Career Trajectories, Gender Differences and the Reproduction of Health Disparities over the Life Course

Li Zheng, Mississippi State University

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ABSTRACT

Using longitudinal data from PSID and growth curve models, this study examines the dynamic relationship between gender, occupational career and health among people of working age. The major concern is whether there are gender differences in the health returns to occupation/employment resources across life course, and whether health affect men's and women's occupation/employment differently. Results show that women experience significantly poorer health than men, but this health gap reduces with aging. The health disadvantages experienced by women are entirely explained by SES status. Employment becomes increasingly important to maintain health as people age. However, women receive far fewer health rewards from employment than men. The health benefit from a higher occupational status is similar for men and women across life course. More importantly, all else being equal, the health declining rate of women is just half that of men, showing a reversed gender health gap toward old age. Regarding health selection, results show that health is not a predictor of occupational status for either men or women, but is an important predictor for employment status of both genders.

KEYWORDS

life-course health; gender differences in health; occupational-career and health; health selection

Instruction

Previous studies demonstrate that the reproduction and accumulation of socioeconomic disparities in self-rated health across the life course are largely due to how socioeconomic position itself contributes to a more deteriorated health with aging in the lower social strata. Moreover, men's and women's health is the product of both their social lives in a stratified society and the gender expectations that they play out. Occupational status and other social factors interact with gender across the life course to produce variations in both gender disparity and its health outcomes. Under the new global economy, women's careers become more vulnerable and face higher levels of insecurity and instability, which in turn may worsen women's already poorer health status. The aim of the current study is to further examine these issues and answer the following research questions: 1) What are the effects of life course stratification on health through occupational status on both genders? 2) What are the effects of health status on social mobility for both genders through the life course?

Data for this study are drawn from the 1989-2005 wave of Panel Study of Income Dynamics (PSID). Five observation points were selected (1989, 1994, 1999, 2001 and 2005) based on when variables of self-rated health and detailed occupations were available. The dependent variable in this study is a time-varying measure of self-reported health (SRH), ranging from poor to excellent. The independent variables of interest are time-varying measures of occupation from two aspects: occupational status score (measured by Nam-Power OSS) and employment status. Growth curve models are used to estimate the mean health change rate of the analytic sample and individual variation around the mean.

Literature Review

Women live longer than men in all developed countries, but they usually report poor health. This "gender health paradox" is often explained by gender differences in the underlying distributions of diseases (Case and Paxson 2005; Crimmins et al. 2002; Gorman and Read 2007). Social causation is the main explanation for the differences in men's and women's health. American women remain economically and socially disadvantaged despite advances in recent decades, placing greater limits on women's access to health-related resources (Phelan et al. 2004; Rose and Hartmann 2004; Ross and Bird 1994). Since women are more likely to work with little personal control and low job security, they also tend to report higher levels of chronic stress and more stressful life events than men (Bebbington 1996; McDonough and Walters 2001; Ross and Mirowsky 2006). More recently—over the last 30 years—women have experienced huge gains in education and employment in the United States, so some researchers predict that gender differences in self-rated health might soon reverse (Schnittker, 2007).

Beyond gender-based health disparities, there is also a well-established relationship between socioeconomic status and health, called the SES-health gradient. Socioeconomic status, typically measured by income, education, or occupation, is associated with a wide range of health and illness outcomes, including health and illness behaviors (Lantz et al. 2001; Marmot et al. 1997; Mechanic and Volkart 1961; Roller and Gowan 2010) and health problems, such as low birth weight, cardiovascular disease, and cancer (Blakely et al. 2011; Kreatsoulas and Anand 2010; Myint et al. 2006; Pattenden et al. 1999; Viswanath and Ackerson 2011). Health literature thus illustrates the persistence of the association between SES and mortality and morbidity, across space, cohort, and historical time. Link and Phelan (1995, 2000) even call socioeconomic status a "fundamental cause" of health disparities.

One's occupation has long been used as an indicator of socioeconomic status (SES) for people in the labor market and has been found to have direct and indirect effects on health. Indicators of occupational class are widely used in European countries and have been found to be strong predictors of variations of health outcomes, including both mortality and morbidity, especially among the employed population (Krieger et al. 1997; Marmot et al. 1995; Marmot et al. 1997; Marmot 2003; Morikawa et al. 2004; Sekine et al. 2006). Studies in the United States, however, have relied heavily on education and income as predictors of health so as to limit the effect of health selection (Robert and House 2000; Sindelar et al. 2007; Willson et al. 2007). Research has shown that social causation and health selection often co-exist (See Manor et al. 2003 for a review). And more important for this study, the health rewards from educational attainment may differ between men and women. Categorizing population by education does not adequately control for all socioeconomic variations regarding health discrepancies between social groups (Matthews et al. 1999).

Besides social causation, health selection effects also contribute to social class disparities in health. That is, an individual's health status is one of the factors affecting his or her opportunities of social mobility. Recent studies have found that health selection has some moderated effects on individual social mobility (Lundberg 1991a; Manor et al. 2003; Palloni et al. 2009; Power et al. 1998), though it cannot be regarded as a major explanation for inequalities in health. Some other studies find that mobility between occupational classes among the employed is not selective for health (Elstad and Krokstad 2003; Power and Matthews 1997), while others find that transitions into and out of employment were strongly health-selective (Elstad and Krokstad 2003).

Occupation, Gender and Health

Despite advances in recent decades, women remain socially and economically underprivileged in American society relative to men, as in other developed countries. Their average earnings and security are less than that of men in the labor market, even for the same jobs. They are also more likely to work part-time and engage in entry-level occupations or domestic positions (Smith 1998a, Arber 1997), or concentrate in the tertiary sector (care and personal service occupations) that is compared with various forms of self-employment, high rates of part-time work, and sub-contracting. In addition, unequal domestic arrangements and childcare responsibilities between men and women have been persistent even in current society when women have the same work load and occupational expectations. The dynamic relationship between work and family causes "de-standardization trends" between women and men (Widmer and Ritschard 2009, p28). Uncertainty has become persistent in women's career trajectories, while it is only temporary in men's career paths (Blossfeld and Hofmeister 2007).

These varying occupational experiences result in different social class gradients in health between women and men, but the evidence is mixed. Occupation gradient health differences are more marked among men than among women. Sacker et al (2000) find that occupational status was the strongest predictor of mortality in men; yet in women, gradients of occupation showed only a weak effect. Using the 1984 and 1994 PSID data, Duncan and colleagues (2002) find that individual occupational status has an inverse effect on men's, but not women's, mortality. A number of other studies in Western countries illustrated smaller SES-mortality gradients for women than for men by education and income (Elo and Preston 1996; Koskinen and Martelin 1994).

No obvious differences between the health outcomes of social class gradient of men and women are found when using education or household-head status as the social class assignment (Erikson 2006; McDonough et al. 1999). In fact, using data from the Wisconsin Longitudinal Study (WSL) and the National Surveys of Family and Household (NSFH), Marmot and colleagues (1997) find that, for all the health measures, the health gradient is similar for women and men, whether education (as in the NSFH) or individual occupation (as in the WLS) is used.

Understanding the gendered nature of occupational health benefits is quite complex (Schnittker 2007; Waldron et al. 1998; Walters et al. 2002). On the one hand, employment is a good source of health and well-being for women. On the other hand, it creates additional strains and overloads, given women's traditional roles of family responsibilities. This reality explains why women report more job strain and worse health outcomes even while holding the same occupational status as men (Bosma et al. 1998; Griffin et al. 2002).

A Life Course Perspective on the Gender-Occupation-Health Disparity Relationship

From a life course perspective, changes in SES and health and the relationship between the two should be examined over an individual's life time. For the current area of study, this means that the gender-health-SES relationships is dynamic over time at individual, family, and societal levels, and across age groups, cohorts, and time periods (Lynch 2008; Mayer 2009).

A number of life course scholars (e.g., Kohli, 1986; Mayer, 1989; Moen, 1998, 2003; Riley & Riley, 1994) argue that an occupation provides the "organizational blueprint" for a person's life course and contributes to gender inequalities by channeling resources such as power, status, and income that men and women accrue (Moen and Chermack 2005). Women's lifetime dual participation in paid (employment) and unpaid (family) domains limits their opportunities of occupational mobility and constrains them to the lower- income margin of the

aged population (Le Feuvre 2009; O'Rand 1996). For already disadvantaged women, globalization has made the situation even worse (Hofmeister 2006).

Among life course studies, the processes associated with cumulative advantage and disadvantage have been systematically developed to explain disparity trajectories. A cumulative advantage and disadvantage process enlarges small differences over time and makes it difficult for an individual or a group disadvantaged in early life in educational attainment or health status to catch up (DiPrete and Eirich 2006). So, early life disparities in educational development and other social resources affect subsequent occupation, income, and wealth accumulation in a dynamic process, which may place a disadvantaged group at a permanent or ever increasing disadvantage relative to an advanced group. This phenomenon can also be observed in persistent inequalities between races (O'Rand 1996).

In the case of health, cumulative advantage suggests a process whereby the relationship between SES and health initiated in early life becomes magnified over time, with advantaged individuals and groups retaining a permanent and increasing health advantage relative to others who lack these advantages as they age (Willson et al. 2007). Several longitudinal studies support—at least partially—this hypothesis and find more detrimental health developments in later middle age in the lower social strata (Ferraro and Kelley-Moore 2003; Lynch 2003; Ross and Wu 1996; Willson et al. 2007).

Such studies partially determine whether health advantages or disadvantages increase over the life course. Yet most of the research uses the path-dependent modeling and little empirical attention has been given to whether cumulative advantage processes operate the same across groups as people age (George 2005). An excellent exception is Shuey & Willson's (2008) study using the concept of cumulative disadvantage as a mechanism generating health inequality

among Blacks and Whites in the United States. In the case of gender differences in life-course health, most studies emphasize the relationship of gender and SES control for age rather than integrate age dynamically into an analytic model.

Previous studies therefore demonstrate that the reproduction and accumulation of socioeconomic disparities in self-rated health across the life course are largely due to how socioeconomic position itself. Moreover, men's and women's health is the product of both their social lives in a stratified society and the gender expectations that they play out. Although on average there are significant gender gaps in health, men and women are two heterogeneous groups. Occupational status and other social factors interact with gender across the life course to produce variations in both gender disparity and its health outcomes. Under the new global economy, women's careers become more vulnerable and face higher levels of insecurity and instability, which in turn may worsen women's already poorer health status.

The aim of the current study is to further examine these issues and answer the following research questions: 1) What are the effects of life course stratification on health through occupational status on both genders? 2) What are the effects of health status on social mobility for both genders through the life course?

Data and Methods

Data

Data for this study are drawn from the 1989-2006 wave of Panel Study of Income Dynamics (PSID). The PSID is a representative, longitudinal study of individuals and their families in the United States, containing a wide range of individual-level data, including occupation, education, income, and health. Beginning with a nationally representative sample of approximately 4,800 families in 1968, the PSID has expanded to more than 9,000 families in

2007 (PSID 2011). Due to low attrition rates and success in following family descendents when they form their own households (Duncan et al. 2002), data of several thousands of families and more than 70,000 individuals have been collected over the past 40 years (McGonagle and Schoeni 2006). The PSID data were collected on an annual basis from 1968 to 1997 and the interview schedule shifted to a biennial design after 1997 (PSID 2011).

For this study I limit the sample on several conditions. I select five observation points as 1989, 1994, 1999, 2001 and 2005 (when variables of self-rated health and detailed occupation were available), and include both individuals who were household heads and spouses (if married or cohabited) in these time points. All respondents in the study were interviewed in at least three of the five waves of data collection—the analytic model is flexible and does not require the data of a respondent in every wave (Singer and Willett 2002); therefore, the analytic sample vary across waves of data.

Dependent Variable

Following the health literature, I use self-reported health (SRH) as the dependent variable to measure individual health status. Although self-rated health is a subjective measure, it is highly correlated with objective measures as mortality and morbidity (Idler and Benyamini 1997; Welin et al. 1985) and other health measures (Ferraro and Farmer 1999). Moreover, SRH accurately reflects gender differences in health and health reports. Gender differences reflect real differences in the kinds of conditions men and women face (Case and Paxson 2005). In addition, measuring SRH over time reflects health changing trajectories, and thus fits well with my goal of measuring health growth model instead of specific health issues (Shaw et al. 2004).

In all five time points of PSID, respondents were asked a question: "Would you say your health in general is 'excellent,' 'very good,' 'good,' 'fair,' or 'poor'?" Health is measured at the

five time points included in analysis. In the multilevel analysis, health is treated as a continuous variable, and 1 represents excellent health and a 5 represents poor health.

Independent Variables

Gender is included as a dummy variable where 1 = female and 0 = male.

Other independent variables are occupation related. Occupational structure is measured from two aspects: occupational status score and employment status. The PSID data provides details for the measurement of occupation title, which measures the current occupation of the household head and spouse, or the most recent occupation, if one is non-employed by that time. Since 20003, the PSID occupational coding system has been changed from 1970 census coding system to 2000 census coding system, which makes it hard to trace individual occupation cross years. To make the occupational status more comparable cross waves, I recode the occupational titles into Nam-Power's Occupational Socioeconomic Scores (OSS). The OSS scores range from 0 to 100 and shows the percentage of persons in an occupation having combined average levels of income and education lower than the given occupation.

Employment status is an important component in the study of occupation related health inequality. The unemployed usually report worse health than their working counterparts, even after controlling for other factors such as education and income (Arber and Cooper 1999). The effect of employment status on health also varies by gender. In the multivariate analysis, currently working for pay is coded as one (1) and all others are coded as zero (0).

Control variables

Education is defined in terms of completed years of schooling. Since general education occurs well before the age of 25, it also measures characteristics related to occupational

attainment at earlier ages. Thus it serves as a control for unobservable selectivity into occupation and health.

Household income is measured in terms of total household income. This variable was generated by the PSID staff at the ICPSR, Institute for Politic and Social Research Center. All of the income measures are based on total household income adjusted for household size and inflation in American dollars for the year 2000 (Bureau of Labor Statistics 2005). Also, to correct its skewed distribution, the measure of income is included as log transformation.

Age is measured in years at each time point and is censored between 25-49 in 1989 so that the respondents had mostly finished their education by the first wave and had been among the working-age population in most of the waves. Age is also treated as a quadratic because age may have a curvilinear effect on individual health trajectory (Willson et al. 2007). In hierarchical models, age is centered at the grand mean of the sample. To control for cohort effects, I compute a continuous variable of cohort by using a respondent's age of entry into the first survey (Lynch 2003; Shuey and Wilson 2008). This variable is constant and is included at level 2 of the growth curve models. For descriptive purposes, the sample is divided into five 5-year cohorts (See appendix table A1).

Marital status and family structure are two other important factors that affect men and women's health unequally. Marital status is coded as one (1) for currently married and zero (0) for currently unmarried, which includes single, divorced, and widowed. I also include number of children, a continuous variable, and whether having young child (Children) at home, which is dichotomized as zero (0) for no child under 6, and one (1) for having at least one child under 6.

Finally, all analyses included controls for variations in self-rated health that are associated with race (1=black, 0=white) and primary region of residence. Region is a dummy

variable that represents whether the respondent lived in the South in the majority of the analytic waves.

Analytical Strategy

I first use growth curve models to examine the systematic variation in health trajectories as a function of occupational and other social and economical factors. The statistic package used here is HLM 6.0 developed by Raudenbush and Bryk (2009). Then, I apply general logistic random-intercept analysis to study the reversal causal relationship from health to career. The statistical package used here is STATA 11.0.

In multivariate analysis, I estimate change in self-rated health over the period 1989–2006 at five-year intervals using growth curve models. Growth curve models are multi-level models applied to longitudinal data to model change in individual measures over time (Raudenbush and Bryk 2002; Singer and Willett 2002). Repeated measurements of an individual are assumed to have a "hierarchical structure," in which the measures from different waves are “nested” within individuals (Willson et al. 2007). Thus using growth curve models allows me to address within-person and between-person health change simultaneously.

A Growth curve model is composed of a pair of subsidiary models; a level-1 model shows how each person changes over time, and a level-2 model shows how these changes vary from person to person (Signer & Willet 2003). The model assumes a trajectory that certain characteristics can modify (Raudenbush and Bryk 2002). Individual growth models begin from different start points (intercepts) and change at different rates. That is, the values of intercepts and slopes differ randomly across individuals. For the current study, some individuals might have better health status (higher intercepts) and others have worse health status (smaller intercepts), and some individuals' health might change more rapidly while others’ health changes

slowly. Besides the dependent variable, the major predictor of occupational status varies by individual and time as well; these are known as time-varying covariates (TVCs). Occupational status therefore contains both within-person and between-person variability (Raudenbush and Bryk 2002). The within-person effects of time and between-person effects of time on occupation should also be disaggregated.

The level-1 component of the growth curve models, also known as the individual growth model, is organized around the observation, and captures the within-person differences over time. The level-2 model shows that the values of the intercept and slope parameters vary across people randomly and hence represents between-person differences in within-person change (Curran and Bauer 2010, Signer & Willet 2003:49-57). Equations for the models used in the analysis are located in Appendix B.

Results

This part begins with a general description of the health and occupational trajectories of the analytical samples from 1989 to 2005, culminating with growth curve models and general logistic random-intercept analysis. I employ growth curve models to examine the systematic variation in health trajectories as a function of occupational and other social and economical factors. The statistic package used here is HLM 6.0 developed by Raudenbush and Bryk (2009). Then I use general logistic random-intercept analysis and growth curve models to study the reversal causal relationship from health to employment and occupation. The statistical package used here is STATA 11.0.

Descriptive analyses in table 1 show that women respondents, who were averagely younger than men respondents, reported significantly poorer health than men in all five waves; this gap increases in later waves. In average, women were less educated and reported lower

household income than men. Meanwhile, women had much lower employment rates and much higher rates of unemployment than men. The occupational status score (OSS) of working women is around 10 points lower than that of working men at almost every study point. Moreover, women respondents reported lower rates of marriage than men, and this gap grew over the course of the analysis. Overall, the bivariate analysis presents a picture of inequality for women in health, occupation, and family structure that grows larger over time.

Social Causation: Growth Curve Models

In growth curve models, I first analyze a model that examines the dynamics of gender differences of health over time. Then I add other important controls, such as race, education, income and family-related factors. Next, I examine the relationship between the occupation-related variables (employment status and occupational status score) and self-reported health in three steps. For each independent variable, I first measure the fixed effects. In subsequent models, interaction effects between gender and employment and occupation are added to determine whether the overall health rewards of employment and occupation differ for women and men across the life course.

Age. Model 1 of Table 2 includes only the dummy variable gender, and two interactions, female* age and female*age^2 to demonstrate the changing effect that gender has on health with aging. Women experienced significantly poorer health than men, but this gap got smaller as people age. however, even at the oldest working age (64 years), women still reported poorer health than men.

Table 1 Means for selective variables (weighted): Men and Women, 1989-2005 (N=4101)

	1989		1994		1999		2001		2005	
	Women	Men	Women	Men	women	Men	Women	men	women	men
Education	13.58***	13.89***								
	(2295)	(1920)								
Age	36.12**	36.36**	41.04**	41.35**	45.92**	46..01**	47.90**	48.05**	51.85	51.91
	(2295)	(1920)	(2285)	(1902)	(2240)	(1869)	(2216)	(1831)	(2230)	(1690)
Health Status	2.16***	2.01***	2.27***	2.17***	2.38***	2.22***	2.42***	2.25***	2.54***	2.37***
	(2283)	(1920)	(2275)	(1902)	(2236)	(1867)	(2207)	(1830)	(2110)	(1688)
Health good & below	.346***	.281***	.394***	.336***	.431***	.373***	.452***	.389***	.491***	.430***
Employment status	.747***	.947***	.750***	.921***	.776***	.909***	.759***	.870***	.716***	.852***
(employed=1)	(2295)	(1920)	(2285)	(1902)	(2236)	(1867)	(2207)	(1830)	(2113)	(1689)
Marital status	.700***	.752***	.694***	.783***	.696***	.775***	.691***	.773***	.672***	.768***
(married=1)	(2295)	(1920)	(2285)	(1902)	(2240)	(1869)	(2216)	(1831)	(2130)	(1690)
Family income	22,417***	24,630***	25,488***	27,649***	31,039***	33,069***	32,722***	37,757***	32,673***	43,649***
($ in yr 2000)	(2295)	(1920)	(2286)	(1902)	(2250)	(1884)	(2228)	(1837)	(2143)	(1699)
Occupational score	56.79***	66.12***	57.22***	67.25***	58.77***	66.59***	59.76***	68.07***	55.85***	62.30***
(exclude not working)	(1898)	(1878)	(1902)	(1841)	(1885)	(1773)	(1881)	(1704)	(1881)	(1704)
Non-employed 2 yrs	.147***	.014***	.156***	.026***	.145***	.046***	.159***	.070***	.208***	.111***
	(2292)	(1916)	(2283)	(1901)	(2283)	(1901)	(2210)	(1821)	(2115)	(1671)

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

Education, income, and race. Model 2 of Table 2 adds in education, income, and race. Consistent with previous research, both higher education and household income brought about improved health. Furthermore, race had a marked effect on results. After controlling for education and income, blacks reported poorer health than whites. After introducing education, income, and race to the model, the effect of being female on health declines (from 0.148 to 0.094), meaning that part of the female health disadvantage results from education, income and race. Neither education nor income has interaction effect with gender on health (coefficients not shown here), indicating that both education and income are equally beneficial for the health of men and women.

Findings show that neither cohort nor region is associated with health status. Since cohort is found to be a robust predictor of health in a number of previous studies (e.g. Wilson et al 2007, Shuey & Wilson 2008, Weise 2009), one possible reason for the current finding is that the respondents in the current study are relative young (25-49 in 1989), so that the cohort effect is not as significant as in more diverse age groups (see from 25-75).

Family structural factors. Consistent with previous studies, married people reported better health than those currently not married after controlling for other variables (Model 3, Table 2); the health rewards from marriage were similar for men and women, which is inconsistent with some previous research (Hardinge 2009; Monin and Clark 2011). Having young children (<6) was weakly associated with poorer health for both genders, while having children improved individual health for both genders across the life course. The later finding, indicating a health return to child rearing, has not been previously reported.

Table 2. Growth curve models of self-reported health and occupation, 1989-2005 (N=4101)

	Baseline			Employment			OSS
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Intercept	2.1869***	2.0941	2.1856***	2.3221***	2.413***	2.440***	2.438***
	(0.0177)	(0.0180)	(0.02287)	(0.0306)	(0.0356)	(0.0322)	(0.0447)
Age (centered)	0.0207***	0.0229***	0.0225***	0.0221***	0.0224***	0.0324***	0.0318***
	(0.0246)	(0.0012)	(0.0012)	(0.0012)	(0.0008)	(0.0038)	(0.0039)
age^2	0.0012***	0.0002***	0.0000			0.0008***	0.0009***
	0	0.0000	0.0000			(0.0002)	(0.0002)
Female	0.148***	0.0942***	0.0896***	0.0814**	-0.0522	-0.0348	-0.0338
	(0.0246)	(0.0220)	(0.0215)	(0.0215)	(0.0462)	(0.0419)	(0.0435)
Black		0.3830***	0.3681***	0.3645***	0.3652***	0.3652***	0.3540***
		(0.0249)	(0.0251)	(0.0251)	(0.0251)	(0.0250)	(0.0251)
Education(centered)		-0.0900***	-0.0885***	-0.0874***	-0.0872***	-0.0871***	-0.0800***
		(0.0052)	(0.0052)	(0.0052)	(0.0052)	(0.0052)	(0.0054)
Household Income(logged)		-0.0388***	-0.0441***	-0.0433***	-0.0429	-0.0427***	-0.0392***
		(0.0069)	(0.0072)	(0.0062)	(0.0072)	(0.0072)	(0.0073)
Marital Status			-0.0597***	-0.0536***	-0.0537**	-0.0529**	-0.0502**
			(0.0179)	(0.0173)	(0.0179)	(0.0179)	(0.0178)
Number of Kids			-0.0206***	-0.0246**	-0.0211**	-0.0191**	-0.0196**
			(0.006)	(0.0061)	(0.0064)	(0.0066)	(0.0066)
Having kid(s) <6			0.0325*	0.0285			
			(0.0160)	(0.0156)			
Employment				-0.1447***	-0.2436***	-0.2284***	-0.3135***
				(0.0208)	(0.0366)	(0.0207)	(0.0411)
OSS							-0.0014***
							(0.0003)
Female*Age	-0.0036**	-0.0037*	-0.0044**	-0.0039**	-0.0037*	-0.0148**	-0.0155**
	(0.0017)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0048)	(0.0048)

Table 2 continued

	Baseline			Employment			Occupation
	Model 1 (SE)	Model 2 (SE)	Model 3 (SE)	Model 4 (SE)	Model 5 (SE)	Model 6 (SE)	Model 7 (SE)
Female*Employment					0.1445***	0.09812***	0.1387***
					(0.0445)	(0.0207)	(0.0207)
Age*Employment						-0.0113**	-0.0110**
						(0.0039)	(0.0039)
Age^2*Employment						0.0010***	0.0010***
						(0.0002)	(0.0002)
Female*Age*Employment						0.0117*	0.0117*
						(0.0002)	(0.0002)
Female*OSS							-0.0001
							(0.0005)
Variance Components	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Level-1 residual	0.4662	0.3703	0.3658	0.3636	0.3634	0.3630	0.3603
Deviance(heterogeneous model)	42142.3	41392.9	41368.6	41320.8	41313.59	41285.0	41267.8
# of Parameter	11	14	16	17	17	20	21

Note: N=4101 individuals; 17895 observations. Standard errors in parentheses.

a. Health is coded as 1 represents *excellent health* and 5 represents *poor health*.

b. Significance tests indicate that for each model, model fit is significantly improved compared to less nested models. The differences between the deviance statistics for models is chi square distributed.

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

Employment status. Consistent with previous research, those currently employed reported much better health than those non-employed (Table 2, Model 4). Employment status did not completely explain the gender differences in health; controlling for employment status, women still reported significantly worse health than men. In addition, the health effect of having a young child (<6) was no longer significant, indicating that the association between health and having young children is mainly explained by employment status. In Model 5, an important interaction between gender and health indicated that women experienced significantly fewer health rewards from employment than men did. After controlling for the interaction of gender and employment status, the gender health disparity disappeared, and even reversed (not statistically significant though). The of gender health gap suggests that if employed women (of average education/income) enjoyed the same health benefit of employment as men do, they would report similar health, if not better, as men.

Model 6 adds interaction terms between age, employment, and gender. The interaction between employment and age was significant and negative, indicating that employment health benefits increase with age, although the increasing rate decreased slightly in late age. The three-way interaction of gender, age, and employment is positive and significant, meaning that, for those who reported a recent occupation, men received increasingly greater health returns to employment with age than women. Thus the interaction of gender, age and employment reveals that employed women experienced a health deficit that increased with age.

In addition, the coefficient of the interaction of gender and age decreases dramatically (from -0.004 to -0.015), meaning that the health declining rate women experience with age (Coefficient = -0.017) is nearly half that of men (coefficient = -0.032). Specifically, comparing Model 1 and Model 6, the coefficient of age for men increases from 0.0207 to 0.0324, while it

remains similar for women (0.017 in both models). Thus the health advantage that men enjoy are mainly from their higher SES status, higher employment rate and higher health return to employment. Even with these health facilitating advantages, the average health status of men still declines faster with aging than that of women. If men and women have similar SES and enjoy similar health return from employment, the health declining rate of men is going to be twice as that of women, reversing the gender health gap at middle age, and reporting increasing health disadvantage each year toward the oldest observing age of 65.

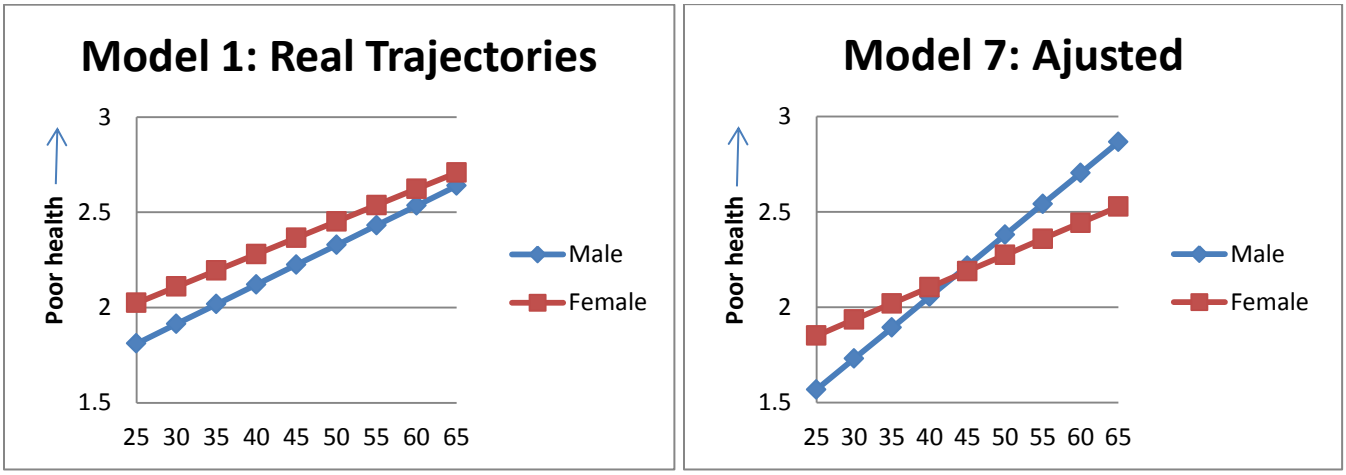

Figure 1----Predicted trajectories of self-reported health by gender: Model 1 vs. Model 7

Including interactions in the model, the fixed effects compared employed men and women of average age, education, and income, indicating that that women would have better health than men if they got the same health rewards from employment across time; the health declining rates of women would also be much smaller than that of men. Figure 1 visualizes the gender gap of health declining rates before and after adding all the controls, dependent variables and interactions, showing a trend from convergence to reversal of gendered health gap with aging if women enjoy same health return to employment.

Model 7 of Table 2 adds occupational status score to the model. Consistent with previous research, higher occupational status improved health status for both men and women. The

interaction between gender and occupation is not statistically significant, indicating that the health benefit of occupation is similar for men and women. This result is inconsistent with some previous research that finds the occupation-related health inequality is more evident among men than among women (Eli 2009). Moreover, the interaction between age and occupation was not significant either, suggesting occupation remains an important predictor of health across life course, but its effect does not rise or decline over time.

Health Selection: General Logistic Modeling and General Linear Modeling

To test the health selection hypothesis, I run two different statistical models because the dependent variables vary from continuous variable to dichotomous variable. First, I run general logistic random-intercept models to examine the effects of health on employment status, a dichotomous dependent variable. Next, I run growth curve models to test the health selective effects on occupational status, a continuous variable. For both analyses in this section, health is measured one wave earlier to exclude social causation effects. Therefore, health is observed from 1989 to 2001; other variables are observed from 1994 to 2005.

General Logistic Random-Intercept Models

The models presented in Table 3 address health selective effects on employment status among respondents who were between 30-54 years of age in 1994. Model 1 in Table 3 includes only age, cohort, and their interaction with gender. After controlling for age and cohort, the odds of a woman to be employed were 12 percent of that of a man. Moreover, the interaction between female and cohort showed that the chances of employment for women of older cohorts were even lower than that of younger cohorts. The odds of being employed decreased with age for man, but increased for women. However, even at the oldest working age (64 years), women still reported lower employment rates than men.

Model 2 of Table 3 adds education, household income, and race to the analysis. The gender gap on employment status increased after adding the controls. Consistent with previous studies, higher education and higher household income were associated with higher chances of being employed. There was no joint effect between education and gender, nor between income and gender on employment status. Race was a robust predictor of individual employment status and also interacted with gender on employment. The odds of being employed for a black male were 37 percent of that of a white male. However, the odds of employment for a black women, were three times that for a black men. The cohort effects and the interaction between female and cohort disappeared after introducing SES and race, suggesting that the employment disadvantage that was experienced by older cohorts (especially older females) can mainly be explained by their lower level of education.

Model 3 introduces family structural factors, such as marital status and number of children. After adding the family structural factors and their interactions with gender, the gender gap of employment status disappeared. Being married, having more children, and having young children (<6) all significantly reduced women's chances of being employed. Conversely, these factors had no effect on men's employment status. As such, low employment rates of women are mainly explained by their traditional family responsibilities.

Model 4 in Table 3 adds health to the nested model. Poor health strongly decreased the likelihood of being employed. The odds of employment for those who reported very good health (health=3) were 40 percent of the odds of those who reported excellent health (health=1); the odds of employment for those who reported poor health (health=5) were only 16 percent of the odds of those with excellent health. Model 5 of Table 3 adds the interaction of gender and health, and the three-way interaction of gender, health, and age; none was significant.

Table 3 Odds Ratios of General Logistic Random-Intercept Models of Employment Status and health[a], 1989-2005 (N=4214)

	Baseline Models			Health	
	Model 1	Model 2	Model 3	Model 4	Model 5
	(SE)	(SE)	(SE)	(SE)	(SE)
Age (centered)	0.9227**	0.9195***	0.9198***	0.9315***	0.9315***
	(0.0126)	(0.0093)	(0.0099)	(0.0102)	(0.0102)
Age^2	0.9928***	0.9934***	0.9939***	0.9937***	0.9937***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Cohort	1.1200	1.1352			
	(0.1180)	(0.1097)			
Female	0.1173***	0.0924***	0.8520	0.7135	0.7133
	(0.0152)	(0.0139)	(0.1925)	(0.2151)	(0.2151)
Black		0.3657***	0.5041***	0.5587**	0.5436**
		(0.0717)	(0.0922)	(0.1001)	(0.1001)
Education(centered)		1.2331***	1.2478***	1.1893***	1.1873***
		(0.0321)	(0.0322)	(0.0302)	(0.0302)
Logged Income (centered)		1.6653***	1.6636***	1.6352***	1.6352***
		0.0594	(0.0605)	(0.0605)	(0.0605)
Marital Status			3.7801***	3.3778***	3.3778***
			(0.6269)	(0.5164)	(0.5164)
Kid_under6			0.6759***	0.6820***	0.6820***
			(0.0689)	(0.0690)	(0.0690)
Number of Kids			1.1466	1.1578	1.1578
			(0.0844)	(0.0843)	(0.0843)
Female*Age	1.0741***	1.0815***	1.0456***	1.0420**	1.0420**
	(0.0124)	(0.0125)	(0.0127)	(0.0125)	(0.0125)
Female*Cohort	0.7837*	0.8187			
	(0.0943)	(0.9646)			
Female*Black		3.2038***	2.053**	2.0402**	1.9871**
		(0.7631)	(0.4940)	(0.4234)	(0.4234)
Female*Marital Status			0.1035***	0.1101***	0.1070***
			(0.0171)	(0.0179)	(0.0193)
Female*Kid6			0.6621		
			(0.1578)		
Female*Number of Kids			0.6815***	0.6705***	0.6676***
			(0.0570)	(0.0555)	(0.0561)
Health				0.6588***	0.6331***
				(0.0265)	(0.0378)
Female*health					1.0239
					(0.0643)
Female*health*age					0.9905
					(0.0054)

Table 3 (continued)

Variance Components	Model 1	Model 2	Model 3	Model 4	Model 5
Level 2 variance	7.0172	5.8830	5.5474	5.1677	5.1626
level 1 & 2 Covariance	0.4635	0.4113	0.3940	0.3733	0.3731
Log likelihood	-6024.69	-5808.54	-5724.13	-5671.80	-5670.33
Wald Chi-Square[b]	529.28	784.76	902.49	984.10	984.80
df	6	10	14	14	15

Note: : N=4214 individuals; 15918 observations. Standard errors in parentheses.
a. To trace the causal effect, health is measured 1 wave earlier. Thus health is observed from 1989 to 2001, other variables are from 1994 to 2005.
b. Significance tests indicate that for each model, model fit is significantly improved compared to less nested models. The differences between the deviance statistics for models is chi square distributed.
* p<.05. ** p<.01. *** p<.001.

Growth Curve Models

The models presented in Table 4 address health selective effects on the occupational status score among respondents who were between 30-54 years of age in 1994. Model 1 in Table 4 included only age, gender, and the interaction between age and gender. It shows that, on average, women reported lower occupational status than men. With aging, men's occupational status decreased slightly, while women's occupational status increased slightly.

Model 2 adds control variables: cohort, race, education, and income. Controlling for other variables, blacks, on average, reported 10 points lower on their occupational status score. Higher education was associated with higher occupational status, but the negative value of the interaction between education and women indicated that women did not enjoy the same occupational rewards from education as men. Higher household income was also associated with higher occupational status, although it was hard to confirm the causal direction. Men of older cohorts reported higher occupational status scores, while there were no cohort occupational differences among women. After controlling for these variables, the gender gap on the occupational status score diminished and was no longer statistically significant, indicating that education, in concern with the interaction between gender and cohort, mainly explain the female

disadvantage on occupational status. This finding is different from the findings of gender gap on employment status, which is mostly explained by family structural factors, instead of education or cohort effects (see Model 3 of Table 3).

Model 3 in Table 4 introduces family structural variables and shows that married men, on average, reported higher occupational status scores (4.2 points), but the interaction between marital status and gender was negative 3, indicating that women enjoyed fewer occupational benefits from marriage than men. Other family structural factors, number of children and having a child or children under 6, were not associated with individual occupational status for either men or women.

Model 4 in Table 4 adds health to the nested model and shows that poorer health is negatively associated with occupational status score; the association is weak, though. For those who reported poor health (=5) in a certain year, their average occupational status score was 2.4 points lower than those with excellent health (=1) in the same year after controlling for other variables. Similarly, for a respondent who had experienced the worst health change (i.e. those who reported excellent health at 1989 and then poor health in 2001), his/her occupational status score was 2.4 points lower in 2005 than that in 1994 after controlling for other variables. Considering the occupational status score ranged from 0 to 100, 2.4 points out of 100 did not make any difference. It could not even be considered as occupational mobility, which is often defined as a 10-point change of occupational status score (Hofmeister 1996; Ferraro et al 2012). Model 5 in Table 4 brought together the interaction between health and gender and found no statistically significant difference between men and women.

Table 4 Growth Curve Models of Occupational Status and Self-Reported Health[a], 1989-2005 (N=4008)

	Baseline Models			Health	
	Model 1	Model 2	Model 3	Model 4	Model 5
	(SE)	(SE)	(SE)	(SE)	(SE)
Intercept	63.5190***	60.9115***	57.0276***	57.0756***	57.0762***
	(0.5345)	(1.2538)	(0.7277)	(0.7274)	(0.7274)
Age (centered)	-0.1582**	-0.4043***	-0.4097***	-0.3972***	-0.3983***
	(0.4206)	(0.0475)	(0.0457)	(0.0459)	(0.0460)
Age^2	-0.0240***	-0.0217***	-0.0216***	-0.0216***	-0.0216***
	0.0025	0.0024	0.0024	0.0024	0.0024
Female	-7.4642***	-3.3342	-1.7473	-1.6857	-1.6540
	(0.7143)	(1.841)	(1.9401)	(1.841)	(1.841)
Black		-9.7536***	-7.6799***	-7.4617***	-7.4537***
		(0.6485)	(0.6379)	(0.6405)	(0.6410)
Education(centered)		5.8820***	5.6300***	5.5748***	5.5821***
		(0.1326)	(0.1326)	(0.1831)	(0.1846)
logged Income (centered)		1.8490***	1.9731***	1.9721***	1.9737***
		(0.2408)	(0.2413)	(0.2413)	(0.2413)
Employment status		0.1401	0.1796	0.1209	0.1198
		(0.9499)	(0.8547)	(0.8547)	(0.8547)
Cohort[b]		1.4931***	2.7775***	2.2674**	2.2654**
		(0.2772)	(0.3318)	(0.3313)	(0.3314)
Marital Status			4.2288***	4.1456***	4.1547***
			(0.7023)	(0.7025)	(0.7025)
Female*Age	0.2290***	0.2426***	0.1657***	0.2618***	0.2618***
	(0.0588)	(0.0666)	(0.0412)	(0.0614)	(0.0615)
Female*Education		-0.9107**	-0.8546**	-0.8491***	-0.8491***
		(0.2595)	(0.2582)	(0.2577)	(0.2577)
Female*Income		2.1739***	2.0209***	2.0172***	2.0133***
		(0.3540)	(0.3560)	(0.3560)	(0.3561)
Female*Employment		2.8818***	2.7130***	2.7406***	2.7406***
		(1.1680)	(0.9786)	(0.9782)	(0.9782)
Female*Cohort		-1.7940***	-1.9844***	-1.9832***	-1.9800***
		(0.5320)	(0.3806)	(0.3802)	(0.3804)
Female*Marital Status			-3.0665***	-3.0456**	-3.0602***
			(0.9056)	(0.9050)	(0.9062)
Health				-0.5900*	-0.5276
				(0.1967)	(0.2808)
Female*Health					-0.1215
					(0.3906)

Table 4 (Continued)

Variance Components	Model 1	Model 2	Model 3	Model 4	Model 5
Level-1 residual	444.31	228.00	225.00	223.64	223.65
Deviance[c] (heterogeneous model)	1322360.1	120149.1	120114.14	120105.18	120105.08
# of Parameter	10	19	20	21	22

Note: : N=4008 individuals; 13959 observations. Standard errors in parentheses.

a. To trace the causal effect, health is measured 1 wave earlier. Thus health is observed from 1989 to 2001, other variables are from 1994 to 2005.

b. Cohort is center at the youngest age of entry into the sample, age 25.

c. Significance tests indicate that for each model, model fit is significantly improved compared to less nested models. The differences between the deviance statistics for models is chi square distributed.

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

Discussion and Conclusion

In this study, I examine the life-course dynamic between gender, career, and health. I estimate cumulative advantage and disadvantage as a process that generate an increase disparity of health return to employment/occupational resources with age, investigate whether women receive the same health returns to occupation and employment across the life course as men, and examine to what extent that health status affect individual employment and occupational status and how health selection effect differ from men to women. The result for employment is consistent with a process of cumulative advantage and disadvantage whereby the over-time compounding of early disadvantages in employment-related resources produce trajectories of health that diverge with age between men and women. However, results for occupation and other SES factors as education and income indicate that occupation, education and income are equally beneficial for the health of men and women. More importantly, the gender gap of health diminishes with age, showing a gender-health convergence tendency and even a reversed gender-health tendency as men and women age, instead of cumulative disadvantage process.

The findings of this study demonstrate that although women initially report poorer health than women, the gender related health gap decreases with age. Women experience significantly

poorer health than men, but this gap narrows each year. Consistent with previous research, the health disadvantages experienced by women are almost entirely explained by SES and family-related factors. The general indicators of SES of occupation, education, and income had similar health effects on men and women as people age, so do family-related factors. However, these factors cannot complete explain the gender differences in health, even after adding another important factor of employment status.

The primary concern in this study was whether there are gender differences in the health returns to occupation/employment resources across life course. Employment becomes increasingly important to maintain health as people age; However, employment does not benefit men and women similarly. Women receive markedly fewer health rewards from employment than men—and that is compounded with age. The health benefit from a higher occupational status, on the other side, are similar for men and women. In addition, after controlling the three way interaction of age-gender-employment, the health declining rate of men is nearly twice that of women, pointing to reversed gender health trajectories if women enjoy same health return to employment with age.

One possible explanation of the health deficit that working women receive from employment might be the types of jobs that women tend to hold. The major health-enhancing resources from employment, according to empirical records, include income, insurance, social support, and sense of control (Schnittker 2007, McDonough & Amick 2001). As income has already been included in the analytical models, the possible explanation for women's relatively low health return to employment might be that women receive less insurance and less social support, and have less control at work. Women are more likely to work part-time, which are less likely to provide insurance benefits. Also, women are largely concentrated in occupations of care

and personal service, which require emotion regulation and are psychologically demanding (Hochschild 1979, 1983) and problematic for health (Schnallet al 1994). Ultimately, the social support that women have through employment is relatively lower than that of men (Fuherh et al 1999), although the health implication of social capital and support at work is still unclear. In spite of these possible explanations for the unequal health return to employment that men and women receive, future studies are needed to examine the latent variables of the gender inequality on health benefit from employment.

The predicted health trajectory that shows a reversed gender health gap in late working age is a novel finding; however, it is consistent with women's mortality advantage. Why does women's health decline at a rate half that of men after adding all the controls, predictors, and interactions? The possible answers lie in the combination of both biological and social processes.

Biological features that benefit women instead of men include menstruation (Coutinho & Segal 2000; Thomas & Ellertson 2000) and genetic reasons that contribute to lower female infant mortality (Drevenstedt et al 2008). Meanwhile, a wide range of social processes create and maintain the female health advantage; women tend to live a healthier life style with fewer risk behaviors, such as smoking and binge drinking (Courtenay, 2006) and to have stronger social networks that include more relatives and close girlfriends (strong ties according to Lin 2000), while men's networks include more co-workers (weak-ties, according to Bird & Rieker 1999). Women's traditional gendered role of caregiver also contributes to their knowledge regarding health and illness (Cockham 2006). Both biological and social causes of women's health advantage are under-studied and the interaction of the genetic and social structures has largely been excluded from empirical research and theoretical debates regarding cumulative advantage as it is applied to health (Gravlee 2009; Wilson et al, 2007). These limitations point to a direction

of future studies, that is, to examine the combined effects of biological and social forces on men's and women's life course health stratification.

The health benefit from family related factors, such as marital status and parenthood are similar for men and women. The results from childrearing variables do not show any negative effects on women's health compared to men; the coefficients even show that having more children at home benefit men's as well as women's health. To some extent, raising children promotes parental health; that is not to say that balancing work and family is not with difficulty, especially for women. For some women, one way to resolve the conflict of work and family is simply to give up work, as shown in the health selection tables. Parenthood affects men and women's career trajectories completely differently, with motherhood selecting women out of employment and fatherhood promoting men's employment. Because employment status plays an important role in facilitating health, although motherhood benefits women's health to some extent, it "harms" women's health via mothers' very low employment rate.

This study also tries to investigate the reversal causation from health to occupation and employment. An analysis of the effect of earlier waves' health on employment status shows that poor health status selects individuals out of employment, across both genders and all ages and cohorts. Poor health and SES are the major predictors of men being selected out of the labor force. However, for women, family responsibilities largely contribute to select them out of the labor force, besides health and SES. Findings also show health has a significant but very weak effect on individual occupational status for both genders. The gender gap of occupational status is mainly explained by education, marriage status, and the interactions of gender with education, marriage, and cohort. Comparing health selection effect on employment and occupation shows that education, in concern with the interaction between gender and cohort, mainly explain the

female disadvantage on occupational status, while the gender gap on employment status is mostly explained by family structural factors.

The lack of gender difference in health selection for employment status is inconsistent with previous research that shows men, especially men of younger cohorts, are more vulnerable to the selective effects of poor health (McDonough & Amick, 2001). The major reason for this inconsistency is that lagged health is used as the predictor of employment status in current models and thus excludes the effects of social causation, while other researchers use same year health. In addition, women's traditional family roles as wife and mother, the major contributor of the gender difference of employment, was not included in most previous health selection and epidemiology literature (Manor et al 2003).

This study's results should be interpreted within the context of its limitations. Although previous research has shown that there is no significant effect of working hours on men and women's health (Arber 1997, Schnittker 2007), combining work and family could indicate more of a burden for women of young cohorts than for men and older women. The current study does not include working hours in the analysis model; this limitation may be responsible for the results.

A second problem related to this study comes from separating health selection from social causation: results show they do co-exist. In social causation models, the independent variables of employment/occupation and dependent variable of health are of the same year, which are not able to exclude health selective effects. In the case of occupation, it is not a big issue because health selection contributes little on individual occupational score. However, in the case of employment, both men and women with poor health are selected out of labor force, but women with better health are also selected out of employment when facing work- family conflict,

which is not a case for men. Thus for the finding that employment-related health inequality is more evident among men than among women, both social causation and health selection make contributions, but it cannot be tell from this research that to what extend employment-related health disparities are caused by social causation, and to what extent they are caused by health selection.

A third problem related to the study is that, although studies of attrition bias in the PSID illustrate that attrition has not distorted the overall representativeness (Case et al. 2003; Fitzgerald et al. 1998), the key relationships of interest might be affected by differential attrition, especially on the shift of health trajectory of men and women.

Appendix

Appendix A Cohorts

	Birth Year	Wave 1: 1989	Wave 5: 2005
Most recent cohort	1950-54	25-29	42-46
	1945-49	30-34	47-51
Middle cohort	1940-44	35-39	52-56
	1935-39	40-44	57-61
Earliest cohort	1930-34	45-49	62-66

Appendix B

For models of the effect of occupational measures (i.e. occupation and employment) alone, the hierarchical models for the health of individual i at time t are as followed.

Level 1:

$$Health_{ti} = \pi_{0i} + \pi_{1i} age_{ti} + \pi_{2i} Occupation_{ti} + \pi_{3i} Unemployed_{ti} + \pi_{4i} Occupation_{ti} * age_{ti} + e_{ti} \quad (3.1)$$

For i =1,..., N individuals in the sample. In this model, $\pi_{0i}$is the starting point health status for a specific person.For individual$i$ at time t, π_{1i} is the growth rate and represents person-mean change in health for each year of age; π_{2i} is the expected health change rate when occupation status increases 1 unit; π_{3i} is the expected growth rate when prestige status increases 1 unit; π_{4i} is the expected growth rate when work status increases 1 unit; and e_{ti} is the time- and individual-specific residual.

To estimate the effects of individual characteristics on individual health trajectory, I estimate the influence of characteristics of the person on the slope and intercepts ($\pi_{0i,}\pi_{1i},\pi_{2i},,\pi_{3i},\pi_{4i},$). The equations for level-2 models are the following:

Level-2:

$$\pi_{0i} = \beta_{00} + \beta_{01}\, Cohort_i + \beta_{02}\, Female_i + \beta_{04}\, Black_i + \beta_{04}\, South_i + \beta_{05}\, HS_i + r_{0i}$$

$$\begin{aligned} \pi_{1i} &= \beta_{10} + \beta_{11}\, Female_i + r_{1i} \\ \pi_{2i} &= \beta_{20} + \beta_{21}\, Female_i \\ \pi_{3i} &= \beta_{30} + \beta_{31}\, Female_i \\ \pi_{4i} &= \beta_{40} + \beta_{41}\, Female_i \end{aligned} \qquad (3.2)$$

In these equations, the coefficients β_{pq} are the effects of individual characteristics on the intercept π_{0i} and slope parameters π_{pi}, and r_{pi} are random terms of individual i that represent unobserved factors during the period of study.

The combined level 1/level 2 equation of this two-level model is a more parsimonious representation. The components within the first set of parentheses are the fixed effects, and the parameters within the second set of parentheses are the random effects.

$$Health_{ti} = [\beta_{00} + \beta_{10} age_{ti} + \beta_{20} Occupation_{ti} + \beta_{30} Prestige_{ti}\, \beta_{40} Unemployed_{ti}$$
$$+ \beta_{50} Occupation_{ti} * age_{ti} + \beta_{01}\, Cohort_i + \beta_{02}\, Female_i$$
$$+ \beta_{04}\, Black_i + \beta_{04}\, South_i + \beta_{05}\, HS_i + \beta_{11} Female_i * age_{ti}$$
$$+ \beta_{21} Female_i * Occupation_{ti} + \beta_{31} Female_i * Unemployed_{ti}$$
$$+ \beta_{41} Female_i * Occupation_{ti} * age_{ti}] + [r_{0i} + r_{1i} * age_{ti} + e_{ti}] \quad (3.3)$$

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