

The Pennsylvania State University

The Graduate School

College of the Liberal Arts

**PROTECTIVE BUT NOT SHELTERING
EDUCATIONAL ATTAINMENT AND POOR MENTAL HEALTH
IN THE GREAT RECESSION**

A Thesis in

Sociology and Demography

by

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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Arts

August 2016

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ABSTRACT

The objective of the following thesis is to examine the effect of educational attainment on poor mental health before, during, and after the Great Recession. Higher educational attainment is associated with various mechanisms for improved mental health. Those with greater levels of education are more likely to have more satisfying jobs, larger supports networks, greater access to resources, as well as better coping skills when experiencing negative life events. Prior research has found that in economic downturn, individuals with greater education were protected against negative outcomes, or “sheltered” from the effects of economic downturn. The 2007-2009 Great Recession, however, resulted in widespread job instability and chronic unemployment in the United States, even affecting those with greater socioeconomic status. This paper seeks to reexamine the relationship between educational attainment and poor mental health in regards to the experiences of the Great Recession. Using data from the 2006, 2008, and 2010 National Longitudinal Survey Year 1997 (NLSY97), two questions were discussed. 1) What is the relationship between educational attainment and poor mental health before, during, and after the Great Recession? 2) Did this relationship change across time? Using regression analysis, the findings confirm that educational attainment is negatively associated with poor mental health in all three years. Statistical analysis of the coefficients across years find the relationship between these two variables to remain unchanged. In other words, while the effect of educational attainment on poor mental health was not “sheltering,” its protectiveness remained robust against any effects of the Great Recession.

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ACKNOWLEDGEMENTS

The author would like to thank John Iceland, the adviser of this thesis, for his thoughtful critiques and exceptional guidance for the entire project. Also, thanks to David Baker and Steven Haas for their careful readings of this thesis and their encouragement in future research. This project is dedicated to my family. First to the wonderful one I was born into: Mom, Dad, and Tresne. Second to the one I found along the way: Amber, Sean, Aaron, Steven and Sam.

INTRODUCTION

The primary aim of this research is to study the relationship between educational attainment and poor mental health before, during, and following the Great Recession. Higher educational attainment is associated with better health through a series of mechanisms (Johnson et al. 2014), including improved mental health (Brännlund 2014). Education provides individuals greater access to better jobs and helps them become more adept at acquiring resources and more extensive social support systems, which lead to improved health (Mirowsky and Ross 2003). In addition, education develops critical thinking and decision making skills to allow for greater agency when making healthy lifestyle choices (Johnson et al. 2014). Chevalier and Feinstein (2006) find that greater levels of education improve stress and mental health. With the economic downturn of the Great Recession, and the associated increase in economic insecurity at all education levels including higher education levels (Farber 2011), it is important to reexamine the relationship between educational attainment and mental health.

Additional evidence suggests that, when starting careers during bad economic times, more highly educated persons are better protected from income and health losses than are those with lower levels of education (Cutler, Huang, and Lleras-Muney 2015). In other words, highly educated persons were more sheltered from the negative effects of economic downturn. Individuals with less education experience greater economic insecurity, but with the widespread effects of the Great Recession it is important to observe whether or not the protective effect of high educational attainment against poor mental health has changed. Beginning in 2007 and ending in 2009 (NBER), the Great Recession is widely considered to be the worst global economic crisis since the Great Depression (Grusky 2011). While there were other recessions during the late 20th century, this most recent recession had one of the steepest inclines in long-

term unemployment, and the economic recovery has been very slow (Cho and Partridge 2014). With these economic difficulties, it is important to examine whether the protective effect of educational attainment against poor mental health has remained stable or changed, as well as if more educated persons were sheltered from experiencing worse mental health than their less educated counterparts. Many individuals may have lost access to critical resources and support, making them more likely to experience increased levels of poor mental health.

The specific problem of study is to examine whether the association between educational attainment and poor mental health changed during and following the Great Recession for young adults entering the workforce. I hypothesize that educational attainment remains inversely related to poor mental health, and that while the size of the protective effect of educational attainment against poor mental health may remain unchanged (null hypothesis), it is important to assess if higher levels of education sheltered individuals from declining mental health associated with greater economy instability in the Great Recession. Meaning, were the most educated unaffected (mental health wise) by the Great Recession?

BACKGROUND

Association between health and socioeconomic status

Cross national comparisons find that low socioeconomic status (SES)—including variables such as income and education—is associated with high psychiatric morbidity, disability, and poor access to health care (Andrade et al. 2000). Lower SES groups are more likely to have poorer coping styles, ongoing life events, greater stress exposure, and weaker social support, all of which are factors increasing psychiatric risk (Turner and Lloyd 1999). While the 2007-2009 Great Recession, discussed below, affected certain groups more than others (Elsby et al., 2010), individuals in higher SES groups (e.g., high level education groups) were more economically vulnerable than in prior recessions

Between the fourth quarter of 2007 and the fourth quarter of 2009, the unemployment rate more than doubled—from 4.8 percent to 10 percent (Katz 2010). Layoffs added to the unemployed population, but one of the most significant drivers of the unemployment rate was the reduced number of job openings and the failure to hire from the unemployment pool (Werick and Islam 2010). While long-term unemployment and economic stagnation in the Great Recession disproportionately affected men, industry workers producing goods, young workers, and non-college workers, the economic downturn severely impacted almost every group of workers in all regions of the country (Katz 2010). Such long periods of unemployment are quite stressful because individuals lose self-esteem, networking opportunities, and a time structure for their days (Barley and Montgomery 2006). Analysis of the U.S. Panel Study of Income Dynamics finds that job loss is harmful to the health of persons who become unemployed or lose their jobs (Strully 2009). Strully's (2009) results indicate that the health consequences of job loss are equally significant for blue- and white-collar careers, but that health-related selection out of jobs is stronger for blue-collar occupations.

While evidence suggests that male, younger, and less educated workers, especially from ethnic minorities, experienced the steepest rises in joblessness during the Great Recession (Elsby et al., 2010), it is important to note that the more educated were also more vulnerable during the Great Recession than in previous recessions. The 2007-2009 rate of job loss for college graduates was at a historically high level (Farber, 2011), and since 2009 the rates of job loss remain above the pre-recession rate for workers in all educational groups (Farber, 2015).

In addition, as noted by Strully (2009: 221) managerial and professional jobs became more vulnerable during the Great Recession due to downsizing and layoffs: “higher socioeconomic groups are experiencing increased job instability, and the risk of job loss is

becoming more equally distributed by socioeconomic status.” Evidence suggests job instability—an intermediate state between secure employment and unemployment—is associated with deteriorating psychological health (Dekker and Schaufeli 1995). This increased job instability may cause individuals to experience greater economic insecurity, which evidence suggests has a strong effect on psychological distress and nonspecific psychological illness (Catalano 1991).

A vast body of research has documented an association between increasing U.S. income inequality and greater health disparities (Deaton and Paxson 1998; Elo and Preston 1996; Pappas et al. 1993), as well as the increasing negative effect of economic insecurity on health (Hacker 2006). But negative associations between economic insecurity/hardship and mental health may be mitigated by higher educational attainment. Research finds an association between lower educational attainment and depression (Lorant et al. 2003, Bromet et al. 2011, Crespo et al. 2014; Mezuk et al. 2013, McFarland and Wagner 2015), and that the lowest educational group observed has a greater prevalence of psychiatric morbidity (Andrade et al. 2000) and mental stress (Wang et al. 2015). There is a large body of research indicating that higher educational attainment contributes to better health (physical and mental) and longevity. For example, Ross and Mirowsky (2008) find that years of formal education have a positive, statistically significant association with physical functioning and perceived health. The higher the level of education, the better the physical functioning and perceived health reported by respondents.

Conceptual Framework

The main conceptual perspective regarding the association between educational attainment and adult mental health that guides the present research is that schooling causally improves general health (Montez and Friedman 2015), and therefore mental health. There is a

growing literature using multiple methods that support this argument. For example, a meta-analysis of 37 studies from mostly western countries found a 3% decrease in log-odds ratio for depression for each additional year of education. Additionally, low education is significantly associated with major depressive episodes in the United States (Bromet et al. 2011), and greater prevalence a higher prevalence of mood, anxiety substance use disorder and adult ADHD (de Graaf et al. 2012).

Education is thought to improve health through greater access to and use of health care, due both greater financial resources and to greater cognitive and social psychological resources. Evidence suggest that higher educational attainment typically provides greater access to satisfying jobs, social ties (support), economic security, as well leading to a greater sense of personal control, to greater learned effectiveness (see more connection between their actions and important outcomes in their lives), and to healthier lifestyles (Mirowsky and Ross 2003). Research finds evidence that education builds knowledge and cognitive skills—including literacy, numeracy, reasoning, and “learning how to learn”—which enhance decision making skills and risk assessment, allowing individuals to use their autonomy to live healthier lives (Johnson et al. 2014). Chevalier and Feinstein (2006) corroborate these findings, writing that education improves skills that are valuable in protecting against stress and poor mental health. More educated people tend to have greater self-efficacy, or learned effectiveness, which facilitates better information gathering and action to overcome obstacles and to live a healthy life (Pampel et al. 2010).

Education also affects health through its association with work and economic conditions (Ross and Wu, 1995). Well-educated individuals are more likely to be employed, which as discussed earlier is linked many factors which lead to improved health. In addition, evidence

suggests that individuals with lower levels of educational attainment tend to have lower incomes (Sewell and Hauser 1975), and experience greater economic hardship than those with higher levels of formal education (Ross and Huber 1985). Finally, more educated individuals are reported to respond less emotionally to negative life events (Cutler, Huang, and Lleras-Muney 2015). This could indicate that during economic downturn, individuals with higher education would be more sheltered—financially and health wise—either because they are less exposed to economic instability or because they deal with the situation differently. But with the widespread effect of the Great Recession, would the more educated be sheltered? Or was the protective effect of educational attainment against mental health unchanged, meaning that the recession affected the mental health of individuals with either low or high educational attainment.

The conceptual perspective that educational attainment positively influences mental health is key to the current study. I will examine the extent to which the experiences of individuals during the Great Recession changed the effect of educational attainment on poor mental health. Much of the previous research has examined the effect of both economic insecurity/hardship and educational attainment on health. But the continued effects of the Great Recession, which impacted individuals across a variety of demographic and socioeconomic characteristics, has not yet been examined. While the most recent recession has been studied regarding its direct effect on many outcomes, no research has focused on the relationship between educational attainment and mental health.

My primary research question is: did the structural effects of the Great Recession affect the relationship between educational attainment and mental health? I have two primary hypotheses. The first hypothesis is that at all three points in time—before, during, and following the Great Recession—the level of educational attainment is inversely related to the level of poor

mental health. Educational attainment should have a protective effect against poor mental health. Three possibilities exist for the second hypothesis. The null hypothesis would find the protective effect remaining stable, perhaps due to the mechanisms and learned effectiveness associated with higher educational attainment. If the Great Recession has a widespread effect on mental health, however, then confirming the null hypothesis would mean that while more educated individuals had better mental health than their less educated counterparts, they were not unaffected by (i.e. sheltered from) economic downturn. Alternatively, the size of the effect grows across time, meaning that education acts as sheltering against poor mental health. The final alternative would find that the size of the effect shrinks over time, meaning that education became less protective after the Great Recession

DATA AND METHODS

This study analyzes secondary data for 2006, 2008, and 2010 from the National Longitudinal Study (NLS) Year 1997. The NLSY97 is a longitudinal project, sampling Americans born between 1980 and 1984. Since the first interviews in 1997, 15 waves of interviews have been conducted. The original 1997 sample (Wave 1) contained 8,984 respondents, aged 12-17. The gender composition of the initial sample was 51% male and 49% female. Two subsamples comprise the NLSY97; (1) with a cross-sectional sample of 6,748 respondents representative of persons born in the United States between January 1, 1980 and December 31, 1984, and (2) a supplemental sample of 2,236 respondents oversampling the Hispanic or Latino and black populations living in the US during the initial survey. The racial/ethnic composition of the initial survey was roughly 60% non-black, non-Hispanic, 26% black non-Hispanic, 21% Hispanic or Latino, and 1% mixed. The types of information gathered in the survey pertaining to my research included education; employment; income; dating,

marriage and cohabitation; health; and personal behaviors. This research will focus on the relationship between educational attainment and poor mental health in 2006, 2008, and 2010 (Waves 10, 12, and 14). The analysis for 2006 will examine this relationship prior to the recession, while the analysis for 2008 will examine the relationship during the recession, and the analysis for 2010 will examine the relationship after the recession. By 2010, the retention rate of the sample had declined to 86.5% (7,479 respondents) of the initial survey size.

For the analysis of these three years/waves, I begin with descriptive statistics for all of the variables in my analysis (described below), including in each time period. Next, using nested OLS regression, I examine the relationship between level of education and poor mental health in 2006, 2008, and 2010. Control variables include school enrollment status, demographic characteristics (sex, race, age, marital status), employment and income variables (weekly employment status and total income received), health insurance and practices variables (seeking/not seeking treatment, health insurance coverage, recent check-up in the last year), and general health (current health). A brief summary of all variables can be found on Table 1. The coefficients related to education and poor mental health are calculated and discussed by size, direction and statistical significance. This analysis addresses the first hypothesis. To address my second hypothesis, I conduct two sets of analyses. I examine the relationship between educational attainment and poor mental health over time (2006, 2008, 2010) by comparing coefficients in linear regression models. In addition, I examine whether and how mediating variables lead to changes over time in the coefficients for educational attainment.

Dependent Variable: Poor Mental Health Scale

In the three years/waves examined, the survey included questions asking how often the respondent experienced specific mental states in the month before the interview. These five

questions are a short version of the Mental Health Inventory (MHI-5), created by Veit and Ware from the longer Mental Health Inventory (MHI) developed in the late 1970s (Berwick et al). Respondents were asked to report the frequency with which they felt nervous, happy, calm and peaceful, downhearted and blue, or being so unhappy that nothing could cheer them up. Respondents were asked to respond with a four-point scale to identify the frequency of their feelings, “All of the time,” “Most of the time,” “Some of the time,” and “None of the time.” For my analysis, questions from the MHI-5 asking about the frequency of positive mental states were recoded to match the pattern of negative mental state questions. That is, with a lower score signifying better mental states and a higher score signifying poorer mental states, giving a four point range of 0-3 for each question. I constructed my poor mental health dependent variable in a manner similar to Cuijpers et al. (2009). Responses to these five questions were combined to form a single variable by summing the scores the scores, and transforming these raw scores into a scale ranging from 0 to 100. While Cuijpers et al. (2009) code the variable with lower scores indicating worse mental health, I coded so higher score indicates worse mental health (greater poor mental health).

Main Independent Variable: Educational Attainment

The NLSY97 measured educational attainment using several questions, including highest grade completed, highest degree completed, and enrollment. For this analysis I chose the question recording the highest degree attained by respondents at the date of the survey. While every additional year of schooling may affect mental health, attaining education degrees may be most critical to opening social and economic opportunities for individuals, which could protect against poor mental health. I recoded the education variable to form four dummy variables, “did not complete high school” (No HS), “completed high school” (HS only), “some college” (Some

College), and “BA or more” (BA+). In the linear regression analysis, respondents who did not complete high school (NoHS only) are the reference group.

Population Characteristics: Sex, Race, Age, Marital Status

1) Sex

Gender has been recoded into the dummy variable, FEMALE (Male=0, Female=1)

2) Race

Race has been coded into four mutually exclusive categories; “Black,” “Hispanic,” “Mixed Race (non-Hispanic),” and “Non-Hispanic White.”

3) Age

Evidence suggests that experiencing events such as the Great Recession at different ages results in different effects on health. Respondents in this study are at most four years apart in age in any specific year. In 2006, the age range was 22-26. By 2010, the age range was 26-30. The regressions will include the age variable transformed from to range 0-4, with 0 indicating the youngest age of interviewees, and 4 indicating the oldest.

4) Marital Status

Marital status may have a significant mediating effect on the relationship between educational attainment and mental health. Evidence suggest that persons who tend to get married and stay married usually have higher levels of education (McLanahan 2004), and have higher levels of well-being (less depression, fewer reported alcohol problems) than those who stay single (Horwitz, 1996). Therefore, educational attainment may influence the likelihood of marital status, which in turn influences individuals’ quality of mental state. In addition, social support through marriage has been found to improve mental health and curtail the negative effects of stress (Thoits 1995). Married persons—with either high or low education—may have better

mental health than unmarried people because of the social support marriage provides to individuals

Marital status has been coded into four categories; “never married, not cohabitating” (1), “married” (2), separated/divorced/widowed” (2), and “cohabiting” (4). I have included respondents who are cohabitating as a separate category because cohabiting persons may experience a different association between educational attainment and mental health in the context of the Great Recession. For example, cohabiting men are more likely to have alcohol problems than married or single men, and cohabiting women report more alcohol problems than married women (Horwitz and White 1998). While cohabitating individuals may not share in the legal benefits of marital status, they may still experience some social support similar to married people. In addition, individuals who are no longer married—due to separation, divorce, and widowhood—may experience levels of mental health different from stable unions due to the transition out of a marriage.

Income and Employment Variables

The following list of control variables is used in regression analysis because these variables may have a mediating effect on the relationship between education and mental health distress. If my alternative hypothesis is confirmed—the protective effect of educational attainment against poor mental health declined during, and possibly after, the Great Recession—it then will become of interest to learn the nature of the effects of mediating variables. These control variables all have links to educational attainment and as well as an effect on mental health.

1) Weekly Employment Status

As discussed earlier, economic insecurity/hardship is likely to be a driving force in increased stress. Persons with higher levels of education may be more likely to be employed, but individuals across the entire educational spectrum may have lost their jobs due to the Great Recession. Losing one's job may increase feelings of inadequacy, hopelessness, or failure. Without a job, individuals may be more likely to have poor mental health, but evidence suggests that those with less education are likely to lose their job than those with higher education (Strully 2009). Individuals were asked how many they were employed weeks in the past year. The employment variable has been coded from 0 to 52, with 0 indicating no weeks employed in the last year, and 52 indicating the maximum number of week employed in the last year. Persons employed by the military were excluded from the analysis because their employment trends may differ from civilians.

2) Total Income Received

People with greater levels of income may be less stressed because their income may bring resources that would protect them from the consequences of poverty. Losing one's income may increase the chances of having poor mental health, but people with less education are more likely to lose their income (or be at risk) than those with higher education. People receive income through a variety of means, including from professional work or a stable job, or from odd jobs and temporary work. The NLSY97 asked respondents to report the total income they received in the last year, including salaries, wages, and tips. Respondents who reported receiving no income in the last year were recoded as 0. These dollar wages were adjusted for inflation to match the 2010 US dollar value. The income variable is continuous.

Health Insurance and Practices

1) Seeking Treatment/Not Seeking Treatment

Some people may either not have access to or choose not to seek health services despite having access because of potential negative associations with seeking medical help (Cooper et al. 2003). Although the NLSY97 does not contain a variable pertaining to seeking mental health, respondents were asked two questions in seeking general medical health. First, in the past 12 months how many times were respondents injured or ill and treated by a doctor or nurse. This variable has been coded from 0 (None) to 4 (4 or more times). Second, if in the last 12 months they had been injured or ill so that they missed at least one full day of usual activities such as work or school, but were not treated by a doctor or a nurse. This variable has been coded as “Yes” (1), and “No” (0).

2) Health Insurance Coverage Status

Whether or not people are covered by health insurance may influence their level of stress. Not being covered may indicate economic hardship or not being covered may mean they cannot access needed health services. The health insurance coverage status variable is coded as “Not Covered” (0) and “Covered” (1).

3) Checkup

Having regular checkups may indicate that an individual values being mindful of their health. Being mindful of one’s health may affect one’s mental state. The NLSY97 asked interviewees if they had received a checkup in the last 12 months. The variable has been coded “No” (0), and “Yes” (1).

General Health

1) Current Health

Respondents' current general health may influence their mental state. For example, an individual reporting poor health may worry about the time they may need to recover, which could hinder their work or affect other aspects of their life. This worry and stress may result in a poor state of mental health. They may also experience discomfort or pain which might affect their mental health. Mirowsky and Ross (2003) report the best all-around survey measure of general health is subjective self-reporting of health. In the NLSY97, respondents were asked, "In general, how is your health?" with response options: "Excellent" (1), "Very Good" (2), "Good" (3), "Fair" (4), and "Poor" (5). The coding of all variables is summarized in Table 1.

ANALYSIS

Descriptive Stats

Table 2 present unweighted means and standard deviations for all analyzed variables. The mean poor mental health score ranges between 29.29 and 30.48 over the three observed time periods. For educational attainment, relatively little change occurred among the percentage of high school dropouts and high school graduates. College attendees declined from 43 percent of the sample in 2006 to 38 percent in 2010 (5 percentage points), while persons with at least a bachelor's increased from 17 percent in 2006 to 26 percent in 2010 (10 percentage points).

Population characteristics remain relatively consistent (gender, race, age), aside from marital status. From 2006 to 2010, the percentage of single persons decreased, while the percentage of married persons increased. Changes in the percentage of divorce/separated/widowed and cohabiting are relatively small. Examining economic variables,

the average number of weeks of employment ranges between approximately 38 and 41 hours, with the greatest average weeks of employment in 2008 and the fewest weeks in 2010. Although these three averages of weeks employed are within one standard deviation of each other, it is important to note that the greatest average was during the recession (2008). There may be a greater average weeks of employment during the recession because individuals are less likely to be in school and more likely to work as they grow older. The average inflation-adjusted total income rises from approximately \$20,500 in 2006 to a little over \$24,700 in 2008. In 2010, the average total income rose approximately \$1,000. As with the employment variable, an increase in the average total income is during the recession (2008), perhaps indicating that individuals worked more often/went to school less (and thus made more money) during the recession. This may also indicate a limitation in the study, taking cross-sectional data at three points in time. Although these data are taken from the same persons, the study is not truly longitudinal, and such a longitudinal study will be an avenue of future work. Health insurance status and practices were nearly unchanged. Finally, average current health increase slightly from 2.15 in 2006 to 2.31 in 2010.

Nested Regression in Five Models over Three Time Periods

Figure 3-5 present the nested regression for unstandardized, unweighted b coefficients examining the relationship between educational attainment and poor mental health in 2006 (Table 3), 2008 (Table 4), and 2010 (Table 5), with high school dropouts as the reference group. Table 6 presents only the unweighted b coefficients for educational attainment found in Tables 3-5. All three nested regressions contain the same analysis models. Model 1 consists of only the effect of educational attainment on poor mental health. Model 2 introduces population characteristics (gender, race, age, and marital status) to control for variations by population.

Model 3 introduces employment and income variables, controlling for economic conditions.

Model 4 introduces health insurance and practice variables, controlling for individuals' access to health resources and health behavior. Model 5 introduces individuals' current health.

In addition to analyzing education as an ordinal variable, I attempted to use nested regressions (with all five models) with education as a continuous variable, which is not shown. While everyone was surveyed for their highest grade completed, in examined time periods some people transitioned from one level of education to another. The current difficulty is that only a small subset of the sample was surveyed in 2008 and 2010 (approximately 1,700 respondents out of nearly 7,000 in the analysis).

Changes in Coefficients between Models 1-5

Table 6 shows the effect of educational attainment on poor mental health (coefficients) for each educational group, model, and year. An overview of Table 6 supports the primary hypothesis, that educational attainment has an inverse relationship with poor mental health. In nearly every successive model, there is a statistically significant difference. More educated groups score lower on the poor mental health scale with regard to the reference group (less than high school completion) in each year.

Tables 3-5 allow us to examine the more detailed changes in the education coefficients by model. The introduction of population characteristics (Model 2) resulted in a statistically significant decrease in the poor mental health score for both some college and at least a bachelors' in all three years ($p < .001$). The changes in coefficients for high school only from Model 1 to 2 were not statistically significant in any year. Adding employment and income variables (Model 3) resulted in statistically significant changes in the coefficients for each education group across all years (at least $p < .01$). The number of week employed was significant

in each year ($p < .001$), while total income was only significant in 2008. This indicates that the number of weeks employed had a mediating effect on the relationship between educational attainment and poor mental health. Health insurance and health practices (Model 4) were weakly statistically significant in changing the education coefficients in 2006 alone. Finally, general health was very significant in changing the education coefficients ($p < .001$), meaning that respondents health mediated the effect between educational attainment and poor mental health.

Differences in Coefficients between Years

While education remains statistically significant in nearly every model for all years, significance testing of differences between coefficients of the education groups in different years (not shown) finds that the differences are not statistically significant. In other words, the differences in coefficients across years—for nearly every model—is not statistically significant. The relationship between educational attainment and poor mental health did not change during or after the Great Recession, supporting the second, null hypothesis. Table 7 supports these findings, presenting the OLS regression final models (Model 5) for each year. Educational attainment remained protective against poor mental health (supporting the null hypothesis), but did not shelter those with highest educational attainment.

DISCUSSION

The results in OLS regression address the first two hypotheses. First, in all three years, educational attainment had an inverse effect on poor mental health, corroborating with prior studies (Chevalier and Feinstein 2006; Brännlund 2014; Lorant et al. 2003, Bromet et al. 2011, Crespo et al. 2014; Mezuk et al. 2013, McFarland and Wagner 2015). Second, regression estimates find that the protective effect of educational attainment against poor mental health remained unchanged during and after the Great Recession, supporting the second null

hypothesis. The disparity between lower and higher educational groups did not grow (become sheltering) nor shrink (become less protective) in size

Those with greater educational attainment experienced better mental health compared to their less educated counterparts, but did not experience any sheltering benefit from education against the effects of the recession period. One explanation may be that since the Great Recession was widespread enough to affect the upper socioeconomic class (Strully 2009), more educated respondents experienced similar levels of stress in job instability as respondents with lower educational attainment. Another explanation could be that this lack of sheltering may be due, in part, to the age group of the sample. With individuals in their early to later 20's, respondents had either completed or in the process of completing their full educational attainment. They may have been sensitive to the economic shortcoming of the recession, even if they were still enrolled in school and not directly engaged in the labor market. In additional analysis (not shown), enrollment in school had no statistically significant effect on the relationship between educational attainment and mental health. So simply being aware of the depressive condition of the labor market may have been enough to increase stress (worsen mental health) in respondents. It would be beneficial in future analysis to observe the level of optimism in the future by educational group with regards to individuals entering the labor market in the recession.

It is important to discuss that while the size of the coefficient for educational attainment and mental health did not grow, it also did not experience any significant shrinking across time. Educational attainment can influence mental health in two ways. First, education can prevent individuals from experiencing situations that may worsen mental health. As discussed earlier, having more satisfying jobs, better financial and social resources, and greater self-efficacy can

improve overall health, including mental health (Mirowsky and Ross 2003). Second, education can mediate experiences that may increase poor mental health. More-educated individuals respond less emotionally to negative life events (Cutler, Huang, and Lleras-Muney 2015), and may have better coping styles that protect themselves from poor mental health (Turner and Lloyd 1999). The current analysis finds the relationship between educational attainment and poor mental health to remain robust, despite any period effects of the Great Recession.

For future study, this analysis could also continue to study this sample group over time, examining differences in trends of mental health by education level. Perhaps as these young people age, there may be longer, structural effects that change (either widening or shrinking) the gap in mental health by educational group. In addition, this model of analysis could be used to examine how older age groups have been affected by the Great Recession, identifying differences in the relationship between educational attainment and mental health by age. Finally, the economic instability from the Great Recession was a global event, and it would benefit social researchers to develop international comparisons of the effect of educational attainment on mental health.

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Appendix A: Discussed Tables of Analysis

Table 1. Variable Description	
Variable Name	Definition
<i>Dependent Variable</i>	
Poor Mental Health Scale	0-100. The higher the score, the worse mental health
<i>Independent Variables</i>	
<i>Main Predictor</i>	
Educational Attainment	Highest level of education completed
No HS	1=Did not complete high school, 0=else
HS Only	1=Completed high school/GED, 0=else
Some College	1=Some college, but no degree, 0=else
BA+	1=Complete bachelors' of higher, 0=else
<i>Population Characteristics</i>	
Sex	Dummy: 1=Female, 0=Male
Race	1=Black, 2=Hispanic, 3=Mixed, 4=Non-Black/Non-Hispanic
Age	Respondent's age
Marital Status	1=Never married, not cohabiting, 2=Married, 3=separated/widowed/divorced, 4=cohabiting
<i>Socioeconomic Variables</i>	
Total Income	FINSIH THIS
Weeks Employed	# of weeks employed in the last year, 0-52
<i>Health Insurance and Practices</i>	
Treated	# of times injured/ill and saw doctor for treatment
Not Treated	# of times injured/ill and did not seek doctor
Health Insurance Coverage	1=Yes, 0=No
Checkup in Past Year	1=Yes, 0=No
<i>General Health</i>	
Current Health	Excellent (1) to Poor (5)

Table 2: Descriptive Statistics

	2006		2008		2010	
	Mean	Std. Dev	Mean	Std. Dev.	Mean	Std. Dev.
Poor Mental Health	29.29	16.08	30.48	16.17	28.63	16.33
Education						
No HS	12%	33%	11%	32%	10%	30%
HS Only	28%	45%	27%	44%	26%	44%
Some College	43%	49%	38%	49%	38%	49%
BA or More	17%	38%	24%	42%	26%	44%
Female	50%	50%	51%	50%	50%	50%
Race						
Black	26%	44%	26%	44%	26%	44%
Hispanic	21%	41%	21%	41%	21%	41%
Mixed	1%	10%	1%	10%	1%	10%
Non-Hispanic White	52%	50%	52%	50%	51%	50%
Age*	23.95	1.39	25.97	1.40	27.96	1.40
Marital Status						
Single	58%	49%	47%	50%	42%	49%
Married	22%	41%	28%	45%	34%	47%
Div/Sep/Wid	2%	15%	4%	19%	5%	21%
Cohabiting	18%	39%	21%	41%	20%	40%
Weeks Employed	39.94	17.65	40.96	17.66	38.31	19.98
Income**	20564.38	20582.27	24764.39	22019.72	25494.79	25018.21
Sought Treatment	0.70	1.11	0.68	1.10	0.52	1.02
Did Not Seek Treatment	0.89	1.27	0.89	1.28	0.69	1.18
Health Insurance	67%	47%	66%	47%	66%	47%
Checkup	51%	50%	51%	50%	53%	50%
Current Health	2.15	0.94	2.23	0.94	2.31	0.98
N	6888		6838		6841	

*recoded 0-4 in regression

**adjusted to 2010 dollars

Table 3: Nested Regression of Poor Mental Health on Educational Attainment, 2006

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
High School	-2.49 ***	0.66	-2.70 ***	0.66	-1.86 **	0.66	-1.62 *	0.65	-1.16	0.63
Some College	-3.33 ***	0.63	-4.23 ***	0.63	-3.07 ***	0.64	-2.75 ***	0.63	-1.74 **	0.62
BA or More	-4.51 ***	0.72	-6.21 ***	0.74	-4.79 ***	0.76	-4.07 ***	0.76	-2.18 **	0.75
Female			4.89 ***	0.39	4.50 ***	0.39	3.50 ***	0.41	3.07 ***	0.40
Black			-2.11 ***	0.48	-2.49 ***	0.48	-1.57 ***	0.47	-1.86 ***	0.47
Hispanic			-1.97 ***	0.50	-1.90 ***	0.50	-1.16 *	0.49	-1.62 ***	0.48
Mixed			2.13	1.98	1.79	1.97	2.02	1.93	1.50	1.89
Age (0-4)			0.02	0.14	0.12	0.14	0.07	0.14	-0.03	0.14
Married			-3.26 ***	0.50	-3.03 ***	0.50	-2.95 ***	0.49	-2.91 ***	0.48
Div/Sep/Wid			2.05	1.30	1.95	1.30	1.10	1.27	1.11	1.24
Cohabiting			-1.49 **	0.52	-1.17 *	0.52	-1.36 **	0.51	-1.45 **	0.50
# Weeks Employed					-0.09 ***	0.01	-0.09 ***	0.01	-0.08 ***	0.01
Total Income					0.00	0.00	0.00	0.00	0.00	0.00
Sought Treatment							2.08 ***	0.18	1.42 ***	0.18
Did Not Seek Treatment							1.40 ***	0.15	1.10 ***	0.15
Health Insurance							-1.39 ***	0.43	-1.12 **	0.42
Check Up							-0.36	0.41	-0.17	0.40
Current Health									3.59 ***	0.21
Cons	32.19 ***	0.55	32.29 ***	0.69	35.31 ***	0.77	33.49 ***	0.78	25.59 ***	0.89
N	6888		6888		6888		6888		6888	
Adj R-squared	0.0062		0.0352		0.0463		0.0859		0.1245	

***p<.001 **p<.01 *p<.05

Table 4: Nested Regression of Poor Mental Health on Educational Attainment, 2008

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
High School	-2.61 ***	0.69	-2.60 ***	0.68	-1.99 **	0.69	-1.72 *	0.68	-1.35 *	0.66
Some College	-4.01 ***	0.66	-4.57 ***	0.65	-3.68 ***	0.67	-3.50 ***	0.66	-2.62 ***	0.65
BA or More	-4.92 ***	0.71	-6.17 ***	0.72	-4.81 ***	0.74	-4.45 ***	0.75	-2.50 ***	0.74
Female			5.22 ***	0.39	4.76 ***	0.40	4.13 ***	0.42	3.76 ***	0.41
Black			-1.71 ***	0.48	-1.99 ***	0.48	-1.06 *	0.48	-1.27 **	0.47
Hispanic			-1.64 ***	0.51	-1.67 ***	0.50	-0.97	0.50	-1.33 **	0.49
Mixed			-0.29	1.97	-0.66	1.96	-0.35	1.93	-0.47	1.89
Age (0-4)			0.07	0.14	0.16	0.14	0.15	0.14	0.05	0.14
Married			-3.60 ***	0.48	-3.40 ***	0.48	-3.14 ***	0.47	-3.03 ***	0.46
Div/Sep/Wid			1.91	1.05	1.92	1.05	1.97	1.03	2.06 *	1.01
Cohabiting			-2.00 ***	0.51	-1.77 ***	0.51	-1.79 ***	0.50	-1.96 ***	0.49
# Weeks Employed					-0.05 ***	0.01	-0.04 ***	0.01	-0.04 ***	0.01
Total Income					0.00 ***	0.00	0.00 **	0.00	0.00	0.00
Sought Treatment							1.98 ***	0.18	1.30 ***	0.18
Did Not Seek Treatment							1.07 ***	0.16	0.82 ***	0.15
Health Insurance							-1.38 **	0.45	-1.22 **	0.44
Check Up							-1.04 *	0.42	-0.72	0.41
Current Health									3.53 ***	0.21
Cons	33.88 ***	0.58	33.76 ***	0.73	35.81 ***	0.81	34.26 ***	0.81	26.10 ***	0.93
N	6838		6838		6838		6838		6838	
Adj R-squared	0.0083		0.0419		0.0480		0.0783		0.1151	

***p<.001 **p<.01 *p<.05

Table 5: Nested Regression of Poor Mental Health on Educational Attainment, 2010

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
High School	-3.73 ***	0.73	-3.72 ***	0.72	-2.86 ***	0.73	-2.87 ***	0.72	-2.40 ***	0.70
Some College	-3.30 ***	0.70	-3.87 ***	0.69	-2.62 ***	0.70	-2.75 ***	0.70	-1.71 *	0.68
BA or More	-4.86 ***	0.74	-5.91 ***	0.74	-3.82 ***	0.78	-3.85 ***	0.78	-1.63 *	0.76
Female			4.72 ***	0.39	4.20 ***	0.40	3.62 ***	0.42	3.42 ***	0.41
Black			-2.04 ***	0.49	-2.52 ***	0.49	-1.64 ***	0.49	-2.08 ***	0.48
Hispanic			-1.80 ***	0.51	-1.82 ***	0.50	-1.22 *	0.50	-1.94 ***	0.49
Mixed			0.20	1.99	-0.16	1.98	0.23	1.95	-0.28	1.89
Age (0-4)			0.24	0.14	0.30 *	0.14	0.27 *	0.14	0.20	0.13
Married			-4.64 ***	0.47	-4.37 ***	0.47	-4.12 ***	0.46	-3.77 ***	0.45
Div/Sep/Wid			1.39	0.96	1.38	0.95	1.19	0.94	1.35	0.91
Cohabiting			-2.80 ***	0.54	-2.58 ***	0.53	-2.63 ***	0.53	-2.74 ***	0.51
# Weeks Employed					-0.08 ***	0.01	-0.08 ***	0.01	-0.07 ***	0.01
Total Income					0.00	0.00	0.00	0.00	0.00	0.00
Sought Treatment							1.76 ***	0.20	0.98 ***	0.20
Did Not Seek Treatment							1.38 ***	0.17	1.07 ***	0.17
Health Insurance							-0.78	0.46	-0.71	0.44
Check Up							-1.05 *	0.42	-0.76	0.41
Current Health									4.10 ***	0.20
Cons	32.12 ***	0.62	32.75 ***	0.77	35.31 ***	0.82	34.06 ***	0.82	23.81 ***	0.94
N	6841		6841		6841		6841		6841	
Adj R-squared	0.0064		0.0416		0.0534		0.0805		0.1335	

***p<.001 **p<.01 *p<.05

Table 6: Relationship of Poor Mental Health on Educational Attainment Over Time

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
2006										
HS Only	-2.49 ***	0.66	-2.70 ***	0.66	-1.86 **	0.66	-1.62 *	0.65	-1.16	0.63
Some College	-3.33 ***	0.63	-4.23 ***	0.63	-3.07 ***	0.64	-2.75 ***	0.63	-1.74 **	0.62
BA or More	-4.51 ***	0.72	-6.21 ***	0.74	-4.79 ***	0.76	-4.07 ***	0.76	-2.18 **	0.75
2008										
HS Only	-2.61 ***	0.69	-2.60 ***	0.68	-1.99 **	0.69	-1.72 *	0.68	-1.35 *	0.66
Some College	-4.01 ***	0.66	-4.57 ***	0.65	-3.68 ***	0.67	-3.50 ***	0.66	-2.62 ***	0.65
BA or More	-4.92 ***	0.71	-6.17 ***	0.72	-4.81 ***	0.74	-4.45 ***	0.75	-2.50 ***	0.74
2010										
HS Only	-3.73 ***	0.73	-3.72 ***	0.72	-2.86 ***	0.73	-2.87 ***	0.72	-2.40 ***	0.70
Some College	-3.30 ***	0.70	-3.87 ***	0.69	-2.62 ***	0.70	-2.75 ***	0.70	-1.71 *	0.68
BA or More	-4.86 ***	0.74	-5.91 ***	0.74	-3.82 ***	0.78	-3.85 ***	0.78	-1.63 *	0.76

***p<.001 **p<.01 *p<.05

Table 7: OLS Model 5 of Poor Mental Health on Educational Attainment

	2006		2008		2010	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
High School	-1.16	0.63	-1.35 *	0.66	-2.40 ***	0.70
Some College	-1.74 **	0.62	-2.62 ***	0.65	-1.71 *	0.68
BA or More	-2.18 **	0.75	-2.50 ***	0.74	-1.63 *	0.76
Female	3.07 ***	0.40	3.76 ***	0.41	3.42 ***	0.41
Black	-1.86 ***	0.47	-1.27 **	0.47	-2.08 ***	0.48
Hispanic	-1.62 ***	0.48	-1.33 **	0.49	-1.94 ***	0.49
Mixed	1.50	1.89	-0.47	1.89	-0.28	1.89
Age (0-4)	-0.03	0.14	0.05	0.14	0.20	0.13
Married	-2.91 ***	0.48	-3.03 ***	0.46	-3.77 ***	0.45
Div/Sep/Wid	1.11	1.24	2.06 *	1.01	1.35	0.91
Cohabiting	-1.45 **	0.50	-1.96 ***	0.49	-2.74 ***	0.51
# Weeks Employed	-0.08 ***	0.01	-0.04 ***	0.01	-0.07 ***	0.01
Total Income	0.00	0.00	0.00	0.00	0.00	0.00
Sought Treatment Did Not Seek	1.42 ***	0.18	1.30 ***	0.18	0.98 ***	0.20
Treatment	1.10 ***	0.15	0.82 ***	0.15	1.07 ***	0.17
Health Insurance	-1.12 **	0.42	-1.22 **	0.44	-0.71	0.44
Check Up	-0.17	0.40	-0.72	0.41	-0.76	0.41
Current Health	3.59 ***	0.21	3.53 ***	0.21	4.10 ***	0.20
y2008						
y2010						
Cons	25.59 ***	0.89	26.10 ***	0.93	23.81 ***	0.94
Adj R-squared	0.1245		0.1151		0.1312	
N	6888		6838		6841	

***p<.001 **p<.01 *p<.05

Appendix B: Additional Tables of Analysis

Table A: Change in Coefficients from Mod 1 to 2

	Model 1	Model 2	Diff
2006	Coef.	Coef.	M2-M1
HS Only	-2.49 ***	-2.70 ***	-0.21
Some College	-3.33 ***	-4.23 ***	-0.90 ***
BA or More	-4.51 ***	-6.21 ***	-1.71 ***
2008	Coef.	Coef.	M2-M1
HS Only	-2.61 ***	-2.60 ***	0.01
Some College	-4.01 ***	-4.57 ***	-0.57 ***
BA or More	-4.92 ***	-6.17 ***	-1.25 ***
2010	Coef.	Coef.	M2-M1
HS Only	-3.73 ***	-3.72 ***	0.00
Some College	-3.30 ***	-3.87 ***	-0.57 ***
BA or More	-4.86 ***	-5.91 ***	-1.04 ***

***p<.001 **p<.01 *p<.05

Table B: Change in Coefficients from Mod 2 to 3

	Model 2	Model 3	Diff
2006	Coef.	Coef.	M3-M2
HS Only	-2.70 ***	-1.86 **	0.84 ***
Some College	-4.23 ***	-3.07 ***	1.16 ***
BA or More	-6.21 ***	-4.79 ***	1.42 ***
2008	Coef.	Coef.	M3-M2
HS Only	-2.60 ***	-1.99 **	0.62 ***
Some College	-4.57 ***	-3.68 ***	0.90 ***
BA or More	-6.17 ***	-4.81 ***	1.36 ***
2010	Coef.	Coef.	M3-M2
HS Only	-3.72 ***	-2.86 ***	0.86 ***
Some College	-3.87 ***	-2.62 ***	1.25 ***
BA or More	-5.91 ***	-3.82 ***	2.09 ***

***p<.001 **p<.01 *p<.05

Table C: Change in Coefficients from Mod 3 to 4

	Model 3	Model 4	Diff
2006	Coef.	Coef.	M4-M3
HS Only	-1.86 **	-1.62 *	0.24 *
Some College	-3.07 ***	-2.75 ***	0.32 *
BA or More	-4.79 ***	-4.07 ***	0.72 *
2008	Coef.	Coef.	M4-M3
HS Only	-1.99 **	-1.72 *	0.26
Some College	-3.68 ***	-3.50 ***	0.17
BA or More	-4.81 ***	-4.45 ***	0.36
2010	Coef.	Coef.	M4-M3
HS Only	-2.86 ***	-2.87 ***	0.00
Some College	-2.62 ***	-2.75 ***	-0.12
BA or More	-3.82 ***	-3.85 ***	-0.03

***p<.001 **p<.01 *p<.05

Table D: Change in Coefficients from Mod 4 to 5

	Model 4	Model 5	Diff
2006	Coef.	Coef.	M5-M4
HS Only	-1.62 *	-1.16	0.46 **
Some College	-2.75 ***	-1.74 **	1.01 ***
BA or More	-4.07 ***	-2.18 **	1.89 ***
2008	Coef.	Coef.	M4-M3
HS Only	-1.72 *	-1.35 *	0.37 *
Some College	-3.50 ***	-2.62 ***	0.88 ***
BA or More	-4.45 ***	-2.50 ***	1.95 ***
2010	Coef.	Coef.	M4-M3
HS Only	-2.87 ***	-2.40 ***	0.46 *
Some College	-2.75 ***	-1.71 *	1.03 ***
BA or More	-3.85 ***	-1.63 *	2.22 ***

***p<.001 **p<.01 *p<.05