

Revisiting Health Disparities Linked to “Some College”: Incorporating Gender and High School Experiences

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Abstract

In the United States, “some college” is attained more frequently than a 4-year college degree. However, attainments below 4-year college vary considerably in terms of credentials and years of higher education, and gender differences in health disparities remain overlooked. Additionally, high school experiences may confound any estimated health gains. We draw on national longitudinal data (Add Health; Waves IV and V) to estimate associations between subbaccalaureate education and general health during young adulthood and again at early midlife. Relative to attaining no education past high school, women’s greater self-rated health with all levels of postsecondary attainment is robust to high school experiences, with the exception of vocational/technical training without a degree, in young adulthood and in early midlife. Greater health gains are linked to associate degrees compared to some college without a degree. For men, health benefits are found only among 4-year degree holders. For both genders, depressive symptom buffering linked to subbaccalaureate education is inconsistent and sometimes not robust to high school experiences. Overall, these findings offer a compelling case for recasting college health gains in terms of distinct postsecondary endpoints by gender.

Keywords

education, associate degree, sex and gender, self-reported health, depressive symptoms

Introduction

Obtaining “some college” is more common in the United States than finishing a 4-year college degree (U.S. Census Bureau 2020). Zajacova and Lawrence (2018) recently classified “some college” attainers as an “anomaly,” in terms of how their adult health outcomes resemble those of high school graduates more closely than those of 4-year college graduates. From a human capital perspective, education promotes health by inculcating “learned effectiveness,” or a variety of general and specific problem-solving

skills, with each additional year spent in school (Lawrence, Rogers, and Zajacova 2016; Mirowsky and Ross 2008).

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On the basis of years spent in school (e.g., [Mirowsky and Ross 2008](#)), greater health gains could be expected for subbaccalaureate attainment. However, this heterogeneous category encompasses a variety of postsecondary attainments, in terms of credentials and years of higher education. Given this, any anomalous gains could differ depending on particular attainments, but this important gap remains in the literature.

In this study, we begin to address two gaps in our current understanding of the “some college”-health link. First, we do not know whether different postsecondary gains differ by gender. In general, women demonstrate a relatively stronger link between education and health ([Ross, Masters, and Hummer 2012](#); [Ross and Mirowsky 2010](#)). Specifically, a resource substitution perspective predicts that women should derive greater health benefits from higher education than men due to their fewer alternative social and economic resources compared to men ([Ross et al. 2012](#); [Ross and Mirowsky 2010](#)), but it awaits application to a study of differences in subbaccalaureate attainments. We extend the existing literature by conducting gender-specific estimation of postsecondary health gains.

A second gap surrounding our understanding of estimated health gains to “some college” is that existing approaches typically are focused on postsecondary human capital. However, this represents only one possible explanation, as high school instruction and experiences profoundly shape college preparation and success (e.g., [Carroll et al. 2017](#); [Crosnoe et al. 2017](#); [Grodsky et al. 2022](#)). Despite the clear role that high school plays in configuring postsecondary education, a persistent gap remains in applying high school characteristics or experiences to the estimation of subbaccalaureate health disparities. Thus, it is important to understand whether and how high school experiences might inform health disparities for those with some college completed. Here, we take two approaches to addressing any possible confounding related to high schools, by adjusting for high school

experiences as well as examining high school fixed effects.

For our analysis, we draw on national longitudinal survey data spanning adolescence to early midlife, to test whether and which health gains linked to subbaccalaureate attainments differ by gender, differ by type of higher education attained, and are robust to high school differences. We differentiate between some vocational/technical training with no degree and some 2- or 4-year college with no degree, while also contrasting these categories against vocational/technical and academic associate degrees and 4-year (baccalaureate degrees). Our findings reveal that any “catch all” anomaly linked to “some college” is in fact driven by heterogeneous health estimates attached to differing types of subbaccalaureate attainments and credentials all of which fall within the “some college” category. For women in particular, we find consistent but diverse health gains across multiple types of subbaccalaureate attainment, which persist into early midlife net of high school experiences. For men, postsecondary health gains are found only with a 4-year college degree. For both genders, depressive symptom buffering linked to subbaccalaureate education is inconsistent—and sometimes rendered nonsignificant by controlling high school experiences. Thus, overall, our findings provide a strong case for recasting college health gains in terms of distinct postsecondary endpoints by gender.

Background

Subbaccalaureate (“some college”) attainments comprise those who have earned 2-year associate degrees (AA/AS) and vocational and technical diplomas and certificates (VTCs), as well those as who obtain some college education but no 4-year degree. More than one-quarter of adults in the U.S. over the age of 25 is included in one of these postsecondary categories ([U.S. Census Bureau 2020](#)). While numerous studies demonstrate positive associations between obtaining a 4-year college diploma and better overall physical and mental

health (Bauldry 2015; McFarland and Wagner 2015; Mirowsky and Ross 2008), empirical investigations of subbaccalaureate attainments and health have yielded more mixed results (e.g., Munoz and Santos-Lozada 2021; Zajacova and Johnson-Lawrence 2016; Zajacova and Lawrence 2021; Zajacova, Hummer, and Rogers 2012a). Indeed, research has suggested a “glitch” in educational health gradients around subbaccalaureate categories of attainment (Zajacova, Rogers, and Johnson-Lawrence 2012b).

Whether postsecondary education conveys better health depends on whether and what type of subbaccalaureate degree is awarded (e.g., no degree vs. academic associate vs. vocational associate) and also on the health outcome examined, with self-rated health apparently showing a clearer advantage relative to objective morbidity indicators (Muñoz and Santos-Lozada 2021; Zajacova and Lawrence 2018; Zajacova et al. 2012a; Zajacova and Johnson-Lawrence 2016). Meanwhile, some levels of subbaccalaureate education may not show a significant depression advantage relative to high school graduation after accounting for an extensive array of pre-college covariates (Rosenbaum 2012; Zajacova and Lawrence 2021).

In a recent analysis, Zajacova and Lawrence (2021) find using the Add Health dataset and a variety of treatment estimators that associate degree holders sometimes fare better than high school graduates on their reports of depressive symptoms and self-rated health, with a clearer advantage existing for academic associate degrees relative to vocational or technical certifications. Research using data on working-age adults has shown that those with technical or vocational degrees or some college but no degree have similar physiological risk profiles (Zajacova and Johnson-Lawrence 2016), and equivalent or higher reports of health conditions (Zajacova et al. 2012b), compared to high school graduates with no higher education. Further, while adults with bachelor’s and academic associate degrees compared to those with high school degrees only were shown to have lower likelihoods of serious

psychological distress, adults with vocational or technical degrees or some college but no degree were indistinguishable from high school graduates with no college (Muñoz and Santos-Lozada 2021).

Overall, existing research into subbaccalaureate health disparities finds stronger or more consistent benefits for general physical health than for mental health, and studies vary considerably in their incorporation of covariates. Moreover, among subbaccalaureate attainments, health advantages seem to be most consistent for academic associate degrees. From a human capital perspective, academic associate degrees offer curricula and coursework that are more similar in nature to bachelor’s coursework than vocational programs, generally speaking (Schudde, Ryu, and Brown 2020). This could translate to a wider variety of work opportunities or gains based in lifetime employment or household income. Indeed, Kim and Tamborini (2019) find higher 20-year income returns to academic associate degrees compared to vocational degrees. These patterns also could be consistent with the greater signaling potential of academic compared to vocational degrees (Gerber and Cheung 2008; Schudde and Goldrick-Rab 2015).

We contribute to a further illumination of these subbaccalaureate disparities in this study. We do so by explicitly structuring our analysis around gender differences, following prior studies of resource substitution, women’s self-rated health, and economic and occupational returns to education. Further, we incorporate high school experiences to test if the results in the existing literature are robust to differences in college preparation.

Gendered Benefits to Higher Educational Credentials

Educational attainment improves adult health by enhancing economic, psychological, and social resources into adulthood (Mirowsky and Ross 2008). Further research into educational health benefits considers how gender structures these disparities (e.g., Ross, Masters, and Hummer 2012; Ross and Mirowsky 2010).

For instance, a resource substitution hypothesis contends that higher education provides social and economic opportunities during adulthood especially among those for whom such opportunities are less readily available due to structural inequities. This hypothesis has received support for women and those from economically disadvantaged families, for health outcomes and for non-health outcomes such as personal networks (e.g., [Andersson 2016, 2018](#); [Bauldry 2015](#); [Mirowsky and Ross 2008](#); [Schafer et al. 2013](#)).

A competing hypothesis, termed resource multiplication, builds on axiomatic principles derived from a cumulative (dis)advantage paradigm: it predicts that those who are structurally enabled will be better poised to realize benefits to educational capital. For instance, those with cultural capital are better able to extract teacher support or institutional opportunities in a variety of higher educational settings ([Hamilton, Roksa, and Nielsen 2018](#)), and highly remunerated fields such as medicine, law, and engineering have major, well-known gender inequities in their educational pipelines, revealing how many academic programs structurally favor men ([Montez et al. 2018](#)). Despite how institutions of higher education can and do reproduce class and gender inequities, relatively less support for this hypothesis has been observed when tested in terms of general educational health disparities.

While women's self-rated health has increased apace with their historical gains in educational attainment and labor force participation ([Hill and Needham 2006](#); [Schnittker 2007](#)), women still remain in worse self-rated health than men through middle age ([Zajacova, Huzurbazar and Todd 2017](#)). Although education enhances the sense of control similarly by gender, women's mental health may benefit more from a sense of control than men's ([Ross and Mirowsky 2010](#)). However, economic and occupational educational returns such as labor force participation, earnings, authority, job satisfaction, and occupational prestige—and avoidance of gender discrimination more generally—are on the whole more favorable for men ([Andersson and Harnois 2020](#); [Pudrovska](#)

[2013](#)). Moreover, the authority associated with higher-status jobs is disproportionately burdensome on women's health, in part due to the greater amount of emotional and logistical labor involved compared to men holding authority positions ([Pudrovska and Karraker 2014](#)) and likely also due to the greater structural incompatibility between work and family among women ([Montez et al. 2014](#); [Rao 2020](#)).

All told, [Ross and Mirowsky \(2006, 2010\)](#) find support for the enhanced value of women's human capital as a health-promoting resource when their other economic and social resources are relatively limited as compared to men's, in that education provides enhanced economic, job, and marital prospects even if these do not translate or obtain as easily as they do among men due to structural sexism ([Homan 2019](#)). Indeed, education has been instrumental in closing gender gaps in health ([Ross et al. 2012](#); [Ross and Mirowsky 2010](#)). [Hernandez and colleagues \(2016\)](#) similarly find that educational differences in women's health-protective behaviors are stronger than men's when faced with a new chronic illness diagnosis. Educational health disparities have been increasing over time for both genders, shaped mainly by declining health among the lower-educated ([Montez and Zajacova 2013](#)).

However, the ramifications for gender differences in subbaccalaureate health disparities remain unclear. Findings from [Lawrence and colleagues \(2016\)](#) suggest that postsecondary vocational certifications carry value for significant health improvement relative to earning only a high school diploma. Yet, evidence on gender differences in potential subbaccalaureate effects remain more ambiguous. [Zajacova and Johnson-Lawrence \(2016\)](#) find inconsistent evidence of women's greater cardiovascular protection from associate degrees, but this evidence does not consider more general health outcomes in the context of high school experiences preceding and shaping college engagement and success. [Kim and Tamborini \(2019\)](#) find gendered 20-year income gains to subbaccalaureate credentials, such that women show a clearer income

advantage linked to academic degrees, while men seem to benefit more from vocational degrees. For both genders, the income benefits linked to academic degrees are larger.

High School Experiences and Postsecondary Education

Often conceptualized incompletely in terms of individual or family background, differences in high school experiences actually matter a great deal to college engagement, success, and graduation (Brand, Pfeffer, and Goldrick-Rab 2014; Hamilton, Roksa, and Nielsen 2018; Schudde and Grodsky 2018). High school experiences represent an integration of individual trajectories with institutional characteristics (Walsemann, Gee, and Geronimus 2009). For instance, high schools vary in their college-preparatory resources and social and academic climates in and near school (Carroll et al. 2017). High school differences are not reducible to individual-level processes, but rather reflect a duality of individual-level and contextual experiences (e.g., Downey, Quinn, and Alcaraz 2019).

However, there has been a relative oversight of modeling high school differences in the construction of subbaccalaureate health disparities. Secondary schools could conceivably shape subsequent health disparities related to higher education (Augustine et al. 2021; Crosnoe, Kendig and Benner 2017; Johnson et al. 2016). For instance, social and academic features of high school environments play a significant and lasting role in students' academic and psychosocial preparedness for college (e.g., Long, Conger, and Iatarola 2012; Schneider, Swanson, and Riegle-Crumb 1998). Indeed, existing studies focused on rigor of coursework in high school and young adult health find that this association partially operates through postsecondary educational enrollments and degrees (e.g., Carroll et al. 2017; Crosnoe and Riegle-Crumb 2007).

Existing research into high school quality and life-course health proceeds by examining distinct dimensions of high school experience or quality (e.g., Boen, Kozlowski, and Tyson

2020; Carroll et al. 2017; Crosnoe and Riegle-Crumb 2007; Dudovitz et al. 2016; Frisvold and Golberstein 2013; Moorman, Greenfield, and Garcia 2019). For instance, school attributes such as college-preparatory curricula or teacher qualifications or credentials, peer connectedness or achievement, class size, and school socioeconomic resources have shown significant associations with health behaviors and mental and physical health indicators across the life course. In this study, we implement an observational approach to high school experiences that incorporates multiple individual-level indicators of high school experiences, while also incorporating a fixed effects approach to absorb institutional variation between high schools (Carroll et al. 2017).

As for any specific expectations concerning how high school experiences might confound links between postsecondary attainment and adult health, these experiences represent a heterogeneous set of exposures leading to complex trajectories of health. For instance, high schools configure college-preparatory coursework and occupational expectations, which themselves influence health conditional on final attainments and prevailing labor market conditions during adulthood (Carroll et al. 2022). Furthermore, experiences of achievement or social integration during high school influence adult health differently depending on heterogeneous postsecondary pathways (e.g., Crosnoe and Riegle-Crumb 2007). Following previous research, we are led to expect that high school experiences contribute in multifaceted ways to emergent processes of higher education, but they nonetheless offer a proximal, pre-college assessment of human capital.

Overview of the Present Study

Drawing on national longitudinal data, we estimate associations between health through early midlife and subbaccalaureate educational attainments. We use the National Longitudinal Study of Adolescent to Adult Health (Add Health) due to its school-based sampling design (Bearman, Jones, and Udry 1997) and how

this enables a rigorous examination of high school differences. Meanwhile, the multi-wave design allows us to assess health into early midlife. Our analysis is guided by a joint focus on gender and high school–based variation. Informed by human capital, stratification, and institutional perspectives, we ask the following: (1) What are the estimated associations between subbaccalaureate education and health, net of high school characteristics? (2) Do these estimated associations vary by gender? and (3) Are these associations evident in both young adulthood and early midlife?

Data and Methods

We draw on Waves I, IV, and V of the National Longitudinal Study of Adolescent to Adult Health (Add Health), funded by the National Institute of Child Health and Human Development (NICHD) with co-funding from 23 other federal agencies and foundations. Respondents were selected using a stratified, random, school-based cluster sampling procedure. In-school surveys were administered to 90,118 American adolescents in grades 7–12 across 145 middle, junior, and high schools in 1994–1995, and interviews (Wave I) were conducted with 20,745 of these students from 80 of these schools in their homes. Follow-up interviews (Wave II) were conducted in 1996, approximately 1 year after the first survey wave ($N = 14,738$). Wave III, Wave IV, and Wave V interviews were then conducted between ages 18–26 (2001–2002, $N = 15,197$), 24–34 (2008–2009, $N = 15,701$), and 33–43 (2016–2018, $N = 12,300$), respectively.

Our analyses examining young adulthood use Waves I and IV and are restricted to those respondents who are high school graduates and have valid Add Health survey weights as well as complete data for educational attainment at Wave IV ($N = 13,906$). The analyses focused on outcomes at early midlife use Waves I and V and similarly restrict the sample to respondents who graduated high school and have valid survey weights and complete data for educational attainment at Wave V ($N = 11,503$). Respondents who did not obtain at least a high

school diploma were omitted from both sets of analyses, to limit comparisons to high school graduates and to ensure adequate exposure to high school characteristics (e.g., [Rosenbaum 2012](#); [Zajacova and Lawrence 2021](#)). A supplemental analysis excludes GED recipients. Data are secondary and exempt from human subjects IRB review.

Depressive Symptoms

The depressive symptoms measure is based on items derived from the conventional 20-item Center for Epidemiological Studies of Depression Scale (CES-D). Seven of the 10 CES-D items assessed at Waves I and IV asked how often respondents experienced each of the following feelings of distress during the past week: (1) feeling bothered by things; (2) feeling blue; (3) having trouble focusing; (4) feeling depressed; (5) feeling tired; (6) feeling sad; and (7) feeling disliked by others. Additionally, three items were reverse coded: (8) feeling as good as other people; (9) feeling happy; and (10) enjoying life. Response options for each item were “never or rarely,” “sometimes,” “a lot of the time,” and “most of the time or all of the time.” Three of the above items (2, 4, and 6) were also measured at Wave V. A composite depression score was obtained by averaging scores on the scales of items (10 items at Waves I and IV and three items at Wave V), with higher scores indicating greater frequency of depressive symptoms. Scale reliability is consistent across these waves (Wave I, $\alpha = 0.81$; Wave IV, $\alpha = 0.84$; Wave V, $\alpha = 0.85$). For regression analyses, we transform this variable using a started log via the “*lnskew0*” command in Stata, which adjusts a standard log transformation by adding a simple constant, k , such that skewness is minimized (see also [Houle 2011](#)).

Self-Rated Health

At all survey waves, respondents were asked, “In general, how is your health?” Valid response categories were: (1) excellent, (2) very good, (3) good, (4) fair, and (5) poor, and these

were reverse coded with higher scores reflecting greater self-rated health. Self-rated health has similarly broad and meaningful underlying health, behavioral, health care, and morbidity structure in men and women (Zajacova et al. 2017).

Educational Attainment

Respondents were asked at Wave IV, “What is your high school graduation status?” and “What is the highest level of education that you have achieved to date?” Respondents also listed all degrees or certificates they received from a college, university, or vocational/technical school. Using this information, we constructed the following educational categories: received a high school diploma or GED only, attended some vocational/technical training but did not earn a degree, attended some 2-year or 4-year college but did not earn a degree, obtained a vocational or technical associate degree, obtained an academic associate degree, graduated with a bachelor’s degree from a 4-year college or higher attainment. At Wave V, only the question “What is the highest level of education that you have achieved to date?” was asked and we used this information to construct the same educational categories as those outlined above.

High School Experiences

Following previous research, we also adjust for high school experiences that shape postsecondary attendance and evolving adult health inequalities (e.g., Bauldry 2015; Carroll et al. 2017; Walsemann, Hummer, and Hayward 2018; Zajacova and Lawrence 2021). All covariates were assessed at Wave I prior to high school graduation. Two binary measures were included based on items asking respondents whether they had ever repeated a grade or been held back a grade in school (1 = yes, 0 = no) or ever skipped school during the most recent school year for a full day without an excuse (1 = skipped school one or more times, 0 = never skipped school). Grade point average (GPA) was assessed by taking the average across

respondents’ reports of their most recent grades (i.e., A, B, C, D, or lower) in English or language arts, mathematics, history or social studies, and science (range: 1 to 4). School connectedness is a composite measure of items that asked respondents their level of agreement with the following statements: “You feel close to people at your school,” “You feel like you are a part of your school,” “You are happy to be at your school,” “The teachers at your school treat students fairly,” and “You feel safe in your school.” The items were rated on a five-point response scale ranging from 1 (strongly agree) to 5 (strongly disagree). After reverse scoring the items responses were averaged, with higher scores indicating greater levels of school connectedness.

Baseline Controls (Including Sociodemographic Covariates)

We adjusted for a range of covariates from Wave I. Respondent-reported measures included gender (female, male), race/ethnicity (white, Black, Hispanic, Asian, other race), family structure (two-parent family, other), and age (continuous in years). Parent-reported measures included parental education (less than high school, high school degree or equivalency, some college, bachelor’s degree or higher), and household income (continuous in thousands). Interviewer-reported measures included geographic region (Northeast, Midwest, South, West) and Peabody Picture Vocabulary Test score (PPVT), which is a commonly used measure of academic aptitude.

Analytic Strategy

At Waves IV and V, weighted regression models were used to estimate associations between wave-specific educational attainment and health outcomes¹ We control for Wave I (baseline) health outcomes to address reverse-causality concerns. Following preliminary analyses that established significant differences by gender, we present gender-stratified regression models for ease of interpretation (e.g., Pampel, Mollborn, and Lawrence 2014)²

Missing data were imputed for separate samples at the two waves using a chained equations approach, and five data sets were created (Wave IV, $N = 13,739$; Wave V, $N = 11,544$). The highest proportion of missing data was for household income (24.25% for the Wave IV sample, 23.89% for the Wave V sample), with less than 5% missingness on the remaining variables.

Model 1 presents baseline educational estimates adjusted for sociodemographic covariates. Model 2 adds individual-level high school experiences, while Model 3 adds high school fixed effects based on Add Health high school attended in Wave I.

Results

Table 1 presents weighted descriptive statistics from the Add Health sample. Across all waves (i.e., Waves I, IV, and V), women report a higher frequency of depressive symptoms. Women also report worse self-rated health compared to men in Waves I and IV. By Wave IV, women are more likely to have achieved bachelor's degrees compared to men. This baccalaureate advantage remains intact at Wave V. Importantly, women are more likely than men to have earned academic and vocational/technical associate degrees in Waves IV and V, as well.

For sociodemographic or pre-college background measures at Wave I, women show lower levels of parental education and lower likelihood of coming from a two-parent family before college. Women also have lower average PPVT scores compared to men. In terms of high school experiences, women demonstrate greater academic success during secondary school in terms of their higher GPA and lower likelihood of being held back, and women report lower average school connectedness and lower rates of ever skipping school.

We address our research questions about associations between subbaccalaureate educational attainments and health, and whether these vary by gender in young adulthood and early midlife, by presenting our results from multiple regression models in Table 2

(self-rated health) and Table 3 (depressive symptoms).

Table 2 reports estimates from ordered logistic models of self-rated health. Examining the baseline Model 1 in Table 2 for young adulthood (Wave IV), we see that women show health gains at all levels of subbaccalaureate attainment during young adulthood (odds ratios [ORs] = 1.44 to 1.97, $p < 0.001$), with the exception of some vocational/technical training with no degree (OR = 1.07, *ns*), and that these estimated health gains are relatively unaffected by controlling high school experiences in Model 2 and by the use of high school fixed effects in Model 3 (odds ratios [ORs] = 1.43 to 1.94 in Model 2; 1.40 to 1.89 in Model 3; $p < 0.001$). In contrast, men show statistically insignificant gains in self-rated health across the baseline (Model 1; ORs = 1.16 to 1.15, *ns*) and adjusted models.

Moving to the early midlife estimates obtained at Wave V, we see that women's significant gains in health linked to subbaccalaureate education persist in both significance and magnitude, net of high school attended in Model 3 (ORs = 1.29 to 1.95; $p < 0.05$). Estimates were compared across educational categories within models, using the *mi test* command. At Wave IV and V, all within-model coefficient differences were significant at $p < 0.05$ except for the following contrasts: "some vocational/technical training, no degree" and "some 2-year or 4-year college, no degree;" "some 2-year or 4-year college, no degree" and vocational/technical associate degree only; and vocational/technical associate degree only and academic associate degree only. Additionally, the contrast between "some vocational/technical training, no degree" and vocational/technical associate degree only was not significant at Wave V. Figure 1 depicts predicted probabilities for women's "good" self-rated health at Waves IV and V, based on Model 3. Men's health gains linked to subbaccalaureate education remain insignificant at early midlife (ORs = 1.11 to 1.25; *ns*).

Table 3 presents estimates from linear regressions of logged depressive symptoms. For women, the baseline models (Model 1) show

Table 1. Descriptive Statistics (National Longitudinal Study of Adolescent to Adult Health [Add Health]: Waves I, IV, and V).

Variable	Overall sample						Women			Men			p-value ^a
	Min.	Max.	%	M	SD	%	M	SD	%	M	SD		
Health and well-being													
Self-rated health, Wave V	1	5		3.55	0.97		3.58	0.97		3.53	0.96	<0.001	
Self-rated health, Wave IV	1	5		3.67	0.91		3.65	0.90		3.72	0.91	<0.001	
Self-rated health, Wave I	1	5		3.89	0.90		3.81	0.90		3.97	0.89	<0.001	
Depressive symptoms, Wave V	1	4		1.44	0.59		1.48	0.62		1.39	0.56	<0.001	
Depressive symptoms, Wave IV	1	4		1.59	0.46		1.63	0.48		1.55	0.43	<0.001	
Depressive symptoms, Wave I	1	4		1.65	0.46		1.71	0.50		1.59	0.42	<0.001	
Educational attainment, Wave IV													
High school degree only	0	1	21.76%			17.23%						<0.001	
Some vocational/technical training, no degree	0	1	3.74%			3.17%						<0.001	
Some 2-year or 4-year college, no degree	0	1	24.13%			23.44%						<0.001	
Vocational/technical associate degree only	0	1	8.97%			10.00%						<0.001	
Academic associate degree only	0	1	9.51%			10.96%						<0.001	
Bachelor's degree or higher	0	1	31.93%			35.21%						<0.001	
Educational attainment, Wave V													
High school degree only	0	1	17.44%			13.48%						<0.001	
Some vocational/technical training, no degree	0	1	3.39%			2.74%						<0.001	
Some 2-year or 4-year college, no degree	0	1	23.40%			21.91%						<0.001	
Vocational/technical associate degree only	0	1	6.23%			6.57%						<0.001	
Academic associate degree only	0	1	10.71%			12.16%						<0.001	
Bachelor's degree or higher	0	1	38.80%			43.14%						<0.001	
High school experiences, Wave I													
Ever held back in school	0	1	19.55%			15.19%						<0.001	
Ever skipped school	0	1	27.89%			25.79%						<0.001	
GPA	1	4		2.86	0.76		2.95	0.73		2.77	0.77	<0.001	
School connectedness	1	5		3.72	0.75		3.70	0.76		3.74	0.74	<0.001	

(continued)

Table 1. (continued)

Variable	Overall sample			Women			Men			p-value ^a		
	Min.	Max.	%	M	SD	%	M	SD	%		M	SD
Baseline controls (including sociodemographics), Wave 1												
Female	0	1	48.84%									<0.001
Race/ethnicity												
White	0	1	66.70%			66.62%			66.78%			
Black	0	1	14.95%			15.25%			14.65%			
Hispanic	0	1	11.55%			11.61%			11.50%			
Asian	0	1	3.51%			3.37%			3.64%			
Other	0	1	3.30%			3.16%			3.44%			
Geographic region												0.93
Northeast	0	1	17.14%			17.85%			16.41%			
Midwest	0	1	30.71%			31.13%			30.31%			
South	0	1	38.26%			37.39%			39.14%			
West	0	1	13.89%			13.64%			14.15%			
Two-parent family	0	1	69.28%			68.35%			70.21%			<0.001
Parental education	1	4		2.89	0.99		2.88	0.99		2.91	0.99	<0.001
Household income ^b	0	999		47.07	47.48		47.17	48.29		46.98	46.69	0.86
Age	11	21		15.46	1.83		15.37	1.79		15.54	1.85	<0.001
PPVT	14	146		102.27	14.21		101.49	14.35		103.04	14.03	<0.001

Note. GPA = Grade point average, PPVT = Peabody Picture Vocabulary Test. Table is based on non-imputed data and the descriptive statistics are weighted. Cumulative percentages for categorical variables may not add up to 100% due to rounding. p-values come from χ^2 or independent samples t-tests.

^ap-value for comparison between women and men.

^bMeasured in thousands of dollars.

Table 2. Odds Ratios From Ordered Logistic Regression Models Predicting Self-Rated Health by Gender (Add Health).

		Women			
		Young adulthood (Wave IV; n = 7,369)		Early midlife (Wave V; n = 6,567)	
Measures		Model 1 ^b	Model 2 ^c	Model 3 ^d	Model 3 ^d
Women					
Post-secondary education ^a					
Some vocational/technical training, no degree		1.07 (0.20)	1.10 (0.20)	1.10 (0.22)	0.92 (0.23)
Some 2-year or 4-year college, no degree		1.44 (0.13) ^{***}	1.43 (0.13) ^{***}	1.40 (0.14) ^{***}	1.38 (0.15) ^{**}
Vocational/technical associate degree only		1.73 (0.20) ^{***}	1.74 (0.21) ^{***}	1.72 (0.21) ^{***}	1.68 (0.24) ^{***}
Academic associate degree only		1.97 (0.23) ^{***}	1.94 (0.24) ^{***}	1.89 (0.24) ^{***}	2.07 (0.25) ^{***}
Bachelor's degree or higher		3.17 (0.29) ^{***}	3.08 (0.29) ^{***}	2.87 (0.30) ^{***}	3.52 (0.36) ^{***}
Men					
		Young adulthood (Wave IV; n = 6,370)		Early midlife (Wave V; n = 4,977)	
Measures		Model 1 ^b	Model 2 ^c	Model 3 ^d	Model 3 ^d
Post-secondary education ^a					
Some vocational/technical training, no degree		1.16 (0.18)	1.18 (0.19)	1.13 (0.20)	0.87 (0.16)
Some 2-year or 4-year college, no degree		1.13 (0.11)	1.12 (0.11)	1.12 (0.12)	1.21 (0.14)
Vocational/technical associate degree only		1.27 (0.18)	1.26 (0.18)	1.19 (0.17)	1.10 (0.22)
Academic associate degree only		1.15 (0.18)	1.13 (0.18)	1.08 (0.18)	1.35 (0.21)
Bachelor's degree or higher		1.98 (0.20) ^{***}	1.89 (0.22) ^{***}	1.89 (0.24) ^{***}	2.23 (0.25) ^{***}

Note. Analyses are weighted to adjust for the complex survey design.

^aHigh school degree only is the reference category.

^bThe baseline model controls for sociodemographics including race/ethnicity, age, geographic region, family structure, parental education, household income, and PPVT measured at Wave I, as well as self-rated health at Wave I.

^cThe high school experiences model controls for baseline sociodemographics and self-rated health and high school experiences (ever held back in school, ever skipped school, GPA, and school connectedness) at Wave I.

^dHigh school fixed effects included.

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

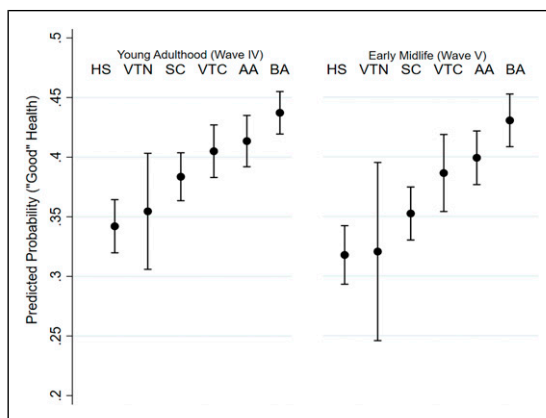


Figure 1. Predicted probabilities for women's self-rated health (Add Health Waves IV and V).

Note. 95% confidence intervals shown. Estimates based on Table 2, Model 3. HS = High school degree only; VTN = Some vocational/technical training, no degree; SC = Some college with no degree; VTC = Vocational/technical associate degree only; AA = Academic associate degree only; BA = Bachelor's degree or higher.

that having a bachelor's degree relative to a high school degree only confers protection against depressive symptoms in both young adulthood ($b = -0.14, p < 0.001$) and early midlife ($b = -0.06, p < 0.01$), and these associations remain after adjusting for high school experiences (Model 2) and including high school fixed effects (Model 3). Additionally, in young adulthood obtaining academic associate degree or having some 2-year or 4-year college without a degree, relative to having a high school degree only, is also shown to lower depressive symptoms among women, but these relationships are not robust to adjustment for high school experiences (in the case of some 2-year or 4-year college with no degree) or inclusion of high school fixed effects (in the case of academic associate degree only). In early midlife, women who report having some vocational/technical training with no degree are shown to have higher depressive symptoms compared to those with a high school degree only ($b = 0.11, p < 0.05$), and this association remains robust to adjustment for high school experiences or inclusion of high school fixed effects.

Among men, the baseline model (Model 1) in young adulthood shows that lower depressive symptoms are observed at all levels of postsecondary education, with the notable

exception of some vocational/technical training with no degree, compared to high school degree only. All of these associations are maintained after adjustment for high school experiences, and after the inclusion of high school fixed effects in Model 3, the association is attenuated for academic associate degree only. In early midlife, in the baseline model (Model 1) men who obtain a bachelor's degree report lower depressive symptoms ($b = -0.06, p < 0.05$) relative to those with no postsecondary education (i.e., high school degree only), but no mental health gains are observed for the subbaccalaureate levels. Further, the association for bachelor's degree or higher is not robust to adjustment for high school experiences.

Supplemental Analysis: GED Recipients

GED recipients receive less exposure to the high school academic and social environment than traditional high school graduates, which carries implications for their college preparation and transition to college (Maralani 2007, 2014) and potentially for their health disadvantage relative to traditional high school graduates (Zajacova et al. 2012a, 2012b). 9.01% of the Add Health sample at Wave IV (3.14% of the Wave V sample) received a GED

diploma. Study results excluding GED recipients are presented in the appendix table. When GED attainers are omitted ([Supplementary Table S1](#)), women's advantage in self-rated health linked to some 2- or 4-year college without a degree becomes non-significant in young adulthood as well as in early midlife in the final models with school fixed effects (Model 3). In [Supplementary Table S2](#), omission of GED attainers yields generally similar results for women and men. However, for men, a 4-year college degree no longer protects against depressive symptoms at early midlife.

Discussion

While obtaining "some college" is more common than completing a 4-year degree, our knowledge of health disparities linked to diverse postsecondary attainments is relatively limited and existing results are mixed. Drawing on national longitudinal data from adolescence to early midlife, we gain new insight into subbaccalaureate health disparities. Drawing on data from young adulthood and early midlife, our findings provide a strong case for analyzing health disparities in terms of distinct postsecondary endpoints by gender. We differentiated our analysis between some vocational/technical training with no degree and some 2- or 4-year college with no degree, while also including traditional 2- and 4-year degree attainments.

Moreover, based on the fundamental insight that high schools shape diverse experiences of college preparation, we take a rigorous approach to accounting for secondary schools as a potential source of selection in postsecondary health disparities. Although we do not pursue causal inference in this study, one key contribution of our study is to address potential sources of selection based in high school experiences, which might confound the correlation of subbaccalaureate attainment and health outcomes. Moreover, our detailed approach to high school experiences and differences strengthens confidence in the possible role of postsecondary human capital in promoting general physical or mental health across the

remaining life course (e.g., [Carroll et al. 2017](#); [Zajacova and Lawrence 2021](#)).

Overall, our findings showed significant subbaccalaureate health gains exclusively among women. These gains are robust to high school experiences and differences, further strengthening the case that they are not based in selection. Using Waves IV and V of Add Health allowed us to examine whether our results were affected by later educational attainments or by shifts in mental or physical health across the life course. We found that women's educational health advantages held into early midlife.³ Thus, human capital and post-educational resource explanations for subbaccalaureate attainments are more consistent with women's than men's educational health disparities. Indeed, subbaccalaureate health gains for men exist only for depressive symptoms and are inconsistent. Moreover, men's gains appear to become nonsignificant from young adulthood to early midlife.

The presence of a subbaccalaureate gradient in self-rated health among women—with higher odds of better self-rated health at three distinct attainment levels below a bachelor's degree—carries important implications for gender health disparities. First, women's health gains linked to associate degrees were demonstrably stronger than gains attached to some college without a degree, consistent with the social and economic importance of credentials above and beyond gained skills. In line with prior work, we also find that academic associate degrees may carry somewhat stronger or more consistent health advantages (see also [Zajacova and Lawrence 2021](#)). The larger estimated health gains linked to academic associate degrees compared to vocational gains, while not significantly different, are in keeping with prior research finding that women's income benefits relatively less from vocational training ([Kim and Tamborini 2019](#)). Meanwhile, a transitory mental health advantage linked to vocational/technical degrees among men in young adulthood seems to align with the relatively greater income gains that men obtain from these particular degrees or certifications; the fading advantage by early midlife could

also reflect changes in income trajectories or accompanying role transitions (Kim and Tamborini 2019).

Following our findings, high school experiences in their own right do not carry straightforward implications for estimated educational health gradients decades down the line. Rather, multiple aspects of high schools structure academic, peer, and social experiences in ways that complex ramifications for eventual adult health disparities (Grodsky et al. 2022). For depressive symptoms, some estimated postsecondary mental health gains are not robust to high school experiences or differences, thus signaling that selection processes may operate differently across self-rated health and depressive symptoms.

Our findings in this study generally are consistent with broader human capital arguments about the relatively greater health-promoting value of education for women relative to men (Ross and Mirowsky 2006, 2010). As we overviewed earlier, this could be based in relationships between education and work-related, social, behavioral, and psychological resources for women in particular. This said, a closer examination of post-college jobs, income, marital or family situations, and sense of control could further illuminate the origins of these higher estimated health gains. Reciprocally, among men, can we trace the lack of health gains to a distinct dampening of particular pathways? Also, for men, why does the buffering of depressive symptoms linked to subbaccalaureate attainment disappear from young adulthood to early midlife?

Robust self-rated health gains linked to vocational and academic associate degrees among women, as well as to some college without a 4-year degree, suggest that physical health disparities among men may be based in selection to a larger extent than what is observed among women. Removing women GED attainers showed that advantages in self-rated health accruing to some college without a degree became non-significant, raising the interesting question of whether higher education without a degree could help enrich social or economic prospects, and thus health, among

women GED recipients in particular, a potential extension of a resource substitution perspective that incorporates nontraditional educational paths (Maralani 2011).

Our analysis carries some limitations from the standpoint of understanding the nature of the educational health disparities documented here. First, given how higher educational attainments are variably timed in the life course (Walsemann et al. 2018), we do not pinpoint when or how strongly subbaccalaureate health disparities in general health arise. Relatedly, analyses of transitions to adulthood position postsecondary education amid work, family, or marital transitions which are deserving of closer, joint attention (e.g., Monaghan and Attewell 2015; Wickrama, Wickrama, and Baltimore 2010). Second, in accounting for robustness to high school differences, we are not ruling out the possibility that early, primary, or pre-secondary education could play a substantial role in structuring later educational disparities (e.g., Ansari and Pianta 2018; Heckman and Krueger 2003; Mollborn and Lawrence 2018), as could differences in teacher quality within schools (Rivkin, Hanushek, and Kain 2005), all of which could be useful paths for continuing inquiry into eventual subbaccalaureate enrollment or health gains. Third, health behaviors are relatively dynamic across the portion of the life course when higher education is most common, differently by gender, raising the possibility that behavioral trajectories may explain the general health patterns we observe for women or may be a source of countervailing inputs to general health for both genders (Andersson, Maralani, and Wilkinson 2022; Crosnoe et al. 2017; Pampel et al. 2014). A fourth limitation circumscribing the meaning of our results is that we do not examine the interaction or nexus of family and school characteristics, which might offer sharper resolution of college preparation, enrollment, or persistence (Hamilton et al. 2018; Lareau and Cox 2011; Schudde and Goldrick-Rab 2015; Walsemann et al. 2009).

Relatedly, our study does not directly address how high school might influence

community college attendance through specific pathways involving health or well-being. However, sociologists have emphasized the interwoven nature of student adjustment or health behaviors and academic success (e.g., [Crosnoe et al. 2017](#); [McLeod and Fettes 2007](#); [Wilbur 2021](#)), raising conceptual questions about the parallel nature of health and sub-baccalaureate trajectories. For instance, health or noncognitive traits could motivate community college attendance as well as transfer to a 4-year institution ([Schudde et al. 2020](#)). Community or 2-year college is the most common “point of entry” for those students who continue their education after high school ([Schudde and Grodsky 2018](#)). We do not find any reliable guidance from the literature that would suggest health selection into 2-year colleges, so we refrain from making any specific claims on this front. To be clear, our study does not address how high school might influence community college attendance through specific pathways involving health or well-being. However, we believe this is an interesting, additional focus for future research.

Given recent evidence that adolescent occupational expectations matter for adult health, we might be better able to explain disparities between subbaccalaureate and baccalaureate health. In particular, occupational attainments can be more volatile among workers without a bachelor’s degree due to changing labor markets, resulting in disparities in suicide and drug poisoning deaths ([Carroll et al. 2022](#)). These mortality disparities are likely to carry precursors in general mental or physical health, in ways that could shed greater light on these contingent mechanisms. Another valuable area for future work would be at the nexus of credentials and geography. Namely, sub-baccalaureate attainments and credentials can have differing consequences across U.S. states due to labor markets or policy variation ([Montez et al. 2020](#)). While distinguishing among state contexts, researchers should also pay particular attention to community colleges with marked levels of upward or downward social mobility ([Chetty et al. 2017](#)).

While pursuing these lines of inquiry, researchers may wish to integrate a growing multidisciplinary emphasis on despair or indignity among workers with lower educational or occupational attainments, reflective of their continued social and economic disadvantages within a college-centric society (e.g., [Andersson and Hitlin 2022](#); [Case and Deaton 2021](#); [Gaydosch et al. 2019](#); [Lamont 2019](#)). Relatedly, while 2-year colleges enhance educational opportunity by admitting a wider range of students than 4-year colleges, these same institutions could also ultimately hinder 4-year degree attainment ([Schudde and Brown 2019](#); [Schudde et al. 2020](#)) relative to various comparison groups ([Brand et al. 2014](#); [Schudde and Brown 2019](#)), leading to inadvertently stalled educational careers. Any beneficial or diversionary aspects to 2-year college education may hinge further on meta-major choice or persistence, teacher effects, or transfer capital (e.g., [Schudde et al. 2020](#)), which in turn could be shaped by student cultural or family capitals ([Schudde and Goldrick-Rab 2015](#)).

Our findings raise other questions about educational mechanisms that could be generative of future research. An examination of college majors may be fruitful, in terms of discovering how men and women sort differently into fields of study in ways that contribute to the gender pay gap as well as educational health disparities by gender at the sub-baccalaureate and baccalaureate levels ([Kim and Tamborini 2019](#); [Montez et al. 2018](#)). Regarding family or marital transitions, [Montez and colleagues \(2009\)](#) find that mortality differentials by education are larger for men, but that this pattern is determined largely by unmarried men with lower levels of education (see also [Zajacova and Hummer 2009](#)). Relatedly, it would be valuable to examine gendered health trajectories linked to sub-baccalaureate attainments. These could include not just general health outcomes but also pathways of smoking, drinking, obesity, or physical activity. Another direction for research would involve joining novel findings about college quality and midlife health ([Wang and](#)

Conwell 2022) to high school data (e.g., Carroll et al. 2017), to estimate an effect of college quality net of high school attended. Generally, the life course leads to accumulating patterns of risk that can widen educational health disparities, although this is not always the case depending on underlying or countervailing mechanisms involving social, economic, and psychological resources either from childhood or adult life (Andersson 2016; Goesling 2007).

In recent decades, educational mortality and health differentials are increasing more rapidly among white people than among Black people (Montez and Zajacova 2013). By intersecting race with subbaccalaureate attainments, we stand to gain a closer understanding of how differences in degree type or lack of degree are contributing to these racial health disparities. Furthermore, prior work that has documented lower health, occupational or income returns to higher education among Black people compared to white people (Sasson 2016; Vable et al. 2018; Williams, Lawrence and Davis 2019) could benefit from a closer consideration of the differences between types of attainment, to help resolve supply-side considerations behind these diminished returns within a broader landscape of systemic racism.

Conclusion

Because “some college” is the most typical level of educational attainment among U.S. adults, a clearer resolution of particular subbaccalaureate credentials gained after graduation from diverse high schools helps to enhance our understanding of links between higher education and population health. Women’s gains in self-rated health linked to postsecondary education persist into early midlife, and they hold across multiple forms of subbaccalaureate attainment and are robust to high school experiences. In contrast, men show inconsistent health gains to subbaccalaureate attainments, and these do not persist into early midlife.

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. All analyses were weighted to adjust for the complex sampling design in Add Health and attrition across waves.
2. Gender interactions for self-rated health were significant at Wave IV for all educational attainment categories except “some vocational/technical training, no degree” and “vocational/technical associate degree only,” and at Wave V for “academic associate degree only” and “bachelor’s degree or higher,” while the interactions for depressive symptoms at both outcome waves were not significant.
3. In additional analyses, a more extensive vector of pre-college controls (similar to Zajacova and Lawrence 2021) did not alter the main findings concerning women’s health benefits accruing to “some college” education, and gave quite similar magnitude estimates, as well.

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