The role of occupations in differentiating health trajectories in later life

Authors: Michal Engelman, Heide Jackson

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Michal Engelman and Heide Jackson

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Center for Retirement Research at Boston College
Hovey House
140 Commonwealth Ave
Chestnut Hill, MA 02467
Tel: 617-552-1762 Fax: 617-552-0191
http://crr.bc.edu

Both of the authors are affiliated with the University of Wisconsin, Madison. Michal Engelman is an assistant professor of sociology and Heide Jackson is a Ph.D. candidate in sociology. The research reported herein was performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement Research Consortium. The opinions and conclusions expressed are solely those of the authors and do not represent the opinions or policy of SSA, any agency of the federal government, the University of Wisconsin, Madison, or Boston College. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation or favoring by the United States Government or any agency thereof.

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140 Commonwealth Ave
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http://crr.bc.edu

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Abstract

This study characterizes heterogeneous trajectories of health among older Americans and investigates how employment histories differentiate them. Using the 1998-2010 waves of the *Health and Retirement Study,* we examine the impact of longest-held occupations on patterns of limitations in activities of daily living. We use latent class growth analysis to identify distinct health trajectory classes and linear growth curve analysis to model the pattern of limitation accumulation for individuals. All analyses are stratified by sex and race, to account for differential labor markets and health experiences of these demographic groups. A limitation of this analysis is its reliance on broad occupational categories rather than specific measures of working conditions. In future work, we plan to incorporate data on specific occupations and merge them with detailed information on occupational characteristics available in the O*NET database (an online repository that has updated the Dictionary of Occupational Titles used in previous research on aging and retirement and occupational epidemiology: http://www.onetonline.org/).

The paper found that:

- White respondents (both male and female) are substantially more likely to be in the healthiest class compared to black respondents.
- Certain occupations are protective against membership in poor health classes, but the list of protective occupational categories differs substantially by sex and race.
- The impact of occupations on health trajectories was diminished when we controlled for educational attainment and smoking, suggesting the important role of education in sorting individuals into occupations that differ in physical and cognitive demands that likely influence health.

The policy implications of the findings are:

- Life expectancy alone does not capture all the health information that would be relevant for assessing the capacity of American workers to stay on the job beyond traditional retirement ages. Legislators should consider differences in health and in the trajectories of functional decline across demographic groups defined by sex, race, and occupational exposures when debating further increases in the Social Security retirement age.

Introduction

Recent and projected increases in the absolute and relative size of the older population have raised concerns about the level of pension spending and its sustainability into the future. Advocates for raising the pension eligibility age note that life expectancy in the US was less than 61 years in 1935 (when the eligibility age was set at 65) and point to improvements in life expectancy to argue that older Americans are living longer, healthier lives, and are thus capable of working longer. In response increasing life expectancy and concerns about fiscal viability, the full retirement age for Social Security benefits has been rising: it is scheduled to reach 67 for individuals born in and after 1960 (Kingson and Altman, 2011), and there are proposals to further increase it to 70 (Office, 2010).

However, life expectancy alone does not capture all the health information that would be relevant for assessing the capacity of American workers to stay on the job beyond traditional retirement ages. Physical and mental health in later life are known to vary greatly across individuals and sociodemographic groups (Liang et al., 2010a, 2011, Xu et al., 2010, Quiñones et al., 2011), reflecting the dynamic influence of innate endowments and the cumulative impact of lived experiences in specific environmental and socioeconomic contexts. Thus, though people are living longer, their additional years are not always healthy ones: they may also be burdened by health problems that lower their quality of life and limit their ability to continue working.

Limitations in physical activities become increasingly common with age, and the particular pattern of health declines in later life may be associated with certain prior exposures in early and mid-life. While longevity and health in older ages have been linked to measures of socioeconomic position, the mechanisms that predispose individuals to specific impairment patterns are not well understood. Occupation, as a nearly universal adult experience, is an exposure of special interest both for life-course researchers and for those engaged in retirement age policy debates.

Given the context of this debate, our study addresses two research questions:

- **Question 1** How do past occupational exposures affect older Americans' physical health?
- **Hypothesis 1** We expect that individuals who previously held jobs with poor physical or psychosocial conditions will have worse health outcomes in later life, as evidenced by more impairments and an earlier age of onset.
- **Question 2** Do past occupational exposures have different effects on the health trajectories of older Americans depending on their gender and race?
- **Hypothesis 2** We hypothesize that past occupational exposures will be more varied and have a greater influence on the health trajectories of older men than older women because men in these cohorts spent more time in the formal labor force and had access to a wider range of occupations. We also expect that histories of occupational segregation coupled with systematic differences in occupational structures and experiences on-the-job will contribute to differential patterns of health declines among older blacks and whites.

Occupations and Health

Occupational categories are a function of education, working conditions, and choices made by individuals upon entering the job market. A broad literature has shown that occupations associated with a range of physical and mental health outcomes, and that they affect health via physical demands and job conditions; psychosocial job characteristics including substantive complexity, feelings of control, job security, exposure to stress, and access to social support; and via income, prestige, employer provision of health insurance and other benefits; and exposure to resources, information, and peers who reinforce particular health behaviors (Baker, 1985, House et al., 1986, Moore and Hayward, 1990, Bosma et al., 1997, Marmot et al., 1997b, Cheng et al., 2000, Virtanen et al., 2002, Warren et al., 2004).

Past research has influentially demonstrated that individuals who have held jobs characterized by lower socioeconomic position and poor physical or psychosocial working conditions will tend to have shorter life expectancies and worse physical and psychosocial health in later life (as measured by self-reported health, as well as morbidity, coronary heart disease, and health-related behaviors) even when controlling for demographics, health habits, education, and income, among other factors (Marmot et al., 1997a, Case and Deaton, 2005).

However, longitudinal studies (often relying on limited data on past occupational exposures) have found mixed evidence on how occupations may influence the health of older adults. Consistent with the hypothesis of differentiation due to cumulative disadvantage (Dannefer, 2003), some longitudinal studies find that, over time, health and functional declines are more pronounced for manual workers and workers doing routine non-manual tasks, leading to widening health disparities with age (Pietiläinen et al., 2011). Other longitudinal studies have found that occupational category has little or no impact (Gueorguieva et al., 2009) on the rate of change in health after accounting for baseline health differences. These conflicting findings may be due to heterogeneity across study populations, health-related selection into occupations, reductions in occupational exposures post-retirement, selective mortality or attrition by workers with poorer health, or a leveling of socioeconomic differences in health resulting from inevitable biological consequences of aging.

Earlier studies using occupation at a single point in time implicitly assumed either that work organization exerts acute, proximal effects on disease risk or that the exposures associated with all past occupations were similar to those associated with the job held at the time of interview. However, the dynamics of employment changes and career mobility in the U.S. are such that work experience changes over time, and it is the cumulative exposure to particular working conditions throughout the life course that may be thought to have the most direct relationship to health over time.

Recent studies link the cumulative burden of job characteristics (and particularly exposure to adverse working conditions) with declines in physical and mental health (Michie and Williams, 2003, Fletcher et al., 2011). Long-term exposure to stressful physical or psychosocial job conditions may result in poor physical health due to the impact of an increasing allostatic load (McEwen, 2000, McEwen and Seeman, 1999, Seeman et al., 2001). That is, the body may react to physical, social, and psychological stresses (resulting from occupational exposures as well as other life course circumstances) in physiological and biological ways that literally allow the physical and social environment to get under the skin. While short-term stress response may be beneficial or adaptive, prolonged or chronic stress exposure may wear down aspects of brain and immune system functioning.

While most studies examining health in later life focus on one or two points in time, there is growing recognition that physical and mental health are dynamic life course processes and are best understood and modeled as longitudinal trajectories. A growing literature (Jokela et al., 2010, Liang et al., 2010b, Taylor, 2010) documents heterogeneous health trajectories among older adults, but to date differences in prior occupational experiences have not been a primary focus in this literature.

Differences by Gender and Race

There is considerable variability in occupational experiences and in health across both gender and ascribed race categories. A result of historical and ongoing processes of racial and gender-based stratification, occupational and health differences between women and men and blacks and whites are apparent at all ages, but are especially notable for members of older cohorts, who have spent much of their lives within explicit patriarchal and segregated socioeconomic structures.

The stratification of jobs by gender has long been noted in the economics and sociology literature (Bielby and Baron, 1986, Kilbourne et al., 1994, Reskin, 1993, Warren et al., 2002). For much of the twentieth century, men were more likely to work in the formal labor force than women, and women who worked in the formal labor force averaged fewer hours per week and typically had work histories that were shorter and more likely interrupted by childbearing and rearing. Women tended to concentrate in low-paying occupations, and those who worked in the same occupations as men tended to be paid less and experienced different stresses and work-related pressures. While men were more likely to have jobs in which they were exposed to dangerous working conditions than women, men were also more likely than women to hold supervisory roles, have control over their work schedules, and learn new things at work.

There is also strong evidence of stratification of health conditions by gender. Women report worse self-rated health and a higher number and variety of chronic illnesses relative to men, but they are also less likely than men to die at every age (Verbrugge, 1985, Arber and Cooper, 1999, McDonough and Walters, 2001, Case and Paxson, 2005), suggesting a complex relationship between gender and domains of physical and mental health.

Given gender differences in patterns of labor force participation and the social, economic, and cultural contexts of American society throughout the twentieth century, the relationship between occupational histories and health is likely to vary substantially across gender. Likewise, *not* working may probably hold different meanings and signal differential socioeconomic statuses for older women and men with potential implications for health.

Occupation and health patterns likewise differ tremendously across ascribed race categories. Long-time patterns of occupational segregation have led to a disproportionate concentration of African Americans in occupations with low status, skills, and earnings, though growing numbers of African Americans have made significant gains into previously white-only sectors since the 1970s (King, 1992). Nonetheless, despite their increased occupational attainment, African Americans earn less than whites in many private-sector occupations (Grodsky and Pager, 2001), and the racial gap in occupational status grows with advancing age (Miech et al., 2003).

A substantial literature documents lower life expectancy and higher levels of morbidity and disability among African Americans in the United States, reflecting the biological impact of historical and ongoing patterns of racial discrimination and economic deprivation (Geronimus et al., 2001, Krieger, 2005, Geronimus et al., 2006, Frieden, 2013). Analyses of health trajectories have also shown that relative to white Americans, blacks have higher probabilities of experiencing poor functional health trajectories and trajectories with more elevated depressive symptoms (Liang et al., 2010b, 2011).

These disparate strands of research suggest that the impact of job characteristics on health may differ substantially across demographic groups. Indeed, one recent study found that the cumulative physical demands of work decrease health considerably more for black men than for white men, that exposure to harsh environmental conditions decreases the health of older women more than their male or younger counterparts, and that job characteristics are more detrimental to the health of white female workers (Fletcher et al., 2011). Keeping these extensive processes of stratification and differentiation in mind, we conduct our analysis of the relationship between occupational histories and health trajectories using gender and race-stratified subsamples.

Data

Our data come from the *Health and Retirement Study* (HRS), a longitudinal survey of community-dwelling, middle-aged and older Americans with extensive information on both socioeconomic conditions and health status (Juster and Suzman, 1995).

In the present study, baseline data were obtained from responses in 1998 with some data pulled from earlier survey waves if there were items missing in the 1998 survey round. Follow-up data were gathered every two years up to 2010. HRS data collected in 1992, 1994, and 1996 were excluded because several key questions about health and occupations, as well as their response options, were worded differently in those waves, rendering comparisons difficult. We additionally exclude individuals who were part of the HRS military subsample, because their past occupational exposures were quite different from the general sample. Finally, we exclude persons who do not report a longest held occupation at any survey round between 1992 and 1998 and who meet one of the following criteria: report having been in the labor force in the last 20 years or do not report when last in the labor force. These persons are excluded because we have very limited information about their prior work histories.

We use the RAND HRS data file, and the final analytical sample consisted of 27,628 individuals at baseline, with 17,721 (64% of the initial sample) surviving to the last wave of the survey in 2010.

Based on birth year and sampling design four cohorts are constructed [1]:

1. AHEAD Cohort: born on/after 1914 and before 1924.
2. CODA Cohort: born between 1924 and 1930.
3. HRS Cohort: born between 1931 and 1941.
4. WB Cohort: born between 1942 and 1947.

Because there are distinct and systematic differences in labor markets and health experiences (particularly among older cohorts) for men vs. women and for whites vs. blacks, each cohort is stratified by sex and race and all models are estimated separately for every cohort-sex-race group. In the current draft, we describe results from race- and sex-stratified models for the HRS birth cohort only. In future work we will explore whether and how patterns found in the HRS compare to race-sex groups born in other cohorts.

Dependent Variable

The key dependent variable is the number of activities of daily limitation a person reports. This measure summarizes a person's difficulty in walking across a room, getting in and out of bed, dressing, bathing, and eating. Our scale ranges from zero (no limitations) to five (limited in all of these domains). Activities of daily living are used to summarize a person's health status because self-reported ADL difficulties have been shown to be comparable to objective performance measures in predicting functional capacity (Idler and Benyamini, 1997, Fried et al., 2001) and to be accurate for the majority of men and women across a range of socio-economic contexts (Merrill et al., 1997, Wray and Blaum, 2001).

Independent Variable

The primary explanatory variable is the respondent's longest-held occupation. The HRS includes information on respondents' current job as well as their longest-held one. Research has shown that health is sensitive to working conditions, and understanding the structure of a career – not merely the circumstances most proximate to retirement –

[1] Because there are some discrepancies between how the HRS classifies individuals into cohorts and cohort classification made strictly on birth year individuals are considered to belong to a cohort if they are identified as being in that cohort within the HRS sample and their birth year falls within the proper specified range.

is essential for understanding the long-term influence of job characteristics on later life health (Moore and Hayward, 1990, Gueorguieva et al., 2009, Fletcher et al., 2011). Here, we use the longest-held occupation as the best available proxy for individuals' greatest cumulative exposure to occupational conditions that could influence health.

We classify the longest-held occupation into one of eight categories: professional, managerial, clerical, sales, production, operations, service, and farming, adjusting for time spent working in the occupation.[2] The reference category comprises persons who are believed to have not been employed in the formal labor market in the two decades prior to the baseline survey. These individuals do not report having a longest-held occupation and report having last been in the labor market prior to 1972. While adults who are not in the formal labor force are likely to be a heterogeneous group, we chose them as a reference group to highlight the impact that employment in a particular occupation (and thus, exposure to particular working conditions) is likely to have on subsequent health trajectories. While the heterogeneity of the reference group poses certain challenges to the interpretation of our results, it nonetheless offers a policy-relevant comparison in the context of the retirement-age debate.

[2]These eight categories are collapsed from 16 categories available for the CODA, HRS, and WB cohorts:

1. managerial specialty oper (managerial)
2. prof specialty opr/tech sup (professional)
3. sales (sales)
4. clerical/admin supp (clerical)
5. svc:prv hhld/clean/bldg svc (service)
6. svc:protection (service)
7. svc:food prep (service)
8. health svc (service)
9. personal svc (service)
10. farming/forestry/fishing (farming)
11. mechanics/repair (production)
12. constr trade/extractors (production)
13. precision production (production)
14. operators: machine (operations)
15. operators: transport, etc (operations)
16. operators: handlers, etc (operations)

and from 9 categories available in the ahead cohort:

1. professional/technical workers (professional)
2. managers/officials/proprietors (managerial)
3. clerical/kindred workers (clerical)
4. sales workers (sales)
5. craftsmen/foremen/kindred workers (production)
6. operatives/kindred workers (operations)
7. laborers/farm foremen (farming)
8. svc workers (service)
9. farmers and farm managers (farming)

Controls

We control for a respondent's educational attainment (less than high school, high school graduate, some college, completed four year college degree or greater) and whether the respondent ever smoked. These characteristics are modelled because they likely occurred prior to when a person began their longest held occupation.

More proximate factors like income, wealth, and health insurance type are not controlled in the models because they may be mediators of occupational exposures. That is, they may be on the causal pathway – influenced by occupation and influencing subsequent health.

Analytic Strategy

The analytic strategy for this paper includes two different methods, latent class growth analysis (LCGA) and linear growth curve modelling. Using these two approaches we are able to answer different dimensions of our research question, one focused on identifying distinct health trajectory classes and the other modeling the pattern of ADL limitation accumulation for individuals.

LCGA is designed to flexibly capture longitudinal trajectories. It is a particularly appealing method for modeling health across the life course, because it can describe the onset of a particular health condition as well as its progression and/or recovery efficiently in one model. While some individuals will struggle with many activity limitations throughout their lives, others will be mostly free of limitations. Some individuals may show increasing limitations over time, while others may experience decreases in limitations, and these changes may proceed either gradually or rapidly over time. Others may alternate between levels of activity limitation depending on their experiences of disease and recovery. The LCGA method recognizes that time-specific variables (e.g. health status at a point in time) may represent a coexisting set of qualitatively different trajectories in a population.

In particular, LCGA allows us to detect whether there are general patterns of ADL limitations within each cohort-race-sex grouping. Estimation in this method consists of two parts. In the first stage, we derive basic trajectory models in which ADL limitation is a function of time only, without any other covariates. This latent health domain model depicts distinct classes of individuals with particular trajectories of deficit accumulation over time.

We test models with 1-6 latent classes and linear as well as polynomial functions of time and assume that ADL limitations are a count variable with a zero inflated Poisson distribution[3]. The number of latent classes (visualized via the number and shape of trajectories) for each cohort-sex-race group is chosen based on an examination of overall and component fit statistics. The best-fitting model among those we examined is that which has the smallest Bayesian information criterion (BIC) value combined with a significant Lo, Mendell, and Rubin likelihood ratio test, following

[3]In other preliminary analyses, we observe that the distribution of ADL limitations might be better modelled with a negative binomial distribution; however, zero-inflated Poisson is computationally similar and supported by our software package

suggested practice (Jung and Wickrama, 2008).

Next, health trajectory class membership is treated as the dependent variable predicted (in a fashion akin to multinomial logistic regression analysis, e.g. Nagin 2005; Liang 2010) by occupation along with the education and smoking covariates. The model parameters are generated via maximum likelihood estimation with robust standard errors. This analysis allows us to determine whether (and how many years of) exposure to a particular occupation affects the likelihood of following a particular trajectory of ADL limitations, adjusting for smoking history and educational attainment.

A key limitation of this approach is that the number of classes and the accompanying ADL limitation trajectories are not comparable across race-sex-cohort subgroups. Thus, when interpreting results from these models, we compare what occupations predict that an individual will be in a class with more ADL limitations compared to a reference class with low levels of ADL limitation and examine differences across sub-groups in the number of limitations in the "best" health latent class.

Our second analytic approach uses longitudinal growth models to predict individual trajectories of ADL limitation. Again, we treat the number of ADL limitations as a count variable with a zero inflated Poisson distribution and obtain parameter values using a maximum likelihood estimator with robust standard errors. The interpretation of this model can also be divided into two parts: first, the likelihood an individual in the sample will report no ADL limitations over the entire period of follow-up (sometimes called a structural zero), and second, the expected number of limitations an individual is expected to develop,conditional on not being a structural zero.

Occupation is allowed to affect both the probability of an individual being free of ADL limitations (i.e. being in the structural zero category) and, for those not identified as structural zeros, occupation may also influence the expected number of ADL limitations. Among the latter groups, two key parameters may be affected by occupation: (1) the model intercept, denoting an individual's expected number of ADL limitations at the first survey round, and (2) the slope, denoting the expected change in ADL limitations over time. For each cohort-race-sex grouping, we also check whether a random effects or fixed approach is warranted based on the empirical data. In contrast to a fixed-effects model, the random effects model incorporates a significant covariance between the intercept and slope. Simply stated, under a random effects model, a person's starting number of ADL limitations is related to the expected change in ADL limitations, suggesting an interdependence between baseline health status and the subsequent progression of functional limitation.

In pursuing both strategies, we are additionally concerned about how mortality and attrition may be affecting model results. For both the latent class growth analysis and the longitudinal growth model, we use full information maximum likelihood to take advantage of all case information available. All models are estimated using the Mplus 7 software.

Results

Differences in health and sociodemographic characteristics across our race and sex-stratified analytic subsamples are highlighted in descriptive Tables 1 and 2. Table 1 shows that while the majority of surviving cohort members at each study wave report no limitations with activities of daily living, all groups show some aggregate increases in ADL limitations over time. At every survey wave, black women and men have a less favorable distribution of limitations, with larger proportions reporting one or more ADL limitations relative to their white counterparts. Table 2 shows that approximately 44.6% of black women and 49.7% of black men do not have a high school degree, as compared to 26.7% of white women and men. Rates of smoking are similar across racial groups, with men more likely to ever-smoke than women. Across nearly all occupational categories (farming is the exception), white men have the longest mean tenure while white women have the shortest mean tenure, with the tenure of black men and black women falling somewhere in the middle.

Figure 1 shows differences by sex and race in the distribution of occupations. As expected, relative to other race-sex groups, white men are more evenly distributed across occupation categories. White women also show a relatively diverse distribution across occupations, though they also have the largest proportion of individuals reporting no occupation. Black men are concentrated in operations, production, and service jobs, while black women are especially likely to work in service, operations, clerical, and professional jobs.

Latent Class Growth Analysis

The stratified latent class analyses suggest that the preferred number of classes differs across race and sex groups. The preferred model for each group, defined as the model with the lowest BIC conditional on the LMR-LRT p-value being below .05, is shown in Table 3. (Fit statistics for 1-6 class models for each race-sex group are available upon request.) Health class trajectories for each race-sex group are shown in Figures 2a-d. Notably, the largest number of classes (5) is reported for white males, followed by white females (4), black females (3), and black males (2).

Key health differences across these groups should be noted. First, white respondents (both male and female) are substantially more likely to be in the healthiest (reference) latent class compared to black respondents. Second, among white respondents, there appears to be little difference in the proportion of men and women occupying the healthiest latent class, but for black respondents, significantly more black men than women are in the healthiest latent class. A final difference across these groups is that only among white men is there some evidence of recovery from health limitations. For other groups, all latent classes are characterized by increasing or relatively constant levels of ADL limitations over time.

When looking at factors that predict class membership (see Figure 3 summarizing Tables 8-11 in Appendix A), we find that a number of occupation categories appear to be somewhat protective against membership in a poorer health class after controlling for education and smoking status. For white females, professional, management, clerical, and service workers are less likely to be in a poorer health trajectory class than those not working. For black females, the protective occupations are clerical, service, and operations. For black males, work in management, clerical, production, services, and operations is protective against membership in the less healthy class. Finally, for white males, all 8 occupational categories are protective against membership in the class characterized by worse health (i.e. high and rising trajetory of ADL limitations) relative to not working.

Notably, however, the effects of education and smoking largely outweigh the influence of occupational categories. For all groups, having less than a high school education increases the likelihood of not being in the healthiest latent class, and this effect is substantially greater than spending a decade in any of the occupational categories measured here. Including education in the model considerably diminishes the unadjusted effects of occupational categories (results available upon request), suggesting that the relationship between occupations and later-life health is at least partially due to education-based selection into occupations.

Longitudinal Growth Models

Next, we analyze the HRS sex-cohort groups using longitudinal growth models. Here, rather than derive classes based on patterns of ADL limitation, we are interested in individual-level prediction. Presented in Figure 4 are the average number of limitations expected for a person in each race-sex-cohort group at the tenth survey round who worked ten years in any of the occupational categories listed and was assumed to have an education and smoking history equal to the mean value for the race-sex-cohort-occupation group. Additionally, in Tables 6, 7, 5, and 4 we calculate the probability of a person having a number of limitations if they are in that occupational category and again have the subgroup specific mean. These results are based on the models depicted in Tables 12 - 15 in Appendix B.

Occupations associated with lower levels of mean ADL limitation differed substantially across demographic groups. For white men, the lowest average limitations relative to those not working was associated with being in a service occupation, while the highest average limitations were associated with operations. For white and black women, being in professional or management occupations was protective. Among black men, management and sales occupations seem to have slightly protective effects and be related to lower average ADL limitations.

Differences across demographic groups were also apparent in the relationship of occupations with the intercept (or baseline limitation level) and slope of the trajectory over time. For white men, professional, management, and service occupations had a statistically significant negative effect on the intercept, confirming lower starting levels of disability for workers in these occupations. For white women, the intercept was negatively and significantly associated with professional, management, clerical, sales, and service occupations. Clerical occupations were positively and significantly associated with the slope, suggesting that those who started out with higher ADL limitation rates experienced a more accelerated pace of increase in limitations. For black men, the intercept was negatively and significantly associated with professional, management, clerical, sales, and production occupations. Again, clerical occupations were positively and significantly associated with the slope. Finally, for black women, clerical, service, and farming occupations were significantly and negatively associated with the intercept. The same occupations, along with sales, were also positively associated with the slope.

Across models, there are a few differences in the structure of the preferred model (based on statistical significance of the covariance between the intercept and the slope as well as the robustness of predicted values). For all groups, there was some evidence of deviation from a fixed model. Residual variances for all groups differed from zero; however, only among black females was there evidence of a significant covariance between the intercept and slope, suggesting that the baseline level of ADL limitations was related to the rate of subsequent progression in ADL limitations. For white males and females, predictive value improved when the covariance between the intercept and slope was set to zero.

Discussion

Whether population ageing is understood as a burden or an opportunity for societies is primarily a function of whether individuals age in good health and maintain their independence and ability to contribute as long as possible, or age in poor health with limitations that render them vulnerable and dependent on others. Some individuals reach older ages in excellent health, thanks to the benefits of a favourable genetic endowment in combination with a consistently nutritious diet, a physically and mentally active lifestyle, and few exposures to environmental or behavioral hazards; others reach the same chronological threshold with pre-existing burdens of disease and disability, the consequences of challenges and deleterious exposures to physical and psychosocial stresses over the life course. As a result, individual trajectories of health at older ages proceed along markedly different paths within any population, reflecting the diverse living circumstances and experiences of individuals during the entire lifespan. While some health declines at the end of life are inevitable, the type, timing, and duration of such declines are a function of multiple interacting factors leading to substantial heterogeneity in health status among older people within and across populations.

Our analysis aims to provide insight into how people exposed to particular occupations vary in their likelihood of following differing health trajectories in later life. We show that some occupations are protective for membership in poor health classes, but that the relationship between occupational history and health differs substantially by sex and race. The impact of occupations on health trajectories was diminished when we controlled for educational attainment and smoking, suggesting the important role of education in sorting individuals into occupations that differ in physical and cognitive demands that likely influence health, but also pointing to the limitations of broad occupational categories as a variable for this analysis.

Indeed, actual working conditions and experiences on the job likely matter much more to health than the broad occupational categories available in the public-use HRS. Assuming that all those within a given occupation have jobs with the same demands potentially masks heterogeneity across work sites and in individuals' specific work circumstances (Hayward et al., 1998). While we currently employ a broad measure of occupational categories, we are in the process of constructing more detailed measures of occupational exposures. We plan to combine three-digit specific occupation codes found in restricted HRS data files with detailed information on occupational characteristics available in the O*NET database (an online repository that has updated the Dictionary of Occupational Titles used in previous research on aging and retirement and occupational epidemiology: http://www.onetonline.org/). The linkage[4] will allow us to incorporate more nuanced information on the physical and mental strain associated with particular jobs into our models and will facilitate the analysis of cumulative exposures to specific job characteristics and their impact on health. In particular, the O*NET data will add information on specific work environments and conditions (e.g. work control, psychological job demands, social support, physical demands, and job hazards) to the rich personal health and employment data in the HRS.

Subsequent work will incorporate additional covariates, including marital status, income, wealth, labor force status (including time out of labor force), Hispanic ethnicity, health insurance type, and an interaction of education and wealth to account for differential impacts in cases where status and compensation aren't well-aligned. We will also explore whether and how patterns found in the HRS cohort compare to race-sex groups in older and younger cohorts. Through additional analyses, we will examine how sensitive our estimated trajectories are to the specific measure of physical health impairment used. Finally, we plan to conduct a number of supplementary analyses to gauge the extent to which mortality and attrition may be influencing our model results, including checking for a relationship between occupation and the probability of non-response and for differential mortality by occupation and race-sex-cohort subgroup.

This research will contribute to current knowledge in several respects. Previous studies have focused on relatively homogeneous samples of white-collar workers, while the HRS offers an opportunity to examine the association between work and health in a nationally representative sample, including both men and women (who have been less studied) with varied backgrounds. A latent class approach to modeling health trajectories provides a nuanced analysis of differences in baseline health as well as impairment progression patterns, linking them to occupations and working conditions. Our findings will improve our understanding of differentiation processes and factors that promote or hinder compression of morbidity (and need for support) in later life and inform policy debates regarding the pension eligibility age and post-retirement health and survival.

American life expectancy has been rising over the course of the twentieth and early twenty-first centuries, and currently stands at approximately 79 (Human Mortality Database 2014). However, the increases in life expectancy have not been equal for all Americans, with marked differences by sex, race, geography, and education (Olshansky

[4]More detailed information on the procedure to link O*NET with the HRS is available upon request.

et al., 2012, Murray et al., 2006, Herd, 2011). Occupational factors are also implicated in Americas longevity disparities: disadvantaged workers – including low-status and minority workers – have life expectancies at age 65 that are considerably lower than that of high-status and white workers (Crimmins and Saito, 2001). These disparities, as well as differences in health and the trajectories of functional decline that we document above, should be considered by legislators when debating further increases in the Social Security retirement age.

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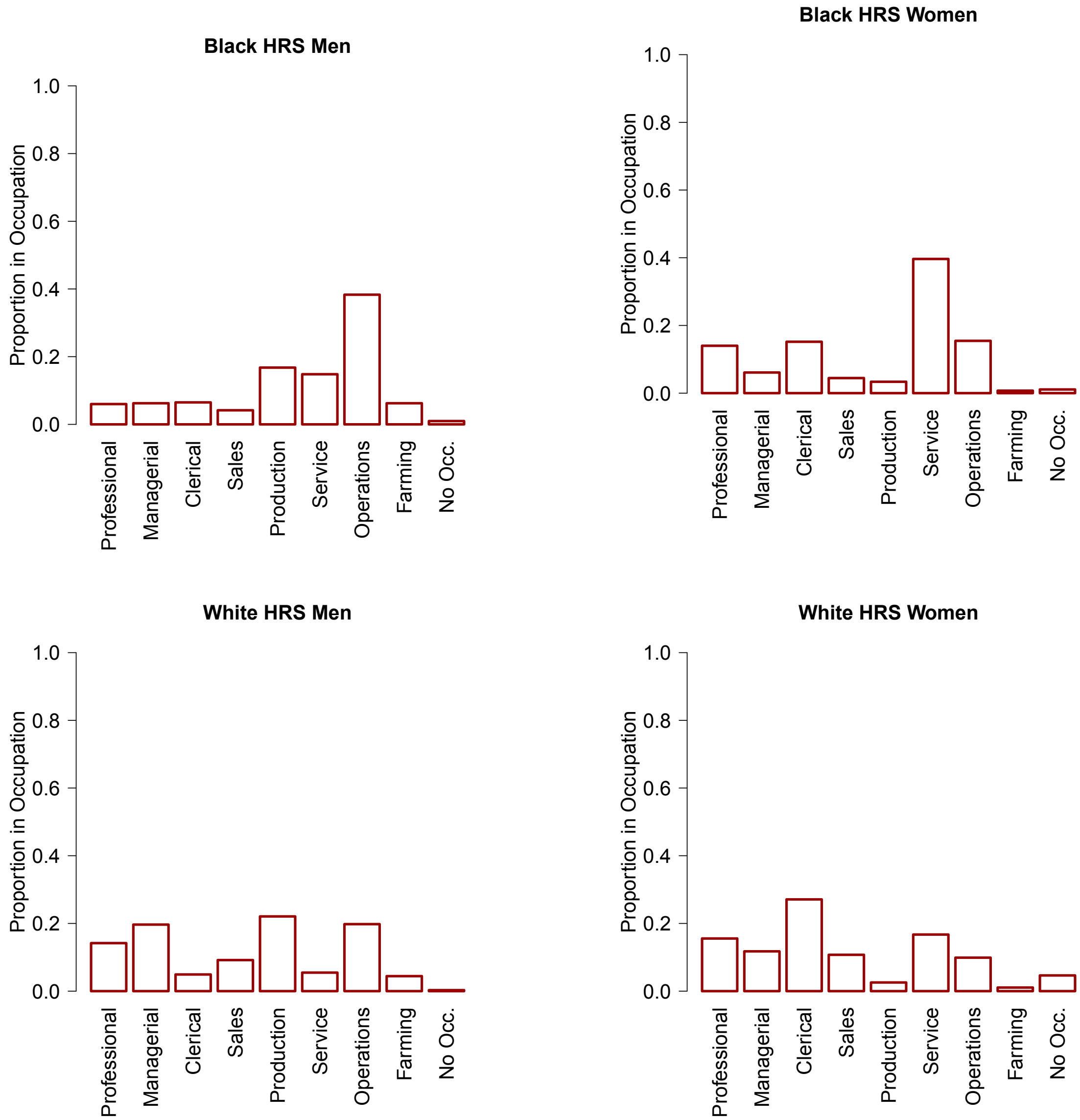
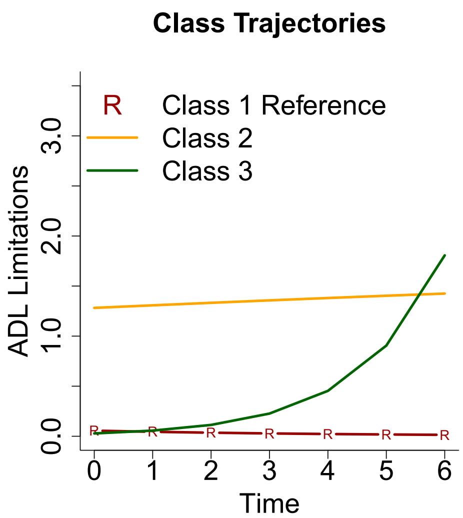
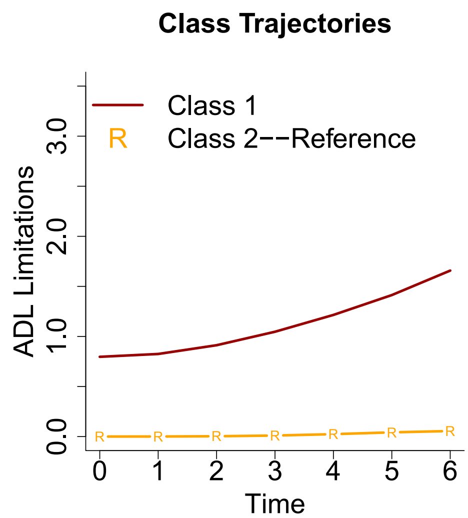


Figure 1: Occupation distribution by race and sex Groups



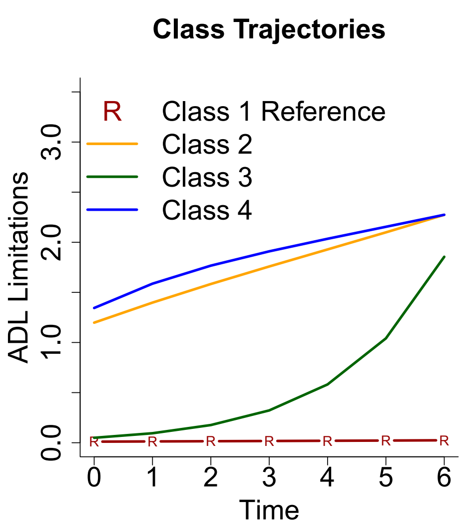
51.1 % in Class 1
32.0 % in Class 2
16.9 % in Class 3

(a) Black Females



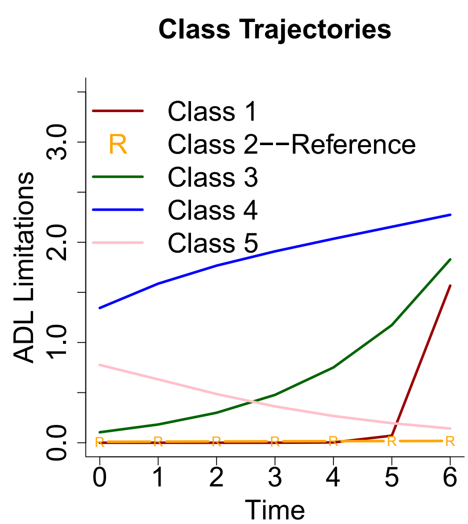
39.7 % in Class 1
60.3 % in Class 2

(b) Black Males



70.6% in Class 1
11.1% in Class 2
11.5% in Class 3
6.7% in Class 4

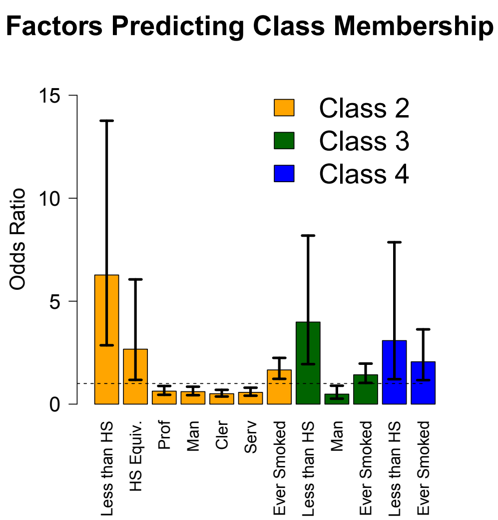
(c) White Females



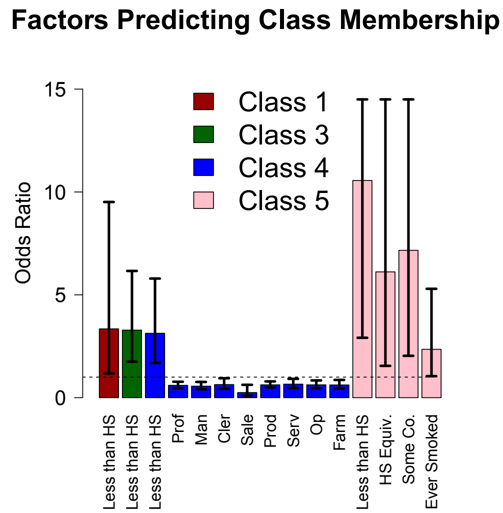
5.6% in Class 1
68.7% in Class 2
10.3% in Class 3
7.5% in Class 4
7.9% in Class 5

(d) White Males

Figure 2: Classes of Health Trajectories Across Race and Sex Groups



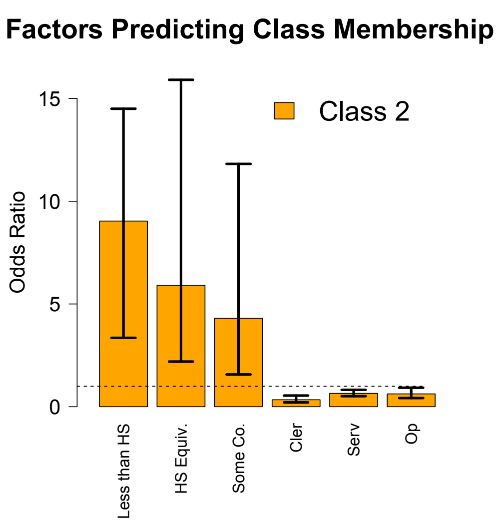
(a) White Females



[a]

(b) White Males

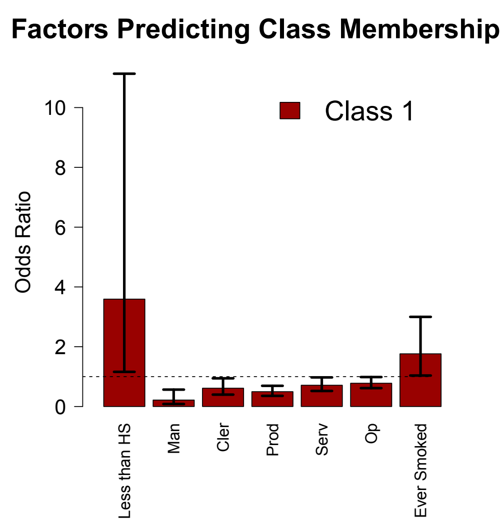
[a]Upper limit for less than high school, hs equivalent, and some college, on membership on class 5 was truncated at 14.5. Actual limits were estimated at 38.2, 24.2, and 25.2 respectively.



[a]

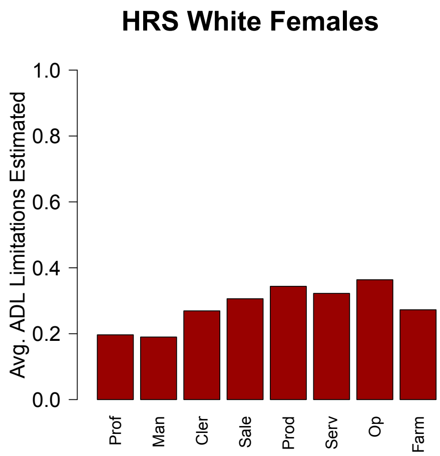
(c) Black Females

[a]although it was also a statistically significant and positive predictor of being in latent class 2, working in a sales occupation could not be included in these estimates because the estimate was not reliable (OR>100). Managerial class could also not be estimated although it was a predictor of membership in class 3 (OR<.0001). Upper limit for less than high school effect was truncated at 14.5-actual upper limited was estimated at 24.3.

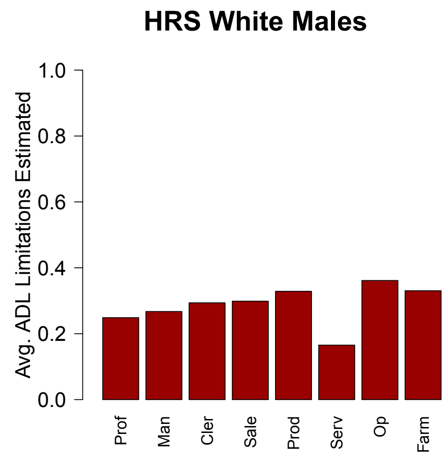


(d) Black Males

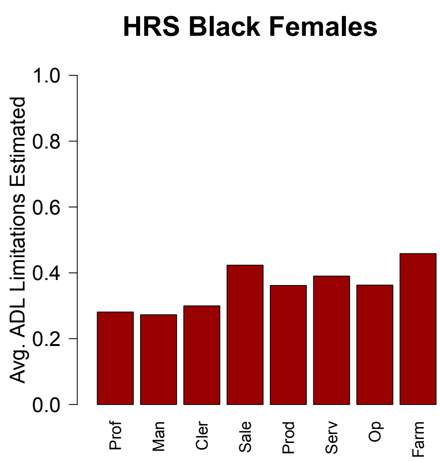
Figure 3: Predictor of Latent Class Membership Across Race and Sex Groups



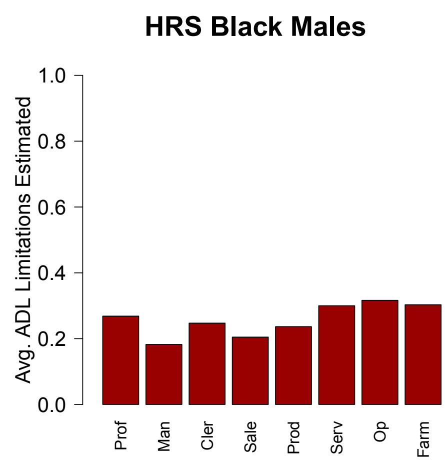
(a) White Females



(b) White Males



(c) Black Females



(d) Black Males

Figure 4: Predicted ADL Limitations from Longitudinal Growth Model at Survey Round 10

	White HRS Women N=3408	White HRS Men N=3080	Black HRS Women N=793	Black HRS Men N=522
0 ADLs at Round 4	0.884	0.902	0.764	0.825
1 ADLs at Round 4	0.063	0.052	0.105	0.095
2 ADLs at Round 4	0.024	0.025	0.047	0.020
3 ADLs at Round 4	0.015	0.010	0.042	0.024
4 ADLs at Round 4	0.009	0.008	0.021	0.016
5 ADLs at Round 4	0.004	0.002	0.018	0.018
0 ADLs at Round 5	0.884	0.899	0.767	0.825
1 ADLs at Round 5	0.059	0.058	0.102	0.069
2 ADLs at Round 5	0.026	0.020	0.052	0.044
3 ADLs at Round 5	0.018	0.010	0.036	0.032
4 ADLs at Round 5	0.005	0.007	0.029	0.012
5 ADLs at Round 5	0.007	0.006	0.013	0.016
0 ADLs at Round 6	0.877	0.899	0.785	0.839
1 ADLs at Round 6	0.064	0.060	0.093	0.078
2 ADLs at Round 6	0.031	0.018	0.049	0.025
3 ADLs at Round 6	0.013	0.008	0.034	0.028
4 ADLs at Round 6	0.009	0.009	0.025	0.008
5 ADLs at Round 6	0.005	0.007	0.013	0.023
0 ADLs at Round 7	0.873	0.894	0.792	0.826
1 ADLs at Round 7	0.067	0.059	0.098	0.075
2 ADLs at Round 7	0.026	0.024	0.043	0.032
3 ADLs at Round 7	0.012	0.010	0.025	0.016
4 ADLs at Round 7	0.013	0.007	0.022	0.027
5 ADLs at Round 7	0.008	0.006	0.019	0.024
0 ADLs at Round 8	0.859	0.879	0.755	0.796
1 ADLs at Round 8	0.071	0.075	0.100	0.088
2 ADLs at Round 8	0.032	0.025	0.070	0.027
3 ADLs at Round 8	0.017	0.009	0.040	0.040
4 ADLs at Round 8	0.009	0.005	0.018	0.021
5 ADLs at Round 8	0.011	0.007	0.018	0.027
0 ADLs at Round 9	0.844	0.876	0.779	0.799
1 ADLs at Round 9	0.073	0.070	0.072	0.066
2 ADLs at Round 9	0.032	0.025	0.054	0.038
3 ADLs at Round 9	0.021	0.011	0.037	0.028
4 ADLs at Round 9	0.015	0.010	0.035	0.031
5 ADLs at Round 9	0.014	0.008	0.023	0.038
0 ADLs at Round 10	0.834	0.839	0.715	0.800
1 ADLs at Round 10	0.074	0.083	0.092	0.073
2 ADLs at Round 10	0.039	0.032	0.067	0.044
3 ADLs at Round 10	0.021	0.019	0.055	0.018
4 ADLs at Round 10	0.016	0.012	0.040	0.047
5 ADLs at Round 10	0.016	0.015	0.027	0.018

Table 1: Health Limitations by Race and Sex Across Survey Rounds

	White HRS Women N=3408	**White HRS Men N=3080**	**Black HRS Women N=793**	**Black HRS Men N=522**
Less than HS Diploma	0.267	0.267	0.446	0.497
Some College	0.204	0.198	0.164	0.143
Completed College Degree	0.146	0.233	0.110	0.083
Completed HS	0.384	0.302	0.280	0.276
Respondent Ever Smoked Round 4	0.539	0.737	0.535	0.731
Years in Longest Occ. Professional Round 4	17.826	25.273	24.096	20.988
Years in Longest Occ. Manager Round 4	17.130	23.242	21.874	22.487
Years in Longest Occ. Clerical Round 4	15.436	25.824	18.372	24.271
Years in Longest Occ. Sales Round 4	11.604	20.500	14.224	19.250
Years in Longest Occ. Production Round 4	16.654	22.742	20.189	23.127
Years in Longest Occ. Service Round 4	11.536	18.524	15.470	18.554
Years in Longest Occ. Operations Round 4	13.069	21.273	16.457	19.398
Years in Longest Occ. Farming Round 4	14.194	25.920	11.240	18.534
Years in Longest Occ. Not Given Round 4	19.643	19.643	19.643	19.643

Table 2: Covariates by Race-Sex Groups

Preferred Model	BIC
HRS Black Males 2 Class ISQ	3378.56
HRS White Males 5 Class IS	14383.51
HRS Black Females 3 Class IS	6916.164
HRS White Females 4 Class IS	18598.211

Table 3: Best Fitting Model Latent Class Analysis

ADLs	Prof	Man	Cler	Sale	Prod	Serv	Op	Farm
0	0.7881	0.7936	0.7755	0.6844	0.7323	0.7112	0.7315	0.6504
1	0.0863	0.0855	0.0881	0.0905	0.0914	0.0916	0.0914	0.0868
2	0.0354	0.0344	0.0375	0.0491	0.0439	0.0465	0.0440	0.0512
3	0.0176	0.0169	0.0191	0.0297	0.0243	0.0268	0.0244	0.0328
4	0.0100	0.0095	0.0111	0.0194	0.0150	0.0169	0.0150	0.0225
5	0.0062	0.0059	0.0070	0.0135	0.0099	0.0115	0.0100	0.0162

Table 4: Predicted Proportion of HRS Black Females With ADL Limitations, Survey Round 10

ADLs	Prof	Man	Cler	Sale	Prod	Serv	Op	Farm
0	0.7651	0.8414	0.7850	0.8225	0.7947	0.7328	0.7142	0.7294
1	0.0687	0.0587	0.0670	0.0621	0.0659	0.0702	0.0703	0.0702
2	0.0311	0.0218	0.0290	0.0244	0.0278	0.0341	0.0355	0.0344
3	0.0176	0.0110	0.0159	0.0126	0.0151	0.0202	0.0215	0.0204
4	0.0113	0.0065	0.0100	0.0076	0.0094	0.0134	0.0145	0.0136
5	0.0079	0.0042	0.0069	0.0051	0.0064	0.0095	0.0105	0.0097

Table 5: Predicted Proportion of HRS Black Males With ADL Limitations, Survey Round 10

ADLs	Prof	Man	Cler	Sale	Prod	Serv	Op	Farm
0	0.8661	0.8703	0.8201	0.7966	0.7723	0.7862	0.7593	0.8180
1	0.0791	0.0774	0.0964	0.1039	0.1108	0.1070	0.1142	0.0971
2	0.0231	0.0223	0.0319	0.0362	0.0406	0.0381	0.0429	0.0323
3	0.0103	0.0099	0.0152	0.0178	0.0206	0.0190	0.0220	0.0155
4	0.0057	0.0054	0.0088	0.0105	0.0123	0.0113	0.0133	0.0089
5	0.0035	0.0034	0.0056	0.0068	0.0082	0.0074	0.0089	0.0058

Table 6: Predicted Proportion of HRS White Females With ADL Limitations, Survey Round 10

ADLs	Prof	Man	Cler	Sale	Prod	Serv	Op	Farm
0	0.8341	0.8226	0.8061	0.8030	0.7841	0.8885	0.7633	0.7830
1	0.0924	0.0964	0.1017	0.1026	0.1081	0.0652	0.1135	0.1084
2	0.0297	0.0319	0.0351	0.0357	0.0392	0.0197	0.0430	0.0394
3	0.0138	0.0151	0.0170	0.0173	0.0195	0.0088	0.0219	0.0196
4	0.0078	0.0086	0.0098	0.0101	0.0115	0.0048	0.0132	0.0116
5	0.0049	0.0055	0.0063	0.0065	0.0075	0.0030	0.0087	0.0076

Table 7: Predicted Proportion of HRS White Males With ADL Limitations, Survey Round 10

Appendix A: Results from latent-class growth analyses

Table 8: **LCGA Results: White Males**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Latent Class 1				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999

RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	-21.41	11.817	-1.812	0.07
S	3.098	1.688	1.835	0.067
II	0	0	999	999
SI	-0.805	0.32	-2.519	0.012
Intercepts				
RADLA4#1	-0.612	0.381	-1.606	0.108
RADLA4	0	0	999	999
RADLA5#1	-0.612	0.381	-1.606	0.108
RADLA5	0	0	999	999
RADLA6#1	-0.612	0.381	-1.606	0.108
RADLA6	0	0	999	999
RADLA7#1	-0.612	0.381	-1.606	0.108
RADLA7	0	0	999	999
RADLA8#1	-0.612	0.381	-1.606	0.108
RADLA8	0	0	999	999
RADLA9#1	-0.612	0.381	-1.606	0.108
RADLA9	0	0	999	999
RADLA10#1	-0.612	0.381	-1.606	0.108
RADLA10	0	0	999	999
Variances				
I	0.352	0.096	3.668	0
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 2				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999

RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	-4.685	0.419	-11.192	0
S	0.071	0.091	0.78	0.435
II	0	0	999	999
SI	-0.805	0.32	-2.519	0.012
Intercepts				
RADLA4#1	-0.612	0.381	-1.606	0.108
RADLA4	0	0	999	999
RADLA5#1	-0.612	0.381	-1.606	0.108
RADLA5	0	0	999	999
RADLA6#1	-0.612	0.381	-1.606	0.108

RADLA6	0	0	999	999
RADLA7#1	-0.612	0.381	-1.606	0.108
RADLA7	0	0	999	999
RADLA8#1	-0.612	0.381	-1.606	0.108
RADLA8	0	0	999	999
RADLA9#1	-0.612	0.381	-1.606	0.108
RADLA9	0	0	999	999
RADLA10#1	-0.612	0.381	-1.606	0.108
RADLA10	0	0	999	999
Variances				
I	0.352	0.096	3.668	0
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 3				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999

RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	-2.659	0.362	-7.342	0
S	0.441	0.059	7.514	0
II	0	0	999	999
SI	-0.805	0.32	-2.519	0.012
Intercepts				
RADLA4#1	-0.612	0.381	-1.606	0.108
RADLA4	0	0	999	999
RADLA5#1	-0.612	0.381	-1.606	0.108
RADLA5	0	0	999	999
RADLA6#1	-0.612	0.381	-1.606	0.108
RADLA6	0	0	999	999
RADLA7#1	-0.612	0.381	-1.606	0.108
RADLA7	0	0	999	999
RADLA8#1	-0.612	0.381	-1.606	0.108
RADLA8	0	0	999	999
RADLA9#1	-0.612	0.381	-1.606	0.108
RADLA9	0	0	999	999
RADLA10#1	-0.612	0.381	-1.606	0.108
RADLA10	0	0	999	999
Variances				
I	0.352	0.096	3.668	0
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999

Latent Class 4

I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	0.285	0.181	1.575	0.115
S	0.052	0.022	2.375	0.018

II	0	0	999	999
SI	-0.805	0.32	-2.519	0.012
Intercepts				
RADLA4#1	-0.612	0.381	-1.606	0.108
RADLA4	0	0	999	999
RADLA5#1	-0.612	0.381	-1.606	0.108
RADLA5	0	0	999	999
RADLA6#1	-0.612	0.381	-1.606	0.108
RADLA6	0	0	999	999
RADLA7#1	-0.612	0.381	-1.606	0.108
RADLA7	0	0	999	999
RADLA8#1	-0.612	0.381	-1.606	0.108
RADLA8	0	0	999	999
RADLA9#1	-0.612	0.381	-1.606	0.108
RADLA9	0	0	999	999
RADLA10#1	-0.612	0.381	-1.606	0.108
RADLA10	0	0	999	999
Variances				
I	0.352	0.096	3.668	0
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 5				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999

RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	0.107	0.218	0.49	0.624
S	-0.319	0.084	-3.817	0
II	0	0	999	999
SI	-0.805	0.32	-2.519	0.012
Intercepts				
RADLA4#1	-0.612	0.381	-1.606	0.108
RADLA4	0	0	999	999
RADLA5#1	-0.612	0.381	-1.606	0.108
RADLA5	0	0	999	999
RADLA6#1	-0.612	0.381	-1.606	0.108
RADLA6	0	0	999	999
RADLA7#1	-0.612	0.381	-1.606	0.108
RADLA7	0	0	999	999
RADLA8#1	-0.612	0.381	-1.606	0.108
RADLA8	0	0	999	999
RADLA9#1	-0.612	0.381	-1.606	0.108
RADLA9	0	0	999	999

RADLA10#1	-0.612	0.381	-1.606	0.108
RADLA10	0	0	999	999
Variances				
I	0.352	0.096	3.668	0
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Categorical Latent Variables				
C#1 ON				
LHS	1.208	0.533	2.267	0.023
HS	0.355	0.534	0.665	0.506
SCO	0.706	0.568	1.244	0.213
PROF4	0.001	0.018	0.063	0.95
MAN4	-0.025	0.019	-1.3	0.194
CLER4	-0.065	0.045	-1.435	0.151
SALE4	-0.049	0.039	-1.251	0.211
PRODUCTION	-0.035	0.023	-1.538	0.124
SERVICE4	0.003	0.027	0.117	0.907
OP4	-0.016	0.025	-0.632	0.528
FARM4	-0.017	0.027	-0.646	0.518
RSMOKEV4	0.067	0.414	0.161	0.872
C#3 ON				
LHS	1.189	0.321	3.701	0
HS	0.262	0.315	0.833	0.405
SCO	0.627	0.328	1.914	0.056
PROF4	-0.027	0.019	-1.455	0.146
MAN4	-0.003	0.011	-0.259	0.796
CLER4	-0.022	0.022	-0.989	0.323
SALE4	0.007	0.012	0.564	0.573
PRODUCTION	0.002	0.009	0.255	0.799
SERVICE4	-0.025	0.029	-0.85	0.396
OP4	0.005	0.011	0.447	0.655
FARM4	-0.013	0.019	-0.663	0.507
RSMOKEV4	-0.044	0.219	-0.201	0.84
C#4 ON				
LHS	1.141	0.314	3.63	0

HS	0.428	0.358	1.197	0.231
SCO	0.463	0.332	1.394	0.163
PROF4	-0.051	0.013	-3.808	0
MAN4	-0.058	0.016	-3.707	0
CLER4	-0.045	0.02	-2.258	0.024
SALE4	-0.139	0.047	-2.943	0.003
PRODUCTION	-0.047	0.012	-4.022	0
SERVICE4	-0.042	0.017	-2.401	0.016
OP4	-0.047	0.015	-3.177	0.001
FARM4	-0.048	0.017	-2.846	0.004
RSMOKEV4	0.004	0.255	0.015	0.988
C#5 ON				
LHS	2.357	0.657	3.587	0
HS	1.811	0.701	2.583	0.01
SCO	1.969	0.642	3.066	0.002
PROF4	-0.011	0.016	-0.682	0.495
MAN4	-0.047	0.027	-1.707	0.088
CLER4	0.004	0.018	0.208	0.835
SALE4	-0.05	0.026	-1.887	0.059
PRODUCTION	-0.006	0.012	-0.521	0.602
SERVICE4	-0.041	0.046	-0.886	0.376
OP4	-0.007	0.014	-0.465	0.642
FARM4	0.011	0.016	0.686	0.492
RSMOKEV4	0.855	0.414	2.067	0.039
Intercepts				
C#1	-2.724	0.572	-4.759	0
C#3	-2.327	0.379	-6.145	0
C#4	-1.8	0.334	-5.383	0
C#5	-4.341	0.795	-5.458	0

Table 9: **LCGA Results: White Females**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Latent Class 1				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999

RADLA10#1	7	0	999	999
Means				
I	-4.574	0.321	-14.27	0
S	0.102	0.068	1.503	0.133
II	0	0	999	999
SI	-0.528	0.207	-2.553	0.011
Intercepts				
RADLA4#1	-0.92	0.377	-2.442	0.015
RADLA4	0	0	999	999
RADLA5#1	-0.92	0.377	-2.442	0.015
RADLA5	0	0	999	999
RADLA6#1	-0.92	0.377	-2.442	0.015
RADLA6	0	0	999	999
RADLA7#1	-0.92	0.377	-2.442	0.015
RADLA7	0	0	999	999
RADLA8#1	-0.92	0.377	-2.442	0.015
RADLA8	0	0	999	999
RADLA9#1	-0.92	0.377	-2.442	0.015
RADLA9	0	0	999	999
RADLA10#1	-0.92	0.377	-2.442	0.015
RADLA10	0	0	999	999
Variances				
I	0.319	0.146	2.189	0.029
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 2				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999

S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	0.159	0.346	0.459	0.646
S	0.073	0.016	4.579	0
II	0	0	999	999
SI	-0.528	0.207	-2.553	0.011
Intercepts				
RADLA4#1	-0.92	0.377	-2.442	0.015
RADLA4	0	0	999	999
RADLA5#1	-0.92	0.377	-2.442	0.015
RADLA5	0	0	999	999
RADLA6#1	-0.92	0.377	-2.442	0.015
RADLA6	0	0	999	999
RADLA7#1	-0.92	0.377	-2.442	0.015

RADLA7	0	0	999	999
RADLA8#1	-0.92	0.377	-2.442	0.015
RADLA8	0	0	999	999
RADLA9#1	-0.92	0.377	-2.442	0.015
RADLA9	0	0	999	999
RADLA10#1	-0.92	0.377	-2.442	0.015
RADLA10	0	0	999	999
Variances				
I	0.319	0.146	2.189	0.029
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 3				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999

RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	-3.528	0.665	-5.305	0
S	0.571	0.095	6.009	0
II	0	0	999	999
SI	-0.528	0.207	-2.553	0.011
Intercepts				
RADLA4#1	-0.92	0.377	-2.442	0.015
RADLA4	0	0	999	999
RADLA5#1	-0.92	0.377	-2.442	0.015
RADLA5	0	0	999	999
RADLA6#1	-0.92	0.377	-2.442	0.015
RADLA6	0	0	999	999
RADLA7#1	-0.92	0.377	-2.442	0.015
RADLA7	0	0	999	999
RADLA8#1	-0.92	0.377	-2.442	0.015
RADLA8	0	0	999	999
RADLA9#1	-0.92	0.377	-2.442	0.015
RADLA9	0	0	999	999
RADLA10#1	-0.92	0.377	-2.442	0.015
RADLA10	0	0	999	999
Variances				
I	0.319	0.146	2.189	0.029
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 4				

I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	0.395	0.244	1.615	0.106
S	-0.345	0.105	-3.284	0.001
II	0	0	999	999
SI	-0.528	0.207	-2.553	0.011

Intercepts				
RADLA4#1	-0.92	0.377	-2.442	0.015
RADLA4	0	0	999	999
RADLA5#1	-0.92	0.377	-2.442	0.015
RADLA5	0	0	999	999
RADLA6#1	-0.92	0.377	-2.442	0.015
RADLA6	0	0	999	999
RADLA7#1	-0.92	0.377	-2.442	0.015
RADLA7	0	0	999	999
RADLA8#1	-0.92	0.377	-2.442	0.015
RADLA8	0	0	999	999
RADLA9#1	-0.92	0.377	-2.442	0.015
RADLA9	0	0	999	999
RADLA10#1	-0.92	0.377	-2.442	0.015
RADLA10	0	0	999	999
Variances				
I	0.319	0.146	2.189	0.029
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Categorical Latent Variables				
C#2 ON				
LHS	1.836	0.401	4.578	0
HS	0.982	0.418	2.351	0.019
SCO	0.538	0.442	1.217	0.224
PROF4	-0.046	0.017	-2.682	0.007
MAN4	-0.05	0.017	-2.896	0.004
CLER4	-0.068	0.016	-4.143	0
SALE4	-0.06	0.041	-1.464	0.143
PRODUCTION	-0.016	0.02	-0.811	0.418
SERVICE4	-0.056	0.017	-3.289	0.001
OP4	-0.031	0.017	-1.887	0.059
FARM4	-0.138	0.118	-1.177	0.239
RSMOKEV4	0.507	0.154	3.3	0.001
C#3 ON				
LHS	1.383	0.367	3.769	0

HS	0.544	0.359	1.518	0.129
SCO	0.429	0.376	1.139	0.255
PROF4	-0.001	0.013	-0.107	0.915
MAN4	-0.072	0.031	-2.314	0.021
CLER4	0.005	0.012	0.425	0.671
SALE4	0	0.022	-0.016	0.987
PRODUCTION	-0.009	0.026	-0.326	0.744
SERVICE4	-0.014	0.017	-0.849	0.396
OP4	-0.016	0.018	-0.885	0.376
FARM4	-0.032	0.036	-0.903	0.366
RSMOKEV4	0.354	0.165	2.142	0.032
C#4 ON				
LHS	1.127	0.477	2.362	0.018
HS	-0.071	0.53	-0.134	0.893
SCO	-0.014	0.505	-0.028	0.978
PROF4	-0.02	0.023	-0.87	0.384
MAN4	-0.031	0.025	-1.267	0.205
CLER4	-0.027	0.024	-1.15	0.25
SALE4	-0.019	0.048	-0.388	0.698
PRODUCTION	-0.02	0.023	-0.861	0.389
SERVICE4	-0.023	0.032	-0.728	0.467
OP4	-0.005	0.023	-0.23	0.818
FARM4	-2.331	1.507	-1.546	0.122
RSMOKEV4	0.721	0.29	2.487	0.013
Intercepts				
C#2	-2.646	0.461	-5.733	0
C#3	-2.585	0.342	-7.565	0
C#4	-2.833	0.574	-4.938	0

Table 10: **LCGA Results: Black Males**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Latent Class 1				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
Q |				
RADLA4	1	0	999	999
RADLA5	4	0	999	999
RADLA6	9	0	999	999
RADLA7	16	0	999	999
RADLA8	25	0	999	999
RADLA9	36	0	999	999
RADLA10	49	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999

RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
QI |				
RADLA4#1	1	0	999	999
RADLA5#1	4	0	999	999
RADLA6#1	9	0	999	999
RADLA7#1	16	0	999	999
RADLA8#1	25	0	999	999
RADLA9#1	36	0	999	999
RADLA10#1	49	0	999	999
Means				
I	-0.326	0.194	-1.676	0.094
S	-0.043	0.078	-0.55	0.582
Q	0.014	0.009	1.55	0.121
II	0	0	999	999
SI	0.168	0.474	0.354	0.723
QI	-0.102	0.079	-1.282	0.2
Intercepts				
RADLA4#1	-1.082	0.545	-1.985	0.047
RADLA4	0	0	999	999
RADLA5#1	-1.082	0.545	-1.985	0.047
RADLA5	0	0	999	999
RADLA6#1	-1.082	0.545	-1.985	0.047
RADLA6	0	0	999	999
RADLA7#1	-1.082	0.545	-1.985	0.047
RADLA7	0	0	999	999
RADLA8#1	-1.082	0.545	-1.985	0.047
RADLA8	0	0	999	999
RADLA9#1	-1.082	0.545	-1.985	0.047
RADLA9	0	0	999	999

RADLA10#1	-1.082	0.545	-1.985	0.047
RADLA10	0	0	999	999
Variances				
I	0.872	0.186	4.677	0
S	0	0	999	999
Q	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
QI	0	0	999	999
Latent Class 2				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
Q |				
RADLA4	1	0	999	999
RADLA5	4	0	999	999
RADLA6	9	0	999	999
RADLA7	16	0	999	999
RADLA8	25	0	999	999
RADLA9	36	0	999	999
RADLA10	49	0	999	999
II |				

RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
QI |				
RADLA4#1	1	0	999	999
RADLA5#1	4	0	999	999
RADLA6#1	9	0	999	999
RADLA7#1	16	0	999	999
RADLA8#1	25	0	999	999
RADLA9#1	36	0	999	999
RADLA10#1	49	0	999	999
Means				
I	-10.633	3.5	-3.038	0.002
S	1.965	1.337	1.469	0.142
Q	-0.131	0.128	-1.029	0.303
II	0	0	999	999
SI	0.168	0.474	0.354	0.723
QI	-0.102	0.079	-1.282	0.2
Intercepts				
RADLA4#1	-1.082	0.545	-1.985	0.047
RADLA4	0	0	999	999
RADLA5#1	-1.082	0.545	-1.985	0.047
RADLA5	0	0	999	999
RADLA6#1	-1.082	0.545	-1.985	0.047
RADLA6	0	0	999	999

RADLA7#1	-1.082	0.545	-1.985	0.047
RADLA7	0	0	999	999
RADLA8#1	-1.082	0.545	-1.985	0.047
RADLA8	0	0	999	999
RADLA9#1	-1.082	0.545	-1.985	0.047
RADLA9	0	0	999	999
RADLA10#1	-1.082	0.545	-1.985	0.047
RADLA10	0	0	999	999
Variances				
I	0.872	0.186	4.677	0
S	0	0	999	999
Q	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
QI	0	0	999	999
Categorical Latent Variables				
C#1 ON				
LHS	1.279	0.577	2.218	0.027
HS	0.308	0.584	0.526	0.599
SCO	0.579	0.584	0.992	0.321
PROF4	-0.001	0.025	-0.033	0.974
MAN4	-0.153	0.049	-3.126	0.002
CLER4	-0.049	0.022	-2.212	0.027
SALE4	-0.153	0.11	-1.387	0.165
PRODUCTION	-0.07	0.017	-4.185	0
SERVICE4	-0.034	0.016	-2.066	0.039
OP4	-0.025	0.012	-2.074	0.038
FARM4	-0.013	0.02	-0.662	0.508
RSMOKEV4	0.567	0.271	2.089	0.037
Intercepts				
C#1	-0.967	0.604	-1.601	0.109

Table 11: **LCGA Results: Black Females**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
Latent Class 1				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999

RADLA10#1	7	0	999	999
Means				
I	-2.773	0.427	-6.495	0
S	-0.218	0.151	-1.442	0.149
II	0	0	999	999
SI	0.091	0.115	0.793	0.428
Intercepts				
RADLA4#1	-2.344	0.571	-4.106	0
RADLA4	0	0	999	999
RADLA5#1	-2.344	0.571	-4.106	0
RADLA5	0	0	999	999
RADLA6#1	-2.344	0.571	-4.106	0
RADLA6	0	0	999	999
RADLA7#1	-2.344	0.571	-4.106	0
RADLA7	0	0	999	999
RADLA8#1	-2.344	0.571	-4.106	0
RADLA8	0	0	999	999
RADLA9#1	-2.344	0.571	-4.106	0
RADLA9	0	0	999	999
RADLA10#1	-2.344	0.571	-4.106	0
RADLA10	0	0	999	999
Variances				
I	0.42	0.124	3.386	0.001
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 2				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999

S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	0.109	0.179	0.611	0.541
S	0.029	0.016	1.779	0.075
II	0	0	999	999
SI	0.091	0.115	0.793	0.428
Intercepts				
RADLA4#1	-2.344	0.571	-4.106	0
RADLA4	0	0	999	999
RADLA5#1	-2.344	0.571	-4.106	0
RADLA5	0	0	999	999
RADLA6#1	-2.344	0.571	-4.106	0
RADLA6	0	0	999	999
RADLA7#1	-2.344	0.571	-4.106	0

RADLA7	0	0	999	999
RADLA8#1	-2.344	0.571	-4.106	0
RADLA8	0	0	999	999
RADLA9#1	-2.344	0.571	-4.106	0
RADLA9	0	0	999	999
RADLA10#1	-2.344	0.571	-4.106	0
RADLA10	0	0	999	999
Variances				
I	0.42	0.124	3.386	0.001
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Latent Class 3				
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA4#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999

RADLA10#1	1	0	999	999
SI |				
RADLA4#1	1	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
RADLA10#1	7	0	999	999
Means				
I	-4.382	0.705	-6.216	0
S	0.704	0.1	7.057	0
II	0	0	999	999
SI	0.091	0.115	0.793	0.428
Intercepts				
RADLA4#1	-2.344	0.571	-4.106	0
RADLA4	0	0	999	999
RADLA5#1	-2.344	0.571	-4.106	0
RADLA5	0	0	999	999
RADLA6#1	-2.344	0.571	-4.106	0
RADLA6	0	0	999	999
RADLA7#1	-2.344	0.571	-4.106	0
RADLA7	0	0	999	999
RADLA8#1	-2.344	0.571	-4.106	0
RADLA8	0	0	999	999
RADLA9#1	-2.344	0.571	-4.106	0
RADLA9	0	0	999	999
RADLA10#1	-2.344	0.571	-4.106	0
RADLA10	0	0	999	999
Variances				
I	0.42	0.124	3.386	0.001
S	0	0	999	999
II	0	0	999	999
SI	0	0	999	999
Categorical Latent Variables				

C#2 ON				
LHS	2.201	0.506	4.352	0
HS	1.777	0.505	3.519	0
SCO	1.146	0.515	2.227	0.026
PROF4	-0.013	0.018	-0.731	0.465
MAN4	-0.047	0.027	-1.771	0.077
CLER4	-0.108	0.024	-4.485	0
SALE4	42.846	0.036	1205.639	0
PRODUCTION	-0.023	0.024	-0.943	0.346
SERVICE4	-0.043	0.012	-3.455	0.001
OP4	-0.047	0.02	-2.367	0.018
FARM4	-0.179	0.159	-1.127	0.26
RSMOKEV4	0.251	0.208	1.206	0.228
C#3 ON				
LHS	0.275	0.723	0.381	0.703
HS	-0.259	0.743	-0.348	0.728
SCO	-0.287	0.708	-0.406	0.685
PROF4	-0.023	0.03	-0.762	0.446
MAN4	-7.484	0.027	-279.662	0
CLER4	0.004	0.024	0.157	0.875
SALE4	42.934	0	0	1
PRODUCTION	0.006	0.036	0.168	0.867
SERVICE4	-0.028	0.019	-1.511	0.131
OP4	0.019	0.029	0.661	0.508
FARM4	0.159	0.086	1.837	0.066
RSMOKEV4	0.304	0.328	0.926	0.354
Intercepts				
C#2	-1.769	0.539	-3.281	0.001
C#3	-1.206	0.746	-1.617	0.106

Appendix B: Results from linear longitudinal models

Table 12: **Linear Longitudinal Model: HRS White Males**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA10#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
SI |				
RADLA10#1	7	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999

I ON				
LHS	1.999	0.633	3.157	0.002
HS	1.134	0.26	4.368	0
SCO	1.487	0.247	6.012	0
RSMOKEV4	0.283	0.135	2.092	0.036
PROF4	-0.028	0.01	-2.774	0.006
MAN4	-0.04	0.009	-4.327	0
CLER4	-0.017	0.015	-1.13	0.259
SALE4	-0.082	0.157	-0.52	0.603
PRODUCTION	-0.016	0.011	-1.529	0.126
SERVICE4	-0.041	0.016	-2.562	0.01
OP4	-0.025	0.014	-1.761	0.078
FARM4	-0.011	0.015	-0.715	0.474
S ON				
LHS	-0.141	0.124	-1.14	0.254
HS	-0.127	0.048	-2.631	0.009
SCO	-0.156	0.038	-4.155	0
RSMOKEV4	-0.035	0	999	999
PROF4	-0.001	0.002	-0.607	0.544
MAN4	0.001	0.001	0.956	0.339
CLER4	-0.002	0.003	-0.622	0.534
SALE4	0.008	0.033	0.248	0.804
PRODUCTION	-0.001	0.002	-0.575	0.565
SERVICE4	0.002	0.003	0.862	0.388
OP4	0.001	0.003	0.357	0.721
FARM4	-0.003	0.004	-0.75	0.453
Means				
II	0	0	999	999
SI	-0.819	0.9	-0.91	0.363
RADLA4#1	-0.47	0.192	-2.444	0.015
Intercepts				
I	-4.022	0.488	-8.249	0
S	0.248	0.027	9.261	0
RADLA4	0	0	999	999
RADLA5#1	1.323	1.54	0.859	0.39
RADLA5	0	0	999	999
RADLA6#1	1.323	1.54	0.859	0.39
RADLA6	0	0	999	999

RADLA7#1	1.323	1.54	0.859	0.39
RADLA7	0	0	999	999
RADLA8#1	1.323	1.54	0.859	0.39
RADLA8	0	0	999	999
RADLA9#1	1.323	1.54	0.859	0.39
RADLA9	0	0	999	999
RADLA10#1	1.323	1.54	0.859	0.39
RADLA10	0	0	999	999
Variances				
II	25.928	11.952	2.169	0.03
SI	0	0	999	999
Residual Variances				
I	4.094	0.732	5.593	0
S	0	0	999	999

Table 13: **Linear Longitudinal Model: HRS White Females**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999

II |				
RADLA10#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
SI |				
RADLA10#1	7	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
I ON				
LHS	1.504	0.319	4.722	0
HS	0.45	0.314	1.431	0.152
SCO	0.159	0.325	0.488	0.625
RSMOKEV4	0.548	0.139	3.928	0
PROF4	-0.045	0.017	-2.717	0.007
MAN4	-0.049	0.015	-3.37	0.001
CLER4	-0.057	0.011	-5.136	0
SALE4	-0.051	0.02	-2.575	0.01
PRODUCTION	-0.012	0.02	-0.612	0.54
SERVICE4	-0.04	0.016	-2.538	0.011
OP4	-0.016	0.014	-1.12	0.263
FARM4	-0.169	0.091	-1.854	0.064
S ON				
LHS	0.011	0.056	0.188	0.85
HS	0.031	0.055	0.559	0.576
SCO	0.034	0.058	0.58	0.562
RSMOKEV4	-0.016	0.022	-0.736	0.462
PROF4	0.003	0.003	0.945	0.345
MAN4	-0.002	0.002	-0.775	0.438
CLER4	0.006	0.002	2.96	0.003
SALE4	0.006	0.004	1.495	0.135
PRODUCTION	0	0.002	-0.15	0.88

SERVICE4	0.001	0.003	0.535	0.593
OP4	0	0.002	0.062	0.951
FARM4	0.017	0.014	1.175	0.24
Means				
II	0	0	999	999
SI	-0.387	0.31	-1.249	0.212
RADLA4#1	-0.953	0.245	-3.887	0
Intercepts				
I	-3.734	0.343	-10.897	0
S	0.072	0.062	1.163	0.245
RADLA4	0	0	999	999
RADLA5#1	-0.701	0.846	-0.829	0.407
RADLA5	0	0	999	999
RADLA6#1	-0.701	0.846	-0.829	0.407
RADLA6	0	0	999	999
RADLA7#1	-0.701	0.846	-0.829	0.407
RADLA7	0	0	999	999
RADLA8#1	-0.701	0.846	-0.829	0.407
RADLA8	0	0	999	999
RADLA9#1	-0.701	0.846	-0.829	0.407
RADLA9	0	0	999	999
RADLA10#1	-0.701	0.846	-0.829	0.407
RADLA10	0	0	999	999
Variances				
II	7.967	3.33	2.393	0.017
SI	0	0	999	999
Residual Variances				
I	4.513	0.239	18.867	0
S	0	0	999	999

Table 14: **Linear Longitudinal Model: HRS Black Males**

	Estimate	S.E.	Est./S.E.	P-Value

I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999
II |				
RADLA10#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
SI |				
RADLA10#1	7	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
I ON				
LHS	0.226	1.581	0.143	0.887
HS	-0.15	0.874	-0.171	0.864
SCO	-0.079	0.759	-0.104	0.917
RSMOKEV4	0.386	0.299	1.292	0.196
PROF4	-0.055	0.025	-2.176	0.03

MAN4	-0.154	0.045	-3.395	0.001
CLER4	-0.171	0.05	-3.411	0.001
SALE4	-0.256	0.098	-2.608	0.009
PRODUCTION	-0.153	0.045	-3.42	0.001
SERVICE4	-0.039	0.078	-0.499	0.618
OP4	-0.048	0.059	-0.822	0.411
FARM4	-0.044	0.051	-0.865	0.387
S ON				
LHS	0.125	0.26	0.48	0.631
HS	-0.119	0.194	-0.612	0.541
SCO	0.101	0.168	0.6	0.549
RSMOKEV4	0.089	0.067	1.337	0.181
PROF4	0.007	0.006	1.134	0.257
MAN4	0.007	0.012	0.605	0.546
CLER4	0.022	0.01	2.308	0.021
SALE4	0.025	0.014	1.74	0.082
PRODUCTION	0.013	0.014	0.969	0.332
SERVICE4	0.007	0.015	0.439	0.66
OP4	0.007	0.012	0.595	0.552
FARM4	-0.001	0.012	-0.088	0.929
S WITH				
I	0.013	0.072	0.184	0.854
SI WITH				
II	-572.203	317.928	-1.8	0.072
Means				
II	0	0	999	999
SI	-0.481	0.546	-0.881	0.378
RADLA4#1	-0.721	0.635	-1.136	0.256
Intercepts				
I	-1.048	0.929	-1.128	0.259
S	-0.086	0.219	-0.392	0.695
RADLA4	0	0	999	999
RADLA5#1	-1.529	2.29	-0.668	0.504
RADLA5	0	0	999	999
RADLA6#1	-1.529	2.29	-0.668	0.504
RADLA6	0	0	999	999

RADLA7#1	-1.529	2.29	-0.668	0.504
RADLA7	0	0	999	999
RADLA8#1	-1.529	2.29	-0.668	0.504
RADLA8	0	0	999	999
RADLA9#1	-1.529	2.29	-0.668	0.504
RADLA9	0	0	999	999
RADLA10#1	-1.529	2.29	-0.668	0.504
RADLA10	0	0	999	999
Variances				
II	4724.872	2193.945	2.154	0.031
SI	106.133	44.867	2.365	0.018
Residual Variances				
I	2.455	0.943	2.605	0.009
S	0.025	0.019	1.296	0.195

Table 15: **Linear Longitudinal Model: HRS Black Females**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
I |				
RADLA4	1	0	999	999
RADLA5	1	0	999	999
RADLA6	1	0	999	999
RADLA7	1	0	999	999
RADLA8	1	0	999	999
RADLA9	1	0	999	999
RADLA10	1	0	999	999
S |				
RADLA4	1	0	999	999
RADLA5	2	0	999	999
RADLA6	3	0	999	999
RADLA7	4	0	999	999
RADLA8	5	0	999	999
RADLA9	6	0	999	999
RADLA10	7	0	999	999

II |				
RADLA10#1	1	0	999	999
RADLA5#1	1	0	999	999
RADLA6#1	1	0	999	999
RADLA7#1	1	0	999	999
RADLA8#1	1	0	999	999
RADLA9#1	1	0	999	999
SI |				
RADLA10#1	7	0	999	999
RADLA5#1	2	0	999	999
RADLA6#1	3	0	999	999
RADLA7#1	4	0	999	999
RADLA8#1	5	0	999	999
RADLA9#1	6	0	999	999
I ON				
LHS	2.46	0.406	6.053	0
HS	2.233	0.47	4.75	0
SCO	1.435	0.398	3.608	0
RSMOKEV4	-0.08	0.17	-0.47	0.639
PROF4	-0.011	0.017	-0.668	0.504
MAN4	-0.005	0.022	-0.232	0.817
CLER4	-0.103	0.024	-4.313	0
SALE4	0	0.015	-0.01	0.992
PRODUCTION	0.005	0.015	0.314	0.754
SERVICE4	-0.047	0.008	-6.14	0
OP4	-0.028	0.016	-1.726	0.084
FARM4	-0.455	0.183	-2.48	0.013
S ON				
LHS	-0.243	0.101	-2.418	0.016
HS	-0.302	0.11	-2.743	0.006
SCO	-0.225	0.094	-2.384	0.017
RSMOKEV4	0.057	0.032	1.793	0.073
PROF4	-0.002	0.003	-0.692	0.489
MAN4	-0.005	0.004	-1.24	0.215
CLER4	0.01	0.004	2.776	0.005
SALE4	0.006	0.003	1.985	0.047
PRODUCTION	-0.004	0.003	-1.167	0.243

SERVICE4	0.005	0.002	3.192	0.001
OP4	0.001	0.003	0.279	0.78
FARM4	0.068	0.027	2.482	0.013
S WITH				
I	-0.239	0.073	-3.256	0.001
SI WITH				
II	-71.408	207.133	-0.345	0.73
Means				
II	0	0	999	999
SI	0.689	1.189	0.579	0.563
RADLA4#1	-15	0	999	999
Intercepts				
I	-3.674	0.508	-7.228	0
S	0.401	0.119	3.384	0.001
RADLA4	0	0	999	999
RADLA5#1	-7.11	9.521	-0.747	0.455
RADLA5	0	0	999	999
RADLA6#1	-7.11	9.521	-0.747	0.455
RADLA6	0	0	999	999
RADLA7#1	-7.11	9.521	-0.747	0.455
RADLA7	0	0	999	999
RADLA8#1	-7.11	9.521	-0.747	0.455
RADLA8	0	0	999	999
RADLA9#1	-7.11	9.521	-0.747	0.455
RADLA9	0	0	999	999
RADLA10#1	-7.11	9.521	-0.747	0.455
RADLA10	0	0	999	999
Variances				
II	174.875	514.713	0.34	0.734
SI	41.749	117.203	0.356	0.722
Residual Variances				
I	3.561	0.521	6.836	0
S	0.041	0.007	5.691	0

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