SSM -Population Health 2 (2016) 360–364

Contents lists available at ScienceDirect

SSM -Population Health

journal homepage: www.elsevier.com/locate/ssmph

Short Report

Anomaly in the education–health gradient: Biomarker profiles among adults with subbaccalaureate attainment levels

Anna Zajacova [a,*], Vicki Johnson-Lawrence [b]

[a] University of Wyoming, Department of Sociology, Dept. 3293, 1000 E University Ave., Laramie, WY 82071, United States
[b] University of Michigan Flint, United States

ARTICLE INFO

Article history:
Received 22 February 2016
Received in revised form
27 April 2016
Accepted 2 May 2016

Keywords:
Education
Subbaccalaureate
Biomarkers
Health
Gradient
US adults

ABSTRACT

This Short Communication builds on recent findings that documented an anomaly in the education–health gradient: adults who attended college but did not earn a BA (the subbaccalaureate group) reported an equal or higher level of health problems than adults with high school (HS) diploma. Our aim is to test whether this anomaly holds when we eliminate potential reporting differences, by examining biomarker levels in the subbaccalaureate vs HS groups.

Using the restricted 1999–2012 NHANES, we estimate models of biomarkers for cardiovascular and metabolic diseases as a function of educational attainment, including three subbaccalaureate levels: "some college", vocational associate degree (AA), and academic AA.

The data show that adults with "some college" or vocational AA have no systematic advantage over HS graduates in most biomarker indices while academic AA is associated with a significantly better risk profile compared to HS. The findings indicate that the adults with some college and vocational AA degrees do not benefit from their college experience in terms of improved physiological risk profile.

This pattern underscores the need to understand and explain the anomalous health pattern that concerns 28% of American adults in the subbaccalaureate group among whom many reap little health payoffs to postsecondary schooling.

Introduction

Questions about the nature of the education–health gradient are central to social epidemiology and population health. The gradient refers to the positive relationship between educational attainment and health (Conti, Heckman & Urzua, 2010) and is thought to be universal across populations, health outcomes, and across the entire range of attainment (Mirowsky & Ross, 2003). A recent study, however, found an intriguing anomaly: subbaccalaureate adults – who attended college but did not earn a bachelor's degree – reported *more* physical health problems and diagnoses than high school (HS) graduates who never attended college (Zajacova, Rogers, & Johnson-Lawrence, 2012). Several other studies also suggested that adults with "some college" did not always compare positively to HS graduates, for instance with respect to health behaviors (Rosenbaum, 2012; Skalamera & Hummer, 2016). This pattern is important because it contradicts the expectation that the college education beyond HS would yield health payoffs. If corroborated, the anomaly may provide valuable clues about the mechanisms of the relationship between educational attainment and adult health. It is also important because the "some college" category is now the modal educational-attainment level for working-age Americans: 28% are college dropouts or have earned associate (AA) degrees (U.S. Census Bureau, 2012).

The studies above that detected the subbaccalaureate anomaly used self-reported health measures, however. This is a potential problem because respondents with different levels of education may also differ in how they report health (Bago d'Uva, O'Donnell & van Doorslaer, 2008). Adults with more education are more likely to have adequate health insurance (NCHS, 2012), receive preventive care (Bennett, Jing, Soroui & White, 2009) and have more health care interactions (Blackwell, Martinez, Gentleman, Sanmartin & Berthelot, 2009), and may thus have a better understanding of their health problems (Kawachi, Adler & Dow, 2010). Previous studies have shown that adults with more education report general health with higher reliability (Zajacova & Dowd, 2011) and higher predictive validity (Zajacova & Woo, In press). If adults at the subbaccalaureate level report their health differently, in particular if they overreport health problems relative to HS graduates, then the findings from self-reports could be biased.

On the other hand, adults who do not complete college may be unable to convert their additional schooling into a significant

* Corresponding author.
E-mail address: zajacova@uwyo.edu (A. Zajacova).

http://dx.doi.org/10.1016/j.ssmph.2016.05.001

health return. The economic returns to subbaccalaureate schooling are significant for AA degrees but not for "some college" (Belfield & Bailey, 2011). Psychologically, the "college dropout" status may be stigmatizing (Dorn, 1993) and its ongoing psychological burden may gradually damage health (Link & Phelan, 2006). Selection factors into the subbaccalaureate level, such as own cognitive and noncognitive skills or family background, may also play a role: adults who attend college but do not complete a college degree may differ from those who completed college (Hoachlander, Sikora, Horn & Carroll, 2003), but also from those who just completed high school (Rosenbaum, 2012). Such selection factors may also influence health and thus drive the health anomaly among subbaccalaureate adults.

Two competing theories can be used to form hypotheses about the subbaccalaureate patterns. According to the human capital theory (Becker, 1964), any college education should translate to better health compared to just a HS diploma because the additional schooling increase skills and resources. Under the credential model (Collins, 1979), only the attainment of an AA degree should be associated with better health than a HS diploma. An important further nuance exists at the AA level. There are two types of AA degrees, both requiring about 60 credit-hours of study. The technical/vocational AA is a terminal degree that prepares students for specific occupations, such as paralegal, computer technician, or nursing. The academic AA is a stepping stone; it provides a general education applicable toward a BA and thus those who do not complete the additional 2 years toward a BA could be conceptualized as "dropouts". There may be important selection factors into the two AA degrees: those who earn the academic AA may be more similar to those enrolled in 4-year colleges in their intention to eventually earn a BA, compared to the vocational AA students who may be more like HS students in their intention to work in blue-collar or lower-prestige white-collar occupations.

The present study analyzes biological risk marker indices across detailed educational attainment in the working-age U.S. population, using the only nationally-representative data source available to disaggregate the large subbaccalaureate group some college and those with academic and vocational AA degrees. Our aim in this Short Communication is not to explain the patterns but to describe them in detail at the postsecondary level for health measures not affected by reporting tendencies.

Data and methods

Data

The analyses are based on restricted data from the National Health and Nutrition Examination Surveys (NHANES) 1999–2012 (CDC, 2010). These ongoing cross-sectional surveys collect extensive sociodemographic, lifestyle, and health information including biomarkers from a nationally representative sample of the noninstitutionalized civilian US population. Respondents complete a household survey and undergo a 4-hour-long physical examination at a mobile examination center (CDC, 2013).

Sample

The analytic sample is defined as adults age 30–64 whose highest educational attainment is at least 9 years of schooling and no more than bachelor's degree (BA). The age boundaries were selected to capture working-age individuals, excluding younger adults who may not have completed their schooling and older adults from earlier birth cohorts when the average attainment was considerably lower than in the early 21st century and the meaning of college education was correspondingly different.

Variables

Educational attainment

Information about schooling was collected as the highest year of schooling up to 12 years and as the highest earned educational credential for those with more schooling. We retained the detailed educational categories as collected by NHANES at the postsecondary level and only grouped those with less than a high school (HS) diploma into a single category of 9–12 or GED. The General Educational Development diploma (GED) is included in this lowest category because previous studies indicated that GED recipients are comparable to HS dropouts and not HS graduates with respect to health (Zajacova, 2012). The attainment categories are: 9–12 or GED, HS diploma (reference), some college but no degree, technical/vocational associate degree (AA), academic AA, and bachelor's degree (BA).

Health measures

Three clinically defined biomarker-based measures were used to measure biological risk profile: (1) cardiovascular risk (CVD) index; (2) metabolic syndrome; and (3) a cumulative biologic risk measure. The CVD index was calculated based on the Framingham Risk Score (Wilson et al., 1998) using a weighted formula that includes age (weight range of 2–12 units), high density lipoprotein (HDL) cholesterol levels (weight range of −2 to 2 units), total cholesterol (weight range of 0–5 units), high blood pressure (weight range of −3 to 5 units), smoking status (weight range of 0–3 units), and blood glucose levels (weight range of 0–4 units). Higher scores indicate greater CVD risk.

The metabolic syndrome measure was based on the National Cholesterol Education Program's Adult Treatment Panel III report (NCEP-ATP III) criterion (Grundy et al., 2004). It is a count of the presence of five metabolic risk factors: high waist circumference (88 cm (cm) or greater for women or 102 cm or greater for men), low HDL cholesterol (1.04 millimoles per liter (mmol/L) or lower), high triglyceride levels (1.7 mmol/L or greater), high blood

Table 1
Characteristics of the analysis sample, ages 30–64 (N=12,889).

	Men	Women	Total
N	6157	6732	12,889
Age (mean, s.e.)	46.09 (0.16)	46.59 (0.18)	46.34 (0.15)
Female			0.51
Race			
Non-Hispanic White	0.73	0.69	0.71
Non-Hispanic Black	0.11	0.15	0.13
Hispanic	0.11	0.11	0.11
Other or missing	0.05	0.05	0.05
Education			
9–12 or GED	0.20	0.19	0.19
HS Completion	0.27	0.25	0.26
Some College	0.20	0.22	0.21
Vocational AA	0.10	0.11	0.11
Academic AA	0.03	0.05	0.04
BA Degree	0.20	0.18	0.19
Health indices (mean, s.e.)			
Metabolic risk index (n=10,469)	1.85 (0.15)	1.60 (0.02)	1.72 (0.016)
CVD risk index (n=12,310)	8.48 (0.09)	7.04 (0.10)	7.75 (0.079)
Total biological risk index (N=8653)	2.43 (0.03)	2.42 (0.03)	2.43 (0.023)

Adjusted for NHANES 1999–2012 complex sampling design.
s.e.=standard error
Range for the health indices are 0-1 for metabolic risk index, -5 to 26 for cardiovascular risk index, and 0-8 for total biological risk index.