HHS Public Access

Author manuscript

SSM Ment Health. Author manuscript; available in PMC 2023 January 25.

Published in final edited form as:

SSM Ment Health. 2022 December ; 2: . doi:10.1016/j.ssmmh.2022.100138.

Educational attainment and emotional well-being in adolescence and adulthood

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Abstract

Education has been conceptualized as a causal factor leading to emotional well-being. However, it is also possible that some of the effect of education may be due to selection factors. Analyzing data from the National Longitudinal Study of Adolescent to Adult Health (n = 10,908), we asked: to what extent does educational attainment increase emotional well-being once stable observed and unobserved individual characteristics are accounted for? Findings from fixed effects models showed that attaining a college degree was associated with greater emotional well-being. However, interactions with gender indicate that the positive association with emotional well-being is primarily for women, although a small negative association between completing college and depressive affect was found for men. These findings point to unmeasured confounding factors as motivating some of the association between educational attainment and emotional well-being among adolescents and adults.

Keywords

Education; Emotional well-being; Early adulthood

1. Introduction

Social class disparities in physical and mental health have been well-established in the research literature (Kessler et al., 1994; Link and Phelan, 1995; Miech et al., 1999; Ross and Wu, 1995). More highly educated individuals report better health (Bauldry, 2014, Ross and Wu, 1995), lower rates of impairment and disability (Schoeni et al., 2001), lower risk of premature death (Lleras-Muney, 2005); and lower rates of depression (Gaydosh et al.,

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CRediT authorship contribution statement

Kristen Schultz Lee: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft. **Yulin Yang**: Software, Formal analysis, Writing – review & editing, Visualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2022.100138.

2018; Miech, 2000). The positive association between education and health is not surprising; there is good reason to expect that more education leads to better physical and mental health outcomes. Indeed, several theories have been drawn on to explain the positive association between education and health. In their review essay, Zajacova and Lawrence (2018) identify three prominent theories in the literature: Fundamental Cause Theory (Link and Phelan, 1995), Human Capital Theory (Becker, 2009), and the Credentialing Perspective (Collins, 1979; Spence, 1973). According to Fundamental Cause Theory (Link and Phelan, 1995), education is a fundamental cause of health because it provides access to health-enhancing resources like a higher income, better health care, access to healthier foods, and a healthier lifestyle. Human Capital Theory (Becker, 2009) conceptualizes education as an investment that yields returns to the individual including greater abilities, skills, and resources, which can produce better health. Scholars have argued that education produces greater personal control (Mirowsky and Ross, 2015) and reduces risk taking (Mirowsky and Ross, 1998) which are associated with better physical and mental health. Finally, the Credentialing Perspective emphasizes that educational credentials signal one's skills and abilities and connects the social and economic returns to these credentials with better health (Collins, 1979; Spence, 1973). For all of these reasons, the positive association between education and general health is not often questioned.

However, in the study of education and mental health, it is unclear to what extent education increases emotional well-being (*causal*) and to what extent either individuals with greater emotional well-being pursue more education (*selection*) or the association is attributable to unmeasured family background, genetic, and personality characteristics (*confounding*). Some scholars find that both selection and causation play a role in linking educational attainment and mental health outcomes (Miech et al., 1999; Zheng, 2017), while others find no association between education and mental health once selection is accounted for (Halpern et al. 2016). Untangling these explanations will add conceptual clarity to models of the socio-economic determinants of mental health and will shed light on the utility of proposed interventions in education as a means of improving mental health outcomes.

In this paper, we analyze panel data from adolescents and adults as they transition from high school into adulthood, allowing us to track changes in reported emotional well-being with the completion of different levels of education. High levels of positive affect, or positive feelings, are one dimension of emotional well-being along with low levels of negative affect and high life satisfaction (Diener, 1984). Our analysis focuses on happiness and depressive affect as key dimensions of emotional well-being. We employ individual fixed effects models in order to determine how emotional well-being changes with the completion of one's schooling, net of the unmeasured time-invariant factors that have biased other analyses. We also investigate how the association between educational attainment and well-being varies by gender, based on past research pointing to the greater mental health benefits for women (Ross et al., 2006). We find that, although education is associated with greater well-being for women, the evidence for men is mixed.

2. Education and mental health

The positive association between education and mental health is well-established in the literature (Andersson, 2018; Bauldry, 2015; Gaydosh et al., 2018; McFarland and Wagner, 2015; Miech, 2000; Quesnel-Vallée and Taylor, 2012; Vable et al., 2018). Most of the literature examining the association between education and mental health has focused on depression (Bauldry, 2015; Gaydosh et al., 2018; McFarland and Wagner, 2015; Miech, 2000; Schaan, 2014; Quesnel-Vallée and Taylor, 2012; Zheng, 2017; but see Andersson, 2018; Wood et al., 2017 as notable exceptions), but analyses of both mental health problems and flourishing are needed to fully understand the consequences of educational attainment on mental health outcomes. Indeed, the World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (International Health Conference 2002). As Andersson (2018, p. 2) points out: "positive well-being indicators remain a notable oversight" in the study of the returns to higher education.

There are several potential mechanisms specifically linking higher education and better mental health outcomes (Zajacova and Lawrence, 2018). Higher educational attainment leads to higher paid jobs with more autonomy and creativity and these types of jobs are associated with more happiness (Delhey, 2010). Higher education also provides access to psychosocial and cognitive resources that protect against stress and improve mental health (Becker, 2009; DiMaggio, 1987; Hayward et al., 2015; McFarland and Wagner, 2015; Mirowsky and Ross, 1998). In particular, higher education is associated with stronger social ties and with greater sense of control which may make it easier to deal with life's stressors and to adopt a healthy lifestyle (McFarland and Wagner, 2015; Mirowsky and Ross, 2003).

2.1. Is the relationship between education and emotional well-being causal?

In the literature on education and physical and mental health, the relationship between educational attainment and health outcomes is often conceptualized as causal. For example, policy implications based on the empirical literature linking education and mental health include a call for greater investment in educational opportunities as a means of improving adult mental health (see, e.g., Quesnel-Vallée and Taylor, 2012). However, disagreement exists in the literature regarding whether or not the effects of education on emotional well-being are indeed causal (see, e.g., Halpern-Manners et al. 2016).

Some critics have pointed out that many studies analyze the association between educational attainment and mental health later in life, after education is completed, and do not include measures of mental health at younger ages (Dolan et al., 2008). This may mean that the direction of causality is reversed, with individuals with lower levels of emotional well-being less likely to complete higher education. Indeed, Miech et al. (1999) investigated the role of selection and causation in their prospective study of educational attainment and mental health during the transition to adulthood. They found that although selection factors do not explain the association between educational attainment and anxiety or depression, they do play an important role in the association between education and externalizing disorders. Moreover, Lynch & von Hippel (2016) argue the well-documented causal effect of education on health occurs in adulthood or in later life, when education has been completed and the

returns from education start playing an important role in promoting health. However, earlier in life when individuals are still completing their education, both causation and selection might both play a role in shaping health outcomes. Based on this logic, adolescence and early adulthood is a critical period in which to examine selection in the association between education and emotional well-being.

Other scholars argue that the positive effects of education on emotional well-being found in previous studies are subject to omitted variable bias (Duke and Macmillan, 2016) and that selection effects account for much of the purported association (Amin et al., 2015; Behrman et al., 2011; Zheng, 2017; Halpern-Manners et al. 2016). It is possible that completing higher levels of education does not actually cause individuals to experience better mental health outcomes but rather that the association is spurious and attributable to factors that both increase an individual's likelihood of attaining higher levels of education and better mental health. In particular, childhood socio-economic status, child cognitive and non-cognitive abilities, personality characteristics, health problems, early life trauma and home environment, and genetic predispositions all potentially influence both an individual's educational attainment and their well-being in adulthood (Fujiwara and Kawachi, 2009; Hayward et al., 2015; Gottfredson and Deary, 2004; McFarland and Wagner, 2015; Zheng, 2017). If selection factors are indeed responsible for some of the association between educational attainment and emotional well-being, then this association should diminish or even disappear once those selection factors are accounted for.

A variety of statistical models have been used to assess the extent to which the association between educational attainment and mental health is causal. Many studies have used regression analysis with controls for family background characteristics to account for selection factors. However, as Lynch and von Hippel (2016, p.25) conclude in their study of education and self-rated health, "Since studies that rely only on covariates do not control fully for selection, they likely overestimate the causal effect of education on health." This is potentially also true for similar investigations of education and mental health. Other studies have tried to address selection factors more directly by using twin fixed effects designs (Halpern-Manners et al. 2016; McFarland and Wagner, 2015), propensity score models (Bauldry, 2015; Zheng, 2017), and structural equation models (Quesnel-Vallée and Taylor, 2012; Wood et al., 2017).

The methods used to investigate the role played by selection factors have strengths and weaknesses in evaluating to what extent the association between educational attainment and emotional well-being is causal. Twin fixed effects studies leverage differences between identical twins in educational attainment to investigate this question (Halpern-Manners et al. 2016; McFarland et al., 2016). In these studies, differences in genes or home environment are essentially held constant because identical twins share the same genotype and are raised in the same home context. However, unmeasured differences in environment, personality characteristics, etc. could still bias the estimated association between educational attainment and emotional well-being in twin fixed effects designs. Propensity score matching has also been used to determine how the association between higher education and mental health varies by one's propensity to complete college (Bauldry, 2015; Zheng, 2017). These models account for a wide range of background characteristics that are hypothesized to

both increase the likelihood of college completion and good mental health. One drawback of this approach is that the propensity score model is only as powerful as the measured characteristics included in the model. Unmeasured differences in genetic predispositions or personality characteristics still have the potential to bias model results. The structural equation models that have been used to estimate the association between educational attainment and health (see e.g., Quesnel-Vallée and Taylor, 2012; Wood et al., 2017) offer the advantage of using a full information maximum likelihood approach to handle missing data and allow for the estimation of group differences in the pathways linking education and health outcomes. However, the applications of these models in the literature on education and mental health do not control for unobserved sources of heterogeneity in the population and may still be subject to selection effects.

2.2. Gender, education, and emotional well-being

One additional question that has received limited attention is how the association between educational attainment and emotional well-being varies by gender. It is well-established in the research literature that women report more depressive symptoms and less frequent positive emotions than men (Rosenfield and Mouzon, 2013; Simon, 2014) and that adolescent girls report higher levels of depressive symptoms than adolescent boys (Adkins et al., 2009; Galambos et al., 2004; Hankin et al., 1998; Petersen et al., 1991). There are several proposed explanations for this gender difference. The exposure hypothesis (Thoits, 1986) identifies how adult men and women's different exposure to stressors as a result of the social roles they fill could account for gender differences in emotional well-being. Among adolescents, more focus has been placed on the stresses associated with early puberty (Ge et al., 2001), or exposure to abuse and harassment (Nolen-Hoeksema and Girgus, 1994) that are disproportionately borne by adolescent girls.

A second hypothesis is that adult women are more vulnerable to the mental health effects of stress as a function of their disadvantaged social position. Men experience more frequent positive emotion due to their greater status and power in U.S. society whereas women's relatively disadvantaged social position makes them more vulnerable to stress. In explaining the gender gap in emotional well-being among adolescents, it is possible that adolescent boys' relatively more advantaged social position could help explain their better mental health outcomes. Support for this hypothesis is mixed, however, with some studies finding greater vulnerability to stress among women only for stress related to caregiving activities (Simon, 2020). Instead, the gendered response hypothesis receives somewhat more support. According to this hypothesis, adult women and adolescent girls react to stressors with internalizing behaviors while adult men and adolescent boys more often react with externalizing behaviors (Adkins et al., 2009). These differences in reaction to stress by gender may be attributable to gender differences in self schema (Rosenfield, et al., 2005) or to emotion norms in the U.S. which prescribe appropriate emotional reactions based on gender (Simon, 2020).

What remains unclear, however, is the extent to which educational attainment may play a different role in influencing the trajectories of emotional well-being for young men and women. Ross et al. (2006) found that higher levels of education are more strongly

associated with a reduction in depression for women than men. Bayard et al. (2014) found that educational attainment is positively associated with women's self-esteem, while no relationship was found with men's self-esteem. Similarly, Samuel (2014) found that young women are more likely to experience positive effects of educational success on emotional well-being and Muñoz and Santos-Lozada (2021) found that completing some college protected women against feeling sad. It may be the case that women are more dependent on educational attainment for well-being (Ross et al., 2006). As Ross and Mirowsky (2006, p. 1402) explain: "The absence of alternative resources means women are especially dependent on education for well-being. Women with low levels of education will suffer more psychologically than will men for the very reason that they have fewer alternative resources to call on."

3. The present study

In this study, we focus our analyses on two components of emotional well-being –happiness and depressive affect. Depressive affect refers to the negative feelings (i.e. feeling sad, depressed or blue) measured with items from the Center for Epidemiological Studies Depression (CES-D) scale. We analyze both happiness and depressive affect because there is the possibility that education may affect these two dimensions of well-being differently. For example, it is possible that higher education may reduce depressive affect due to the financial stability associated with higher education, but not increase happiness.

Our research specifically analyzes the link between education and emotional well-being in adolescence and adulthood. We ask: to what extent does educational attainment increase emotional well-being? We propose competing hypotheses regarding the association between education and well-being. On the one hand, it is possible that, consistent with many previous studies, education is positively associated with well-being, even after accounting for selection factors.

Hypothesis 1. Even after accounting for selection factors, the strong, positive association between education and emotional well-being persists.

On the other hand, it is possible that the positive association between education and emotional well-being will disappear or decrease significantly in models which compare individuals to themselves over time, controlling for individual background characteristics. In our second hypothesis, we predict that attaining more education will not in fact result in a large boost of emotional well-being for individuals in models which compare individuals to themselves over time because this positive effect of education is largely capturing between-individual differences in background, motivation and resources.

Hypothesis 2. The strong positive association between education and emotional well-being is greatly reduced or eliminated once differences between individuals in social and economic background are accounted for.

Our final hypothesis draws on the literature investigating the gender gap in mental health in adolescence and early adulthood and predicts that women will benefit more from educational attainment than young men in their mental health outcomes.

Hypothesis 3. The association between education and emotional well-being will be positively moderated by female gender.

4. Materials and methods

4.1. Data

We analyze data from four waves of the National Longitudinal Study of Adolescent to Adult Health (Add Health) (Harris et al., 2009). These data follow a nationally representative sample of students in grades 7–12 from 1994 to 2018 (when the respondents were age 33–43). In Wave I, 20,745 adolescents in grades 7–12 completed an in-home interview and by Wave V, 12,300 adults age 33–43 remained in this sample. We analyze data from waves I, III, IV and V in this paper.[1] The intervening waves were collected when the respondents were ages 18–27 (Wave III), and when they were ages 24–33 (Wave IV). While the measures of depressive affect were asked in all four waves, the measure of happiness was not asked in Wave III, thus we draw data from three waves for the models with happiness as the dependent variable and four waves for the models with depressive affect as the dependent variable. Among the 20,745 adolescents in the original sample, we exclude adolescents who have a missing value on the longitudinal survey weight (n = 9931), yielding an analytic sample of 10,914 adolescents. Among those 10,914 adolescents, all the respondents have valid information on at least two waves for the dependent variables; 6 respondents have missing values on two or more waves of the time-varying measure of educational attainment. This yields an analytic sample with 10,908 respondents and 32,636 person-wave observations for happiness models and 42,044 for depressive affect models. All analyses are adjusted using the longitudinal survey weight provided by Add Health to account for the complex sampling design.

We conducted multiple imputation using chained equations (MICE) to address missingness (Young and Johnson, 2015), and obtained a balanced panel for all subjects on all four waves. We first reshaped the longitudinal data into wide format and then imputed the reshaped data ten times using *mi impute chained* syntax in Stata 16. The registered imputed variables include happiness, depressive affect, years of schooling, self-rated health, age, sex, race and ethnicity, family SES, and primary sampling unit for the in-school surveys. Linear regression models were used to impute years of schooling and age. Following the *multiple imputation, then deletion* (MID) strategy from von Hippel (2007), we included happiness and depressive affect to impute independent variables, but excluded the imputed outcome variables from the analyses.

Because we use the longitudinal sampling weight provided by Add Health to address attrition bias, we only included participants who have valid values for this sampling weight variable (N = 10,908). Thus, about 50% of participants contribute to the analysis from the original sample at baseline (N = 20,745). We conducted T-tests and Chi-squared tests to check whether the individuals who were included in our analytical sample were significantly different from those who were not. We found adolescents in the analytic sample report lower levels of depressive affect at Waves 1, 3, and 4 and are happier at Waves 1 and 4 than those

[1]We excluded Wave II data because adolescents who were in 12th grade in Wave I were largely excluded from Wave II data collection.

who were excluded. Moreover, male respondents, individuals with lower levels of completed education, and individuals from disadvantaged background are more likely to be lost in follow-up. To address attrition and selection bias, we adjusted for the sampling weight in the analysis, which has been found to be an effective way to address attrition and selection bias (Lewin et al., 2018).

4.2. Measures

Happiness.—The happiness outcome variable is measured by a single item asking the respondent how often they felt happy in the past week. In Waves I, IV, and V, respondents were asked, How often was the following true during the past week?: Feel happy? The response ranges from 0 (never or rarely) to 3 (most of the time or all of the time).[2]

Depressive affect.—The outcome variable of depressive affect is assessed with the three items from the CES-D scale that have been used in past research as indicators of depressive affect and that were available at all four waves (Sheehan et al., 1995). Respondents were asked, how often was the following true during the past week? *You felt that you could not shake off the blues, even with help from your family and your friends*[3]; *You felt depressed; You felt sad.* The depressive affect scale is created by dividing the sum of the individual measures of depressive affect in the past week by the number of items included ($\alpha_{\text{wave I}} = 0.80$; $\alpha_{\text{wave III}} = 0.82$; $\alpha_{\text{wave IV}} = 0.82$; $\alpha_{\text{wave V}} = 0.85$).[4]

Time-varying respondent characteristics.—Age and educational attainment are included as time-varying independent variables. Age is included as a control for developmental changes that may be associated with fluctuating emotional well-being as respondents move through adolescence and into adulthood. Age-squared is included to capture non-linearities in the association between age and emotional well-being. *Educational attainment* is a categorical variable that we recoded as measured with four categories of different levels of education achieved at each wave: *less than high school, high school, some college, college degree or more,* with *less than high school* as the reference group. These variables allow us to capture non-linearity in the association between educational attainment and well-being. However, we also test an alternative specification of educational attainment measured by years of schooling completed. Those results are reported in the Appendix.

Time invariant respondent characteristics.—Measures of the respondent's gender, race and ethnicity (*non-Hispanic White, non-Hispanic Black, non-Hispanic other, and Hispanic*), and family SES are included in the random effects models. Family SES is measured by Wave I respondent and parent reports of mothers' and fathers' education and occupation. To reduce missingness, we cross-checked parents' reported education and occupation in both the in-home and in-school surveys. We calculate mothers' SES (1–10)

[2]At Wave V, the variable was measured from 1 (never or rarely) to 4 (most of the time or all of the time) but was recoded to be consistent with the other waves of data.

[3]This is slightly different than the standard measure used in the CES-D which asks how often "You felt that you could not shake off the blues." "Even with help from your family and friends" is added in the Add Health version.

[4]We selected these measures of happiness and depressive affect based on Sheehan et al.'s (1995) factor analysis showing that the measure of happiness and the three measures of depressive affect load onto different underlying factors (for positive affect and depressive affect). We were limited in the measures available because not all items from the CES-D were asked in every wave of Add Health.

by combining mothers' educational attainment (1–5) and occupational prestige (1–5). We replicated this to get fathers' SES. The measure of family SES is based on the maximum value of either parent's SES, ranging from one to ten. This coding strategy has been widely used in previous studies (e.g., Ford et al., 1999; Dennison, 2016). This measure of family SES is preferred over measures of income because it is more stable over time than income measures and has fewer missing reports.

4.3. Analytic approach

We start by using simple descriptive statistics to demonstrate the role of selection in explaining the association between educational attainment and well-being (Table 1). Then, taking advantage of the longitudinal nature of the Add Health dataset, this research uses random effects and fixed effects models, two common modeling strategies for dealing with panel data (Halaby, 2004; Vaisey and Miles, 2017). The difference between random effects and fixed effects models lies in the assumptions they make about unobserved time-invariant, person-specific characteristics (e.g., genes, personality). Random effects models assume that the observed predictors in the model are not correlated with those unmeasured time-invariant factors and fixed effects models allow them to be correlated. Random effects models have the advantage of estimating the effects of time-invariant predictors that matter to sociologists (e.g., race, gender, social background) and have the potential to identify unobserved heterogeneity (Halaby, 2004). However, identifying unobserved heterogeneity is not equivalent to addressing this problem, thus fixed effects models are preferable as they account for both observed and unobserved time-invariant factors (Vaisey and Miles, 2017). In our study, the first step in the analysis is to replicate the analytic approach of many past studies by comparing emotional well-being across individuals with different levels of education in a random effects model (Table 2). Then, as a comparison, we estimate a fixed effects model to see how the coefficients for educational attainment differ when comparisons are made within individuals over time(Table 3). These models provide a test of the hypothesis that the positive association between educational attainment and emotional well-being found in many past studies will be present in the random effects but absent or substantially diminished in the fixed effects model.

Both the fixed effects and random effects models take the following form:

$$y_{it} = \mu_t + \beta x_{it} + \gamma z_i + \alpha_i + \varepsilon_{it}$$

In both the fixed effects and random effects models, y_{it} is the time-varying measure of emotional well-being (indicated by either depressive affect or happiness) for individual i at time t, μ_t is an intercept, β and γ are vectors of coefficients, x_{it} is a vector of time-varying variables, z_i is a vector of time-invariant variables, and ε_{it} is a random error term (Allison, 2018). The difference between the two models is that in the random effects model, α_i is a set of random variables that capture unobserved heterogeneity between individuals, but in the fixed effects model, α_i is a set of fixed constants, one for each individual (Allison, 2018). One additional note is that in the fixed effects model specification, α_i and z_i are perfectly collinear and therefore the effects of z_i are not estimated.

4.4. Sensitivity analysis

In addition to the models described above, we also estimated our models (1) using a continuous measure of years of schooling completed, (2) using dichotomized measures of our dependent variables, (3) without sample weights, and (4) with lagged measures of educational attainment as sensitivity analyses for our main findings. The fixed effects models with measures of educational attainment lagged by one wave allow us to more clearly establish the time ordering of education and well-being. The results of our sensitivity analyses are reported in the Appendix.

5. Results

Our first step was to examine how educational attainment varies by age in our sample (Fig. 1). While 100% of 11–14 year olds in the data have less than a high school degree, only 3.0% of 39–43 year olds do. Similarly, the proportion of respondents with a college degree or more increases from 5.2% of 19–22 year olds to 40.0% of 39–43 year olds. It is this variation in educational attainment across waves that allows us to estimate the within-person effects of education on well-being. Next, we graphed the changes in average happiness and depressive affect across age categories by educational attainment at Wave V (Fig. 2). This figure shows that from early adolescence through middle age, those who eventually earn a college degree or more report higher levels of happiness and lower levels of depressive affect. This is the first descriptive piece of evidence suggesting that the association between education and well-being is not entirely causal. Indeed, those individuals who go on to attain higher levels of education report greater well-being well before they even finish high school.

Table 1 shows the sample-weight adjusted descriptive statistics for the sample (with missing data imputed using multiple imputation). We report descriptive statistics separately by whether or not the respondent completed college by Wave V as well as for the whole sample. Although there is not much change across waves in overall happiness, these averages mask significant variation in the sample, specifically among those who did and those who did not complete a college degree or more by Wave V. This reinforces what we show in Fig. 2: there are differences in reported well-being among those who go on to achieve a college degree or more even before they complete their schooling (i.e., in Wave I). While average happiness levels range from 2 to 2.1 across all three waves for those who did not complete college by Wave V, averages fluctuate from 2.1 to 2.3 for those who did complete college. The differences in average happiness by wave between those who did and did not complete college by Wave V are statistically significant, which indicates that there are measurable differences in the reported happiness of these groups even before they finish their schooling. For depressive affect, averages among those who did not complete college by Wave V range from 0.4 in Wave II to 0.6 in Wave I. Those who did complete college by Wave V report lower levels of depressive affect overall, ranging from a low of 0.3 at Wave IV to a high of 0.4 at Wave I. The differences in average depressive affect by wave between those who did and did not complete college by Wave V are also statistically significant, again indicating measurable differences between these groups in depressive affect long before their schooling is completed.

Several statistically significant differences emerge between those who completed college by Wave V and those who did not. The college graduates have, on average, a higher family SES (7.4 versus 5.5 on a 10-point scale). College graduates are also more likely to be white (59.8% versus 54.1%) and female (62.4% versus 53.9%) compared with those with less than a college degree. Together, these descriptive findings show that there are measurable differences in the characteristics of those who go on to attain higher levels of education and those who do not that need to be accounted for in analyzing the relationships between educational attainment and emotional well-being. These descriptive results provide initial support for hypothesis 2.

In Table 2, we estimated a random effects model of the associations among time-varying measures of educational degree completed and emotional well-being. These models provide a baseline estimate of the effect of educational attainment on well-being. Time-invariant controls for gender, race and ethnicity, and family of origin SES are included in the models. As in many other between-person analyses, we find that the attainment of higher degrees is associated with greater reported happiness and decreased depressive affect. Attaining a college degree or more (compared to finishing less than high school) is associated with a 0.3 point boost in happiness (on a 4 point scale) and 0.2 points (on a 4 point scale) lower depressive affect.

In models 2A and 2B, we added an interaction between degree attained and gender. In these models, the attainment of a college degree or more continues to be associated with greater well-being, but this effect is magnified for women. Moreover, completing some college or a high school degree is also more strongly associated with reduced depressive affect for women compared to men, but no statistically significant gender interaction with some college or high school was found in the model for happiness.

In Table 3, we report the fixed effects models of the associations among time-varying measures of educational attainment and emotional well-being (Models 1A and 1B). The fixed effects coefficients for the measures of educational attainment “control” for the effect of all stable measured and unmeasured individual and family characteristics that may otherwise be biasing the estimated association between educational attainment and emotional well-being. A Wald test supports the use of a fixed effects model over the random effects model for this analysis. Model 1A shows that the positive within-person effect of educational attainment on happiness persists but is reduced in size, compared to the random effects estimates. For example, the coefficient for completing college or more from the random effects model in Table 2 is reduced by about 50%. Similarly, the negative association between completing college or more and depressive affect is weakened by about 50% in Table 3 (Model 1B). There is also a reduction in the coefficients for completing some college (by 23% in Model 1A and 50% in Model 1B) and high school (by 25% in Models 1A and 50% in Model 1B) in the fixed effects models. Age and age-squared do not reach statistical significance in either model.

This provides some additional support for our second hypothesis that the positive association between education and emotional well-being found in many studies is at least in part attributable to selection factors (and challenges hypothesis 1). Although a positive

association between educational attainment and well-being persists in the fixed effects models, the size of the coefficients is reduced considerably. Completing college for example, is associated with about 0.14 point greater happiness and 0.11 point lower depressive symptoms in the fixed effects models.

Next, we investigated to what extent the association between educational attainment and emotional well-being varies by gender. In Models 2A and 2B we added interactions between educational attainment and gender to test the prediction of hypothesis 3 that female gender would positively moderate the association between educational attainment and well-being. We found evidence in support of this hypothesis. The interaction between female gender and completing a college degree or more was positive and statistically significant in the model for happiness and negative and statistically significant in the model for depressive affect. The main effect of college in the model for depressive affect is nearly cut in half but remains statistically significant whereas the main effect of college is no longer statistically significant in the model for happiness. To help with interpreting these interactions, Fig. 3 presents the predictive margins of well-being at different levels of educational attainment and for men and women, adjusted for age and age-squared. This figure makes clear the different association between educational attainment and well-being for men and for women. In particular, women have higher expected happiness when they have completed a college degree (2.19) than men do (2.11) and lower expected depressive affect (0.34 versus 0.44). In fact, men with a college degree have lower expected happiness than men with some college (2.16) or a high school degree (2.15). Men have somewhat lower expected depressive affect when they complete college (0.44) compared to some college (0.45), a high school degree (0.47), or less than high school (0.49), but the difference across educational groups is smaller than for women (0.34 with a college degree, 0.39 some college, 0.42 high school degree, 0.49 less than high school). These models provide support for hypothesis 3, given the significant gender interaction in the models for depressive affect and happiness.

5.1. Sensitivity analysis

To further test how sensitive these model results are to the model specification, several additional analyses were conducted. First, the random effects and fixed effects models were estimated using a measure of years of schooling completed (Table A1). The random effects models are substantively similar to those presented in Table 2. In the fixed effects models, the main effect of schooling does not reach statistical significance (in either model 1A or 1B) and the interaction with female is negative and statistically significant in the model for depressive affect (Model 2B), but does not reach statistical significance in the model for happiness (Model 2A). We also tested our fixed effects models using dichotomous measures of happiness and depressive affect as the dependent variables, but the substantive findings remain largely unchanged (model results not reported). Next, the fixed effects models were re-estimated without applying sample weights (Table A2) to test how the sample weights may be impacting our results. The model results are substantively the same as the weighted models, with one exception. The main effect of college is not statistically significant in Model 2B. This suggests there is no statistically significant association between completing college and depressive affect for men. Finally, the fixed effects models were re-specified to include a lagged measure of educational attainment (lagged by one wave of data), in

order to more clearly establish the time-ordering of educational attainment and well-being (Table A3). This reduces the number of waves of data for our outcome measure by one. For this reason, we chose to include all available waves of data (Waves 1,2,3,4, and 5) in this supplementary analysis. In the models for depressive affect (Table A3: Models 1B and 2B), the lagged measure of completing college or more does not reach statistical significance but the interaction between the lagged measure of college completion and female gender is negative and statistically significant (as in Table 3). In the models for happiness (Table A3: Models 1A and 2A), the measures of educational attainment and the gender interactions do not reach statistical significance. These model results provide further evidence challenging a strong causal effect of educational attainment on well-being, particularly for men, when the temporal ordering of these measures is more clearly established.

6. Discussion

The positive association between education and mental health is well-established in the literature, but we find support for the hypothesis that at least some of the association between educational attainment and emotional well-being is attributable to unmeasured individual characteristics that may be confounded with educational attainment. We first reproduce the positive association between educational attainment and well-being found in many previous studies. Then, in our fixed effects models, we show that the within-person effect of attaining a college degree on emotional well-being is positive but reduced by 50% compared to the random effects models, providing some support for the claim that at least some of the positive association found in past studies is due to unmeasured differences between individuals. Our final models which include an interaction between educational attainment and gender add an additional level of complexity to the analysis. In these models, we find either a non-significant (for happiness) or small (for depressive affect) association between completing a college degree and emotional well-being for men, but a positive association for women. This is consistent with past research finding gender differences in the association between education and well-being, specifically a more positive effect of educational attainment on women's self-esteem and well-being (Bayard et al., 2014; Ross et al., 2006; Samuel, 2014). Following resource substitution theory (Ross et al., 2006), it may be that men's more advantaged social position provides access to a greater reserve of resources to draw on in dealing with stressors and bolstering mental health, making educational attainment a more critical resource in achieving emotional well-being for women. Other scholars have pointed to the stable public sector jobs in traditionally masculine fields that have provided the opportunity for a clear path to adulthood in a time when other demographic groups have struggled to find their footing (Silva, 2012). Perhaps this qualitative evidence sheds light on why a college degree is relatively less important to the emotional well-being of the men in our study.

Overall, we find evidence that, comparing individuals to themselves over time, completing a college degree or more is associated with greater emotional well-being for women, but not necessarily for men. Men do report somewhat lower levels of depressive affect when they complete a college degree compared to less than a high school degree, but the difference across these educational groups is much smaller for men (0.05 points) than for women (0.14 points on a 4-point scale). We argue that this difference between the findings of

previous studies and the fixed effects models reported here is attributable to the fact that the effects of education in regression and random effects models are confounded with other unmeasured differences among individuals in disposition, resources, childhood context, and outlook. Using a fixed effects modeling strategy to compare individuals to themselves over time, this well-being premium decreases and, in our final models, applies primarily to women. This is consistent with other studies that have investigated the role of selection factors in their research on educational attainment and physical health (Behrman et al., 2011; Lynch and von Hippel, 2016) and mental health (Halpern-Manners et al. 2016). Our findings provide additional support for the argument that at least some of the association between educational attainment and emotional well-being found in previous analyses could be due to unmeasured individual characteristics because the coefficients for educational attainment were greatly reduced (some to non-significance), once unmeasured background characteristics were accounted for.

7. Limitations

This study has some limitations worth noting. First, as we discussed in the method section, attrition and missing values in the longitudinal data could potentially bias our estimates. To best address this data limitation, we conducted multiple imputation and adjusted the results using survey weights in our analyses, but we think future research is needed using other longitudinal data (e.g., NLSY97) with more waves of data and shorter time intervals between waves to cross-validate our findings. Second, it is possible that the results of this analysis are specific to the birth cohort group reaching adulthood in 2002–2003. This cohort group may have been particularly saddled with college debt and the challenges of being a young adult during the Great Recession. Future research should investigate to what extent subsequent birth cohorts demonstrate a different relationship between education and well-being. Third, our results shed light on the association between education and well-being from adolescence to mid-adulthood. It is possible, however, that the well-being benefits of higher education are more clearly established in later life, as Lynch and von Hippel (2016) note is the case for physical health. Future research with panel data that follow individuals from adolescence to later life would make an important contribution to our understanding of how the association between education and well-being varies by life stage.

Finally, important constraints imposed by the data and analysis method must be considered in drawing implications from the results. A fixed effects approach holds constant unmeasured stable characteristics that may bias the association between educational attainment and emotional well-being. This approach also has its limitations however (see Hill et al., 2020; Vaisey and Miles, 2017). For example, those adolescents and adults who never achieve a high school degree or more are included in our models but do not contribute to the within-person education coefficients because their educational attainment does not change over the study period. However, only 3% of the sample did not attain at least a high school degree by Wave V. Therefore, the results only shed light on the changing levels of well-being over time for those who attain at least a high school degree.

In addition, Vaisey and Miles (2017) note that fixed effects models rely on two assumptions: (1) that the selection into the level of the predictors is based on unobserved factors

rather than on previous values of the outcomes (i.e., treatment selection assumption or no-endogenous-selection assumption) and (2) that the underlying time trajectories of the outcomes are the same regardless of the values the predictors take (i.e., equal trajectory assumption). If the treatment selection assumption is violated, then the estimates of the fixed effects models will be biased. Moreover, if the equal trajectory assumption is violated, that is, "treated" and "untreated" cases have different underlying time trajectories prior to treatment, then the estimates of the fixed effects models will also be biased.

8. Conclusion

These findings shed light on the debate over the role played by education in influencing an individual's emotional well-being. In fixed effects models, completing a college degree or more is associated with greater happiness and lower levels of depressive affect for women, but the evidence is mixed for men. While a college degree is weakly associated with fewer depressive symptoms for men, no statistically significant association was found with happiness. This finding raises some questions about the claim that higher education leads to better mental health outcomes. It is possible that the mixed findings in the literature regarding the association between education and well-being may be due in part to model specification and to unexamined variation in the association by social status characteristics such as gender.

There are implications that can be drawn from this research to promote emotional well-being in adolescence and adulthood. This analysis shows that higher levels of education are not necessarily associated with greater emotional well-being for men. This finding points to the need to further investigate how education may have different implications for emotional well-being depending on social status. Other research (see, e.g., Ross et al., 2006) has similarly found that the greatest benefits of educational attainment accrue to those with fewer resources. Future research should investigate the intersection of gender and social class in analyzing the effects of educational attainment on emotional well-being to better understand who benefits, and who does not, from higher education. Qualitative research in particular is needed to help explain why young men may see some reduction in depressive affect but do not report greater happiness after completing higher levels of education. Moreover, future research should investigate what characteristics of post-secondary institutions (student debt and time to degree, but also sense of belonging and feeling that instructors care about you) are associated with both higher levels of happiness and lower levels of depressive affect in adulthood.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

This research was made possible in part by a grant from the Spencer Foundation (201800093). The views expressed are those of the authors and do not necessarily reflect the views of the Spencer Foundation. Shiyue Cui worked as a graduate research assistant on this project. This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy

Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (http://www.cpc.unc.edu/addhealth). No direct support was received from grant P01-HD31921 for this analysis.

References

Adkins Daniel E., Wang Victor, & Elder Glen H. Jr. (2009). Structure and stress: trajectories of depressive symptoms across adolescence and young adulthood. Soc. Forces, 88(1). 10.1353/sof.0.0238, 31–31. [PubMed: 20119501]

Allison Paul D. (2018). Longitudinal Data Analysis Using Stata Ardmore, PA: Statistical Horizons.

Amin Vikesh, Behrman Jere, & Kohler Hans-Peter (2015). Schooling has smaller or insignificant effects on adult health in the us than suggested by cross-sectional associations: new estimates using relatively large samples of identical twins. Soc. Sci. Med, 127(C), 181–189. [PubMed: 25110343]

Andersson Matthew A. (2018). Against all odds or by dint of privilege? Happiness and life satisfaction returns to college in America. Socius, 4, Article 2378023118773158. 10.1177/2378023118773158

Bauldry S (2015). Variation in the protective effect of higher education against depression. Soc. Ment. Health, 5(2), 145–161. 10.1177/2156869314564399 [PubMed: 27840772]

Bauldry S (2014). Conditional health-related benefits of higher education: an assessment of compensatory versus accumulative mechanisms. Soc. Sci. Med, 111, 94–100. [PubMed: 24768780]

Bayard Sybille, Staffelbach Monika, Fischer Philipp, & Buchmann Marlis (2014). Upper-secondary educational trajectories and young men's and women's self-esteem development in Switzerland. In Keller AC, Samuel R, Bergman MM, & Semmer NK (Eds.), Psychological, Educational, and Sociological Perspectives on Success and Well-Being in Career Development (pp. 19–44). Dordrecht: Springer Netherlands.

Becker Gary S. (2009). Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education University of Chicago press.

Behrman Jere R., Kohler Hans-Peter, Jensen Vibeke Myrup, Pedersen Dorthe, Petersen Inge, Bingley Paul, & Christensen Kaare (2011). Does more schooling reduce hospitalization and delay mortality? New evidence based on Danish twins. Demography, 48(4), 1347–1375. 10.1007/s13524-011-0052-1 [PubMed: 21842327]

Collins Randall (1979). The Credential Society: an Historical Sociology of Education and Stratification MA: Academic Press Inc.

Delhey Jan (2010). From materialist to post-materialist happiness? National affluence and determinants of life satisfaction in cross-national perspective. Soc. Indicat. Res, 97(1), 65–84.

Dennison Christopher R. (2016). 'Keeping up with the joneses?' how perceived SES moderates the relationship between economic problems and instrumental crime. Deviant Behav, 37(10), 1118–1131.

Diener Ed (1984). Subjective well-being. Psychological Bulletin, 95, 542–575. [PubMed: 6399758]

DiMaggio Paul (1987). Classification in art. Am. Socio. Rev, 440–455.

Dolan Paul, Peasgood Tessa, & White Mathew (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. J. Econ. Psychol, 29(1), 94–122.

Duke Naomi, & Macmillan Ross (2016). Schooling, skills, and self-rated health: a test of conventional wisdom on the relationship between educational attainment and health. Sociol. Educ, 89(3), 171–206.

Ford Carol A., Bearman Peter S., & Moody James (1999). Foregone health care among adolescents. JAMA, 282(23), 2227–2234. [PubMed: 10605974]

Fujiwara T, & Kawachi I (2009). Is education causally related to better health? A twin fixed-effect study in the USA. Int. J. Epidemiol, 38(5), 1310–1322. 10.1093/ije/dyp226 [PubMed: 19528192]

Galambos Nancy L., Leadbeater Bonnie J., & Barker Erin T. (2004). Gender differences in and risk factors for depression in adolescence: a 4-year longitudinal study. IJBD (Int. J. Behav. Dev.), 28(1), 16–25. 10.1080/01650250344000235

Gaydosh Lauren, Schorpp Kristen M., Chen Edith, Miller Gregory E., & Harris Kathleen Mullan (2018). College completion predicts lower depression but higher metabolic syndrome among disadvantaged minorities in young adulthood. Proc. Natl. Acad. Sci. USA, 115(1), 109–114. [PubMed: 29255040]

Ge Xiaojia, Conger Rand, & Elder Glen H. Jr. (2001). Pubertal transition, stressful life events, and the emergence of gender differences in adolescent depressive symptoms. Dev. Psychol, 37(3), 404–417. 10.1037/0012-1649.37.3.404 [PubMed: 11370915]

Gottfredson Linda S., & Deary Ian J. (2004). Intelligence predicts health and longevity, but why? Curr. Dir. Psychol. Sci, 13(1), 1–4. 10.1111/j.0963-7214.2004.01301001.x

Halaby Charles N. (2004). Panel models in sociological research: theory into practice. Annu. Rev. Sociol, 30, 507–544.

Hankin Benjamin L., Abramson Lyn Y., Moffitt Terrie E., Silva Phil A., McGee Rob, & Angell Kathryn E. (1998). Development of depression from preadolescence to young adulthood: emerging gender differences in a 10-year longitudinal study. J. Abnorm. Psychol, 107(1), 128–140. 10.1037/0021-843X.107.1.128 [PubMed: 9505045]

Harris Kathleen M., Halpern CT, Whitsel E, Hussey J, Tabor J, Entzel P, & Udry JR (2009). The National Longitudinal Study of Adolescent to Adult Health Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill.

Hayward Mark D., Hummer Robert A., & Sasson Isaac (2015). Trends and group differences in the association between educational attainment and U.S. Adult mortality: implications for understanding education's causal influence. Soc. Sci. Med, 127, 8–18. 10.1016/j.socscimed.2014.11.024 [PubMed: 25440841]

Hill Terrence D., Davis Andrew P., Roos J. Micah, & French Michael T. (2020). Limitations of fixed-effects models for panel data. Socio. Perspect, Article 0731121419863785

International Health Conference. (2002). Constitution of the World health organization. Bull. World Health Organ, 80(12), 983–984, 1946, World Health Organization https://apps.who.int/iris/handle/10665/268688. [PubMed: 12571729]

Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, Wittchen HU, & Kendler KS (1994). Lifetime and 12-month prevalence of dsmiii-R psychiatric disorders in the United States. Results from the national comorbidity survey. Arch. Gen. Psychiatr, 51(1), 8–19. 10.1001/archpsyc.1994.03950010008002 [PubMed: 8279933]

Lewin A, Brondeel R, Benmarhnia T, Thomas F, & Chaix B (2018). Attrition bias related to missing outcome data. Epidemiology, 29(1), 87–95. [PubMed: 28926372]

Link Bruce G., & Phelan Jo (1995). Social conditions as fundamental causes of disease. J. Health Soc. Behav, 80–94. 10.2307/2626958 [PubMed: 7560851]

Lleras-Muney Adriana (2005). The relationship between education and adult mortality in the United States. Rev. Econ. Stud, 72(1), 189–221.

Lynch JL, & von Hippel PT (2016). An education gradient in health, a health gradient in education, or a confounded gradient in both? Soc. Sci. Med, 154, 18–27. 10.1016/j.socscimed.2016.02.029 [PubMed: 26943010]

McFarland Michael J., Wagner Brandon, & Marklin Scarlett (2016). College education and sense of control :A twin-discordant design. Socius, 2, Article 2378023116656011. 10.1177/2378023116656011

McFarland Michael J., & Wagner Brandon G. (2015). Does a college education reduce depressive symptoms in American young adults? Soc. Sci. Med, 146, 75–84. [PubMed: 26513116]

Miech RA (2000). Socioeconomic status and depression over the life course. J. Health Soc. Behav, 41(2), 162–176. 10.2307/2676303

Miech Richard A., Caspi Avshalom, Moffitt Terrie E., Wright Entner, Bradley R, & Silva Phil A. (1999). Low socioeconomic status and mental disorders: a longitudinal study of selection and causation during young adulthood. Am. J. Sociol, 104(4), 1096–1131. 10.1086/210137

Mirowsky J, & Ross CE (2015). Education, health, and the default American lifestyle. J. Health Soc. Behav, 56(3), 297–306. 10.1177/0022146515594814 [PubMed: 26272989]

Mirowsky J, & Ross CE (2003). Education, Social Status, and Health Hawthorne, NY, US: Aldine de Gruyter.

Mirowsky J, & Ross CE (1998). Education, personal control, lifestyle and health: a human capital hypothesis. Res. Aging, 20(4), 415–449.

Muñoz IG, & Santos-Lozada A (2021). Educational attainment and psychological distress among working-age adults in the United States. SSM - Mental Health, i, Article 100003. 10.1016/j.ssmmh.2021.100003

Nolen-Hoeksema Susan, & Girgus Joan S. (1994). The emergence of gender differences in depression during adolescence. Psychol. Bull, 115(3), 424–443. 10.1037/0033-2909.115.3.424 [PubMed: 8016286]

Petersen Anne C., Sarigiani Pamela A., & Kennedy Robert E. (1991). Adolescent depression: why more girls? J. Youth Adolesc, 20(2), 247–271. 10.1007/BF01537611 [PubMed: 24265009]

Quesnel-Vallée Amélie, & Taylor Miles (2012). Socioeconomic pathways to depressive symptoms in adulthood: evidence from the national longitudinal survey of youth 1979. Soc. Sci. Med, 74(5), 734–743. 10.1016/j.socscimed.2011.10.038 [PubMed: 22300713]

Rosenfield Sarah, Lennon Mary Clare, & White Helene Raskin (2005). The self and mental health: self-salience and the emergence of internalizing and externalizing problems. J. Health Soc. Behav, 46(4), 323–340. 10.1177/002214650504600402 [PubMed: 16433279]

Rosenfield Sarah, & Mouzon Dawne (2013). Gender and mental health. In Handbook of the Sociology of Mental Health (second ed., pp. 277–296). New York, NY, US: Handbooks of Sociology and Social Research (Springer Science + Business Media).

Ross Catherine, E., & Wu Chia-ling (1995). The links between education and health. Am. Socio. Rev, 719–745.

Ross Catherine, E. & Mirowsky John (2006). Sex differences in the effect of education on depression: resource multiplication or resource substitution? Soc. Sci. Med, 63(5), 1400–1413. [PubMed: 16644077]

Samuel Robin (2014). The gendered interplay between success and well-being during transitions. Educ. Res, 56(2), 202–219. 10.1080/00131881.2014.898915

Schaan Barbara (2014). The interaction of family background and personal education on depressive symptoms in Later Life. Soc. Sci. Med, 102, 94–102. 10.1016/j.socscimed.2013.11.049 [PubMed: 24565146]

Schoeni Robert F., Freedman Vicki A., & Wallace Robert B. (2001). Persistent, consistent, widespread, and robust? Another look at recent trends in old-age disability. J. Gerontol. B Psychol. Sci. Soc. Sci, 56(4), S206–S218. [PubMed: 11445613]

Sheehan T, Fifeld J, Reisine S, et al. (1995). The measurement structure of the center for epidemiologic studies depression scale. J. Pers. Assess, 64(3), 507–521. [PubMed: 7760258]

Silva Jennifer M. (2012). Constructing adulthood in an age of uncertainty. Am. Socio. Rev, 77(4), 505–522. 10.1177/0003122412449014

Simon Robin W. (2020). Gender, emotions, and mental health in the United States: patterns, explanations, and new directions. Soc. Ment. Health, 10(2), 97–111. 10.1177/2156869320926236

Simon Robin W. (2014). Sociological scholarship on gender differences in emotion and emotional well-being in the United States: a snapshot of the field. Emotion Rev, 6, 196–201. 10.1177/1754073914522865

Spence M (1973). Job market signaling. Q. J. Econ, 87, 355–374.

Thoits Peggy A. (1986). Social support as coping assistance. J. Consult. Clin. Psychol, 54(4), 416–423. 10.1037/0022-006X.54.4.416 [PubMed: 3745593]

Vable Anusha, Cohen Alison K., Leonard Stephanie A., Glymour M Maria, Duarte Catherine dP., & Yen Irene H. (2018). Do the health benefits of education vary by sociodemographic subgroup? Differential returns to education and implications for health inequities. Ann. Epidemiol, 28(11), 759–766. e5. [PubMed: 30309690]

Vaisey Stephen, & Miles Andrew (2017). What you can—and can't—do with three-wave panel data. Socio. Methods Res, 46(1), 44–67.

von Hippel PT (2007). Regression with missing Ys: an improved strategy for analyzing multiply imputed data. Socio. Methodol, 37(1), 83–117.

Wood N, Bann D, Hardy R, Gale C, Goodman A, & Crawford C (2017). Childhood socioeconomic position and adult mental wellbeing: evidence from four British birth cohort studies. PLoS One, 12(10). 10.1371/journal.pone.0185798

Young R, & Johnson DR (2015). Handling missing values in longitudinal panel data with multiple imputation. J. Marriage Fam, 77(1), 277–294. [PubMed: 26113748]

Zajacova Anna, & Lawrence Elizabeth M. (2018). The relationship between education and health: reducing disparities through a contextual approach. Annu. Rev. Publ. Health, 39, 273–289.

Zheng Hui (2017). Why does college education matter? Unveiling the contributions of selection factors. Soc. Sci. Res, 68, 59–73. 10.1016/j.ssresearch.2017.09.003 [PubMed: 29108600]

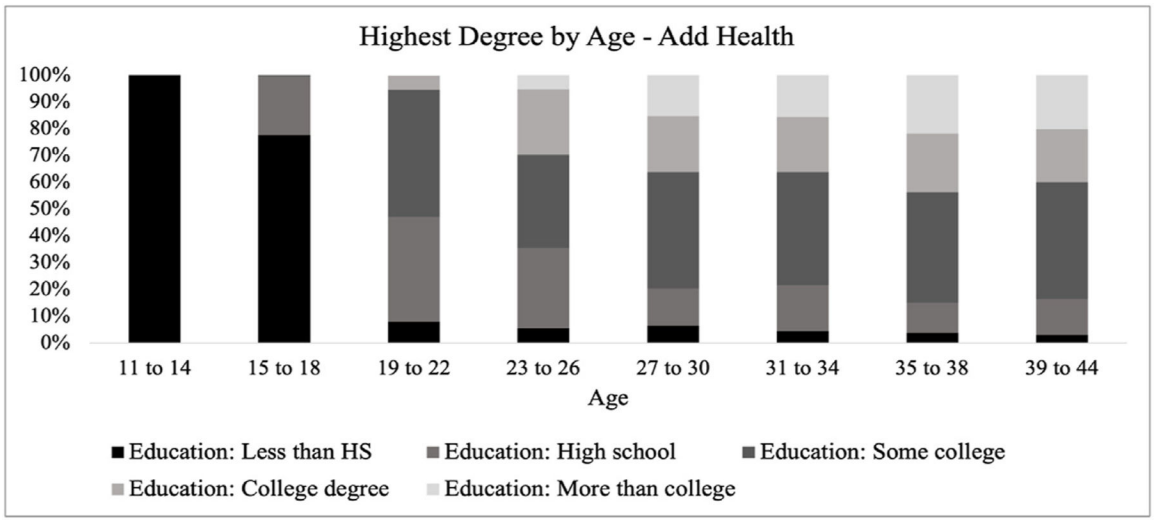

Fig. 1.
Highest degree by age, Add Health (Obs. = 41,750; N = 10,908).

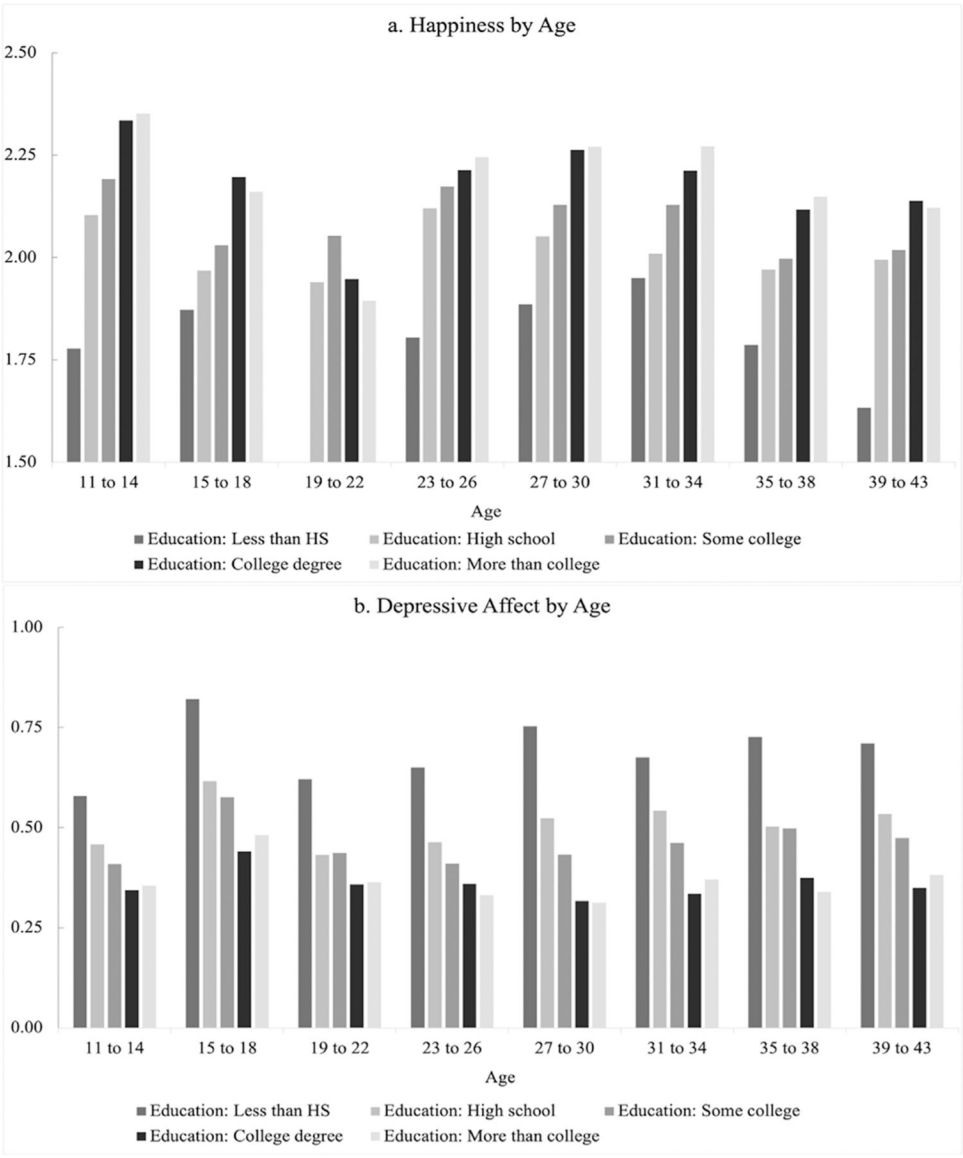

Fig. 2.

Average happiness (a, upper) and depressive affect (b, lower), from age 11 to 43, by Wave V highest degree completed, Add Health.

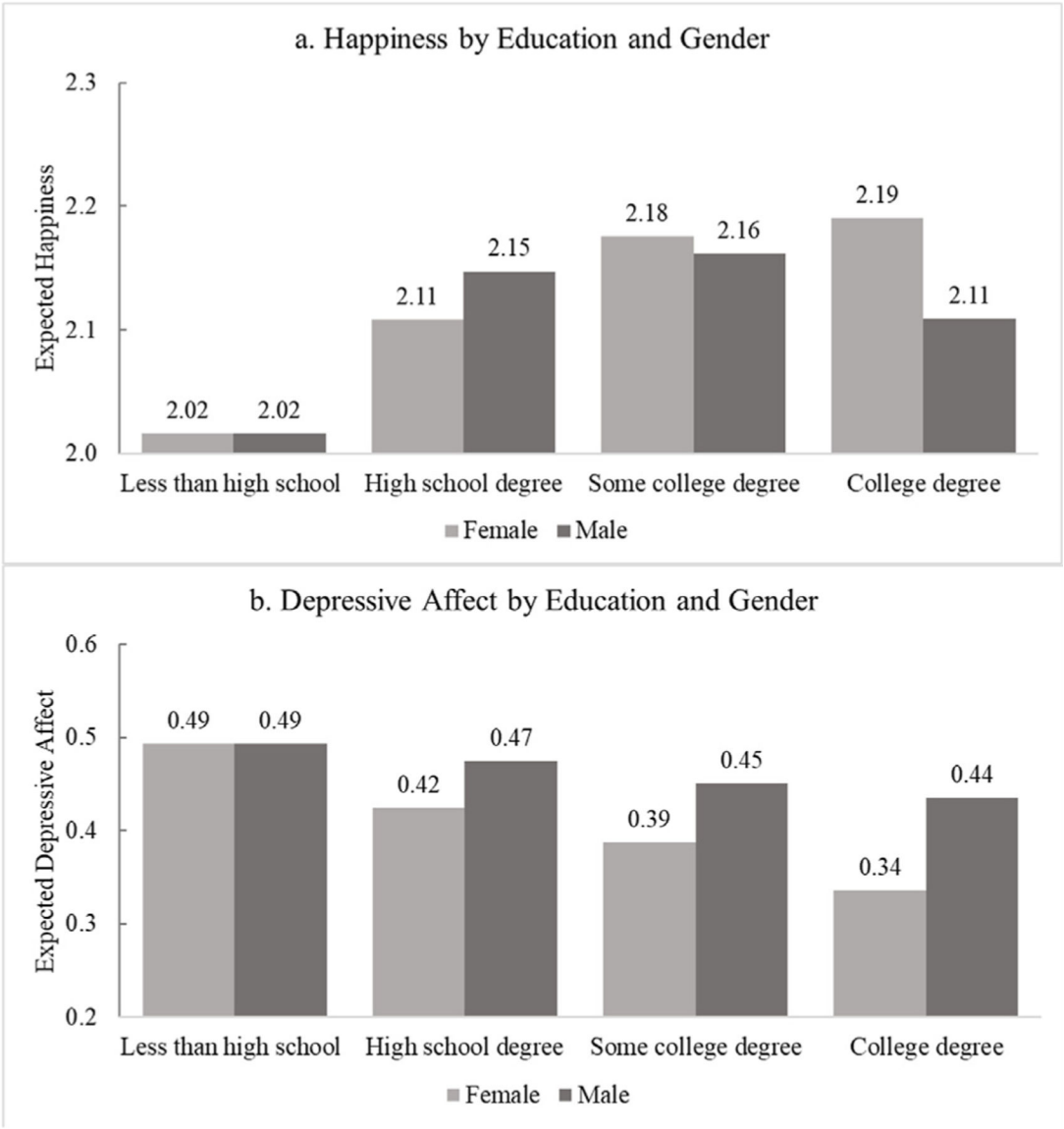

Fig. 3.

Predictive margins of happiness (a, upper) and depressive affect (b, lower) at different levels of education and for men and women, Add Health. “Less than high school” is the reference category for the measure of educational attainment in the models.

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Table 1

Imputed characteristics of all variables by college completion at Wave V (Add Health, 1994–2018; N = 10,908).

	Less than College by W5 (N = 6244)		College completed by W5 (N = 4664)		Combined (N = 10,908)		Range	Sig [a]
	Mean or %	**SD**	**Mean or %**	**SD**	**Mean or %**	**SD**		
Depressive affect								
Wave I	0.55	0.63	0.43	0.55	0.50	0.60	0–3	***
Wave III	0.43	0.59	0.34	0.51	0.39	0.56	0–3	***
Wave IV	0.47	0.60	0.33	0.47	0.41	0.55	0–3	***
Wave V	0.50	0.64	0.36	0.52	0.44	0.60	0–3	***
Happiness								
Wave I	2.05	0.83	2.23	0.76	2.13	0.81	0–3	***
Wave IV	2.11	0.83	2.26	0.77	2.17	0.80	0–3	***
Wave V	1.99	0.84	2.13	0.78	2.05	0.82	0–3	***
Years of schooling								
Wave I	9.57	1.64	9.72	1.66	9.63	1.65	7–12	
Wave III	12.33	1.44	14.64	1.65	13.32	1.91	17–27	***
Wave IV	13.02	1.35	16.34	1.62	14.44	2.20	7–22	***
Wave V	13.00	1.19	17.03	1.59	14.73	2.42	8–22	***
Age								
Wave I	15.59	1.74	15.49	1.73	15.54	1.73	11–21	
Wave III	21.97	1.78	21.85	1.74	21.92	1.76	18–27	
Wave IV	28.48	1.79	28.31	1.77	28.41	1.78	24–34	
Wave V	37.59	1.91	37.38	1.84	37.50	1.88	33–44	
Sex								***
Male (ref.)	46.08		37.63		42.46		0–1	
Female	53.92		62.37		57.54		0–1	
Race & ethnicity								***
Non-Hispanic White	54.07		59.78		56.51		0–1	
Non-Hispanic Black	21.17		17.00		19.39		0–1	
Hispanic	16.69		11.56		14.49		0–1	
Non-Hispanic other	8.07		11.66		9.61		0–1	

	Less than College by W5 (N = 6244)		College completed by W5 (N = 4664)		Combined (N = 10,908)		Range	Sig [a]
	Mean or %	SD	Mean or %	SD	Mean or %	SD		
Family SES at Wave I	5.53	2.50	7.42	2.35	6.35	2.61	1–10	***

Notes:

* p < .05

** p < .01

*** p < .001; two-tailed.

A Multivariate Imputation by Chained Equations (MICE) approach was used to impute missing data.

[a]The significance test is for the difference between those who completed college and those who did not by Wave 5. For interval-ratio variables, the mean differences were tested by a T-test, adjusted for survey weights. For categorical variables, the proportion differences were tested by a proportion test (Z test), adjusted for survey weights.

Table 2

Sample-weight adjusted random-effects models of happiness and depressive affect on education (obtained degree) interacted with gender (Add Health, 1994–2018).

Panel A: Happiness (Obs. = 32,636; N = 10,908)	**RE Model 1A**	**RE Model 2A**
	Coef.(s.e.)	**Coef.(s.e.)**
High school	0.150(0.026)***	0.157(0.034)***
Some college	0.195(0.030)***	0.196(0.035)***
College	0.271(0.033)***	0.215(0.039)***
Female	0.031(0.017)	0.008(0.026)
High school X female		−0.015(0.042)
Some college X female		0.003(0.037)
College X female		0.107(0.036)**
Age	−0.028(0.008)***	−0.029(0.007)***
Age squared	0.0003(0.000)*	0.0003(0.000)*
Race/ethnicity		
non-Hispanic White	0.118(0.031)***	0.115(0.031)***
non-Hispanic Black	0.037(0.033)	0.034(0.033)
Hispanic/Latinx	0.072(0.042)	0.069(0.042)
Family SES	0.018(0.004)***	0.018(0.004)***
Intercept	2.389(0.095)***	2.409(0.095)***
Variance of Intercept	0.131	0.131
Variance of Residual	0.518	0.517
ICC	0.203	0.202
Panel B: Depressive Affect (Obs. = 42,044; N = 10,908)	**RE Model 1B Coef.(s.e.)**	**RE Model 2B Coef.(s.e.)**
High school	−0.084(0.017)***	−0.063(0.021)**
Some college	−0.147(0.018)***	−0.116(0.022)***
College	−0.226(0.021)***	−0.162(0.025)***
Female	0.132(0.011)***	0.188(0.016)***
High school X female		−0.045(0.023)*
Some college X female		−0.066(0.022)**
College X female		−0.125(0.022)***
Age	0.017(0.005)**	0.017(0.005)**
Age squared	−0.0002(0.000)*	−0.0002(0.000)*
Race/ethnicity		
non-Hispanic White	−0.066(0.024)**	−0.064(0.024)**
non-Hispanic Black	−0.005(0.027)	−0.003(0.027)
Hispanic/Latinx	−0.052(0.027)	−0.051(0.027)

Panel A: Happiness (Obs. = 32,636; N = 10,908)	**RE Model 1A**	**RE Model 2A**
	Coef.(s.e.)	**Coef.(s.e.)**
Family SES	−0.014(0.002)***	−0.014(0.002)***
Intercept	0.244(0.062)***	0.207(0.060)**
Variance of Intercept	0.071	0.071
Variance of Residual	0.256	0.255
ICC	0.218	0.217

Notes: Standard errors in parentheses

* p < .05

** p < .01

*** p < .001; two-tailed.

Models in Panel A estimate the effects of education on happiness, and models in Panel B estimate the effects of education on depressive affect. All models used data imputed with Multivariate Imputation by Chained Equations (MICE), and adjusted using the longitudinal sampling weight provided by Add Health ("*gsw145*").

The reference group for education is less than high school.

The reference group for gender is male.

The reference group for race/ethnicity is non-Hispanic other.

Table 3

Sample-weight adjusted fixed-effects (FE) models of happiness and depressive affect on education (obtained degree) interacted with gender.

Panel A: Happiness (Obs. = 32,636; N = 10,908)	**FE Model 1A**	**FE Model 2A**
	Coef.(s.e.)	**Coef.(s.e.)**
High school	0.112(0.034)**	0.131(0.045)**
Some college	0.150(0.042)***	0.145(0.049)**
College	0.136(0.048)**	0.092(0.052)
High school X female		−0.039(0.052)
Some college X female		0.013(0.040)
College X female		0.082(0.039)*
Age	−0.017(0.010)	−0.017(0.010)
Age squared	0.0001(0.000)	0.0001(0.000)
Intercept	2.356(0.113)***	2.361(0.113)***
Panel B: Depressive Affect (Obs. = 42,044; N = 10,908	**FE Model 1B Coef.(s.e.)**	**FE Model 2B Coef.(s.e.)**
High school	−0.042(0.019)*	−0.018(0.024)
Some college	−0.074(0.020)***	−0.042(0.024)
College	−0.111(0.025)***	−0.057(0.029)*
High school X female		−0.050(0.025)*
Some college X female		−0.064(0.024)**
College X female		−0.100(0.024)***
Age	0.002(0.006)	0.002(0.006)
Age squared	0.00002(0.000)	0.00002(0.000)
Intercept	0.434(0.072)***	0.432(0.072)***

Notes: Standard errors in parentheses

* p < .05

** p < .01

*** p < .001; two-tailed.

Models in Panel A estimate the effects of education on happiness, and models in Panel B estimate the effects of education on depressive affect. All models used data imputed with Multivariate Imputation by Chained Equations (MICE), and adjusted using the longitudinal sampling weight provided by Add Health ("*gsw145*").

The reference group for education is less than high school.

The reference group for gender is male.