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Are Educational Differences in U.S. Self-Rated Health Increasing?: An Examination by Gender and Race

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Abstract

Recent literature has documented changes in educational differences in health over recent time periods, across the life course, and by gender and race. We unite previous literature regarding period, age, gender, and race variations in educational health differences by examining how trends in educational differences in self-rated health have unfolded from 1982 to 2003 and whether or not such trends vary across gender and race groups. We use 22 years of pooled repeated cross-sectional data from the National Health Interview Survey to examine these trends among U.S. adults aged 35–79. Consistent with recent literature, we find a trend toward widening gaps in self-rated health by educational level in recent years for middle-aged and older adults but relatively stable or even slightly narrowing gaps in recent years for younger adults. All of these changes are in the context of generally improving health across this time period, particularly for persons with a college education. Moreover, we find that these trends differ to some degree by race and gender, with young adult black women being the only group among whom educational differences in health are converging. Our findings point to the continued need to address educational health disparities in the United States, which are increasing for most demographic subgroups despite the national goal of their elimination.

Keywords

Self-rated health; Education; Trend; Race; Gender; Age; USA; Health inequalities

The educational composition of the U.S. adult population changed quite remarkably in a positive manner over the 20th Century. By the end of the century, however, educational disparities in U.S. adult health remained very wide (Goesling, 2007; Lynch, 2003; Martin, Schoeni, Freedman, & Andreski, 2007). While educational differences in health have long been documented in the United States, their magnitude is not uniform across population subgroups. Indeed, at least four factors have been found to impact the magnitude of educational differences in health: (1) age (House, Kessler, Herzog, Mero, Kinney, & Breslow, 1990; Mirowsky & Ross, 2003); (2) period time (Goesling, 2007; Martin, Schoeni, Freedman, & Andreski, 2007); (3) race/ethnicity (Goldman, Kimbro, Turra, & Pebley, 2006); and (4) gender (Lin, Rogot, Johnson, Sorlie, & Arias, 2003). However, few studies have simultaneously examined the four factors to better understand the relationship between education and health in the United States. Here, we examine changes in the association between education and self-rated adult health between 1982 and 2003 in the United States, both for the general population as well as within gender and race subgroups, using data from the National Health Interview Surveys.

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Educational differences in health: review and conceptual framework

The association between education and health is one of the most robust relationships in social science, with substantial evidence indicating that there is a causal influence of education on health (Mirowsky & Ross, 2003). Even with substantial controls for family background and individual-level demographic characteristics, education strongly predicts adult health in a graded fashion (Mirowsky & Ross, 2003). This educational relationship with health has been shown to be increasing in recent years, especially among older U.S. adults (Goesling, 2007; Martin et al., 2007), suggesting that education is becoming even more important for health than perhaps ever before.

Educational attainment is a central dimension of human capital. The human capital perspective posits that a higher level of education is associated with better health because it increases effective agency, a sense of personal control over one's life, and learned effectiveness (Mirowsky & Ross, 2003; Ross & Wu, 1995). Educational attainment also provides resources far beyond the increased income associated with higher levels of education. In a broad sense, education helps individuals to learn by improving reading comprehension and writing skills, teaches individuals abstract reasoning skills, helps create a future-oriented outlook, and facilitates efficient problem solving skills (Mirowsky & Ross, 2003). Compared to less educated individuals, more highly educated individuals are more likely to exercise, more likely to abstain from tobacco use, and more likely to maintain a healthy body weight (Link & Phelan, 1995; Mirowsky & Ross, 2003). Further, higher levels of education help provide quicker and improved access to new health information and technologies that may improve overall health and longevity (Link & Phelan, 1995).

Individuals have been exposed to more sophisticated educational content now than ever before. More recent high school graduates, for example, have been exposed to many more ideas about health promotion and disease prevention than their peers twenty years ago. People are also much more likely to have learned about the hazards of smoking, the importance of diet and exercise, and the dangers of infectious diseases now than in the past (Lynch, 2003). All of these messages may have been particularly reinforced among those with higher levels of education, suggesting a strengthened relationship between education and health over time. Indeed, a number of studies report that the association between education and health has changed, both over time periods and across birth cohorts (Goesling, 2007; Lynch, 2003; Martin et al., 2007).

Two sets of studies have documented the changing patterns of educational differences in health, with one focused on period trends and the other focused on cohort trends. The first group examines period trends in educational differences in health. For example, based on data from the 1982–2003 National Health Interview Surveys, Martin et al. (2007) found slightly narrowing educational differences in self-rated health for adults aged 18–69 in the United States over the last two decades while, at the same time, showed a widening of educational differences in self-rated health over this time period for adults aged 70 and over. These period-based findings were echoed in another recent study by Goesling (2007). Goesling (2007) attributes the growing health disparities by education among older adults to rising inequality in economic resources, health behaviors, or access to health services. Race and gender differences, however, were not examined by either Goesling (2007) or Martin et al. (2007). Divergent period trends have also been found in studies on educational differences in *mortality*, especially among men (Feldman, Makuc, Kleinman, & Cornoni-Huntley, 1989; Pappas, Queen, Hadden, & Fisher, 1993; Preston & Elo, 1995).

The second group of studies focuses on cohort trends in educational differences in health. Lynch (2003) found that educational differences in self-rated health increased with age and

that this relationship has become stronger among more recent U.S. birth cohorts. Later, Lynch (2006) found no significant *net* change in the overall relationship between education and health across cohorts once income is taken into account. A recent study by Dupre (2007) suggested that education is more closely related to several diseases (e.g., hypertension, diabetes) among more recent birth cohorts. Mirowsky and Ross (2008) most recently used panel data from 1995 to 2001 and found that educational differences in health among U.S. adults not only increase with age, but also have been widening among more recent birth cohorts. Widening educational disparities are also evident in cohort studies on mortality trends (Lauderdale, 2001). Again, population subgroup differences were not examined in these cited cohort trend studies.

Here, we document the changing relationship between education and health among U.S. adults over the 1982–2003 period, while taking into consideration possible differences in the association between education and health over the adult life course as well as across race and gender groups. The central issues we focus on are: (1) whether we document a narrowing or widening of educational differences in health over the last two decades in the context of overall improvements in both education and longevity in recent years; and (2) whether age, gender, and race groups are experiencing different patterns with regard to trends in educational differences in health. Based on previous studies that generally, although not exclusively, find widening period and cohort trends in educational differences in health and mortality, our first and most general hypothesis is that educational differences in health are increasing over the 1982–2003 period in the United States. While very informative about trends in the association between education and health, none of the above cited studies on self-rated health (e.g., Goesling, 2007; Lynch, 2003, 2006; Martin et al., 2007; Mirowsky & Ross, 2008) consider possible gender and race differences in these education-health trends, while at least some grounds exist to expect potential differences in those trends, to which we now turn.

Education, gender, and health

The United States has experienced remarkable changes in education over the last several decades. In fact, the percentage of the populations aged 25 and older who were high school graduates increased from 41% in 1960 to 85% in 2003 (U.S. Bureau of the Census, 2005). These massive educational changes have also unfolded differentially by gender. Although men had greater access to higher education for most of the last century, gender gaps in education were reversed among more recent cohorts. As recently as 1960, women were awarded only 35% of bachelor's degrees in the United States, but by 1982, women were awarded more than 50% of bachelor's degrees and have since continued to outpace men on this measure (Buchmann & DiPrete, 2006). Nevertheless, women continue to lag behind men on some other key measures of education, such as the receipt of Ph.D.s (Jacobs, 1996). Women also continue to earn significantly less income based on their educational level compared to men (Hamil-Luker, 2005), although the overall income gap between men and women has slowly narrowed over the last 35 years (U.S. Bureau of the Census, 2004). Income inequalities by educational level among women, however, have grown wider than in the past (Hamil-Luker, 2005).

Gender differences are reflected not only in educational attainment and labor market rewards but also in health status. Although women live longer than men in the United States, women usually report poorer self-rated health and more hospitalization episodes than men over the life course (Case & Paxson, 2005). Gender differences in the distribution of chronic conditions are thought to be the key explanation for the overall worse self-rated health for women compared to men (Case & Paxson, 2005).

Changing gender differences in health status as well as educational attainment and labor market rewards suggest potential gender differences in period trends of educational differences in health. Indeed, research on mortality finds that educational differences in life expectancy are larger for men than for women (Lin et al., 2003), and that the educational gaps have increased

for men more so than for women (Preston & Elo, 1995). That is, the rewards and penalties associated with higher and lower levels of education are greater for men than for women. However, educational attainment for women has changed dramatically in the United States (Buchmann & DiPrete, 2006); further, women may also be experiencing greater payoffs to such education now than ever before—not only in the labor market but also in terms of health. Recent work by Schnittker (2007), for example, shows that not only have health reports for U.S. adult women improved on average over the last 30 years, but also that the gender gap in health reports has narrowed over this time period as well. Given this previous evidence, our second hypothesis is that educational gaps in health will have widened in recent years particularly for women, due to the especially increasing importance of education for labor market and income outcomes among women than ever before (Hamil-Luker, 2005).

Education, race, and health

The United States has witnessed a substantial narrowing in black-white gaps in educational attainment, particularly at the high school graduate level, in recent decades. In 1980, 69% of whites and 51% of blacks aged 25 and over were high school graduates. By 2003, the percentages were much higher and more similar: 85% for non-Hispanic whites and 80% for non-Hispanic blacks (U.S. Bureau of the Census, 2005). Despite these impressive gains, it is clear that quality differences in education by race continue to abound (Cook & Evans, 2000); further, rates of college completion by race, while narrowing recently, remain wide (Buchmann & DiPrete, 2006).

In addition, educational differences in life expectancy are larger for non-Hispanic blacks compared to non-Hispanic whites (Lin et al., 2003). This may be increasingly so now than ever before, because education has become an especially important stratifying variable within the African American community (Sakamoto, Wu, & Tzeng, 2000); that is, those without a high school degree are especially disadvantaged in the current labor market while those with a college degree, while still disadvantaged overall compared to whites, experience many more opportunities now compared to several decades ago (DiPrete & Buchmann, 2006). Thus, our third hypothesis is that educational differences in self-rated health will have widened for both non-Hispanic whites and non-Hispanic blacks across the study time period, but that this widening will be especially apparent among non-Hispanic blacks.

Taken together, our hypotheses suggest that relative educational differences in health are widening in recent years in the United States and that the widening trends are especially apparent among women and non-Hispanic blacks. Although previous studies are extremely valuable regarding our knowledge about trends in the overall relationship between education and health, most do not make comparisons across race and gender groups. Examining trends in the association between education and health, both for the whole population but also across race and gender groups, enables us to better understand the potentially dynamic development of health inequalities across demographic groups.

Data and methods

Data and analytic sample

Data are from pooled repeated cross-sectional National Health Interview Surveys (NHIS) from 1982 to 2003. The NHIS is a multistage probability sample survey conducted annually by the National Center for Health Statistics (NCHS) and is representative of the civilian non-institutionalized population of the United States (NCHS, 2000a). We apply weights from the different years of the NHIS in the analysis to allow our estimates to reflect the non-institutionalized population of the country across these years. Because NHIS did not provide a constant method for adjusting the design effects (NCHS, 2005), we treat each primary

sampling unit as a separate cluster within survey years that are characterized by the same sampling design (1982–1984, 1985–1994, and 1995–2003, respectively) and report significance tests and confidence intervals based on robust standard errors.

We restrict the lowest age of our analysis to be 35 because many individuals below 35 are still completing their education. We restrict the highest age of our analysis to 79 because beyond age 79, estimation bias from mortality selection is a much more salient issue and a significant fraction of the population at the oldest ages is institutionalized and, thus, not in the NHIS data. The NHIS collects health information of all household members in the survey, but usually only one person responds for all members (NCHS, 2000b). Due to concerns about the validity and reliability of proxy reports of health, we limit our analyses to primary household respondents only, which results in a more female-oriented sample than would otherwise be the case. Individuals with missing data on education or self-reported health (about 1%) are excluded from the analysis. We also restrict our analyses to those who identified as non-Hispanic white or non-Hispanic black (hereafter “white” and “black”) because of tremendous heterogeneity and limited sample sizes in the early NHIS years under study for other race/ethnic groups. The total number of observations used across the 22 years of data is 550,743.

Variables and measurement

Health—Our outcome variable is self-rated health. Between 1982 and 2003, the NHIS asked respondents to rate their health according to five categories, ranging from 1 (excellent) to 5 (poor). We recoded the health measure into two categories, which corresponds with much previous literature in the area (e.g., Goesling, 2007; Martin et al., 2007). The value of 0 indicates good, very good, or excellent health; the value of 1 indicates fair or poor health. Ordered logistic regression and OLS regression models using the full five-category health measure (not shown) revealed similar results.

Education—We classify education into four categories based on the highest year of schooling (before 1997) or highest degree completed (1997 and afterward). The education categories include: (1) college graduates (4 or more years of completed college in the 1982–1996 interviews, or a bachelor’s degree or higher in the 1997–2003 interviews); (2) some college (1–3 years of college in the 1982–1996 interviews, or some college or an associate’s degree in the 1997–2003 interviews); (3) high school graduates (12 years of completed schooling in the 1982–1996 interviews or a high school graduate or equivalent in the 1997–2003 interviews); and (4) no high school diploma (11 or fewer years of schooling in the 1982–1996 interviews or grades 1–11 and 12th grade with no diploma in the 1997–2003 interviews). College graduates serve as the reference group for this variable.

Period time—Period time is indicated by a variable identifying the survey year from 1982 (coded as 0) to 2003 (coded as 21).

Other covariates—The geographic region of respondents includes northeast, midwest, south, and west, with northeast serving as the reference category. We also include a control for the main effect of age (in one year units). Because the educational association with health depends in part on age, estimated trends may be biased if the age interaction with education is ignored. Thus, in order to take age patterns in the educational relationship with health into account, we separately examine age groups 35–49, 50–64, and 65–79 in our analyses. Within these age groups, we include a continuous variable for age as well as an interaction term of education by age in all of our models.

Table 1 presents descriptive information on the variables for the total sample as well as by gender and race in the pooled NHIS 1982–2003. Most of the respondents (83.3%) reported

good or better health in the total sample; just 16.7% rated their health as fair or poor. A total of 21.4% of the sample is a college graduate. Those with some college account for 21.5% of the total, while 36.0% of the respondents are high school graduates and 21.1% have no high school diploma. Whites account for about 88.4% of the sample, while blacks comprise about 11.6%. About 61.9% of the sample is female while about 38.1% is male. This distribution is more female-oriented than what might be expected because women were more likely than men to be the main household respondents in this survey. The mean age of the total sample is 53.8.

Table 1 also shows descriptive statistics for white men and women as well as black men and women separately. In comparison to their white counterparts, black men and women are younger on average but they have higher proportions of individuals reporting poor or fair health. Indeed, black women (29.6%) are most likely to report poor or fair health among the four race and gender groups, while white women have the lowest percentage (14.8%) reporting poor or fair health. As for the educational composition, white men have the highest proportion (27.7%) of college graduates followed by white women (19.4%), black men (14.2%), and black women (12.4%). The proportion of those with some college is relatively even across the four race and gender groups, at about 20–22%. White women have the highest proportion (39.4%) of high school graduates. Both black women (35.1%) and black men (35.2%) have higher proportions in the no diploma group compared with white women (19.3%) and white men (19.1%).

Statistical methods

To best understand period trends in the educational relationship with health, we estimate logistic regression models of self-rated health separately for three age groups: 35–49, 50–64 and 65–79. We do so for the overall sample as well as separately by gender and race. The model we estimate for each gender and race subgroup can be expressed in a simplified form as:

$$\log \frac{p}{1-p} = \alpha + \beta T + \sum \lambda_j E_j + \sum \gamma_j T E_j + \sum \pi_i X_i$$

where p represents the probability of reporting fair or poor health. T represents period time (i.e., survey year). E_j represents the set of dummy variables indicating education categories with the highest level of education (i.e., college graduates) serving as the reference category. The X_i term represents the other covariates in the model, including age (in one year units centered at 42 for the 35–49 age group, 57 for the 50–64 age group and 72 for the 65–79 age group) and region, as well as the interaction terms for education by age. In the models for the total sample, gender and race are also included in X_i . The intercept is α , while β , λ_j , γ_j , and π_i are the respective coefficients. Specifically, β indicates the period trend in self-rated health for college graduates and γ_j reflects the differences in self-rated health trends between each of the educational categories and college graduates. We conduct the analysis for the total sample for each age group and then separately for the four gender and race subgroups to best examine potential differences in education and health trends by gender and race.

Results

Estimated trends in education and health for the total sample

Table 2 shows the coefficients from logistic regression models for estimated trends in educational differences in self-rated health for the total sample over the 1982–2003 period. In Table 2, the large positive coefficients for the main effects of education indicate that the less educated have much higher odds of reporting fair/poor health compared to college graduates; and these main effects are larger for younger individuals than for older individuals—suggesting an intensified educational effect on health among younger adults. Again, these main effects

refer to the reference age within each age group (i.e., age 42 for the 35–49 age group, age 57 for the 50–64 age group, and age 72 for the 65–79 age group) in the baseline survey year (i.e., in 1982). The main effect of year is negative for the two older groups among the total sample. This suggests that for the age groups of 50–64 and 65–79, college graduates have become less likely to report poor/fair health over the 1982–2003 period, net of the effects of other covariates in the model. The negative interaction effect for no diploma by year for the age group of 35–49 indicates a narrowing of educational differences in health over the study period within this youngest age group. In contrast, the interaction effects for education and year are all positive for the age groups of 50–64 and 65–79. This suggests widening gaps in educational differences in health for these two older groups.

To aid with the interpretation of the interaction effects from logistic regression models, we calculate adjusted probabilities of reporting poor/fair health by education and selected survey years (i.e., 1982, 1992, and 2003) based on the estimates in Table 2. We present these results in Table 3 for ages 42, 57 and 72 as an example for each of the three age groups examined. These results show that for age 42, the probability of reporting poor/fair health decreased from 0.206 in 1982 to 0.195 in 2003 for the no diploma group, while it increased for all other higher education groups. This leads to a health convergence between the lowest education category and others from 1982 to 2003 for adults aged 42. Note, though, that lower educated individuals still have much higher probabilities of reporting poor/fair health than their higher educated peers across all survey years (and also for all ages).

For age 57, the probability of reporting poor/fair health decreased 27% (i.e., (0.070–0.051)/0.070) from 1982 to 2003 among college graduates; however, such decreases were much less pronounced among high school graduates (less than 1%) and among individuals without a high school diploma (about 3%). In contrast, the probability of reporting poor/fair health at age 57 increased from 0.108 in 1982 to 0.122 in 2003 for those with some college education. At age 72, individuals became less likely to report poor/fair health from 1982 to 2003 for all education categories, and this trend is most striking for college graduates. Specifically, at age 72, the probability of reporting poor/fair health decreased 44% from 1982 to 2003 for college graduates while it decreased only 19%, 28% and 10% for the some college, high school graduate and no diploma groups, respectively. All of these trends result in a widening health gap between college graduates and each of the lower educated groups for the two older age groups. Thus, our hypothesis about a general widening in educational differences in health over the last two decades is strongly confirmed for U.S. adults in the two older age groups. However, for the youngest age group, there was a slight narrowing of the educational health gap over this time period.

Gender and race variations

Table 4 presents the coefficients from logistic regression models that estimate trends in educational differences in health by gender and race groups. Panels A and B in Table 4 show the results for white men and white women, respectively. For both white men and white women, the negative main effects of year for the age groups of 50–64 and 65–79 indicate that college graduates have become less likely to report poor/fair health from 1982 to 2003 for these two older groups. For the 35–49 age group, educational gaps in health remained stable for white men from 1982 to 2003, whereas they widened for white women, particularly when comparing women who attained either high school degrees or some college with those who have college degrees. Additional analyses (not shown in the paper) that include three way interactions of education, gender and year indicate that these gender differences in health trends by education are statistically significant. The positive interaction effects for education and year indicate widening educational gaps in health for both white men and white women within the 50–64 and 65–79 age groups.

Panels C and D in Table 4 present the coefficients from logistic regression models for black men and black women, respectively. The significant negative coefficients for the main effects of year indicate that college graduates have become less likely to report poor/fair health from 1982 to 2003 for black men aged 50–64 and black women aged 65–79. The negative interaction effect of education and year for black women in the 35–49 age group suggests that educational differences in health narrowed for black women within the youngest age group. In contrast, the significant positive interaction effects of education and year among the two older age groups provide at least some evidence for widening educational gaps in health for both black men and black women. Note that there are fewer significant positive coefficients for the interactions of education and year for blacks (in Panels C and D) in compared to those for whites (in Panels A and B) in Table 4. This suggests that, contrary to our hypothesis, widening gaps are especially apparent among whites rather than blacks. Additional analyses (not shown in the paper) that include three way interactions of education, race and year indicate that these race differences are statistically significant.

To better illustrate the trends, we calculate the adjusted probabilities of reporting poor/fair health for each gender and race subgroup based on results in Table 4. Panels A and B in Table 5 show the adjusted probabilities for white men and white women, respectively. These results show that the probability of reporting poor/fair health remained relatively stable (with only minor increases) from 1982 to 2003 within each educational group for white men aged 42. For white women aged 42, the probability of reporting poor/fair health increased from 1982 to 2003 for each education group and the increase is more striking for those with some college (58%) and high school graduates (60%) than for college graduates (23%). This leads to a health divergence by education for white women (but not for white men) at the age of 42. This finding is somewhat supportive of our hypothesis that educational gaps in health may have widened in recent years particularly for women. Indeed, this is the case for white women in the youngest age group.

For white men aged 57, the probability of reporting poor/fair health decreased substantially from 1982 to 2003 for college graduates (29%), and to a much less extent, for those with some college (5%), high school graduates (6%), and no diploma (1%). For white women aged 57, the probability of reporting poor/fair health decreased for college graduates while it increased for each of the lower educated groups from 1982 to 2003. For both white men and white women aged 72, the probability of reporting poor/fair health decreased for each education group but the decreasing trend is most striking for the highest education category. Specifically, from 1982 to 2003, the probability of reporting poor/fair health decreased 46% for college graduates, 16% for some college, 27% for high school graduates, and 17% for the no diploma group among white men aged 72. Reports of poor/fair health decreased 40% for college graduates, 24% for some college, 29% for high school graduates, and 6% for the no diploma group among white women aged 72. All of these trends indicate widening health gaps between college graduates and each of the lower educated groups within the two older age groups for both white men and white women.

Panels C and D in Table 5 show the adjusted probabilities of reporting poor/fair health for black men and black women, respectively, based on results in Table 4. These results show that the probability of reporting poor/fair health decreased for black men of all education and age groups. However, the decreasing trend only attains statistical significance for the middle-aged group (see Panel C in Table 4). For black men aged 57, the probability decreased 47% for college graduates, 21% for some college, 13% for high school graduates, and 11% for the no diploma group between 1982 and 2003. The more rapid decrease in reporting poor/fair health among higher educated individuals leads to a health divergence by education for black men in the middle age group.

For black women aged 42, the probability of reporting poor/fair health increased modestly for college graduates while it decreased for each of the lower education groups—leading to a health convergence between college graduates and the lower educated groups. For black women aged 57, the probability of reporting poor/fair health increased for the two higher education categories while it decreased for the two lower education categories from 1982 to 2003. Note, though, that the convergent health trends by education do not attain statistical significance for black women within the middle-aged group (see Panel D in Table 4). For black women aged 72, we see a dramatic decrease in the probability of reporting poor/fair health from 1982 to 2003 for college graduates (59%), but more modest decreases for those with some college (11%) and for high school graduates (22%). For black women aged 72 without a high school diploma, reports of poor/fair health remained about 70% across the time period. Together, these trends result in widening health gaps by education for older black women.

Discussion and conclusion

There continue to be major concerns regarding the magnitude of, and changes in, socioeconomic disparities in health in the United States, with the overall goal of eliminating such disparities in the context of improving health for all. Are educational differences in self-rated health increasing or decreasing in the United States from 1982 to 2003? Our results show that the answer to this question depends on age and, to some degree, race and gender. Consistent with Goesling (2007) and Martin et al. (2007), we find that educational differences in health are diverging in recent years for older adults, while they are relatively stable or even slightly converging for younger adults. More importantly, our results add the new evidence to the literature showing that trends in educational differences in health differ to some degree by gender and race. Among white women, health gaps by education widened from 1982 to 2003 for each age group examined. Among white men, educational health disparities widened for middle-aged and older men between 1982 and 2003, but remained constant for younger men. Among black women, educational health gaps widened considerably for the elderly, but actually converged among young adults. And among black men, there was evidence of increasing health inequality by education among the middle-aged. Thus, all told, most of these demographic subgroups experienced increasing health inequality by education between 1982 and 2003, with the only observed convergence occurring among young black women. Again, this is in a context where the probability of reporting poor/fair health was shown to be decreasing for most subgroups across the period, and particularly so among college graduates.

Additional analyses (not shown in the paper) using a relative measure of education (i.e., dividing the sample into four quartiles based on years of schooling) revealed a similar pattern in terms of slightly narrowing health gaps by education for younger individuals and widening gaps for older individuals, although such a relative measure, to some extent, strengthened the convergent trends and weakened the divergent trends. These results, which are consistent with Goesling (2007), provide evidence that changes in the composition of education categories over time do not fully explain the trends we observed, although such compositional trends are both sizable and important.

The divergent health trends by education among older individuals are very robust for most race and gender subgroups. Several factors may contribute to the divergent health trends by education in recent years for the older population groups. For example, some evidence suggests that education may increasingly be working through more favorable income levels to influence health outcomes (Lynch, 2006). Others suggest that education in the information age of today is increasingly associated with a greater sense of control over our lives, and thus may more strongly predict health outcomes now than in the past when education was less tied to social and psychological benefits across the life course (Mirowsky & Ross, 2003, 2008). Widening health disparities by education in old age suggest that the costs of low education and the benefits

of high education have a cumulative effect over the life course and increasingly so now than in the past.

Our study is not without limitations. First, the measure of self-rated health status may pose unique problems for an analysis of historical trends. With recent overall improvements in medical technology and health knowledge, individuals may be better informed about their health status than ever before and, thus, provide more accurate reports of health than ever before. Moreover, the standard of being in good or better health may have changed over time. Despite these limitations, self-rated health is a reliable and valid measure for health status for both women and men and it is a strong predictor for mortality (Franks, Gold, & Fiscella, 2003; Idler & Benyamini, 1997). Our study is valuable in informing us about period changes in educational inequalities in this often-utilized measure. Indeed, we will next move to the examination of mortality as the outcome variable to minimize issues of possibly changing health standards. Second, we restricted the lowest age of our analysis to be 35 because many individuals below 35 are still completing their education; indeed, continuing education even beyond age 35 is no longer rare in the United States; this is more so for whites than blacks (Hamil-Luker & Uhlenberg, 2002). Our study is also limited in that explanations for the health trends we reported remain under-developed. Future studies should focus on trying to best understand the explanations behind the widening disparities among the middle-aged and older populations, so that we not only can achieve better health for all, but also a distribution of health that is more equitable for people of all sociodemographic groups.

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Table 1
Descriptive statistics of variables in the analysis, National Health Interview Surveys 1982–2003

	Total	NHW men	NHW women	NHB men	NHB women
Age					
Mean (standard deviation)	53.8 (12.8)	54.1 (12.7)	54.0(12.9)	51.8 (12.2)	51.8 (12.3)
Respondent-reported health (%)					
Fair or poor	16.7	15.9	14.8	25.6	29.6
Good, very good, or excellent	83.3	84.1	85.2	74.4	70.4
Education (%)					
College graduate	21.4	27.7	19.4	14.2	12.4
Some college	21.5	21.3	21.9	20.3	20.2
High school graduate	36.0	31.9	39.4	30.3	32.4
No diploma	21.1	19.1	19.3	35.2	35.1
Race (%)					
Non-Hispanic white	88.4	-	-	-	-
Non-Hispanic black	11.6	-	-	-	-
Gender (%)					
Male	38.1	-	-	-	-
Female	61.9	-	-	-	-
Region (%)					
Northeast	21.6	21.7	22.2	17.9	18.3
Midwest	26.0	26.3	27.2	19.8	19.5
South	34.8	32.2	32.5	52.5	54.6
West	17.6	19.8	18.1	9.8	7.6
Total number of observations	550,743	177,839	294,597	26,172	52,135

Table 2

Regression coefficients for period trends in educational differences in poor/fair health from logistic regression models, 1982–2003

	Age 35–49	Age 50–64	Age 65–79
<i>Main effects</i>			
Education			
(ref = college graduate)			
Some college	0.79 ***	0.44 ***	0.20 ***
High school graduate	1.16 ***	0.83 ***	0.54 ***
No diploma	2.35 ***	1.89 ***	1.15 ***
Period year	0.01	−0.02 ***	−0.03 ***
(in one year units)			
Age (in one year units)	0.05 ***	0.05 ***	0.05 ***
Female (ref = male)	0.01	−0.15 ***	−0.12 ***
Non-Hispanic black	0.66 ***	0.67 ***	0.55 ***
(ref = non-Hispanic white)			
Region (ref = northeast)			
Midwest	0.19 ***	0.13 ***	0.13 ***
South	0.33 ***	0.45 ***	0.43 ***
West	0.25 ***	0.21 ***	0.15 ***
<i>Interaction effects</i>			
Education × year			
Some college × year	0.00	0.02 ***	0.02 ***
High school graduate × year	0.00	0.02 ***	0.01 **
No diploma × year	−0.01 *	0.01 ***	0.02 ***
Education × age			
Some college × age	0.00	−0.01	−0.02 ***
High school graduate × age	−0.00	−0.01	−0.03 ***
No diploma × age	−0.00	−0.02 ***	−0.06 ***
Intercept	−3.77 ***	−2.59 ***	−1.74 ***
Pseudo R^2	0.09	0.10	0.06
N	237,879	171,998	140,866

Two-tailed tests:

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

Age is centered at 42 for age group 35–49, 57 for age group 50–64 and 72 for age group 65–79.

Table 3

Adjusted probabilities of poor/fair health by education and age for total sample

	College graduate	Some college	High school graduate	No diploma
Age 42				
1982	0.025	0.055	0.073	0.206
1992	0.026	0.060	0.079	0.200
2003	0.028	0.067	0.088	0.195
Age 57				
1982	0.070	0.108	0.152	0.317
1992	0.060	0.115	0.150	0.305
2003	0.051	0.122	0.151	0.306
Age 72				
1982	0.149	0.253	0.338	0.520
1992	0.114	0.234	0.287	0.476
2003	0.084	0.206	0.245	0.470

Gender and race are set at their means.

Table 4

Regression coefficients for period trends in educational differences in poor/fair health from logistic regression models by gender and race groups, 1982–2003

	Age 35–49	Age 50–64	Age 65–79	Age 35–49	Age 50–64	Age 65–79
A. Non-Hispanic white men			B. Non-Hispanic white women			
Education (ref = college graduate)						
Some college	0.82***	0.61***	0.23*	0.66***	0.28***	0.22*
High school graduate	1.32***	0.95***	0.62***	1.00***	0.73***	0.52***
No diploma	2.36***	1.94***	1.21***	2.36***	1.86***	1.19***
Period year (in one year units)	0.00	-0.02***	-0.03***	0.01	-0.02***	-0.03***
Education × year						
Some college × year	0.01	0.02**	0.02***	0.01*	0.03***	0.01
High school graduate × year	-0.00	0.02**	0.01*	0.01*	0.02***	0.01
No diploma × year	-0.00	0.01**	0.01*	-0.00	0.02***	0.02***
N	74,040	56,874	46,925	126,523	90,491	77,583
C. Non-Hispanic black men			D. Non-Hispanic black women			
Education (ref = college graduate)						
Some college	0.83**	0.27	0.38	1.03***	0.64**	-0.32
High school graduate	1.05***	0.55*	0.89*	1.42***	1.21***	0.17
No diploma	1.92***	1.42***	1.15**	2.31***	2.02***	0.46*
Period year (in one year units)	-0.02	-0.03**	-0.02	0.00	0.01	-0.05***
Education × year						
Some college × year	-0.01	0.02	0.02	-0.02*	0.00	0.04*
High school graduate × year	0.01	0.03*	-0.01	-0.02*	-0.02	0.03
No diploma × year	0.00	0.02	0.00	-0.03*	-0.02	0.05**
N	12,179	8411	5582	25,137	16,222	10,776

Two-tailed tests:

*
p < 0.05

 $p < 0.01$

 $p < 0.001$.

Age (in one year units), region, and education $\times$ age are controlled in the models.
Age is centered at 42 for age group 35–49, 57 for age group 50–64 and 72 for age group 65–79.

Table 5
Adjusted probabilities of poor/fair health by gender and race groups

	College graduate	Some college	High school graduate	No diploma	College graduate	Some college	High school graduate	No diploma
A. Non-Hispanic white men								
Age 42								
1982	0.022	0.050	0.070	0.165	0.022	0.043	0.057	0.207
1992	0.023	0.056	0.071	0.166	0.024	0.053	0.072	0.216
2003	0.023	0.063	0.073	0.173	0.027	0.068	0.091	0.224
Age 57								
1982	0.069	0.129	0.173	0.315	0.060	0.077	0.114	0.286
1992	0.058	0.128	0.165	0.302	0.051	0.088	0.118	0.287
2003	0.049	0.123	0.162	0.311	0.043	0.102	0.121	0.290
Age 72								
1982	0.146	0.307	0.301	0.510	0.130	0.204	0.340	0.515
1992	0.110	0.291	0.258	0.452	0.102	0.182	0.285	0.477
2003	0.079	0.258	0.220	0.424	0.078	0.155	0.242	0.482
C. Non-Hispanic black men								
Age 42								
1982	0.047	0.123	0.158	0.234	0.056	0.126	0.176	0.353
1992	0.039	0.090	0.147	0.207	0.058	0.112	0.151	0.303
2003	0.032	0.066	0.132	0.182	0.061	0.094	0.129	0.256
Age 57								
1982	0.158	0.251	0.292	0.401	0.116	0.159	0.284	0.506
1992	0.118	0.236	0.265	0.364	0.121	0.162	0.266	0.479
2003	0.084	0.198	0.253	0.358	0.128	0.182	0.239	0.442
Age 72								
1982	0.190	0.210	0.522	0.546	0.336	0.591	0.669	0.695
1992	0.163	0.204	0.429	0.497	0.227	0.580	0.588	0.676
2003	0.136	0.203	0.343	0.473	0.138	0.528	0.519	0.709
D. Non-Hispanic black women								