Racial/Ethnic and Gender Trajectories of Functional Impairment: Exploring Between- and Within-Group Heterogeneity

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ABSTRACT

Numerous prior studies have examined racial/ethnic and gender disparities in health trajectories focusing on *between-group* differences, but few have considered how *within-group* heterogeneity is also shaped by racial/ethnic/gender opportunity structures. We use the 1994-2006 Health and Retirement Study (HRS) to examine between- and within-group heterogeneity in age-trajectories of functional limitations among white, black and Mexican American men and women aged 53 to 75. We find disparities in the initial level of functional limitations between racial/ethnic/gender groups but largely similar rates of change with age. Differences in life course capital account for initial disparities between-groups. However, there is substantial heterogeneity within racial/ethnic/gender groups. Within black and Mexican American women, health insurance disparities partially explain the wide variability in functional limitation trajectories. We conclude that there is a substantial amount of non-ignorable within-group heterogeneity, which varies considerably across racial/ethnic/gender groups and potentially contributes to between-group stratification in health and functioning with age. [150 Words]

BACKGROUND

There are well-known racial/ethnic and gender disparities in health among older adults (Moen and Spencer 2006; Williams and Wilson 2001) and, despite overall improvements in population health and targeted policy interventions, there is little evidence of these disparities narrowing over time (Gorman and Read 2006; Martin et al. 2007). Racial/ethnic minorities have worse health than whites on a number of indicators including several chronic diseases, functional limitations, and mortality (Hayward & Heron, 1999; Markides, Rudkin, Angel, & Espino, 1997; Rogers, Hummer, & Nam, 2000). Men have higher mortality risks, while women are more likely to suffer from non-fatal chronic conditions and to be functionally impaired (Gorman and Read 2006; Laditka and Laditka 2002). Numerous prior studies have been devoted to documenting such racial/ethnic and gender disparities and trying to understand their origins. These studies have increasingly used longitudinal data to ascertain how these disparities change with age through the examination of trajectories.

However, research on health trajectories among older adults has tended to treat race/ethnicity and gender separately, potentially obscuring important differences in how health is produced and maintained. Indeed, prior studies suggest that health inequality unfolds in complex and different ways across racial/ethnic/gender groups. Black and Hispanic women have higher prevalence rates of several chronic conditions than whites, with black women the most disadvantaged (Greenlund et al. 1998; Hayward et al. 2000; McGee et al. 1996). Racial/ethnic minority women also have disproportionately high levels of functional limitations compared to white women. Moreover, the gender gap in disability among racial/ethnic minorities is greater than that among whites (Hayward and Heron 1999; Hayward, Warner and Crimmins 2007; Read and Gorman 2006). Prior studies have often found that black women have health profiles and

experiences distinct from other racial/ethnic/gender groups, undergoing accelerated physiological decline beginning in the reproductive years—a phenomenon Geronimus (2001) termed "weathering." For example, black women in midlife have higher levels of the underlying physiological indicators of many chronic conditions (Geronimus et al. 2006), are more likely to be hospitalized (Ferraro et al. 2006), have earlier onset (Taylor 2008) and experience distinctive trajectories of "accelerated disablement" (Warner and Brown 2010).

These complex patterns, and particularly the unique health experiences of black women, demonstrate the importance of taking an intersectionality approach to examining health. An intersectionality approach is centered on structural inequality (Thornton Dill and Zambrana 2009) and stipulates that because race/ethnicity and gender are fundamental determinants of opportunity structure, defining access to both the resources that promote health and exposure to the risks that undermine health, their effects cannot be disaggregated or understood separately. In short, an intersectionality approach posits race/ethnicity and gender are *not* separate, additive, dimensions of social stratification but are mutually defining, and reinforce one another in a myriad of ways in the production and maintenance of health across the life course (Mullings and Schulz 2006).

Yet, these studies have focused almost exclusively on *between-group* differences and have not examined how heterogeneous the experiences are *within-group*. As Kelley-Moore and Lin (2011:7) note: "[a] largely-presumed but unchecked assumption is that the degree of variability in inter-individual differences and intra-individual change does not vary across social groups such as gender or race." The paucity of empirical attention to this matter is surprising given conceptual work pointing to the importance of distinguishing between-group differences from within-group variability (e.g., Calasanti 1996). In fact, we argue that it is unrealistic to

assume that every individual within a racial/ethnic/gender group would experience the same patterns of intra-individual change (trajectories) over time or that that patterns of variability in these trajectories would be the same across groups, given the social patterning of life course capital and risks. A comprehensive examination of racial/ethnic/gender health trajectories must necessarily investigate both the "average" differences *between* groups with age, as well as potential age-associated patterns in variability *within* groups. Examination of within-group variability may reveal new opportunities to see and consequently examine the social processes that lead to both differences in the population average mean trajectory for one racial/ethnic/gender group compared to another, but also to variability within each racial/ethnic/gender group (Kelley-Moore and Lin). In short, understanding the social origins of racial/ethnic/gender disparities in health demands that we pay attention to both mean differences between groups and variability within groups.

Theoretical Conceptualizations of Between and Within-Group Heterogeneity

It is hardly controversial to state that health develops across the life course and disparities in health trajectories exist between social groups (George 2003; House et al. 1994; Kuh and Ben-Shlomo 1997). Yet how disparities between social groups change with age is a matter of considerable theoretical debate and there is conflicting empirical evidence as to the observed pattern (for a review, see Warner and Brown). Three hypotheses regarding how health changes with age have been offered and these have been portrayed in a largely competing fashion—*cumulative advantage/disadvantage*, *persistent inequality* , and *aging-as-leveler* (Ferraro and Farmer 1996; Warner and Brown 2010).

The *cumulative advantage/disadvantage* hypothesis (Dannefer 1987, 2003)—and the individual-level life course epidemiology equivalent "chains of risk" (Kuh et al. 1997)— argues

that inequality increases with age because individuals with an initial advantage have increasing access to resources and exposure to opportunities with age, while those with initial disadvantages have diminished access to resources and greater exposure to risk with age (O'Rand 2006). Therefore, we would expect racial/ethnic/gender trajectories of disability to diverge (between groups) and the variability around each trajectory (within group) to increase.

The *persistent inequality hypothesis* suggests that the effects of demographic and socioeconomic factors on health are constant with age and thus puts forward an expectation of status maintenance. Thus, according to this hypothesis, the magnitude of between-group differences in functional limitations should not differ by age as demonstrated by parallel age-trajectories. The within-group corollary is constant variability around these group average trajectories.

Finally, the *aging-as-leveler hypothesis* argues that because aging involves negative health consequences for both advantaged and disadvantaged populations, those with health advantages earlier in life have the most to lose in terms of health decline. Such a process may also occur because the age-based Medicare policy provides disadvantaged persons access to hospitalization and health insurance and persons in poor health may experience fewer declines after age-eligibility than would otherwise be expected. In this later scenario, rather than the ontogenetic "aging" as leveler, it would be more appropriate to describe this as pattern of "age" —as an indicator of social structure—as leveler.[1] According to this hypothesis, between-group differences narrow in late-life and thus race/ethnicity/gender trajectories of functional limitations converge with age. Within-groups, we would expect variability to decrease with age.

[1] Dupre (2007) indicates that evidence for age-as-leveler may also reflect selective mortality processes where the most disadvantaged persons are systematically removed from the population, resulting in a surviving population that is less heterogeneous with age (see also Kelley-Moore and Lin 2011). In the present analysis, we account statistically for such selective mortality processes.

We note that there is no reason to assume that the patterns of between group and within-group heterogeneity be the same. Thus, for example, the overall pattern of average trajectories of functional limitations between racial/ethnic/gender groups may demonstrate one pattern of between-group differences (e.g., divergence), but this does not necessarily mean that all groups have the identical pattern of within-group variability (e.g., increasing). Moreover, there is no reason to expect that all racial/gender/ethnic groups will have the same pattern of within-group variability. Some groups may have increasing variability, while others have constant or decreasing variability, depending on the nature of stratifying forces such as racial/ethnic/gender-based opportunity structures and/or equalizing forces such as universal age-based social welfare programs. We find this later scenario to be especially important to consider.

Sources of Heterogeneity among Racial/Ethnic/Gender Groups: A Focus on Health Insurance

In our exploration of racial/ethnic/gender heterogeneity, we focus our attention particularly on health insurance access given the absence of universal health care coverage before Medicare-eligibility at age 65. Moreover, despite near universal coverage rates under Medicare, it is important to note that Medicare Part A only provides basic hospitalization insurance and, for those who can afford it, Part B provides coverage for a limited number of outpatient services (Moon 2006). Given the lower financial means of racial/ethnic minorities and women, access to and the type of health insurance should be particularly consequential for between-groups differences in functional limitations and individual variability within groups.

Indeed, prior research indicates that employer-sponsored and private pay insurance are key for regular access to high quality care and this essentially creates a two-tiered health care system (Auchincloss, Van Nostrand and Ronsaville 2001). Medicare enrollees with supplemental private insurance are more likely to have visited a physician, to have had more physician visits,

to have been hospitalized, and to have had longer hospital stays in the past year compared to those who lack supplemental insurance coverage (Miller et al. 1997) and they have lower risks of mortality (Rogers, Hummer and Nam 2000). Such financial barriers to access are more pronounced for racial/ethnic minorities who are less likely to have private supplemental insurance coverage, not to mention Medicare Part B enrollment (Burnette and Mui 1999), even net of their lower education and incomes (Cagney and Agree 1999; Crystal et al. 2000; Dunlop et al. 2002). The absence of supplemental health insurance among Medicare-eligible racial/ethnic minorities is a hold-over from the lower rates of private (particularly employer-sponsored) health insurance in the 50s and early 60s prior to Medicare-eligibility (Angel and Angel 1996; Williams and Collins 1995).

THE CURRENT STUDY

The current study examines race/ethnicity and gender jointly and simultaneously to determine between- and within-group heterogeneity in age-trajectories of disability among older adults. We use data from the nationally representative 1994-2006 *Health and Retirement Study* (HRS) to investigate intra-individual change in functional limitations among white, black and Mexican American men and women, and the extent to which differences in life course capital (O'Rand 2006), particularly health insurance, account for initial disparities and rates of change with age between groups and for variability within groups. We focus on disability—measured by functional limitations —because it is an important indicator of total morbidity in the population (Hayward and Warner 2005), the manifestation of underlying chronic disease processes (Kelley-Moore and Ferraro 2004; Verbrugge and Jette 1994).

Research Questions

Three broad questions remain about disparities in disability trajectories among older

adults: (1) How do age-trajectories of functional limitations vary *between* white, black and Mexican American men and women? Does the pattern of change *between* groups show divergence (i.e., cumulative disadvantage), remain stable (i.e., persistent inequality), or narrow (i.e., age-as-leveler) with age? (2) What is the pattern of variability in the age-trajectories of functional limitations for white, black and Mexican American men and women? Are these patterns of *within* group variability consistent across racial/ethnic/gender groups? Do the patterns of *within* groups variability show divergence (i.e., cumulative disadvantage), remain stable (i.e., persistent inequality), or narrow (i.e., age-as-leveler) with age? (3) Are these patterns of between- and within-group heterogeneity explained by racial/ethnic/gender differences in health insurance coverage? We begin to provide answers to these questions in the current study.

METHODS

Data and Sample

We used seven waves of panel data from the 1994-2006 Health and Retirement Study (HRS) to construct a person-period file where observations were nested within individuals. The HRS includes a nationally representative sample of non-institutionalized adults born 1931-1941 (approximately ages 51 to 61 at the time of initial da ta collection in 1992) and oversamples of Blacks and Hispanics. Respondents have been reinterviewed biennially. We excluded the initial 1992 interview from the analysis because the measures of functional limitations at that interview differ from those in subsequent waves. We also exclude Hispanic respondents who were not Mexican-origin due to small sample sizes of these subgroups (HRS 2006). The final analytic sample includes 8,701 White, Black and Mexican Americans aged 53 to 75, who contribute 47,235 observation points across seven waves over the twelve-year period.

Measures

Dependent Variable

The total number of *functional limitations* was a count variable measured with twelve self-reported items assessing limitations in mobility, strength and upper- and lower-body. Respondents were asked whether they had difficulty: walking several blocks; walking one block; walking across the room; climbing several flights of stairs; climbing a single flight of stairs; sitting for two hours; getting up from the seated position; stooping, kneeling, or crouching; pushing or pulling large objects; lifting ten pounds; raising arms above the shoulder; or picking a dime off of a table. Each item was dichotomized with 1 indicating any difficulty performing the task. We summed the twelve items to create a count of limitations ranging from 0 to 12 (0-10 in observed data). We chose functional limitations over ADL (activities of daily living) and/or IADL (instrumental activities of daily living) disabilities, because ADL and IADL measures tend to capture much more severe forms of impairment in physical functioning that are rare among the young-old population in the HRS (Haas 2008; Warner and Brown 2010).

Independent Variables

Race/Ethnicity and gender are our main study variables. We created six mutually exclusive dummy variables for *White men, White women, Black men, Black women, Mexican American men* and *Mexican American women* to indicate the individual's racial/ethnic/gender group membership. White men served as the reference group when comparing trajectories of functional limitations across racial/ethnic/gender groups.

We estimate age-based trajectories of functional limitations with specification of both linear (*age*) and quadratic (age^2) terms, as prior research demonstrates that changes in functioning among older adults are often non-linear across ages (Kim and Durden 2007; Kim and Miech 2009; Mendes de Leon et al. 2005; Warner and Brown 2010). Rounded age of the respondent

was centered at 53 (i.e., age 53 = 0, age 54 =1, …, age 75 = 22) to produce a meaningful zero which improves computational efficiency.[2]

Health insurance is a major concern when studying health inequalities among older adults, given changes in insurance-eligibility with age and racial/ethnic disparities in access (Angel and Angel 1996; Moon 2006; Williams and Collins 1995). Employment-based health insurance is often an indicator of higher social status and such benefits, in addition to other types of advantages, may accelerate stratification in health status whereas government health care programs, as part of the social welfare apparatus, may have the effect of equalizing health inequalities to some extent. *Insurance status* includes four dummy variables: *government health insurance* (=1), *employment-based health insurance* (=1), *private insurance* (=1), and *other insurance* (=1). These variables are not mutually exclusive. People who were uninsured served as the reference group.

Covariates

We included a number of additional covariates to account for the socioeconomic conditions that, borne out of racial/ethnic/gendered opportunity structures, link race/ethnicity/gender to later-life health (see Warner and Brown 2010 for a full discussion). *Early life social origins* include three dummy variables indicating whether the *family was poor* (=1), *father's education and mother's education* (at least a high school diploma=1; otherwise=0).

Four measures capture respondents' *adult socioeconomic status*. *Education* was measured by the total years of schooling, ranging from 0 to 17 or more. *Earnings* is the sum of all wages and salaries. *Social Security Income* is the value of all Social Security payments received. *Net Worth* is the sum of all household assets, minus any debts. We created individual-level

[2] We used rounded age instead of exact age because IQR bands are calculated based on estimates at each age. Rounded age gave us fewer points on x-axis which made it possible to generate graphs in Stata Graphics.

equivalencies of earnings, Social Security income, and net worth from the original, household-level variables by dividing each measure by the square-root of household size (Azpitarte 2010; Brady 2009). The variables were then logarithmically transformed to adjust for right skewness. *In the Labor Force* is a dummy variable coded one if the respondent indicated currently working for pay, unemployed and looking for work, or on temporary leave. Note that in multivariate analyses we centered education at 12 years (high school) and the income and wealth measures at grand mean to aid interpretations of the constant.

We specified *marital status* with three dummy variables for *divorced* (=1), w*idowed* (=1), or *never Married* (=1). Respondents who were married served as the reference group.

Several dummy variables summarized *health-related behaviors*. *Obesity* was a dummy variable coded one indicative of having a BMI above 30. Smoking was measured by two dummy variables which indicated whether the respondent *ever smoked* (=1) and *currently smokes* (=1). Alcohol use was measured with a dummy variable for *heavy drinking* (3+ drinks per day=1).

Since we included both U.S. born and foreign born adults, we controlled for immigration status using a dummy variable coded one if the respondent was an *Immigrant.*

We controlled for panel attrition biases using two dummy variables for whether the respondent was observed in the panel to have ever *died* (=1) or otherwise dropped out (*nonresponse* =1). Although we do not model the mechanisms of missingness explicitly, these dummy indicators capture any individual characteristics associated with mortal and non-mortal attrition that were not already been accounted for by covariates in the model. Given that a fully efficient estimation procedure was used (maximum likelihood), the model estimates are asymptotically unbiased when data are assumed to be missing at random (Little and Rubin 1987). We used Heckman's (1979) two-stage selection bias models to adjust for mortal and non-

mortal panel attrition in preliminary analyses and results were largely similar to those using the dummy variable controls. In preliminary analyses, to ensure that we were properly specifying the effects of controls for immigrant status and panel attrition, we tested interaction terms of these controls with the slope parameters (age and age^2) in preliminary analysis. Only individuals who died during panels exhibit an accelerated growth in functional limitations. Non-mortal drop-out and immigrant status were not statistically associated in the rate of change in functional limitations with age and consequently we retained only the effect of mortal attrition on the linear and quadratic growth rates. Race/ethnicity/gender, early life social origins, immigration status, and panel attrition controls were time-invariant. Adult SES, marriage, and health behavior covariates were time-varying and measured contemporaneously.

Analytic Strategy

Our general analytic approach is to estimate age-based trajectory of functional limitations using fixed- and random-effects models with maximum likelihood estimates. This type of model estimates intra-individual patterns of change with individual-specific initial values (intercepts) and rates of change (slopes) based on a combination of weighted within- and between-individual variances (Hsiao 1986; Rabe-Hesketh and Skrondal 2008; Singer and Willett 2003). The random-effects parameters indicate the amount of variances associated with the specified variables. We specified three variance components: variances in the initial levels of responses (i.e., random intercepts), variances associated with linear growth rate (age) and those with quadratic growth rate (age^2). We specified unstructured covariance matrix to allow the covariance to be estimated freely because we expected correlations between the initial status and the average rate of change.

The analysis proceeded in two stages. First, we estimated a series of nested models of age-based trajectories of functional limitations. A normal link was used, even though the count of functional limitations is not normally distributed (skewness =1.01; Shapiro-Wilk W = .9466, p <.001). Preliminary analysis specifying a Poisson distribution for the dependent variable did not significantly improve model fit and produced comparable results to that assuming a normal distribution. In all trajectories models, we allowed racial/ethnic/gender groups to influence not only the initial level of functional limitations, but the average rate of change with age. In subsequent models, we entered insurance status, and then all covariates, without specifying their interactions with the growth rates. Our previous analyses have shown that entering each set of covariates—early life social origins, contemporaneous socioeconomic status, marital status, and health-related behaviors—separately into the equation does not change the substantive findings and these covariates were not significantly associated with the linear and quadratic growth parameters (see Warner and Brown 2010). The equations are presented below:

Level 1: $$Y_{ti} = \pi_{0ti} + \pi_{ti1}\text{Age}_{ti} + \pi_{2ti}\text{Age}_{ti}^2 + \epsilon_{ti}$$

Level 2: $$\pi_{0ti} = \gamma_{00} + \gamma_{01}\text{Race/Ethnicity/Gender} + \sum_p \gamma_{0p}X_{pti} + \sum_q \gamma_{0q}Z_{qi} + \zeta_{0i}$$

$$\pi_{1ti} = \gamma_{10} + \gamma_{11}\text{Race/Ethnicity/Gender} + \zeta_{1i}$$

$$\pi_{2ti} = \gamma_{20} + \gamma_{21}\text{Race/Ethnicity/Gender} + \zeta_{2i}$$

In the level-1 equation, Y_{ti} is the value of functional limitations for individual i at time t for i = 1, 2,…, N and t = 1, 2, …,J— where J is the number of measurement occasions. π_{0ti} is the mean number of functional limitations at age 53 for individual i. π_{1ti} is the average linear growth rate parameter and π_{2ti} is the average quadratic growth rate parameter, for each additional year in age. ϵ_{ti} is the error term or level-1 residual representing the random deviation of each observation from individual i's mean.

At level-2, the initial status for individual i, π_{0ti}, is the total effect of the population-level average of functional limitations (γ_{00}), the average level of functional limitations for each of the five racial/ethnic/gender groups (a vector of γ_{01}), the effects of time-invariant (a vector of γ_{0p}) and time-varying (a vector γ_{0q}) covariates, and the random intercept (ζ_{0i}). The linear and quadratic change in functional limitations for individual i (π_{1ti}, π_{2ti}) are product of the average rate of change (γ_{10}, γ_{20}), rates of change for each racial/ethnic/gender group (γ_{10}, γ_{10}) and the random slope terms (ζ_{1i}, ζ_{2i}). The random intercept is the deviation of individual i's from the population average in initial status of functional limitations and the random slopes represent the deviation of individual i from the average rates of linear and quadratic change. The resulting fixed effects estimates provided *between-group* differences in trajectories of functional limitations .

In the second stage of the analysis, we obtained predicted values from the model estimated in the previous stage and plotted the variability around average trajectory of each racial/ethnic/gender group to demonstrate the range of variability *within* groups. For each racial/ethnic/gender group, we made use of individual-level fitted trajectories (combined fixed- and random-effects). At each age, we identify individual trajectories that were at the 25th and the 75th percentile and then smoothed these trajectories across ages as a linear and quadratic function of age to produce age-graded interquartile range (IQR) bands between which 50 percent of the individual trajectories fall. Our most important analytic advancement in this paper is to demonstrate the dispersion (IQR) in addition to central tendency (fixed effects group trajectories) measures conventionally used in growth trajectories modeling. We also show the overlap in variability between groups to compare across racial/ethnic/gender groups.

Based on different patterns of within group variability observed between racial/ethnic/gender groups, we conducted post-hoc analysis to further explore the distinctive pattern of black and Mexican American women. Specifically, we estimated models separately for black and Mexican women, allowing insurance status to influence the linear and quadratic rates of change. We had no a prior reason to expect that black and Mexican American would exhibit a unique pattern of within-group variability. While these finding were unexpected, raising more questions than can be answered in the present analysis, they highlight the importance of not only considering within-group heterogeneity (Kelley-Moore and Lin 2011) but also an intersectionality approach to understanding health disparities since the unique pattern of variability among women of color would not have been evident if we examined race/ethnicity and gender separately (Mullings and Schulz 2006; Warner and Brown 2010).

We performed all statistical analyses using the xtmixed procedure in Stata/SE 9.1. Models were not weighted or adjusted for sample clustering because preliminary analyses specifying these in the user-provided GLLAMM Stata add-on yielded comparable results to those presented (not shown). Based on these analyses, the final models presented here were estimated using the xtmixed procedure because it is more computationally efficient.

RESULTS

Between-Group Inequalities: Bivariate and Multivariate Findings

Table 1 presents differences between racial/ethnic/gender groups in the means of baseline (1994) study variables. Consistent with their advantaged social structural position, white men have significantly fewer functional limitations than white women, black men and women, and Mexican American men women. Black and Mexican American women have the most functional

limitations at baseline, more than twice as many (3.17 and 3.35, respectively) as white men (1.52).

[Table 1 about here]

Turning next to health insurance, there are stark racial/ethnic/gender differentials at baseline and while these insurance disparities are consistent with those observed functional limitations there distribution of insurance type is somewhat complex. Only 10% of white men were uninsured, while the percent uninsured was much higher among other racial/ethnic/gender groups and was particularly high among Mexican Americans women (45%). Compared to white men, a greater percentage of black men and women were receiving government insurance. However, Mexican American men and women did not significantly different from White men in percent receiving insurance provided by the government. Interestingly, the proportion of white women receiving health insurance from a government source was lower than that among white men. The three-quarters of white men had employment-sponsored health insurance (76%), as did nearly as many white women (72%). However, the proportion of black men and women with employer-sponsored insurance was significantly lower (63% for men; 57% for women). Rates of coverage among Mexican American and women were even lower among Mexican American men and women (46% and 35%, respectively), in fact a majority of lacked health insurance coverage. Across racial/ethnic groups, women were less likely than men to have employer-sponsored health insurance coverage at baseline.

Examining the indicators of early life and adult socioeconomic status, the advantaged position of white men relative to other racial/ethnic/gender groups is evident. Comparing across racial/ethnic /gender groups is clear that early life advantages or disadvantages are carried forward into adulthood. Black men and women experience greater socioeconomic disadvantages

relative to whites and Mexican American men and women are the most disadvantaged. As these differences have been discussed elsewhere (Warner and Brown 2010), we leave it to the reader to view the details in Table 1.

Table 2 presents fixed- and random-effects estimates of age-trajectories of functional limitations. All models in Table 2 controlled for immigration status, attrition due to mortality and that due to nonresponse. In Model 1, we included racial/ethnic/gender specific rates of linear and quadratic change. White men at age 53 have on average 1.043 ($p<.001$) functional limitations and the number of functional limitation increases by .053 ($p<.001$) for each additional year of age. There is, however, no significant acceleration effect in the rate of change on average for the population. Compared to white men, all of the other racial/ethnic/gender groups have significantly higher initial levels of functional limitations. The disparity is more severe among black and Mexican American women. Black women on average have 1.432 ($p<.001$) more functional limitations and Mexican American women have almost two more limitations (1.992, $p<.001$) than White men at age 53. Racial/ethnic/gender groups are largely similar to White men in average rates of change, as the linear and quadratic slope coefficients for do not statistically differ. The only exception is black women who significantly different linear and quadratic slopes of functional impairment. The positive signs of the linear (γ_{11}= .063, $p<.01$) and the negative sign of the quadratic (γ_{21}= -.002, $p<.05$) slope fixed effects indicate that black women the experience "accelerated disablement" (Warner and Brown 2010), where the gain in limitations with age is accelerating at a decelerating rate.

[Table 2 about here]

Model 2 introduces health insurance status. Compare to the uninsured, individuals who receive health insurance from a government source (Medicaid and Medicare) have on average

.182 (p<.001) more functional limitations at age 53 and those who with employment-based health insurance have fewer limitations (coeff. = -.169, p<.001). Having private (individual pay) insurance is not different from being uninsured in the initial level of function limitations. Insurance status explains very little of the disparities between White men and racial/ethnic/gender groups, as the coefficients associated with these groups decreased by only 2-8% after accounting for insurance status. Nevertheless, Model 2 provides a better fit to the data as indicated by the likelihood ratio tests (χ^2= 129.18, df =4, p<.001) and smaller AIC and BIC statistics compared to Model 1.

Early life social origins, adult socioeconomic status, marital status and health-related behaviors were added in Model 3. The effects of these variables are all in expected directions and magnitudes. These covariates further explain the racial/ethnic/gender disparities by reducing the intercept coefficients and render some between group differences no longer statistically significant. Black men and Mexican American men are statistically similar to White men in initial levels of functional limitations and average rate of change, once we account for racial/ethnic differences in life course capital. However, the distinctive pattern in trajectories of functional limitation for Black women is sustained even after from controlling for all covariates, suggesting that differences life course capital and risks do not fully explain all the inequalities between most and least privileged groups. Mexican American women continue to have a higher level of functional limitations at age 53 even after accounting for their lower socioeconomic standing, although the magnitude of difference is reduced by more than 60%.

Within-Group Heterogeneity in Age-Trajectories of Functional Limitations

Growth trajectory models provide a unique opportunity to address analytically within-group heterogeneity, exploring variability in the individual trajectories that give rise to the

population average trajectory. Figure 1 presents fixed-effects population average trajectories for each racial/ethnic/gender groups, with interquartile range bands (IQR) between which 50 percent of the fitted individual trajectories fall. We only present figures based on estimates from Model 1 because adding covariates in these pooled models did not substantially change the observed pattern of variability. What is immediately clear from the figure, is that the pattern of within-group variability—inter-individual heterogeneity—differs considerably across groups. The unchecked assumption of similar variability within racial/ethnic/gender groups is clearly false (Kelley-Moore and Lin 2011).

In Panel A, White men have a relatively constant, narrow pattern of variability across ages, most consistent with a pattern of persistent inequality. Although the variability appears to start decreasing at upper ages, the inflection point implied is beyond the observed range of the data (at age 76, calculation not shown). Panels B-F show that white women, black men and women, and Mexican American men and women all have greater variability around their fixed-effects average trajectories compared to white men. Notice that in addition to women of all racial/ethnic groups having higher average-levels of functional limitations than men of the same race/ethnicity, they also display greater variability than men do

[Figure 1 about here]

White women, black men and Mexican American men exhibit a pattern of increasing heterogeneity with ages, as evidenced by the widening range of the IQR bands. These three groups share a pattern that is predicted by cumulative dis/advantage theory which argues that different positions of individuals in the opportunity structure will further differentiate individuals over time, resulting in greater within-group variability or heterogeneity at older ages (Dannefer 1987, 2003; O'Rand 2006). Black and Mexican American women show the greatest within-group

variability and exhibit a pattern that is consistent with both cumulative disadvantage and the age-as-leveler perspective—a point to which we return below.

Cross-group comparisons of variability, as depicted in Figure 2, may also alter some of the substantive conclusions drawn from the average between-group age-trajectories. Panel A in Figure 2 shows the overlap in variability among white men, black men and Mexican American men. Black and Mexican American men have greater variability in functional limitation age-trajectories than white men, primarily due to a small number of individuals with a large number of functional limitations at younger ages in these two groups. Mexican American men are less variable than Black men at the youngest ages but the differentiation over time among Mexican American men is more severe than that among Black men, probably because some Mexican American men who were functionally impaired at younger ages develop more limitations at a faster rate—although not so many as to result in an group average age-trajectory of impairment that significantly departs from that for white men (as indicated by the fixed effects results presented in Table 2).

What is important to note is that the substantial amount of overlap in individual age-trajectories of functional limitations implies that these three groups of men may not be as different as suggested by the average group trajectory. For example, the lower band of variability among white men and that among Black men are almost zero in the early 50s and slightly increased to one functional limitation in the early 70s. White and black men are largely indistinguishable in their lower bands of variability, suggesting that both groups have similar individuals who are the least functionally impaired and remain relatively healthy over time. Therefore, the most advantaged black and white men are similar in physical functioning.

[Figure 2 about here]

Panel B in Figure 2 depicts the overlap in variability in age-trajectories of functional limitations among women by race/ethnicity. Recall that women in general have higher initial levels of functional impairment but at the same time have more variable age-trajectories than men. Compared to white women, black and Mexican American women have greater variability around the average group age-trajectories, because the majority of minority women have higher levels of functional impairment. As a consequence, the lower bands of black and Mexican American women are much higher than that of white women.

As we briefly noted earlier, and as is clear in both Figure 1 and Figure 2, black women and Mexican American women have distinctive patterns of variability from other groups. For black women, the lower band is a fairly linear line that slightly increases over time, while the upper band increases up to age 69 (inflection point, calculation not shown) and then begins to decrease. Thus, individual age-trajectories of functional limitations among black women appear to diverge first and then converge. The diverging-converging pattern is also found among Mexican American women with a different inflection point at age 67 (calculation not shown). While the divergence in individual age-trajectories demonstrated by the widening IQR is consistent with the expectations of cumulative advantage./disadvantage (Dannefer 1987, 2003) hypothesis, the convergence and narrowing of the IQR is indicative of age-as-leveler.

Notice that the inflection points for the within-group variability patterns among Black and Mexican American women were a few years after Medicare eligibility age of 65. Medicare coverage is almost universal and it is reasonable to expect that Medicare would have an equalizing effect, slowing the functional health decline of the most disadvantaged members of a group (the upper band of the IQR), leading to a long-term convergence after a particular age

when the intervention has been implemented.[3] We further explored this pattern by examining how insurance status affect the age-trajectories of functional limitations among black and Mexican American women, respectively, and results are presented in the following section.

Within-Group Heterogeneity among Black & Mexican American Women: Is it Health Insurance?

Given the pattern of within-group variability in age-trajectories of functional limitations discussed above, we explored the effect of insurance status on age-trajectories of functional limitations among black and Mexican American women. We expected that Medicare, as an age-based insurance policy that may reduce health disparities through its universal coverage, may cause the observed convergence in variability by lowering the growth rate or even reduce functional limitations among the most functionally limited. Although we do not have a direct indicator of Medicare benefits, we used health insurance provided by the government as a proxy.

Table 3 shows models for Black women and Mexican American women separately, with insurance status influencing the linear and quadratic growth rates of age-trajectories. Compared to model specifying no such insurance* age interactions, allowing health insurance to affect the growth parameters significantly improved model fit for both black and Mexican American women ($\chi^2 = 18.496$, df = 8, $p < .05$ and $\chi^2 = 15.809$, df = 8, $p < .05$, respectively). For Black women, receiving health insurance from the government is positively associated with 0.6 ($p < .001$) more functional limitations at age 53, relative to the uninsured. However, black women with insurance from the government are not significantly different from the uninsured in average rates of change in functional limitations over time—although this may reflect our inability to distinguish Medicare from Medicaid, a means-tested health program. Black women with

[3] It is unlikely that the pattern among Black and Mexican American women is driven by small sample sizes at upper ages because sensitively analyses indicate that we observe a sufficient number of cases of black and Mexican American women. Moreover, we observe a similar number of Mexican American men and women at each age, yet they did not exhibit a similar pattern of within-group variability.

employment-based health insurance had fewer functional limitations at age 53 (0.835, p<.001), but, interestingly, had an accelerated growth with an increase of .135 limitations with each year of age (p<.05). This might be due to the fact that older black women with functional limitations are in need of insurance and therefore remain in the labor force as long as physically able (Brown and Warner 2008)..

[Table 3 about here]

Examining the effect of insurance status on age-trajectories of functional limitations among Mexican American women reveals a different set of findings. Compared to the uninsured, receipt of government health insurance is associated with 1.5 (p<.01) more functional limitations at age 53. However, compared to the uninsured, receiving health insurance from the government slows the linear growth rate by .227 (p<.05) limitations with each year of age. This suggests that social welfare programs are likely to be effective among Mexican American women by slowing down the development of functional limitations for the most impaired. Employment-based health insurance however, does not influence the initial level or the growth rates of functional limitations for Mexican American women. This may be because of the low employer-sponsored insurance rates among Mexican American (Angel and Angel 1996), so Mexican American women are unlikely to have employment-based health insurance either from their own employment or through their husbands' employment.

DISCUSSION

Employing an intersectionality approach (Mullings and Schulz 2006), grounded in life course theory (Elder, Johnson and Crosnoe 2003; O'Rand 2006), we conceptualized and modeled trajectories of functional limitations and the variability around them as dynamic life course processes *jointly and simultaneously* defined by race/ethnicity and gender, which provide access

to health promoting resources and exposure to health compromising risks over time (Warner and Hayward 2006). Our findings demonstrate considerable between- and within-group heterogeneity that reveals complexity in the processes of life course stratification. Moreover, there is some preliminary indication among black and Mexican American women that age-based social welfare programs result in less variability with age.

The most important finding of this paper is that there is a substantial amount of within-group heterogeneity in age-trajectories of functional limitations among white, black and Mexican American men and women that has been largely overlooked in prior research examining health disparities. Relying solely on between-group comparisons, and consequently assuming within-group homogeneity, may put us at risk of erroneously concluding that a specific pattern of racial/ethnic/gender inequality with age exists. Divergence, convergence or persistent differences in the average between-group trajectories cannot be generalized to describe the within-group differentiation process. Furthermore, the patterns of within-group heterogeneity contribute to overall stratification process and the production of old-age health inequalities between groups. Despite a bulk of conceptual work that has suggested heterogeneity may increase or decrease with age (Dannefer 2003), to date there have been few empirical studies that take into account or directly examine within-group heterogeneity in health trajectories. Our findings regarding within-group heterogeneity and its patterning across racial/ethnic/gender groups challenge the unrealistic assumption that every individual within a group would experience the same pattern of intra-individual change over time. The fact that within-group heterogeneity exists and is not ignorable highlights the need of better conceptualization of life course health inequalities and the limitations of comparing only across racial/ethnic/gender groups. However, we must note that our examination of within-group variability is still explorative as here we have only considered

one measure of variability—the range. There are other measures of variability, such as the statistical and social distribution of estimates at each age noted by Kelley-Moore and Lin (2011). More work is needed using these additional measures of variability to describe racial/ethnic/gender within-group heterogeneity.

Our finding regarding the unique pattern of variability among black and Mexican American women is consistent with what the intersectionality approach would argue, that health disparities are not a race/ethnicity or gender issue; rather, long-term dynamics of functional changes are defined by race/ethnicity and gender jointly and simultaneously. Compared to prior studies of health trajectories that have largely focused on black-white differences (e.g., Ferraro & Farmer, 1996b; Kelley-Moore & Ferraro, 2004; Taylor, 2008) or considered only an amorphous Hispanic category (e.g., Liang et al. 2008), we further advance scholarly understandings of inequality and intersectionality by examining the experiences of older Mexican American men and women, an important group given their projected increase as a share of the aged population (Angel and Whitfield 2007). Though not significantly different from other groups in average rates of disability increase, Mexican American women have a distinctive pattern of variability. Either overlooking within-group heterogeneity or ignoring the uniqueness of Mexican Americans may lead to a missed opportunity of disentangling how Hispanic origin matters for health and inequalities.

Another major finding is that insurance status may contribute to the observed pattern of convergence in within-group variability. Black and Mexican African women show a diverging and then converging trend. Our post-hoc analysis suggests the idea that age-based policy intervention has an equalizing effect may be promising. Our future work will focus on creating more accurate, mutually exclusive categories of insurance status, particularly distinguishing

people who are entitled to Medicare only from those who have both Medicare and Medicaid. A new measurement of insurance status and an examination of the distribution of individual trajectories by insurance status within a group may help clarify whether this distinctive variability pattern reflects any leveler effect of the age-based Medicare policy.

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Table 1. Means and Standard Deviations for Baseline Study Variables by Race/Ethnicity/Gender [a,b]

	Total	White		Black		Mexican American	
		Men	Women	Men	Women	Men	Women
Functional Limitations	2.08(2.55)	1.52(2.18)	2.23(2.51) *	2.00(2.76) *	3.16(3.02) *	2.23(2.63) *	3.35(3.00) *
Age [c]	58.13(3.45)	58.22(3.44)	58.18(3.44)	58.30(3.59)	58.14(3.46)	57.86(3.35)	57.62(3.33) *
Health Insurance Status							
Uninsured	.15	.10	.13*	.17*	.22*	.37*	.45*
Government	.13	.13	.10*	.24*	.20*	.17	.16
Private	.09	.08	.10*	.06	.07	.02*	.04*
Employment-Based	.69	.76	.72*	.63*	.57*	.46*	.35*
Other Insurance	.26	.16	.40*	.15	.20*	.04*	.16
Early Life Social Origin							
Family was Poor	.21	0.20	0.16*	0.30*	0.27*	0.33*	0.31*
Father had ≥H.S. Education	.30	0.44	0.38*	0.21*	0.18*	0.07*	0.06*
Mother had ≥ H.S. Education	.35	0.37	0.34*	0.17*	0.16*	0.04*	0.06*
Adult Socioeconomic Status							
Years of Education [c]	12.15(3.15)	12.87(2.96)	12.55(2.35) *	10.86(3.51) *	11.46(3.04) *	7.61(4.40) *	7.39(4.30) *
Earnings (Ln) [c]	2.28(1.50)	2.64(1.45)	2.23(1.50) *	2.15(1.45) *	1.69(1.43) *	1.70(1.26) *	1.29(1.29) *
Social Security Income (Ln) [c]	0.32(.73)	0.28(0.72)	0.31(0.73)	0.39(0.78) *	0.42(0.78) *	0.29(0.67)	0.37(0.71)
Net Worth (Ln) [c]	5.75(.54)	5.84(0.57)	5.85(0.52)	5.49(0.36) *	5.45(0.36) *	5.33(0.36) *	5.37(0.36) *
In the Labor Force	0.65(.48)	0.76	0.58*	0.64*	0.57*	0.72	0.44*
Marital Status							
Married	0.75	0.85	0.74*	0.66*	0.45*	0.81	0.66*
Divorced	0.15	0.10	0.14*	0.22*	0.28*	0.14	0.18*
Widowed	0.07	0.02	0.09*	0.05*	0.19*	0.02	0.12*
Never Married	0.04	0.03	0.03	0.07*	0.08*	0.03	0.04
Health-Related Behaviors							
Obese (BMI ≥ 30)	0.25	0.21	0.23*	0.29*	0.43*	0.27	0.36*
Ever Smoked	0.63	0.74	0.55*	0.73	0.54*	0.76	0.43*
Currently Smokes	0.24	0.24	0.23	0.34*	0.20*	0.25	0.16*
Heavy Drinker (3+Drinks/Day)	0.05	0.08	0.02*	0.07	0.01*	0.10	0.02*
Controls							
Immigrant	0.07	0.04	0.05	0.06	0.05	0.43*	0.43*
Died	0.15	0.16	0.10*	0.24*	0.18	0.17	0.13
Nonresponse	0.22	0.21	0.21	0.29*	0.24	0.32*	0.25
N	8,701	3,197	3,483	629	914	229	249

Notes: [a] Unweighted statistics were reported. [b] Two-tailed T-Tests with Welch approximation were used. Statistically significantly different (p <.05) means between men and women within racial/ethnic groups were shaded; statistically significantly different (p <.05) means between racial/ethnic/gender group and White Men were denoted by a *. [c] Mean was calculated from original, non-centered variable. Source: Health and Retirement Study (1994-2006)

Table 2. Age-Trajectories of Functional Limitations Among Older Adults Aged 53 to 75 (N = 8,701)

	Model 1			Model 2			Model 3		
Fixed Effects	Initial	Linear	Quadratic	Initial	Linear	Quadratic	Initial	Linear	Quadratic
Intercept	1.043***	.053***	.001	1.144***	.062***	-.0002	4.748***	.036***	-.0001
	(.067)	(.011)	(.001)	(.070)	(.011)	(.001)	(.171)	(.011)	(.001)
White Women	.825***	-.005	.001	.806***	-.004	.001	.691***	-.004	.001
	(.088)	(.015)	(.001)	(.088)	(.015)	(.001)	(.085)	(.015)	(.001)
Black Men	.468**	-.018	.001	.445**	-.023	.001	-.053	-.028	.001
	(.161)	(.030)	(.001)	(.161)	(.029)	(.001)	(.155)	(.029)	(.001)
Black Women	1.432***	.063**	-.002*	1.406***	.057*	-.002*	.881***	.050*	-.002
	(.134)	(.024)	(.001)	(.134)	(.024)	(.001)	(.130)	(.023)	(.001)
Mexican American Men	.632**	.056	-.002	.580*	.055	-.002	-.418	.054	-.002
	(.242)	(.044)	(.002)	(.241)	(.044)	(.002)	(.233)	(.043)	(.002)
Mexican American Women	1.992***	.003	.001	1.911***	.002	.001	.777***	.001	.001
	(.226)	(.040)	(.002)	(.225)	(.040)	(.002)	(.219)	(.040)	(.002)
Insurance Status									
Government				.182***			.175***		
				(.024)			(.024)		
Private				-.017			-.004		
				(.020)			(.020)		
Employment-Based				-.169***			-.086***		
				(.025)			(.025)		
Other Insurance				.054*			.027		
				(.027)			(.027)		
Early Life Social Origins									
Family was Poor							.268***		
							(.054)		
Father had ≥ H.S. Education							-.177**		
							(.058)		
Mother had ≥ H.S. Education							.052		
							(.056)		
Adult Socioeconomic Status									
Years of Education							-.142***		
							(.008)		
Earnings (Ln)							-.021**		
							(.007)		
Social Security Income (Ln)							.019*		
							(.009)		
Net Worth (Ln)							-.245***		
							(.022)		
In the Labor Force							-.559***		
							(.023)		

Table 2 (cont.). Age-Trajectories of Functional Limitations Among Older Adults Aged 53 to 75 (N = 8,701)

	Model 1			Model 2			Model 3		
Fixed Effects	Initial	Linear	Quadratic	Initial	Linear	Quadratic	Initial	Linear	Quadratic
Marital Status									
Divorced							.244***		
							(.049)		
Widowed							.047		
							(.048)		
Never Married							.093		
							(.113)		
Health-Related Behaviors									
Obese (BMI ≥ 30)							.362***		
							(.027)		
Ever Smoked							.332***		
							(.048)		
Currently Smokes							-.150***		
							(.034)		
Heavy Drinker(3+Drinks/Day)							-.051		
							(.035)		
Controls									
Immigrant	-.340***			-.341***			-.453***		
	(.102)			(.101)			(.093)		
Died	1.273***	.024	.003*	1.241***	.021	.003**	.979***	.010	.004**
	(.134)	(.026)	(.001)	(.134)	(.026)	(.001)	(.129)	(.026)	(.001)
Nonresponse	-.071			-.073			-.108		
	(.061)			(.060)			(.056)		
Random Effects (Variances)									
Level-1 Residual	1.656***	(.013)		1.663***	(.014)		1.664***	(.014)	
Level-2 Intercept	4.255***	(.161)		4.176***	(.160)		3.406***	(.143)	
Level-2 Age	.056***	(.006)		.055***	(.006)		.054***	(.005)	
Level-2 Age^2	.0001***	(.00001)		.0001***	(.00001)		.0001***	(.00001)	
Covariance(Age, Intercept)	-.042	(.026)		-.052*	(.026)		-.057*	(.024)	
Covariance(Age^2, Intercept)	-.005***	(.001)		-.004***	(.001)		-.003**	(.001)	
Covariance(Age, Age^2)	-.002***	(.0003)		-.002***	(.0003)		-.002***	(.0002)	
Model Fit									
Log Likelihood	-93466.483			-93401.893			-92559.447		
AIC	186993			186871.8			185216.9		
BIC	187255.9			187169.7			185646.3		

Source: Health and Retirement Study (1994-2006); * p<.05 **p<.01 ***p<.001

Table 3. Age-Trajectory of Functional Limitations Among Black & Mexican American Women

	Black Women			Mexican Women		
Fixed Effects	Initial	Linear	Quadratic	Initial	Linear	Quadratic
Intercept	5.690***	-.022	.002	4.845***	.114	-.004
	(.637)	(.052)	(.003)	(1.098)	(.075)	(.004)
Insurance Status						
Government	.600*	-.024	-.0002	1.524**	-.227*	.009
	(.304)	(.058)	(.001)	(.592)	(.107)	(.005)
Private	-.062	-.024	.001	1.042	-.130	.006
	(.379)	(.067)	(.003)	(1.219)	(.197)	(.008)
Employment-Based	-.835**	.135*	-.004	.091	-.009	-.001
	(.282)	(.057)	(.003)	(.546)	(.116)	(.006)
Other Insurance	.122	-.069	.003	1.006	-.166	.007
	(.330)	(.069)	(.003)	(.760)	(.179)	(.010)
Early Life Social Origins						
Family was Poor	.552***			.215		
	(.167)			(.308)		
Father had ≥ H.S. Education	-.463			-.439		
	(.248)			(.643)		
Mother had ≥ H.S. Education	.064			-.730		
	(.237)			(.656)		
Adult Socioeconomic Status						
Years of Education	-.093***			-.132***		
	(.027)			(.039)		
Earnings (Ln)	-.099**			-.129*		
	(.032)			(.065)		
Social Security Income (Ln)	-.010			.070		
	(.038)			(.084)		
Net Worth (Ln)	-.171			-.164		
	(.098)			(.192)		
In the Labor Force	-.885***			-.838***		
	(.087)			(.175)		
Marital Status						
Divorced	.149			.809*		
	(.151)			(.322)		
Widowed	.096			.280		
	(.142)			(.269)		
Never Married	-.301			.173		
	(.275)			(.692)		
Health-Related Behaviors						
Obese (BMI ≥ 30)	.345***			.299		
	(.084)			(.157)		
Ever Smoked	.204			-.082		
	(.154)			(.291)		
Currently Smokes	-.274*			.204		
	(.127)			(.262)		
Heavy Drinker (3+Drinks/Day)	.356			.145		
	(.194)			(.340)		
Controls						
Immigrant	-.449			-.106		
	(.336)			(.324)		
Died	1.086*	.047	-.002	1.048	.022	.006
	(.450)	(.089)	(.004)	(.956)	(.202)	(.011)
Nonresponse	-.435*			-.502		
	(.186)			(.348)		

Table 3 (cont.). Age-Trajectory of Functional Limitations Among Black & Mexican American Women

	Black Women		Mexican Women	
Random Effects (Variances)				
Level-1 Residual	2.318***	(.060)	2.587***	(.125)
Level-2 Intercept	4.723***	(.617)	4.192***	(1.046)
Level-2 Age	.084***	(.023)	.087*	(.049)
Level-2 Age^2	.0001**	(.00005)	.0002*	(.0001)
Covariance(Age, Intercept)	-.192	(.105)	-.142	(.201)
Covariance(Age^2, Intercept)	-.002	(.005)	.0002	(.011)
Covariance(Age, Age^2)	-.003***	(.001)	-.004	(.002)
Model Fit				
Log Likelihood	-10089.82		-2889.129	
AIC	20263.64		5862.257	
BIC	20535.49		6081.05	
N	914		249	

Source: Health and Retirement Study (1994-2006); * p<.05 **p<.01 ***p<.001

Figure 1. Fixed-Effects Population Average Age-Trajectories of Functional Limitations with Interquartile Range (IQR) Bands by Race/Ethnicity/Gender (Base Model)

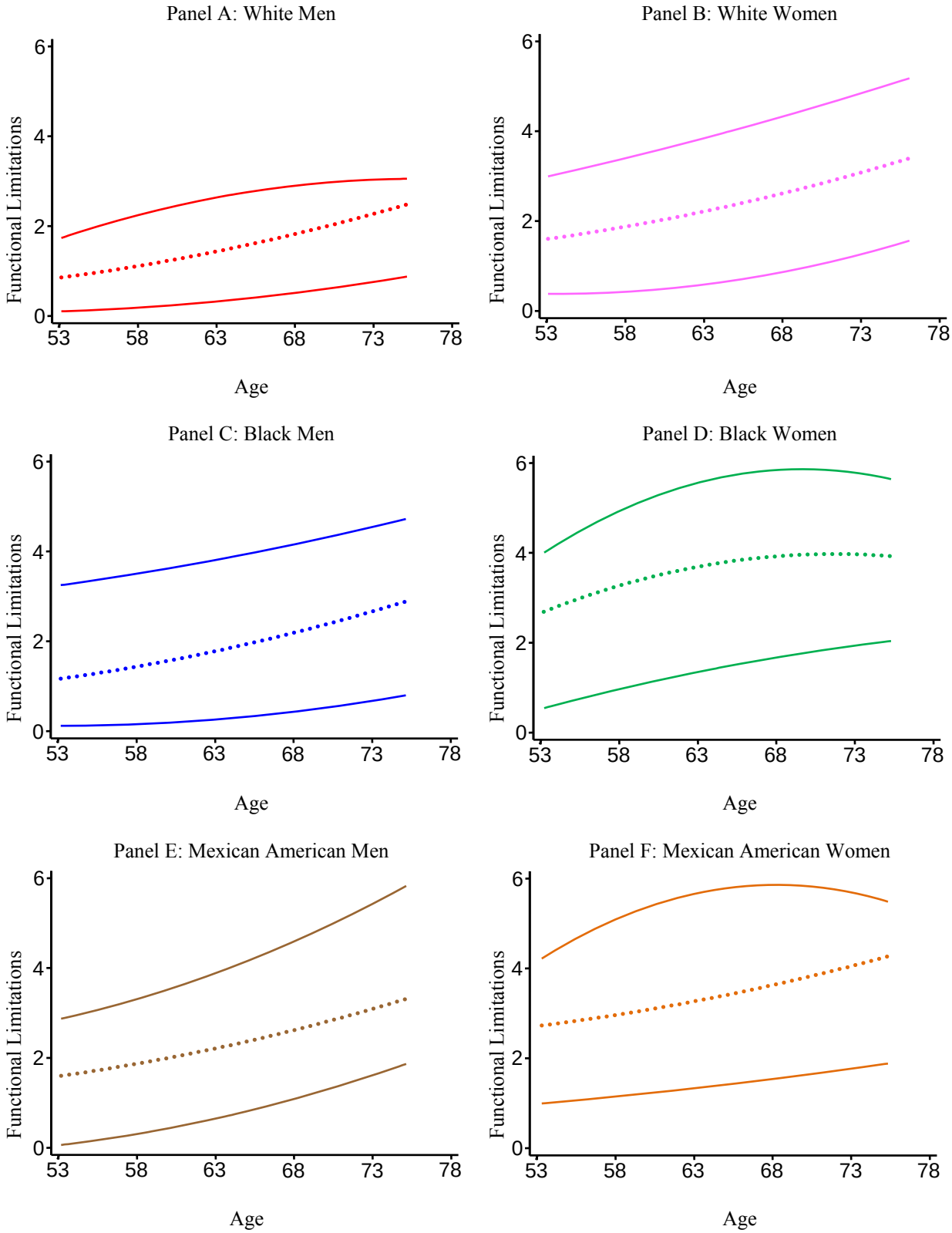

Figure 2. Overlap in Within-Group Variability in Age-Trajectories of Functional Limitations: Interquartile Range (IQR) Bands by Race/Ethnicity/Gender (Base Model)