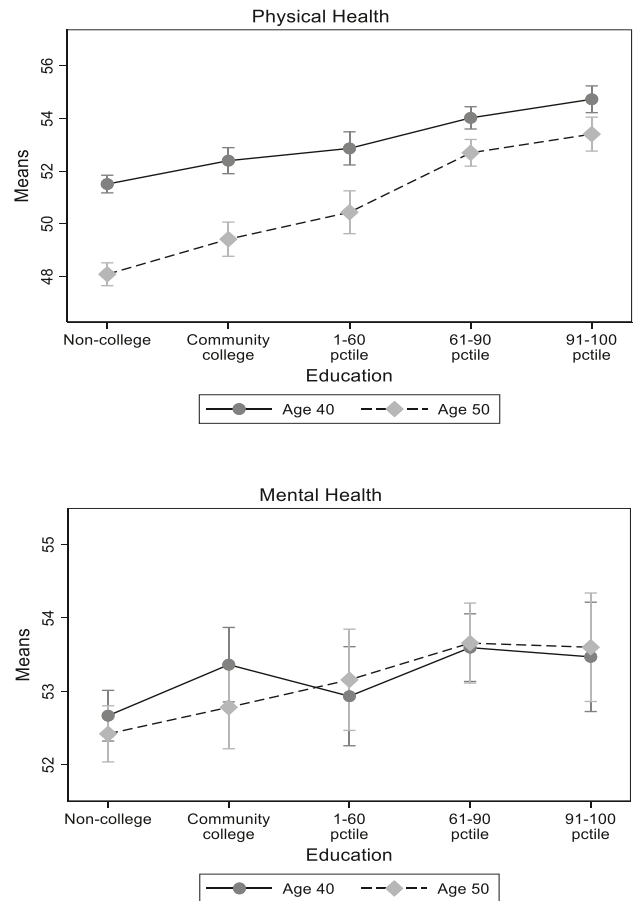


Fig. 1. Average levels of physical and mental health by college quality (including non-college at age 40 and 50).

and physical health relationship had a steeper slope at age 50 than at age 40. This was primarily driven by substantial deterioration in self-reported physical health of those who did not attend college or went to community colleges or four-year colleges in the 1st-60th percentile of quality. Physical health also declined during this ten-year period for individuals who went to better-quality and top universities (61st-100th percentile), but did so by a much smaller magnitude. This descriptive evidence lends initial support for a stratifying role of college quality in shaping physical health, especially at age 50.

Benefits of attending better colleges were less obvious for mental health at age 40 but appeared stronger at age 50. The slope, however, remained less steep compared to that for physical health, especially at the top tier of colleges. Statistical tests indicate a few significant advantages in mental health for those who attended higher quality colleges versus those who did not attend at all, but there was not significant variation in mental health among college-goers. Changes in mental health across age were minimal.

Table 1 reports means and proportions of all covariates across tiers of college attendance and quality, separately by age. Each group of potential pathway variables differs significantly by college attendance and quality. We present descriptive statistics only once for the time-invariant characteristics: respondents' highest grade completed and early childhood and demographic characteristics. Differences on this set of variables by college attendance and quality were in the expected directions. Those who attended college, and among college attendees, those who attended higher quality colleges completed more schooling and were more likely to be White, male, have better-educated parents, live with their parents at age 14, and have higher AFQT scores. There were no

Table 1
Descriptive statistics for covariates.

Variables	Age 40					Age 50				
	Non-college	Community	1-60 percentile	61-90 percentile	91-100 percentile	Non-college	Community	1-60 percentile	61-90 percentile	91-100 percentile
Highest grade completed	11.573 (1.141)	13.970*** (1.764)	15.372**** (2.184)	16.173**** (2.126)	16.892**** (1.969)					
Male	0.522	0.407***	0.455**	0.494 ^a	0.528 ^a					
Race/ethnicity										
White	0.737	0.777**	0.822**** ^a	0.836**** ^a	0.886**** ^a					
Blacks	0.181	0.153**	0.146**	0.121**** ^a	0.066**** ^a					
Hispanics	0.082	0.069*	0.032**** ^a	0.043**** ^a	0.047**** ^a					
Mother's education	10.454 (2.659)	11.787*** (2.576)	12.365**** (2.314)	12.848**** (2.575)	13.520**** (2.574)					
Father's education	10.131 (3.277)	11.938*** (3.460)	12.442**** (3.272)	13.359**** (3.530)	14.662**** (3.367)					
Live with parents at age 14	0.838	0.853	0.875*	0.892**** ^a	0.920**** ^a					
AFQT score (percentile)	32.582 (23.572)	52.461*** (25.008)	62.536**** (24.432)	70.377**** (22.528)	78.715**** (20.739)					
Live in south	0.382	0.355	0.451***	0.352	0.247**** ^a	0.388	0.361	0.453**** ^a	0.358	0.268**** ^a
Work status										
Not working	0.131	0.116	0.100*	0.090**	0.095*	0.198	0.143***	0.114***	0.078**** ^a	0.077**** ^a
Working full year, full time	0.594	0.609	0.667**** ^a	0.660**** ^a	0.655*	0.546	0.594**	0.636***	0.655**** ^a	0.664**** ^a
Working full year, part time	0.110	0.139*	0.120	0.127	0.138	0.114	0.127	0.104	0.135	0.128
Working not full year	0.164	0.137*	0.112**	0.123**	0.113**	0.142	0.136	0.146	0.132	0.130
Logged household income	9.985 (1.950)	10.467*** (1.439)	10.595*** (1.295)	10.872**** (1.187)	11.026**** (1.464)	9.942 (2.174)	10.570*** (1.526)	10.726**** ^a (1.430)	10.831**** ^a (1.563)	11.107**** ^a (1.529)
Household wealth (quartiles)										
1st quartile	0.352	0.221***	0.180***	0.129**** ^a	0.094**** ^a	0.354	0.211***	0.205***	0.127**** ^a	0.079****^a
2nd quartile	0.297	0.248**	0.241*	0.179**** ^a	0.149**** ^a	0.302	0.246**	0.235**	0.186**** ^a	0.139**** ^a
3rd quartile	0.223	0.274**	0.293**	0.270**	0.228	0.218	0.265**	0.278*	0.305***	0.224
4th quartile	0.129	0.257***	0.286***	0.421**** ^a	0.529**** ^a	0.125	0.278***	0.283***	0.382**** ^a	0.557****^a
Union membership	0.130	0.150	0.139	0.156	0.099 ^a	0.124	0.142	0.125	0.167**	0.105
Smoke	0.419	0.271***	0.213**** ^a	0.156**** ^a	0.096**** ^a	0.377	0.236***	0.209***	0.111****^a	0.091**** ^a
Alcohol consumption										
None	0.420	0.392	0.398	0.308**** ^a	0.281**** ^a	0.524	0.440***	0.429***	0.334****^a	0.293**** ^a
Moderate	0.277	0.413***	0.430***	0.529**** ^a	0.574**** ^a	0.248	0.388***	0.422***	0.485****^a	0.594**** ^a
Heavy	0.304	0.196***	0.172***	0.163***	0.145**** ^a	0.228	0.172***	0.149***	0.182**	0.113**** ^a
Exercise										
Daily	0.169	0.218**	0.231**	0.256**	0.308**** ^a	0.300	0.187***	0.188***	0.146****^a	0.143***
Weekly	0.191	0.206	0.228	0.303**** ^a	0.295**** ^a	0.473	0.610***	0.620***	0.692****^a	0.731****^a
Monthly or less/unable	0.640	0.576**	0.542***	0.441**** ^a	0.397**** ^a	0.227	0.203	0.192	0.161****^a	0.125****^a
Health insurance	0.738	0.844***	0.856***	0.907**** ^a	0.905**** ^a	0.724	0.834***	0.842***	0.897**** ^a	0.909**** ^a
Marital status										
Married	0.594	0.675***	0.709***	0.712***	0.749**** ^a	0.572	0.631**	0.666***	0.695**** ^a	0.713**** ^a
Never married and unpartnered	0.139	0.119	0.114	0.133	0.131	0.115	0.093*	0.099	0.114	0.096
Never married but partnered	0.026	0.022	0.023	0.017	0.021	0.021	0.013	0.012	0.014	0.013
Divorced/separated and unpartnered	0.189	0.153*	0.138**	0.114**** ^a	0.095**** ^a	0.216	0.217	0.190	0.153****^a	0.141****^a
Divorced/separated but partnered	0.045	0.024**	0.013***	0.015***	0.004**** ^a	0.053	0.032**	0.026**	0.015**** ^a	0.033
Widowed and unpartnered	0.006	0.005	0.003	0.007	0.001**** ^a	0.018	0.013	0.008*	0.007**	0.004**
Widowed but partnered	0.002	0.000*	0.000*	0.001	0.000*	0.006	0.000**	0.000***	0.001*	0.000***
Number of children	1.417 (1.292)	1.532* (1.247)	1.505 (1.275)	1.444 (1.202)	1.519 (1.333)	0.827 (0.998)	0.969** (1.092)	1.024*** (1.030)	1.287****^a (1.187)	1.417****^a (1.199)
N	3376	1455	730	1019	476	3376	1455	730	1019	476

Note: Means/proportions are weighted by baseline sampling weight. Highest grade completed, male, race/ethnicity, mother's and father's education, living with parents at age 14, AFQT score were time-invariant variables. For each age, differences in covariates were tested across tiers of college quality (non-college and community college being the reference groups). Changes across age were tested within each tier of college quality. For comparisons between non-college vs. attending college: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed test).

^a Significantly different at or smaller than 0.05 level compared with values for "community college."

Numbers in bold indicate significant differences at or smaller than 0.05 level in age 50 compared with situations in age 40.

consistent patterns by college quality of variation in geographic residence. Employment and economic factors also covary by college attendance and in the expected directions at age 40. Those who attended college, and among college attendees, those who attended higher quality colleges were more attached to the labor force and had higher income and wealth. Union membership exhibited little variation across college attendance quality. For health behaviors, college attendees, especially those who attended higher quality and elite colleges, reported much healthier lifestyles than their peers who did not attend college or attended lower quality colleges. They were less likely to smoke or to drink heavily, they exercised more frequently, and they were more likely to be covered by health insurance. In terms of family relationships, college attendees, especially those who attended higher quality colleges, were more likely to be married. The number of children in the household was pretty similar by college quality.

For some groups of college attendance and quality, we also observed significant changes between age 40 and 50. Those who did not attend college or attended community colleges reported higher rates of not working, and those who went to four-year colleges in the 1st-60th percentile of quality reported a lower likelihood of full year, full time work. By age 50, individuals who went to top colleges tended to accumulate more wealth, as revealed by their larger share of family net worth in the top quartile and smaller share in the bottom quartile. Health behaviors also changed as respondents aged. The share of smokers and heavy drinkers decreased as people aged, and those without a college degree substantially increased their daily and weekly exercise, potentially due to the need to exercise more in the face of declined health. Among college goers, the shares reporting daily exercise decreased between 40 and 50, but the shares reporting weekly exercise increased significantly. Respondents who did not go to college or attended community colleges were more likely to experience marital dissolution or lose a partner. Over time, the average number of children decreased for all subgroups.

4.2. Multivariate results

Table 2 presents regression results of relationships between college quality (including non-college) and physical and mental health at ages 40 and 50, net of the highest grade completed. For ease of interpretation,

we standardized physical and mental health at each age with a mean of 0 and standard deviation (SD) of 1. Under each model, we first show health disparities between different tiers of college quality and non-college (reference group is “non-college”). We then switch the reference category to community college to detect health differences among college goers (the panel “comparison within college”). For both sets of coefficients, we also test whether changes between age 40 and 50 are statistically significant.

Consistent with prior research, educational attainment has a significant and positive association with physical health. After controlling for educational attainment, relative to non-college goers, benefits of attending colleges in the two higher tiers of quality (61–90th and 91–100th percentiles) remain substantial and significant, particularly at age 50 (0.16–0.18 SD). Although statistical tests indicate no significant increase over age, the positive associations between college quality and physical health become slightly larger from age 40 to 50.

Among college goers (relative to community college), the same pattern emerges where attending colleges in the two higher tiers brings significant physical health benefits, and such benefits tend to increase across age: In particular, the positive relationship between attending 61st-90th percentile colleges and physical health statistically increases across the life course ($p < 0.05$), with a magnitude almost doubling between ages 40 and 50. At both ages, regardless of the reference category, the magnitudes of significant positive associations between college quality and physical health are much larger than that between the highest grade completed and physical health, indicating the crucial role of college quality beyond of the quantity of educational attainment.

Patterns are quite different for mental health. Educational attainment is significantly and positively correlated with mental health, but with smaller magnitudes compared with physical health. We do not observe any significant relationships between college quality and mental health between those who attended colleges and those who did not, and between different tiers of colleges and mental health among college goers. This applies to both ages across respondents’ life course.

We next explore different mechanisms underlying positive associations between college quality and physical health. For each age, we estimated a series of OLS models that first separately consider selection from early life and demographic characteristics, economic conditions, health behaviors, and family relationships. We then included all posited

Table 2
Regression results of relationships between college quality (including non-college) and health at ages 40 and 50.

	Physical Health			Mental Health		
	Age 40	Age 50	age 40≠ age 50	Age 40	Age 50	age 40≠ age 50
College quality (ref.: non-college)						
Community college	-0.007 (0.045)	-0.026 (0.045)		0.017 (0.044)	-0.024 (0.044)	
1-60th percentile	-0.018 (0.060)	-0.017 (0.057)		-0.077 (0.059)	-0.019 (0.056)	
61-90th percentile	0.094 (0.053)	0.158** (0.049)		-0.018 (0.053)	0.017 (0.052)	
91-100th percentile	0.151* (0.060)	0.181** (0.058)		-0.055 (0.067)	-0.009 (0.064)	
Comparison within college						
1-60th percentile vs. community college	-0.011 (0.056)	0.009 (0.055)		-0.094 (0.055)	0.005 (0.054)	$p < .05$
61-90th percentile vs. community college	0.101* (0.047)	0.184*** (0.045)	$p < .05$	-0.035 (0.047)	0.040 (0.048)	
91-100th percentile vs. community college	0.158** (0.053)	0.208*** (0.052)		-0.072 (0.061)	0.014 (0.059)	
Highest grade completed	0.052*** (0.009)	0.067*** (0.008)		0.029** (0.009)	0.027** (0.009)	
Constant	-0.741*** (0.106)	-0.953*** (0.097)		-0.383*** (0.105)	-0.368*** (0.105)	
N	7056	7056		7056	7056	

Note: Data are weighted. Standard errors are in parentheses.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed test).

pathway variables into the model simultaneously (all of these models also include controls for the highest grade completed). KHB decomposition results reported here are based on OLS models that separately consider each group of pathway variables. In Table 3, we present KHB decomposition results for significant associations between high quality colleges (61–90th percentile and 91–100th percentile) and physical health. For the purpose of better visualization and comparison, Fig. 2 also graphs the explanatory role of each mechanism (detailed OLS regression results are reported in Appendix Table A2).

As shown in Table 3, the total effects of college quality that need to be accounted for are the significant net relationships between 61st–90th percentile and 91st–100th percentile colleges and physical health (independent of highest grade completed).⁶ The indirect effect refers to the part of the total effect that could be accounted for by a certain mechanism, whereas the direct effect indicates the remaining portion of the total effect. Results show that, in terms of attending higher-quality colleges versus not attending any college, selection from early childhood, individuals' ability, and demographic characteristics (grouped in Fig. 2 as early childhood/demographic) played a dominating and significant role in explaining the net benefits – between 60% and 75% – associated with going to these types of colleges between age 40 and 50. Relative to non-college, individuals' employment and economic conditions explained between around one fifth to one quarter of college quality effects on physical health at age 40, and these factors' roles increased to over a third at age 50. However, the explanatory role of these economic conditions is insignificant at both ages. The explanatory power of health behaviors increased almost 15% between age 40 and 50 for the 91st–100th percentile college category, from 30% to 44%, but remained similar for the 61st–90th percentile group, from 42% to 40%. Moreover, the explanatory role of health behaviors was significant at both ages. Although the explanatory role of family relationships also tended to increase between age 40 and 50, the overall percentage remained relatively low and insignificant (less than 10%).

Comparing within college goers, selection accounted roughly for 31%–50% (statistically significant) of the benefits of attending higher-quality four-year colleges rather than community colleges – a smaller share than selection accounts for in comparisons with the non-college group. Employment and economic conditions also accounted for insignificant and relatively smaller shares of physical health differences among college goers than between college attendees and non-college attendees. However, the increase in these factors' explanatory power among college attendees was quite substantial, especially for elite colleges in the 91st–100th percentiles of quality (doubling from 9% to 19% between ages 40 and 50). There was some decrease in the indirect role of health behaviors over time for the category of 61st–90th percentile colleges, from 30% to 20%, while these factors' role was relatively stable among elite college attendees, at around 25%. Importantly, health behaviors still accounted for a significant proportion of the total effect of college quality. Finally, family relationships tended to be more important in accounting for college quality gradient in physical health at age 50 than at age 40, but the magnitude of this effect remained relatively small and insignificant for both groups.

5. Discussion

Using the longitudinal data from the NLSY79 cohort linked with external IPEDS data on college characteristics, we extended the prior focus of the literature on education and health to one important aspect

⁶ Relative to those who did not attend college, the effect of attending colleges in the 61st–90th percentile of quality is only marginally significant at age 40 ($b = 0.094$ SDs, $p < 0.10$). For symmetry of presentation, we include it as an effect to be explained because the same effect reaches conventional significance levels in the same comparison at age 50, and at ages 40 and 50 relative to those who attended community college.

of the educational processes – the *quality* of colleges that individuals attended. We also examined whether and to what extent college quality was distinctively associated with physical and mental health at ages 40 and 50, providing new insights into the health dimension-specific effects of college quality and life course patterns during midlife.

Our findings demonstrated a significant and positive relationship between college quality and physical health even after controlling for years of schooling. At both 40 and 50, individuals who attended better-quality colleges, particularly those within the upper two tiers of the distribution of four-year college quality, reported better physical health than their peers – both those who did not attend college and those who attended lower quality colleges. These results are robust when using quality of the first college respondents ever attended or the average quality of all colleges that respondents ever attended (available upon request). This independent positive effect of higher college quality on physical health tended to strengthen between 40 and 50. This is consistent with a process of accumulating advantages, in which people attending colleges that are of better quality, at least according to the measures used here, could more successfully utilize their compounded economic and social resources to ameliorate or minimize health risks.

Why attending lower-quality four-year colleges (e.g., 1–60th percentile) did not provide health benefits relative to not attending college or community college? First, this may reflect the fact that health benefits of college quality are just highly skewed – only limited to attending higher-quality (61–90th percentile) and elite four-year universities. Second, it is possible for low-tier four-year colleges to offer health benefits, but these benefits only lasted short-term and disappear by mid-life. Finally, although health benefits of low-quality colleges were not obvious among the overall population, some population groups could still enjoy health benefits by attending these colleges. However, supplemental analysis indicates little evidence supporting significant health benefits of attending low-quality colleges across major demographic groups such as gender and race/ethnicity groups (see Appendix Table A1).

Our decomposition results further evaluated indirect roles of selection, employment and economic conditions, and health behaviors in accounting for positive relationships between college quality and physical health. Some of these patterns mirrored findings from studies on educational attainment and health. Selection from demographic background and scholastic ability in adolescence accounted for a significant and large proportion of relationships between college quality and physical health at age 40. As pointed out by [Mirowsky and Ross \(2003\)](#), the explanatory power of economic situation was less important than other factors such as health-related behaviors. However, we further showed that the explanatory role of employment and economic conditions increased during midlife, while the corresponding increase for health behaviors was only modest. Family relationships tended to account for larger share of college quality effect over time, but its proportion was the smallest.

Results for mental health were different. Similar to recent findings among young adults ([Uecker & Wilkinson, 2020](#)), we found that during midlife, the benefits of college quality on physical health did not extend to mental health. Although there was some evidence supporting a positive unadjusted effect of college quality on mental health, positive effects did not persist after conditioning on years of schooling. Why is the case? The relationship between higher college quality and tangible and intangible forms of social status provides a candidate explanation. Research on the stress of high status ([Schieman et al., 2006](#); [Schieman & Glavin, 2011](#); [Uecker & Wilkinson, 2020](#)) suggests that, around age 40, those who attended higher quality colleges may not have improved (even poorer) mental health due to ways that high socioeconomic status potentially creates tensions between competing work and family needs (parenting, caring for elderly parents, maintaining good relationships with partners, etc.). It is also possible that during mid-life, those who attended high quality and more competitive colleges experience more relative deprivation and/or subjective status inconsistency that

Table 3
Decomposition of the relationship between college quality and physical health at ages 40 and 50.

Mechanisms	Age 40				Age 50			
	Selection	Economic conditions	Health behaviors	Family relationships	Selection	Economic conditions	Health behaviors	Family relationships
Relative to Non-college								
61-90th percentile								
Total effect	0.094	0.094	0.094	0.094	0.158**	0.158***	0.158**	0.158**
Direct effect	0.036	0.067	0.058	0.088	0.069	0.098*	0.095	0.146**
Indirect effect	0.059**	0.027	0.036*	0.006	0.089***	0.060	0.063**	0.012
% explained	62.8	28.7	38.3	6.38	56.3	38.0	39.9	7.59
91-100th percentile								
Total effect	0.151*	0.151*	0.151*	0.151*	0.181**	0.181**	0.181**	0.181**
Direct effect	0.062	0.122*	0.105	0.139*	0.047	0.116*	0.102	0.165*
Indirect effect	0.089***	0.028	0.045**	0.012	0.135***	0.065	0.079***	0.016
% explained	58.9	18.5	29.8	7.94	74.6	35.9	43.6	8.84
Relative to Community college								
61-90th percentile								
Total effect	0.101*	0.101*	0.101*	0.101*	0.184***	0.184***	0.184***	0.184***
Direct effect	0.056	0.088	0.071	0.102*	0.127**	0.150***	0.147**	0.172***
Indirect effect	0.045**	0.014	0.030*	-0.001	0.057**	0.034	0.037*	0.012
% explained	44.6	13.9	29.7	-0.99	31.0	18.5	20.1	6.52
91-100th percentile								
Total effect	0.158**	0.158**	0.158**	0.158**	0.208***	0.208***	0.208***	0.208***
Direct effect	0.082	0.143**	0.119*	0.153**	0.105*	0.168**	0.155**	0.192**
Indirect effect	0.075***	0.015	0.039**	0.005	0.103***	0.040	0.053**	0.016
% explained	47.5	9.49	24.7	3.16	49.5	19.2	25.5	7.69
N	7056	7056	7056	7056	7056	7056	7056	7056

Note: Early life and demographic covariates include respondents' sex, race, mother's and father's education, whether living with parents at age 14, AFQT score, and whether living in south. Economic conditions include work status, logged household income, quartile of household wealth, and union membership. Health behaviors include smoke, alcohol consumption, exercise, and health insurance. Family relationships include marital status, number of children. Data are weighted. Standard errors are omitted to save space.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed test).

produces stress, anxiety, or frustration that deteriorate their mental conditions (Andersson, 2018; Eibner et al., 2004). Unfortunately, we do not have detailed measures of these possible mechanisms during midlife.

We acknowledge several limitations. First, health scholars highlight the necessity to adopt multiple-hierarchy stratification and life course approaches to examine and understand health inequalities (Brown et al., 2016). Although, as expected, we did find significant variations in the average levels of health conditions by sex and race/ethnicity, supplemental analysis stratified by gender and race/ethnicity did not find much evidence supporting significant heterogeneity in the linkage between college quality and health outcomes across gender and racial/ethnic groups, or in changes in those relationships between ages 40 and 50 (see Appendix Table A1). Second, given that we only have two time points, ages 40 and 50, during midlife, observed changes across age are not free from idiosyncratic fluctuations in individuals' reporting their health conditions at specific ages and time periods. Observed patterns might be also particular to this single cohort and not generalizable to other cohorts. Third, we relied on self-reported physical and mental health functioning rather than objective measures such as diagnosed physical or mental illnesses. While measures of self-rated health are themselves important (Schnittker & Bacak, 2014), future research on relationships between college quality and health should also seek to use objective measures of health conditions based on medical evaluations, while accounting for potential differences, by college attendance and quality, in access to health insurance (see Table 1) and medical care.

Another limitation is that we did not consider the college trajectory of respondents over time. People are heterogeneous in terms of their college experiences over time, which are likely to be associated with their health at midlife. To better conceptualize and measure long-term trajectory of college quality (such as timing, transition, and duration of exposure to colleges with different qualities), methods such as latent

group analysis or sequence analysis are more appropriate to capture characteristics of respondents' early experiences in college quality. Exploring this question is out of the scope of the current study but is an important direction for future research.

Despite these limitations, our study extends the research scope and conceptualization of the existing literature about education and health. Building on nascent studies on health inequality associated with college quality and other dimensions of higher education like college major (Fletcher & Frisvold, 2011, 2014; Montez et al., 2018), our study demonstrates an independent role of college quality in shaping physical health beyond the quantity of completed schooling. This reinforces the significance of education as a fundamental health risk factor and confirms the recent call for future research to incorporate the quality aspect of higher education or schooling process (Zajacova & Lawrence, 2018). We find evidence that *another* form of education matters for physical health (college quality, net of attainment) and yet more evidence that education matters for mental health (but college quality does not). The distinction has to do with college quality mattering or not, not education mattering or not (it does for both). Differential life course patterns of the relationship between college quality and physical health during midlife also provide new insights as well as new inquiries into understanding health inequalities over individuals' lifetimes.

Ethical Statement for submission

"Higher Education and Health at Midlife: Evaluating the Role of College Quality".

Hereby, my coauthor and I consciously assure that for the above manuscript the following is fulfilled:

- 1) This study is our own original work, which has not been previously published elsewhere.

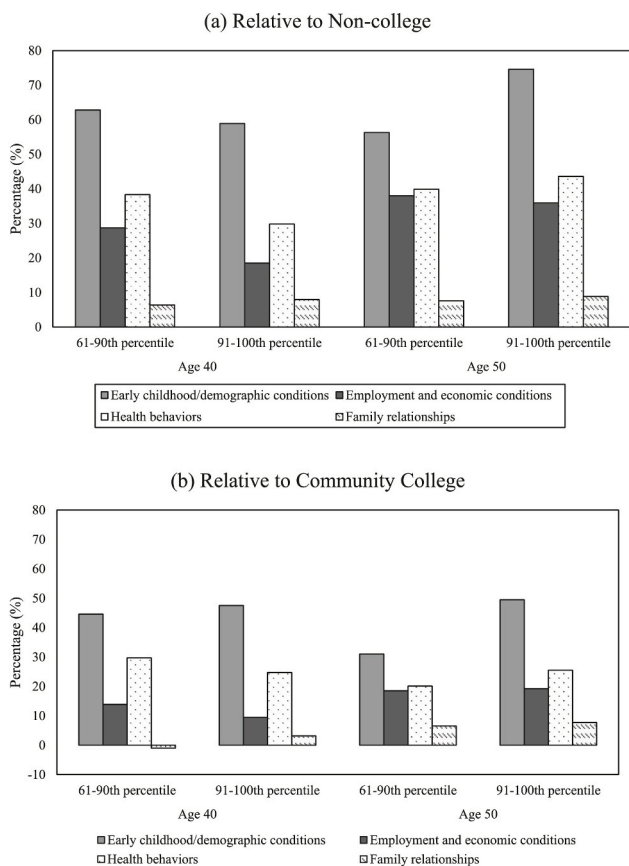


Fig. 2. Explanatory roles of underlying mechanisms, physical health.

- 3) This paper reflects our own research and analysis in a truthful and complete manner.
- 4) This paper properly credits the meaningful contributions of each of the author.
- 5) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference.
- 6) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

The violation of the Ethical Statement rules may result in severe consequences.

Author statement

J.W. and J.C. conceptualized the study. J.W. conducted the statistical analysis and drafted the manuscript. J.W. and J.C. contributed to interpretation of the findings and revised the manuscript. Both authors approved the final version of the paper.

Declarations of competing interest

None.

Data availability

The authors do not have permission to share data.

- 2) This paper is not currently being considered for publication elsewhere.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2022.101228>.

Appendix

Table A1

Relationships between college quality (including non-college) and health at ages 40 and 50: variation by gender and race/ethnicity

	Physical Health			Mental Health		
	Age 40	Age 50	age 40≠ age 50	Age 40	Age 50	age 40≠ age 50
Panel A: Men						
College quality (ref.: non-college)						
Community college	0.057	0.025		0.024	-0.008	
1-60th percentile	0.101	0.075		-0.084	0.009	
61-90th percentile	0.127*	0.157**		-0.090	0.007	
91-100th percentile	0.167*	0.149*		-0.078	0.012	
Comparison within college						
1-60th percentile vs. community college	0.044	0.050		-0.108	0.018	<i>p</i> < .05
61-90th percentile vs. community college	0.070	0.132*		-0.114	0.015	
91-100th percentile vs. community college	0.110	0.124		-0.102	0.020	
N	3477	3477		3477	3477	
Panel B: Women						
College quality (ref.: non-college)						
Community college	-0.040	-0.044		0.054	-0.000	
1-60th percentile	-0.127	-0.098		-0.061	-0.038	
61-90th percentile	0.041	0.138		0.037	0.011	
91-100th percentile	0.105	0.181*		-0.070	-0.063	

(continued on next page)

Table A1 (continued)

	Physical Health			Mental Health		
	Age 40	Age 50	age 40≠ age 50	Age 40	Age 50	age 40≠ age 50
Comparison within college						
1-60th percentile vs. community college	-0.087	-0.054		-0.115	-0.038	
61-90th percentile vs. community college	0.081	0.182**		-0.017	0.011	
91-100th percentile vs. community college	0.145	0.225**		-0.124	-0.063	
N	3579	3579		3579	3579	
Panel C: Whites						
College quality (ref.: non-college)						
Community college	-0.032	-0.057		-0.022	-0.051	
1-60th percentile	-0.064	-0.079		-0.132	-0.058	
61-90th percentile	0.062	0.104		-0.063	-0.016	
91-100th percentile	0.111	0.129		-0.091	-0.040	
Comparison within college						
1-60th percentile vs. community college	-0.032	-0.021		-0.110	-0.007	
61-90th percentile vs. community college	0.094	0.163**		-0.040	0.035	
91-100th percentile vs. community college	0.143*	0.186**		-0.068	0.011	
N	3523	3523		3523	3523	
Panel D: Blacks						
College quality (ref.: non-college)						
Community college	0.062	0.066		0.080	0.005	
1-60th percentile	0.145	0.164		0.034	0.061	
61-90th percentile	0.144	0.265**		0.085	0.081	
91-100th percentile	0.191	0.228		-0.165	0.075	
Comparison within college						
1-60th percentile vs. community college	0.084	0.098		-0.046	0.057	
61-90th percentile vs. community college	0.082	0.199*		0.005	0.076	
91-100th percentile vs. community college	0.129	0.163		-0.246	0.070	
N	2193	2193		2193	2193	
Panel E: Hispanics						
College quality (ref.: non-college)						
Community college	0.137	0.091		0.267**	0.106	
1-60th percentile	0.083	0.268*		0.307*	0.215	
61-90th percentile	0.212	0.379***		0.147	0.152	
91-100th percentile	0.183	0.236		0.316*	0.177	
Comparison within college						
1-60th percentile vs. community college	-0.053	0.178		0.040	0.109	
61-90th percentile vs. community college	0.075	0.288**	<i>p</i> < 0.05	-0.119	0.046	
91-100th percentile vs. community college	0.046	0.145		0.049	0.071	
N	1340	1340		1340	1340	

Note: Data are weighted. Standard errors omitted to save space.

****p* < 0.001, ***p* < 0.01, **p* < 0.05 (two-tailed test).

Table A2

Regressions exploring underlying mechanisms between college quality and physical health at ages 40 and 50.

	Age 40					Age 50				
	Selection	Economic conditions	Health behaviors	Family relationships	All	Selection	Economic conditions	Health behaviors	Family relationships	All
<i>Relative to Non-college</i>										
Community college	-0.020	-0.020	-0.013	-0.007	-0.016	-0.058	-0.051	-0.060	-0.036	-0.082
1-60th percentile	-0.050	-0.036	-0.026	-0.032	-0.055	-0.063	-0.028	-0.039	-0.020	-0.045
61-90th percentile	0.036	0.067	0.058	0.092	0.037	0.069	0.098*	0.082	0.139**	0.025
91-100th percentile	0.062	0.122	0.105	0.146*	0.073	0.047	0.116*	0.094	0.151**	0.015
<i>Relative to Community college</i>										
1-60th percentile	-0.030	-0.016	-0.012	-0.025	-0.039	-0.005	0.024	0.021	0.016	0.037
61-90th percentile	0.056	0.088	0.071	0.099*	0.053	0.127**	0.150***	0.142**	0.175***	0.107**
91-100th percentile	0.082	0.143**	0.119*	0.153**	0.089	0.105*	0.168**	0.154**	0.187***	0.097
Highest grade completed	0.042***	0.034***	0.042***	0.049***	0.028**	0.050***	0.035***	0.050***	0.061***	0.022**
Early life/ demographic characteristics	Y	N	N	N	Y	Y	N	N	N	Y
Economic conditions	N	Y	N	N	Y	N	Y	N	N	Y
Health behaviors	N	N	Y	N	Y	N	N	Y	N	Y

(continued on next page)

Table A2 (continued)

	Age 40					Age 50				
	Selection	Economic conditions	Health behaviors	Family relationships	All	Selection	Economic conditions	Health behaviors	Family relationships	All
Family relationships	N	N	N	Y	Y	N	N	N	Y	Y
Constant	-0.984***	-1.117***	-0.587***	-0.771***	-1.100***	-1.183***	-1.368***	-0.769***	-1.007***	-1.300***
N	7056	7056	7056	7056	7056	7056	7056	7056	7056	7056

Note: Early life and demographic covariates include respondents' sex, race, mother's and father's education, whether living with parents at age 14, AFQT score, and whether living in south. Economic conditions include work status, logged household income, quartile of household wealth, and union membership. Health behaviors include smoke, alcohol consumption, exercise, and health insurance. Family relationships include marital status, number of children. Data are weighted. Standard errors are omitted.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed test).

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