Trends in self-rated health by union status and education, 2000–2018

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ABSTRACT

Previous research has documented changes in health differentials by marital status over time. However, recent shifts in family patterns and continuing socioeconomic changes necessitate analyses of more recent changes in union status and self-rated health. Using pooled data from the 2000–2018 National Health Interview Survey (n = 788,829), this study examines educational differences in trends in self-rated health among married, cohabiting, previously-married, and never-married adults. The results of a series of logistic regression models show increasing divergence in self-rated health by union status and by education, driven mostly by declining self-assessed health in middle educational strata (high school graduate and some college), and among single adults, particularly never-married adults. The findings add to the growing evidence of increasing social class divide in family and health outcomes. Evolving trends in self-rated health by union status and education have important implications for programs promoting health and wellbeing across families.

1. Introduction

1.1. Union status and health

A large body of research has established a strong link between social relationships and health (Carr & Springer, 2010; Umberson & Thomeer, 2020). Married people seem to enjoy certain health-enhancing psycho-social and economic benefits that are not readily available to their unmarried counterparts. As such, compared to unmarried adults, married persons are healthier and live longer on average (Ross & Wu, 1996). The health-promoting effect of marriage may be due to access to economic resources and social support by virtue of being married or a product of spousal control over individuals' health behavior—*social causation* (Waite & Gallagher, 2001). Alternatively, the health advantage among married persons can be attributed to the higher propensity to marry and to stay married among individuals with certain characteristics (e.g. better health and greater access to resources) that promote marriage and health—*social selection* (Lillard & Panis, 1996). The stress of union dissolution may also leave previously-married individuals in poorer health, relative to stably-married adults (Hughes & Waite, 2009). This is known as *the stress perspective*. Longitudinal research suggests limited health-promoting effect of marriage that is largely explained by selection effect and union instability (Kalmijn, 2017; Musick & Bumpass, 2012). Nonetheless, married persons have better self-rated health than cohabiting, previously-married, and never-married adults (Denney et al., 2013; Hughes & Waite, 2009; Liu & Umberson, 2008; Williams & Umberson, 2004).

Analyses of trends in self-rated health by marital status show a divergence in self-rated health of married and previously-married adults and a convergence in self-rated health of married and never-married respondents over time (Liu & Umberson, 2008). Along this line, a recent study (Liu, 2012) shows increased negative effect of divorce on self-rated health between the 1940s cohort and the 1950s cohort. A possible explanation for the convergence in health between married and never-married adults revolves around declining economic advantage and, therefore, health benefits that married people enjoy over their never-married counterparts. As never-married status becomes more normative (Wang & Parker, 2014), never-married individuals may be increasingly less selective of characteristics that predispose them to poorer health and they may have greater access to social resources through potentially bigger and more supportive networks of family and friends. Research suggests that the health of previously married adults is primarily linked to the stress of union dissolution (Hughes & Waite, 2009; Liu, 2012; Williams & Umberson, 2004), but there is little evidence of an increase in strains of marital dissolution over time. Nonetheless, growing diversity in American families and continuing socioeconomic changes warrant further research on trends in union status and health.

Marriage rate for American adults declined from a peak of 72% in 1960 to 50% in 2016 (Parker & Stepler, 2017). Divorce has been declining among younger age groups (Allred, 2019) but recent analyses show increasing divorce rates among persons aged 45 and above (Allred,

2019). As an increasing share of marriages end in divorce, the share of previously-married adults increases over time, from 32% of ever-married adults in 1980 to 43% in 2013 (Livingston, 2014). Remarriage rates are declining, especially among divorced older adults who are increasingly choosing to cohabit instead of remarrying (Brown et al., 2019). Age at first marriage and the share of never-married adults are at historic high levels (Manning et al., 2014; Wang & Parker, 2014). Cohabitation is also gaining momentum among both never-married and previously-married adults but the increase is more pronounced among never-married adults (Lamidi, 2015). More so, as economic inequality heightens, socioeconomic status is increasingly associated with marital status (Parker & Stepler, 2017; Wang & Parker, 2014). In view of these changes, this study reexamines trends in self-rated health by union status.

Building on previous work, I documented recent trends in self-rated health of cohabiting adults, relative to married and unpartnered adults. There is a growing research on the health of cohabitors. However, analyses of trends in self-rated health of cohabiting adults are sparse. Both cohabitation and marriage promote health (Musick & Bumpass, 2012) and being in a partnership (marriage or cohabitation), relative to being single, predicts better self-rated health (Perelli-Harris et al., 2018). Yet, cohabiting adults have significantly worse self-assessed health than their married counterparts (Denney et al., 2013). Recent findings suggest that the poorer health of cohabitors could be attributed to the poorer socioeconomic conditions of cohabiting adults and the longer duration of marital relationships, relative to cohabitation (Perelli-Harris et al., 2018). Analyses of shifts in cohabitation reveal not only an increase in education among cohabiting adults but also lengthening of cohabiting unions (Kuo & Raley, 2016; Lamidi et al., 2019). Increasing duration of cohabiting union, coupled with growing rates of childbearing among cohabiting couples, suggest that cohabitation is becoming more institutionalized in the U.S. (Lamidi et al., 2019). Thus, the health of cohabiting and married adults may be converging.

1.2. Education and health

The educational differentials in health is widely documented. Highly educated persons tend to have better health, live longer, and have fewer health conditions (Conti et al., 2010; Cutler & Lleras-Muney, 2014; Miech et al., 2011; Ross & Wu, 1995). Also, college graduates have better self-rated health than persons with no college degree (Liu & Umberson, 2008; Marquez-Velarde et al., 2020; Ross & Wu, 1995). Educational differentials in health are mostly attributable to the selection effect as well as causal effect of education on health and health behaviors. The selection hypothesis posits that healthy people are more likely to attain higher levels of education partly because adult health is associated with certain confounding individual-level and background characteristics that predict both education and health (Lynch & von Hippel, 2016). For instance, healthier children with greater access to parental and/or other resources may obtain more years of schooling and therefore have better health in adulthood (Conti et al., 2010; Cutler & Lleras-Muney, 2014). Even so, there are more evidences in support of a causal relationship between education and health than in support of the selection hypothesis (Cutler & Lleras-Muney, 2014).

Causal explanations for the education gradient in health point to the effects of education on occupation and income (*the economic model*), socio-psychological resources like social networks and sense of control, health behaviors or lifestyle, access to health coverage, cognitive ability, and knowledge or skills related to health (Cutler & Lleras-Muney, 2014; Ross & Wu, 1995). Higher education affords individuals access to better health through health-care coverage, diet, exercise, better use of health information and technologies, and health behaviors that may or may not be connected to their (more educated) networks and peers (Cutler & Lleras-Muney, 2014).

Some findings suggest heightening health-promoting effect of education on health over time. For instance, disparity in life expectancy at age 25 between college-educated and non-college-educated adults was less than three years in 1980; by 2000, college-educated persons lived seven years longer than those who did not attend college (Cutler & Lleras-Muney, 2014). Similarly, Miech et al. (2011) documented increasing mortality rates at the lowest level of education (less than 12 years) but a declining mortality rate among those with 16 or more years of schooling, with both trends culminating in widening educational disparity in mortality rates between 1989 and 2007. However, previous analyses of trends in educational differentials in self-rated health between 1982 and early 2000s showed stable or slightly narrowing disparities in health across levels of education due to health improvement among young adults with no high school diploma (Goesling, 2007; Liu & Hummer, 2008). A recent analysis (Case & Deaton, 2015) shows increased mortality and worsened self-rated health among middle-aged non-Hispanic white adults between 1997 and 2013.

Recent socioeconomic changes necessitate further analyses of trends in self-rated health by education. The new "college for all" norm in America demonstrates a growing expectation for young people to achieve college education (Goyette, 2008). Along this line, the proportion of American adults aged 25–29 with a bachelor's degree or higher, more than doubled from 16% in 1970 to 36% in 2017 (U.S. Department of Education 2018). Increasing educational attainment coincides with falling employment and wages among men and less-educated Americans thereby widening the social class divide in various aspects of life (Cherlin, 2014; Wang & Parker, 2014). Wage increase among college graduates has either stalled or slowed down, suggesting stability in recent self-rated health trends among college graduates. Whereas the earnings of workers with graduate degree, relative to high school graduates, continued its upward trend from the 1970s, the rise in earnings of workers with college degree, peaked around 1987 (Autor et al., 2008). Yet, the positive effects of education on earnings persist (Tamborini et al., 2015) and economic returns to higher education have grown over time (Bloome & Western, 2011; Kaymak, 2009). Younger cohorts of American adults report larger college earnings premium than older ones (Brand & Xie, 2010; Kaymak, 2009).

Moderately-educated adults may have been more negatively affected (than both college graduates and those with no high school diploma) by the new hourglass economy due to increasingly limited opportunities at the middle of the labor market (Cherlin, 2014). According to the polarization hypothesis (Autor et al., 2008; Goos & Manning, 2007), labor market changes of the past few decades (e.g. computerization of job tasks) "may have raised demand for skill among higher-educated workers, depressed skill demands for middle-educated workers, and left the lower echelons of the wage distribution comparatively unscathed" (Autor et al., 2008, p. 318). Unsurprisingly, family changes have been more pronounced among American adults with high school diploma or some college education (Manning et al., 2015), even as family behaviors of both groups converge over time (Allred, 2018). In light of changing economic conditions, growing importance of higher education, and changing educational composition in the U.S., I examined trends in self-rated health by education from 2000 to 2018.

1.3. Education, union status and health

In the past several decades, America has witnessed economic and sociocultural shifts toward growing economic inequality (Cherlin, 2014). According to the diverging destinies perspective (McLanahan, 2004), most of the family changes of the past few decades have affected people of varying socioeconomic strata differently thereby precipitating a growing social class divide in American family outcomes. The diverging destinies hypothesis posits that the forces driving the trends of the second demographic transition (e.g. declining marriage) precipitate different family experiences across social class, with possible health implications.

In line with the diverging destinies perspective, scholars have widely documented growing educational divergence in family outcomes

including marriage (Parker & Stepler, 2017; Torr, 2011), divorce (Martin, 2006), cohabitation (Kuo & Raley, 2016; Lamidi et al., 2019), and childbearing (Manning et al., 2015). In the past, college education lowered women's chances of marriage but by 2000, college-educated women were more likely to marry than their lower-educated counterparts (Torr, 2011). Educational disparity in marital status has grown since 2000 (Parker & Stepler, 2017), partly due to more marked delay in marriage at lower levels of education (Manning et al., 2014). The share of college graduates who are married had remained steady for over three decades (Allred, 2018). Similarly, the decline in divorce over the past few decades occurred mostly among women with 4-year college education or higher (Martin, 2006). As the economic and social standards of marriage have increased over time, the resources required to meet the new expectations of marriage (e.g. stable employment, befitting wedding, and a house) have been unattainable by many disadvantaged Americans (Gibson-Davis et al., 2005).

The growing educational divergence in marriage rates among cohabitors results from the declining rates of transitioning to marriage from cohabiting union among cohabiting couples with no college degree (Kuo & Raley, 2016; Lamidi et al., 2019). Between 1980 and 2013, nonmarital childbearing increased more rapidly among high school graduates and women with some college education, than among college-educated women (Manning et al., 2015). College-educated women are less likely to give birth outside of marriage than their lower-educated counterparts (Lamidi, 2016) and when they do so, majority of those births occur within cohabiting unions (Manning et al., 2015). As education continues to shape the different aspects of family life, it is important to examine the health implications of the growing educational divergence in family outcomes. This study examines disparities in trends in self-rated health by union status and education among American adults (aged 30–69) between 2000 and 2018. I assessed whether the trends in self-rated health by marital status and education shown in the 1980s and in the 1990s continued into the later part of the twenty-first century. I extended previous literature in two important ways: 1) I documented trends in self-rated health of married, cohabiting, previously-married, and never-married adults 2) I examined the health implications of growing socioeconomic inequality in family patterns by analyzing trends in self-rated health by union status across levels of education.

2. Data and methods

2.1. Data and sample

This research utilizes pooled data from the 2000 to 2018 National Health Interview Survey (NHIS) (Lynn et al., 2019). The NHIS is a nationally representative survey of noninstitutionalized American population conducted annually by the National Center for Health Statistics (NCHS), a part of the Center for Disease Control and Prevention (CDC). The NHIS has been the major source of information about health status, health behaviors, health services utilization, and health-care access among American adults and children since 1957. Detailed information about the NHIS design and sampling procedures are available through the NCHS.

I estimated trends in self-rated health by education and union status among non-Hispanic white, non-Hispanic black, and Hispanic adults aged 30–69. I excluded 59,598 persons who identified with other racial/ethnic groups from the sample. Some racial/ethnic groups could not be consistently identified over the survey years. I also excluded from the sample, 1059 Hispanic respondents with unknown nativity status, 655 of whom had missing information on other variables in the analysis. Similar to previous work (Goesling, 2007), I limited the analyses to respondents aged 30 and above to allow ample time for college graduation. I minimized old age effects on health by focusing on respondents under the age of 70. Lastly, I limited the sample to only persons with valid reports of self-rated health, union status, and education (97% of

the sample). The final analytic sample comprises of 788,829 men and women aged 30–69. Analyses based on a random subset of the original sample (n = 157,766 or about 8000 respondents per survey year) produced similar results as those presented in this paper.

2.2. Measures

The dependent variable is self-rated health, a widely used measure of general health (Denney et al., 2013). Respondents rated their health on an ordinal scale of five, ranging from "excellent" (1), "very good" (2), "good" (3), "fair" (4), to "poor health" (5). Consistent with prior work (e. g. Marquez-Velarde et al., 2020) and for easy interpretation of results, I dichotomized the health variable with a value of "0" indicating excellent, very good, and good health and a value of "1" denoting poor or fair health. I controlled for proxy reports in the multivariate analyses using a dummy variable coded "1" for primary respondents and "0" for proxy reports. Primary respondent status is an imperfect proxy for self-response in the NHIS. The survey selects one adult to be the primary respondent for the family and provide information for all children and adult family members. Adult members of the family who are home at the time of the interview may respond for themselves, but this does not necessarily mean that they do. Limiting the analyses to only primary respondents produced essentially the same trends as those reported in this paper.

The main predictors are *year, union status,* and *education*. I presented trends in self-rated health by union status and education over the past two decades (2000–2018). I assessed self-rated health across four union statuses: married (reference), cohabiting, previously married, and never married. I compared self-rated health among college graduates to those of persons with no high school diploma (1), high school graduates (2) and those with some college education (3).

I included key sociodemographic characteristics (*age, gender, race/ethnicity, presence of children, employment status, and region of residence*) associated with self-rated health (Denney et al., 2013; Goesling, 2007; Liu & Hummer, 2008; Liu & Umberson, 2008; Marquez-Velarde et al., 2020). The odds of fair/poor self-rated health increases with age (Denney et al., 2013). Men have better self-rated health than women (Liu & Umberson, 2008) and transitions into first marriage are associated with significantly greater health benefits for men than women (Williams & Umberson, 2004). Studies have also shown lower odds of good self-rated health among African-Americans and Hispanics than among Whites (Denney et al., 2013; Hughes & Waite, 2009; Ross & Wu, 1995). However, relative to their native-born counterparts, foreign-born Hispanics have lower odds of fair or poor health (Marquez-Velarde et al., 2020). Having children in the household has significant protective effect on adult health (Denney et al., 2013) but unemployment is associated with significantly higher odds of fair/poor health (Marquez-Velarde et al., 2020). Scholars have widely documented regional variations in self-rated health in the United States (Denney et al., 2013; Liu & Hummer, 2008). The Great Recession of 2008 and 2009 had detrimental effects on health (Margerison-Zilko et al., 2016).

Age was measured in years and centered around the mean. Gender was coded "1" for female respondents and "0" for male respondents. I assessed self-rated health among non-Hispanic white (reference), non-Hispanic black, foreign-born Hispanic, and native-born Hispanic adults. Presence of children indicates whether respondents reported having no children (reference), one or more preschool-aged children (<5 years), or older children (no preschool-aged children) in the household. Employment status is measured in four categories: currently working/with a job (reference), unemployed, not in the labor force, and unknown employment status. The four regions of residence included in the NHIS are northeast (reference), midwest, south, and west. I controlled for differences in health prior to (2000–2007, reference), during (2008 and 2009), and after (2010–2018) the 2008–2009 recession.

2.3. Analytic strategy

I presented summary statistics for all the predictors in the analyses in Table 1. Next, I summarized the percent of respondents reporting fair or poor health at the beginning (2000) and at the end (2018) of the study period (Table 2). I then examined trends in self-rated health by union status and by education in a series of logistic regression models. Model 1 estimates trends in the odds of fair or poor self-rated health by union status; Model 2 presents educational trends; and I jointly estimated trends in self-rated health by union status and by education in Model 3. Similar to previous work (Liu & Umberson, 2008), I included the interaction between age and union status in all models. According to the life course perspective, certain union statuses (e.g. never-married) are more normative at specific stages of the life course (Elder, 1975). Thus, the association between union status and self-rated health may depend on the age of respondent (Liu, 2012; Williams & Umberson, 2004). Similarly, I included interaction terms for age and education in all three models. The association between education and health is dependent on age (Liu & Hummer, 2008).

I included in the regression models, a total of 39 two-way interaction terms (nine in each of Modules 1 and 2, 21 in Module 3) and nine three-way interactions (all in Module 3). Twenty-eight two-way interactions

Table 1
Weighted descriptive statistics for variables analyzed.

Variables	Mean/Percentage
Self-rated health	
Excellent/very good/good	87.34
Fair/poor	12.66
Union status	
Married	66.50
Cohabiting	6.14
Previously married	16.50
Never married	10.86
Education	
No high school diploma	10.97
High school graduate	30.06
Some college	28.56
College graduate	30.41
Age	48.13 (10.94)
Age centered	0.20 (10.94)
Gender	
Male	48.76
Female	51.24
Race/ethnicity	
Non-Hispanic white	73.81
Non-Hispanic black	12.16
Foreign-born Hispanic	8.61
Native-born Hispanic	5.42
Number of children	
No children	50.45
One or more Preschool-aged children	11.51
Only older children	38.04
Employment status	
Working/with job	71.28
Unemployed	3.35
Not in labor force	24.88
Unknown employment status	0.49
Region of residence	
Northeast	18.47
Midwest	23.30
South	37.43
West	20.80
Recession	
Pre-recession	39.52
Recession	10.56
Post-recession	49.92
Respondent	
No	42.54
Yes	57.46

Source: IPUMS Health Surveys: National Health Interview Survey (NHIS) 2000–2018; n = 788,829; standard deviation in parentheses

Table 2
Percent reporting fair or poor health in 2000 and 2018 by education and union status.

	No high school diploma	High school graduate	Some college	College graduate
Panel 1: Year = 2000				
Married	25.08	10.25	7.28	3.44
Cohabiting	27.31	12.02	10.19[a]	5.37
Previously married	38.20[a]	16.52[a]	13.20[a]	5.81[a]
Never married	28.14	14.56[a]	9.85[a]	3.46
Panel 2: Year = 2018				
Married	23.23	13.80[b]	10.09[b]	4.29[b]
Cohabiting	23.67	16.46[b]	14.26[ab]	3.99
Previously married	38.17[a]	24.75[ab]	20.24[ab]	8.62[ab]
Never married	35.45[ab]	19.10[ab]	16.82[ab]	8.50[ab]

Source: IPUMS Health Surveys: National Health Interview Survey (NHIS) 2000–2018; In each year, a indicates significant difference in percent fair or poor health between a union status and married group at the same level of education; b indicates significant change in percent fair or poor health between 2000 and 2018 for groups with the same union status and same education; In both 2000 and 2018, all lower-education groups were significantly different from college graduates with the same union status; $p < 0.05$

(7 in Module 1, 8 in Module 2, and 13 in Module 3) were statistically significant at $p < 0.05$; only one of the three-way interaction terms was statistically significant. All the statistically significant tests in Table 3 were also significant at $p < 0.05$ based on adjusted p values derived from Benjamini-Hochberg procedure for correcting for multiple comparisons (Benjamini & Hochberg, 1995; McDonald, 2014). I used a false discovery rate of 0.05 (computed p values available upon request). All the analyses were weighted to account for multistage sample design and to adjust for nonresponse and post-stratification in the NHIS.

3. Results

I presented the summary statistics for the sample in Table 1. Majority of the respondents rated their health as good or better; only 13% reported fair or worse self-rated health. Most of the respondents were either married at the time of the survey or previously married. Only 6% were cohabiting and 11% had never been married. Nearly one-third (30%) of the respondents were college graduates while 11% had no high school diploma. The sample range in age from 30 to 69 years (mean = 48) and had similar shares of men and women. Twelve percent of the respondents identified as black, 9% identified as foreign-born Hispanic, and 5% identified as native-born Hispanic. Fifty percent of respondents reported one or more children in their households. A notable share of the sample was either out of the labor force (25%) or unemployed (3%). Respondents were fairly distributed across the four regions of residence. The 2008 and 2009 surveys both accounted for about 11% of the total sample. More than half (57%) of the sample were primary respondents suggesting that the NHIS relies on proxy reports of self-rated health for substantial number of adults (43%).

Table 2 presents percent reporting fair or poor health by union status and education for the years 2000 and 2018. The results show fewer disparities in self-rated health by union status in 2000 than in 2018. In 2018, smaller shares of partnered (married and cohabiting) adults reported fair or poor health than single adults across levels of education. Conversely, never married adults, particularly those with no high school diploma, had similar self-rated health as cohabiting, and to some extent married adults in 2000. In both years and across levels of education, previously-married adults had worse self-rated health than married, cohabiting, and never-married adults. This pattern suggests a widening gap in health between partnered and single adults driven by changes in health of never-married adults relative to other union statuses. In both

Table 3

Trends in self-rated health by union status and education, odds ratios from logistic regression models (n = 788,829).

Predictors	Model 1	Model 2	Model 3
Year	1.00	1.00	1.00
Union Status (0 = Married)			
Cohabiting	1.67***	1.57***	1.58***
Previously married	1.75***	1.85***	2.35***
Never Married	1.45***	1.57***	1.65***
Union status x Year			
Cohabiting x Year	0.99		1.01
Previously married x Year	1.01**		1.00
Never Married x Year	1.01**		1.02**
Education (0 = college graduate)			
No high school diploma	5.34***	5.41***	6.29***
High school graduate	2.83***	2.63***	2.78***
Some college	2.23***	2.09***	2.17***
Education x Year			
No high school diploma x Year		1.00	1.00
High school graduate x Year		1.01**	1.01**
Some college x Year		1.01**	1.01*
Union status x Education			
Cohabiting x No high school Diploma			0.97
Cohabiting x High school graduate			1.10
Cohabiting x Some college			1.11
Previously married x No high school diploma			0.63***
Previously married x High school graduate			0.74***
Previously married x Some college			0.81**
Never married x No high school diploma			0.69***
Never married x High school graduate			0.96
Never married x Some college			0.94
Union status x Education x Year			
Cohabiting x No high school diploma x Year			0.98
Cohabiting x High school graduate x Year			0.98
Cohabiting x Some college x Year			0.99
Previously married x No high school diploma x Year			1.01
Previously married x High school graduate x Year			1.00
Previously married x Some college x Year			1.00
Never married x No high school diploma x Year			0.98
Never married x High school graduate x Year			0.98**
Never married x Some college x Year			0.99
Age	1.02***	1.02***	1.02***
Union status x Age			
Cohabiting x Age	1.01***	1.01***	1.01***
Previously married x Age	0.99***	0.99***	0.99***
Never Married x Age	1.01***	1.01***	1.01***
Education x Age			
No high school diploma x Age	1.01***	1.01***	1.01***
High school graduate x Age	1.00	1.00*	1.00*
Some college x Age	1.00***	1.00***	1.00***
Female	0.84***	0.84***	0.84***
Race/ethnicity (0 = Non-Hispanic white)			
Non-Hispanic black	1.45***	1.44***	1.45***
Foreign-born Hispanic	0.94**	0.94**	0.92***
Native-born Hispanic	1.31***	1.31***	1.31***
Number of children (0 = no children)			
One or more preschool-aged children	0.54***	0.54***	0.54***
Only older children	1.07***	1.07***	1.08***
Employment status (0 = Working/with job)			
Unemployed	2.01***	2.01***	2.02***
Not in labor force	5.14***	5.14***	5.16***
Unknown employment status	1.57***	1.58***	1.58***
Region of residence (0 = Northeast)			
Midwest	1.14***	1.14***	1.14***
South	1.31***	1.31***	1.31***
West	1.12***	1.12***	1.11***
Recession (0 = Pre-recession)			
Recession	1.06**	1.06**	1.06**
Post-recession	1.04	1.04	1.04
Respondent	1.03***	1.04***	1.03***
Intercept	0.02***	0.02***	0.02***

Source: IPUMS Health Surveys: National Health Interview Survey (NHIS) 2000–2018 ***p < 0.001, **p < 0.01, *p < 0.05; Using a false discovery rate of 0.05, all the significant tests in the models were statistically significant at p < 0.05 based on Benjamini-Hochberg adjusted p values

years and across union statuses, the share of respondents reporting fair or poor health decreases with increasing education.

Table 3 presents the results of logistic regression models estimating trends in self-rated health by union status and education, accounting for other covariates. I assessed trends in self-rated health by union status in Model 1 and presented educational trends in Model 2. Trends by union status and education were jointly estimated in Model 3. The significant interaction terms between year and union status in Model 1 indicate significant variations in trends in self-rated health by union status over the study period (2000–2018). The coefficient of year in the model indicates trend in self-rated health for married respondents. It can be interpreted as follows: Between 2000 and 2018, the odds of fair or poor self-rated health increased by 0% per year [i.e. (1.00–1)*100] for married respondents. The interaction terms of year with the other union statuses represent the differences in trends between each union status and the married group. For instance, the odds ratio of 0.99 for "cohabiting x year" shows a 1% more decline [i.e. (0.99–1)*100] in the odds of fair or poor health per year for the cohabiting respondents relative to the married group. For easy interpretation, I presented the predicted probabilities of fair or poor health by union status (based on the results of Model 1 in Table 3) (Fig. 1).

Between 2000 and 2018, there was an overall health decline among previously-married and never-married adults (Fig. 1). Further analyses showed that the increased probability of fair or poor self-rated health cuts across the different previously-married statuses—divorced, widowed, and separated—but it was more pronounced among widowed adults (results not shown). I found similar trends excluding widowed respondents from the model (results not shown). Married and cohabiting respondents showed little change in their self-rated health over time. Thus, the gap in self-rated health between partnered (married and cohabiting) and single (previously married and never married) respondents widened over time. Worsening health among previously-married and never-married adults also produced some changes in the patterns of self-reported health among unmarried respondents. While in 2000 cohabitors had higher odds of fair or poor self-rated health than never-married adults, the health of cohabiting adults appeared to be better than all but married respondents in 2018.

Next, I analyzed trends in self-rated health by education (Model 2, Table 3). The significant interactions between indicators of year and education in Model 2 show significant variations in trends in self-rated health by education. The coefficient of year in the model depicts trend in self-rated health for college graduates, a 0% change [i.e. (1.00–1)*100] in the odds of fair or poor health per year over the study period. The interaction terms of year with the other educational groups (e.g. no high school diploma x year) represent the differences in self-rated health trends between each education group and the college graduates. I
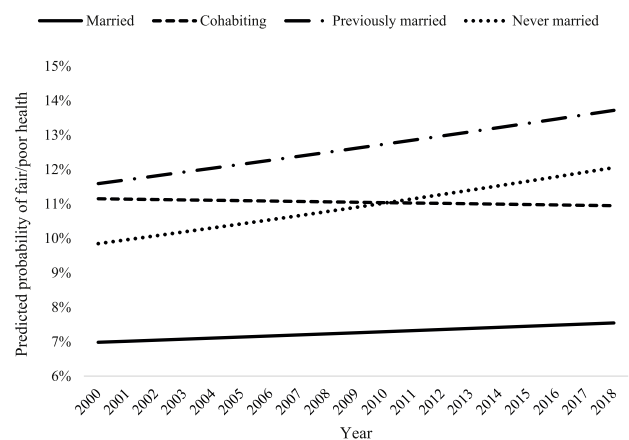

Fig. 1. Trends in self-rated health by union status, 2000–2018.

presented the results of the interactions as predicted probabilities. I estimated the predicted probabilities of reporting fair or poor health in each year by education.

Fig. 2 shows persistent educational disparities in self-rated health over the past two decades. The higher the level of education, the lower the odds of fair or poor self-rated health. However, there were shifts in trends in self-reported health by education. Improvements in health of American adults with no high school diploma reported in the 1980s and the 1990s (Goesling, 2007; Liu & Hummer, 2008), did not persist into the later part of the twenty-first century (see Appendix A for trends from 1982 to 2018). Rather, the last two decades featured worsening self-reported health among adults with modest education—high school graduates and those with some college education—and little changes at the lowest (no high school diploma) and at the highest (college graduate) levels of education.

Model 3 estimates trends in the odds of fair or poor self-rated health by union status and education. As in the previous analyses, the results of the three-way interactions among year, union status, and education were presented as predicted probabilities of fair or poor health in Figs. 3–6. I used different scales for the figures because of the declining probability of fair or poor health with increasing education. Using the same scale for all levels of education obscures the trends at each educational level.

The increasing odds of fair or poor health among never-married adults (reported in Fig. 1 earlier), cuts across the different levels of education but I recorded worsening health only among previously-married adults with no college degree. There was no change in the probability of fair or poor health among previously-married adults with college degree. Stability in the health of married adults was observed at the lowest and at the highest levels of education; there was slight increase in the probability of fair or poor health among married respondents with high school diploma or some college education. The health of cohabitors with no high school diploma improved (Fig. 3) but the health of cohabiting high school graduates remained mostly unchanged (Fig. 4). Cohabitors with college degree and those with some college education reported worsening health over time. Although the health of cohabiting adults improved at all levels of education relative to never-married adults, cohabitors with no high school diploma were yet to show any health advantage over their never-married counterparts in 2018. Thus, the divergence in self-rated health between cohabiting and single adults found in this study happened among adults with high school diploma or higher education.

The results of the other covariates in the models were mostly in the expected directions. In this analysis, the effect of age depends on both union status and education but generally, the odds of fair or poor self-rated health increased with age. I found significantly lower odds of
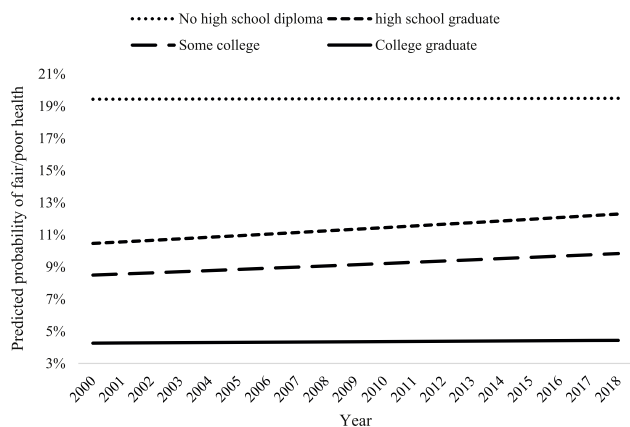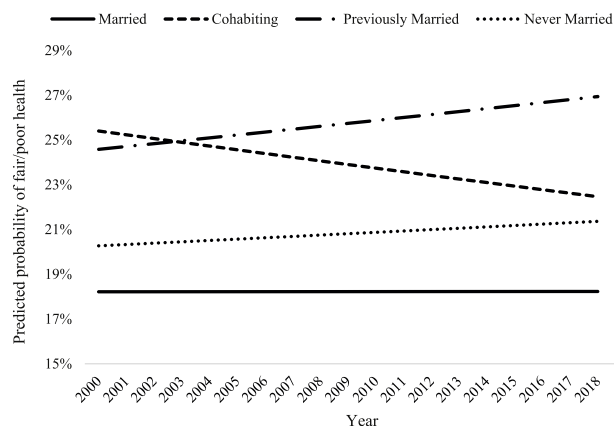

Fig. 3. Trends in self-rated health by union status among respondents with No high school diploma, 2000–2018.

Fig. 4. Trends in self-rated health by union status among high school graduates, 2000–2018.
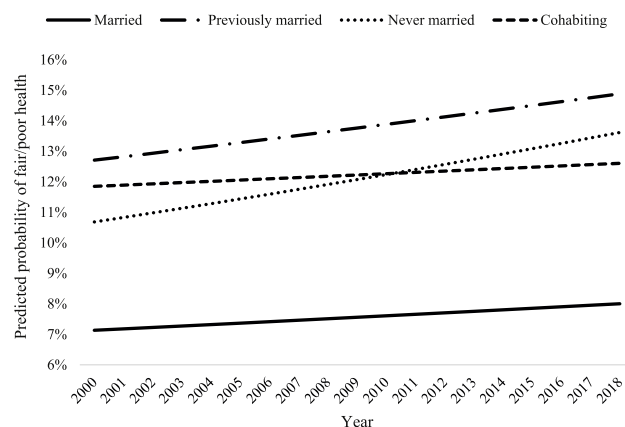

Fig. 5. Trends in self-rated health by union status among respondents with some college education, 2000–2018.

fair or poor self-rated health among women relative to men and among non-Hispanic whites relative to blacks and native-born Hispanics. Foreign-born Hispanic adults reported significantly better self-rated health than non-Hispanic whites. Having one or more preschoolers in
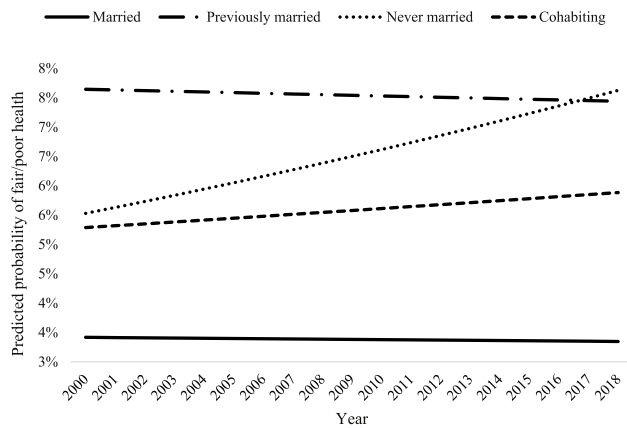

Fig. 2. Trends in self-rated health by education, 2000–2018.

Fig. 6. Trends in Self-Rated Health by Union Status among College graduates, 2000–2018.

the household was associated with significantly better health but respondents with older children reported worse health than those with no children. Unemployment predicts significantly higher odds of fair or poor health and respondents living in the northeast exhibited significant health advantage over those in other regions. There was a significant health decline during the 2008–2009 recession. Primary respondents in the NHIS had significantly worse health.

4. Discussion

Scholars have documented growing economic inequality (Autor et al., 2008; Cherlin, 2014) and changing patterns of family life (Manning et al., 2014; Parker & Stepler, 2017) in America. However, the health implications of growing socioeconomic disparities in family outcomes in recent decades (Kuo & Raley, 2016; Lamidi et al., 2019; McLanahan, 2004) have not been fully explored. This study analyzed recent trends in self-rated health by union status and education.

I documented persistent educational disparities in self-rated health over time. The odds of fair or poor self-assessed health decreases with increasing educational attainment. Changes in self-rated health over the past two decades were concentrated among American adults with modest education perhaps reflecting recent changes in economic opportunities at different levels of education. Contrary to the worsening health found among high school graduates and those with some college education, the analyses showed little change in the probabilities of fair or poor self-rated health at the lowest (no high school diploma) and at the highest (college graduate) levels of education.

I found little change in self-rated health of married and cohabiting respondents but an overall health decline among single (previously married and never married) adults. Nonetheless, the overall stability in the health of cohabitors obscures important educational differentials—improving health at the lowest level of education and worsening health among college graduates and those with some college education. Similarly, there was stability in the self-rated health of married respondents with no high school diploma and college graduates but those with modest education (high school degree and some college education) showed patterns suggesting a health decline over time. The analyses showed that the declining health of previously-married adults, dating back to the 1970s (Liu & Umberson, 2008), applies mostly to those with no college degree. Changes in the union status gap in self-rated health among college graduates, relative to those with lower education, was minimal. However, the health of never-married adults at all levels of education worsened over time.

The above patterns culminate in increasing divergence in self-rated health by union status and by education, driven mostly by declining

health in the middle educational strata (high school graduate and some college education), and among and single adults, particularly never-married adults. The findings align with the postulations of the diverging destinies perspective (McLanahan, 2004) but reinforces the potential health impacts of the new hourglass economy (Autor et al., 2008; Cherlin, 2014). The study adds to the body of literature on growing educational divergence in family patterns including marriage (Parker & Stepler, 2017; Torr, 2011), divorce (Martin, 2006), cohabitation (Kuo & Raley, 2016; Lamidi et al., 2019), and childbearing (Manning et al., 2015). The finding of declining health of single (previously married and never married) adults is particularly concerning given the record-high share of never-married adults and an increasing share of previously-married adults in the population (Livingston, 2014; Wang & Parker, 2014).

While this study provides valuable update to existing knowledge of trends in health differentials by union status and education, there are important limitations. First, the period covered in this analysis (2000–2018) includes the Great Recession (December 2007–June 2009). I caution readers to interpret the findings in relation to "long-term" socioeconomic changes that might have been impacted by the recession. To be sure, the proportion of respondents with fair or poor self-rated health increased over the study period. However, it is unclear how the recession might have impacted health among different socio-demographic groups. Exploratory analyses showed little effect of the recession on the trends presented. The upward trend in the share of adults reporting fair or poor health persisted through the recession years and beyond, from 2000 to 2012. It is possible that the recession exacerbated the pattern of worsening health among certain groups (Margerison-Zilko et al., 2016), but this is unlikely given that the rates of increase from 2008 to 2012 compare to those recorded in the pre-recession years. The share of adults reporting fair or poor health declined somewhat between 2012 and 2014 and remained mostly stable thereafter (2015–2018). The health impacts of the Great Recession and differential health trends post-recession are a viable area for future research.

Second, the trends in self-rated health by union status presented in this study may be attributable to shifts in the composition of married adults unaccounted for in the analyses. The characteristics of currently-married individuals may have changed given that age at first marriage is at historic high (Manning et al., 2014) and marriage rates are declining among certain groups (Parker & Stepler, 2017). Third, due to data limitations, I was unable to analyze factors, such as relationship quality, duration, and history, which may be relevant to trends in health differentials by union status. Fourth, it is important that future studies distinguish individuals in first marriages from those in higher-order marriages. First marriage seems to be more protective of health than remarriages (Carr & Springer, 2010; Lillard & Panis, 1996). Fifth, I examined trends in self-rated health across four union statuses—married, cohabiting, previously married, and never married. Given the high level of heterogeneity among the unmarried group (Carr & Springer, 2010; Liu & Umberson, 2008), future studies should further explore trends in health among widowed, divorced, and separated adults, using diverse health indicators.

Racial/ethnic and gender differences in trends in self-rated health across union statuses are an important area for future research. Racial/ethnic gaps in union formation and in union stability have widened dramatically over the past several decades (Kuo & Raley, 2016; Raley et al., 2015) and there have been some educational shifts in union status among men and women (Wang & Parker, 2014). The health implications of these changes are not fully known. Sensitivity analyses showed notable black-white disparities in trends in self-rated health, particularly among partnered adults. The self-rated health of partnered black respondents improved over time while partnered white adults reported worsening health. This is in line with recent increase in mortality and worsening self-rated health among middle-aged non-Hispanic whites reported by Case and Deaton (2015). I found similar trends in self-rated

health among men and women but there were few educational differences, particularly in trends among previously-married and cohabiting respondents. Future studies should further explore racial/ethnic and gender differentials in health trends across union statuses. My findings also call for further studies of causal and non-causal mechanisms underlying the shifts in the association between union status, education, and health.

In spite of the above limitations, the findings add to the growing literature on increasing social class divide in America. Shifts in trends in self-rated health over the past two decades were more pronounced among moderately-educated American adults and less so among college graduates.

Author statement

Esther O. Lamidi: Conceptualization, Methodology, Software,

Formal analysis, Writing – original draft, Writing – review and editing.

Declaration of competing interest

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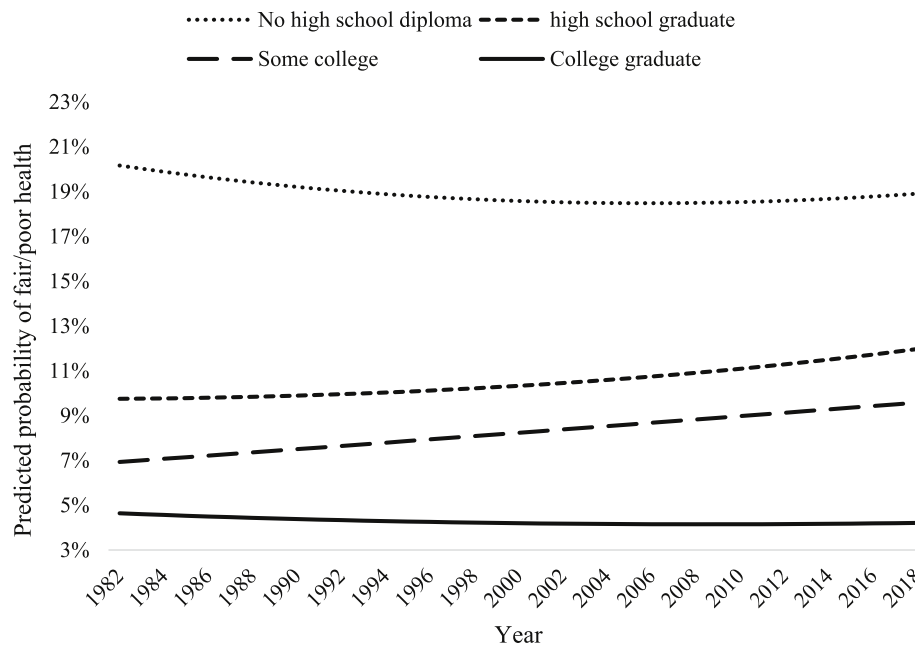
Acknowledgement

Appendix

Fig. A.1. Trends in Self-Rated Health by Education, 1982–2018
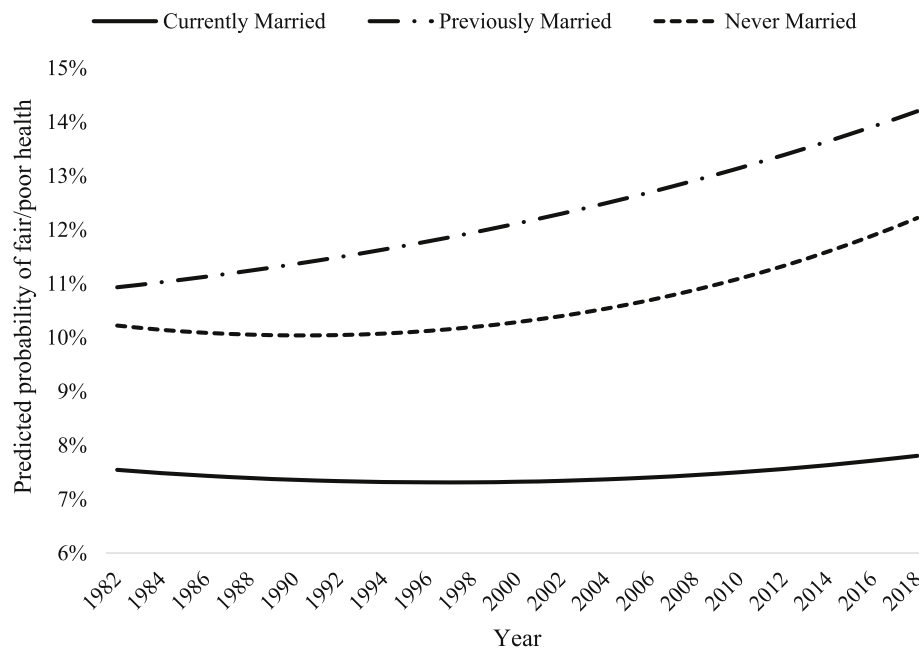
Fig. A. 2. Trends in Self-Rated Health by Union Status, 1982–2018

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