The Impact of Work and Family Trajectories on Financial Well-Being at Older Ages

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Abstract

Using data from the Wisconsin Longitudinal Study, we examine relationships between trajectories of work and family experiences across the life course and four measures of financial well-being at ages 64-65: (a) total personal income, (b) total household income, (c) health insurance coverage, and (d) household net worth. We construct work and family trajectories using group-based trajectory modeling techniques (finite mixture models) to characterize the trajectories of family circumstances and transitions from birth through age 65 and trajectories of labor force experiences from age 36 through age 65. Preliminary estimates (conducted separately for men and women) indicate that latent work and family trajectories are significantly associated with financial well-being net of more temporally proximate correlates, including work and family circumstances at age 53-54. Trajectories characterized by stable full-time employment and stable marriage across the life course are particularly predictive of more favorable economic circumstances at older ages.

Recent research on financial preparation for retirement demonstrates that a substantial proportion of Americans are inadequately prepared. For example, one recent study concludes that inadequate financial preparation puts 35% of the early baby boom cohort (b.1946-1954) and an even larger proportion of younger cohorts at risk of being unable to maintain their current standard of living even if they worked full-time until age 65 (Munnell, Golub-Sass, Webb 2007). The prevalence of inadequate preparation for retirement likely reflects concurrent trends toward greater individual responsibility for ensuring financial well-being in later life and increasing variation in work and family experiences across the life course.

Over the past 20 years, government, employers, and even health care providers have shifted more of the responsibility associated with planning and managing the retirement years towards individuals. To a large extent, this increase in individual responsibility reflects the emergence of defined contribution pension plans as the primary vehicle for saving for retirement. The declining prevalence of defined benefit plans has resulted in increased heterogeneity in pension wealth and the timing and nature of retirement.

At the same time that Americans are increasingly being asked to plan, manage, and save for their retirement years, the family, labor force, and policy contexts in which individuals live their lives have undergone profound changes (Henretta and O'Rand 1999). Increasing rates of female labor force participation, higher rates of marital dissolution, and changes in employment patterns, including increased exposure to "bad jobs" (Kalleberg 2009) characterized by low pay and limited benefits, have led to greater heterogeneity in work and family trajectories among cohorts now approaching retirement ages.

Together, the trends toward individual responsibility for successful aging and increasing heterogeneity in life course trajectories highlight the potential value of a life course approach to the study of financial well-being in later life. Of particular relevance is emphasis on processes of "cumulative stratification" (O'Rand 1996a, 1996b) or "cumulative contingencies" (Elder 1995), which are increasingly central to research on socioeconomic inequality at older ages. The

concept of cumulative stratification refers to intracohort increase across the life course in economic inequality (Crystal and Waehrer 1996; Easterlin, Macunovich, and Crimmins 1993), and heterogeneity in health and other measures of well-being (Ferraro and Kelly-Moore 2003). Many of the most prominent recent efforts to understand this process of cumulative stratification have emphasized theories of cumulative advantage and disadvantage (see e.g., Dannefer 2003; O'Rand 1996b) which posit that differences in well-being at earlier points in the life course are compounded over time to generate larger differentials at later points in the life course.

While these ideas are provocative, theoretically compelling, and consistent with empirical evidence, the mechanisms through which the compounding of advantage and disadvantage occurs are in need of clarification. Despite explicit recognition of the importance of histories of work and family roles in producing patterns of cumulative advantage and cumulative disadvantage (O'Rand 1996a, 1996b), efforts to identify substantively important aspects of life course trajectories and the ways in which they contribute to increasing heterogeneity at older ages have been hampered by the scarcity of data on the full life course. As a result, most related research has focused either on the elaboration of theoretical linkages between indicators of well-being at different points of the life course (e.g., access to resources, exposure to additional risks) or the evaluation of relationships between measures of later-life well-being and individual characteristics measured at specific points in the life course or relatively simple measures of life history such as longest occupation or experience of marital disruption.

In this paper, we address the following research questions: To what extent is financial well-being among older adults associated with life-course patterns of experiences in the family and the labor market? To what extent are these relationships mediated by individuals' contemporaneous work, family, and health circumstances? How do these processes differ for women and men? We overcome the limitations of most previous research by taking advantage

of uniquely rich data on the full adult life course of a large sample of older Americans to generate statistically and substantively meaningful characterizations of work and family trajectories across the life course. Using these data, we first estimate models that characterize the trajectories of graduates' family circumstances and transitions across their lives (from birth through age 64) as well as the trajectories of graduates' labor force experiences and exposures across their careers (through age 64). We then estimate the impact of these work and family trajectories on four measures of financial well-being (total personal income, total household income, home ownership, and household net worth) and changes in these outcomes in later adulthood.

Background

In recent decades, both the public and private sectors have shifted more responsibility for planning for the retirement years to individuals. For example, defined benefit plans, which provide a guaranteed income in retirement based simply on employee tenure and wages have essentially disappeared. The proportion of the workforce covered by a defined benefit plan dropped from just under 60 percent in 1981 to around 10 percent in 2004 (Buessing and Soto 2006). In their place, defined contribution plans have emerged as the primary work related savings vehicle (Sorokina, Webb, and Muldoon 2008). These plans require both that employees make the choice to contribute, which many do not, but also that they make good decisions about where their money should be invested.

These changes in mechanisms for retirement saving, along with concurrent changes in as labor force participation patterns in late adulthood, and increasing individual responsibility for the costs associated with their medical care, have changed the meaning and nature of the retirement years in fundamental ways. Successful aging has increasingly come to depend on individuals' own planning and resources at earlier ages (for example, through management of health care costs and contributions to retirement plans).

Importantly, these changes have taken place within the broader context of growing heterogeneity in work and family experiences across the life course. Recent cohorts of older Americans have experienced fundamental changes in the structure of the labor market, in employment relationships, in women's labor force participation rates, and in rates of marital dissolution and remarriage. Of particular importance are the significant changes in the U.S. labor market since the mid-1970s including substantial increase in jobs with limited security and jobs that do not provide pension or health insurance benefits (e.g., Kalleberg 2000, 2009; Kalleberg, Rosenfeld, and Harris 2000; Loveman and Tilly 1988). For example, in 1995, 44% of employed Americans did not have health insurance and 51% did not have pension (Kalleberg, Rosenfeld, and Harris 2000: 260). At the same time, the prevalence of unionized jobs has fallen dramatically, with the proportion of employees in unions falling from .28 in 1970 to .12 in 2007 (Statistical Abstract of the United States 1980 and 2009 volumes). Explanations for these changes have emphasized the impact of globalization, increased competition, deregulation, technological change and associated increases in non-standard employment and part-time employment, especially in the low-wage service sector (Belous 1998; Kalleberg 2000, 2009).

In this context of increasingly heterogeneous employment experiences (and concurrent increases in the complexity of family experiences including high rates of divorce and remarriage), there is growing interest in the ways in which experiences across the life course contribute to increased within-cohort variation in well-being at older ages (Crystal and Waehrer 1996; O'Rand 1996a, 1996b). Life course scholars have developed a rich vocabulary of temporality that helps to articulate the processes that shape trajectories of work and family experiences and that suggests hypotheses about their consequences for later well-being. The life course concepts of transitions, trajectories, and turning points are all useful for our purposes (Elder 1985; Elder, Johnson, and Crosnoe 2003; George 1999).

Throughout their lives individuals occupy particular roles or statuses—e.g., as spouses, as parents, as workers—and each of these roles has its own set of attributes and characteristics

(e.g., marriages can be first or higher-order marriages, jobs can be physically-demanding or not). Transitions represent movements from one role or status to another—for example, from being single to being married or from working full time to working part time. Whether and how a particular transition impacts outcomes in later adulthood depends in part on the attributes of the social role in question before and after the transition occurs (Wheaton 1990). Transitioning from full- to part-time employment may mean one thing for health, for example, if the full-time work was poorly paid but the part-time work is well-paid. It may mean another thing altogether if the full-time job came with health insurance and the part-time job does not. Duration refers to the length of time between role or status transitions. In this paper, we define trajectories as temporally-organized sequences of statuses (e.g., marital status) or conditions (e.g., the degree to which a job is physically demanding). Trajectories vary depending on (1) the duration of time spent in particular statuses or conditions and (2) the timing and frequency of transitions between statuses or conditions. As described by George (1999: 566), a trajectory is a "long-term pattern of stability and change, often including multiple transitions, that can be reliably differentiated from alternate patterns." There is evidence that trajectories represent a unique temporal dimension above and beyond the simple summation of statuses and transitions of which they are comprised (Moen, Dempster-McClain, and Williams 1992; Pavalko and Smith 1999; Pavalko and Woodbury 2000). That is, life course trajectories—representing the entirety of temporally-organized sequences of statuses and transitions between them—are conceptually and empirically valuable beyond the simple sum of their constituent parts.

Finally, we define turning points as unanticipated, non-normative changes in the direction of one's life (Elder, Johnson, and Crosnoe 2003). Although it is conceptually possible to experience a positive turning point (e.g., winning the lottery), we are primarily concerned with what might be considered negative turning points. These include events like having a child with a severe developmental disability, the death of a child, the death of a spouse, or the sudden loss of a job through corporate downsizing. Turning points may well condition the impact of life

course trajectories on well-being in older adulthood. For example, among people with identical marital status trajectories—e.g., once-married women whose marriages ended at age 50—we might expect widows to experience different levels of financial well-being than divorcees

A primary concern among life course scholars is to understand the consequences for well-being of simultaneously holding multiple social roles (Moen 1998). The broader social changes mentioned above—declining fertility rates, increasing divorce rates, increasing rates of female labor force participation, and changes in the timing and nature of retirement—have all redefined the ways that many women and men combine work and family roles across the life course. Extensive literatures describe the ways in which the demands of work roles impinge on the quantity and quality of time spent in family roles (Altucher and Williams 2003; Moen 1992), the ways in which the demands of family roles impinge on time spent in work roles (Becker and Moen 1999; Greenhaus, Parasuraman, and Collins 2001; Moen and Sweet 2003; Nomaguchi and Milkie 2003), and the ways in which men and women respond differently to competing work and family demands (Marks, Huston, Johnson, and MacDermid 2001; Reynolds 2005; Williams and Han 2003). In our analyses we therefore explicitly model the predictors and consequences of interdependencies in work and family trajectories across the life course.

Past research has typically not specified how earlier-life factors stratify financial well-being in later adulthood. Economists, sociologists, and others have learned a great deal about the economic consequences for older adults of mental and physical health problems (e.g., Kim and Lee 2006; McGarry and Schoeni 2005), public assistance benefits (e.g., Hungerford, Rassette, Iams, and Koenig 2001; Scruggs and Allan 2006), widowhood (e.g., Hungerford 2001), and demographic changes (e.g., Rice 2004), among other factors. However, this work rarely considers economic well-being in later adulthood to be the result of a lifetime of experiences in the labor market, the family, and other social contexts. Although many models of wealth accumulation are based on a rational calculus of investments and returns across the life course, research on economic well-being in later adulthood does not usually reflect the full exigencies of

the life course. Even research that approaches the determinants of health or financial well-being in later adulthood from a life course perspective (e.g., Farkas and O'Rand 1998; Mehdizadeh and Luzadis 1994; O'Rand and Hamil-Luker 2005; Wilmoth and Koso 2002; Yabiku 2000) tends to be limited in important ways. This research is frequently based on small or non-representative samples and/or on representative samples of individuals who are only followed for (at most) a few decades of the life course. It is also limited by frequent reliance on information about experiences across the life course reported retrospectively at older ages. Furthermore, despite evidence of increasing intra-cohort variation in well-being at older ages (e.g., Henretta and O'Rand 1999), this research typically considers health or financial well-being outcomes at a single point in time, rarely considering the processes that lead to changes in health or financial well-being in later adulthood—a central focus in theories of cumulative(dis)advantage. In this paper, we address these limitations using rich data on financial well-being at multiple points in later life and novel techniques for generating statistically and substantively meaningful characterizations of trajectories of work and family experiences across the full adult life course.

Our analyses are based on data collected across the lives of participants in the Wisconsin Longitudinal Study (WLS). WLS respondents—mostly born in 1939—have lived their lives in a period of unprecedented changes in the institutions of family and the labor market. Compared to the cohorts that preceded them, WLS respondents' work and family trajectories are quite heterogeneous. This increased heterogeneity in work and family trajectories may have translated into increased heterogeneity in health and financial well-being in later adulthood. As such, analyses of data from the WLS cohort can provide important insights into the factors that contribute to stratification in the financial well-being of subsequent cohorts of older adults (including those of the baby-boom cohorts) who have experienced even more heterogeneous work and family trajectories (Hughes and O'Rand 2004). For example, female labor force participation across the life course in this "family-then-job" cohort is stronger than in preceding cohorts but weaker than in the "career and family" cohorts that follow (Goldin 2004). The WLS

is the only existing large-scale longitudinal survey that contains near complete information on respondents' work and family histories from early adulthood through the retirement years and detailed measures of financial well-being at multiple points in the second half of the life course. It will be another 20 years before the oldest birth cohorts in NLSY-79 sample reach the current age of the WLS cohort, by which time the early baby boom cohorts will have reached older ages.

Data and methods

Sample

The Wisconsin Longitudinal Study is a long-term study of a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957. The WLS graduate sample is broadly representative of white, non-Hispanic Americans who have completed at least a high school education. Response rates to WLS telephone and mail surveys have been consistently high. Responses were obtained from 88% of surviving graduates' parents in 1964 and from 90% of surviving graduates in 1975. In 1993, 87% of surviving graduates responded to the telephone survey and 71% responded to the mail survey. In 2004, 78% of surviving graduates responded to the telephone survey and 76% responded to the mail survey.

The WLS has collected detailed information on marriage, childbearing, and most jobs that respondents have held thus allowing us to measure work and family trajectories in greater detail than in previous studies. In 1993 and 2004, the WLS telephone surveys obtained essentially complete employment histories for graduates covering the period 1975 through 2004 (or ages 36 through 65 for most graduates). The 1975, 1993, and 2004 telephone surveys obtained complete marital and fertility histories for graduates covering the period 1957 through 2004 (or ages 18 through 65 for most graduates). Rich information on health, work, and family circumstances at multiple points in late mid-life allows us to construct a comprehensive set of established temporally proximate correlates of financial well-being at older ages. Furthermore, the fact that the WLS contains measures of financial well-being at multiple points in time will allow us to advance our understanding of the ways in which life trajectories contribute to *change* in well-

being across the life course – a theoretically critical but empirically understudied focus of theories of cumulative advantage and disadvantage.

Methods

Our analysis consists of two major steps. First, we develop classifications of trajectories of graduates' work and family histories, separately for ages 36 to 53 and ages 54 to 64. Second, we model the impact of work and family trajectories on health and financial well-being, both before and after accounting for more proximate measures of work and family statuses and attributes. Third,

Characterizing Work and Family Trajectories

To identify and describe work and family trajectories we make use of group-based trajectory modeling techniques introduced by Nagin and Land (1993) and developed by Nagin, Jones, and colleagues (Jones and Nagin 2006; Jones, Nagin, and Roeder 2001; Nagin 1999; Nagin 2005). Sometimes referred to as finite-mixture models, or latent growth curve models, these techniques can be used to identify groups of individuals who are following similar "developmental trajectories" or categorically similar patterns on some outcome over time.

Until the early 1990s there were two main techniques for modeling developmental trajectories—hierarchical modeling (e.g., Bryk and Raudenbush 1987) and latent curve analysis (e.g., Muthén 1989). However, Nagin et al. (2003: 349) observe that both techniques "model the unconditional and conditional population distribution of growth curves based on continuous distribution functions, which makes it very difficult to use them for testing theories postulating distinctive developmental courses." This is because all individuals are described with respect to their deviation from some common developmental trajectory. In many cases such an assumption of a single underlying trajectory—from which individuals may or may not deviate—is clearly unwarranted. As noted by Raudenbush (2001: 513) in the context of research on development trajectories of depression, "[i]t makes no sense to assume that everyone is increasing (or decreasing) in depression . . . many persons will never be high in depression,

others will always be high, while others will become increasingly depressed." Group-based trajectory modeling, on the other hand, takes an entirely different approach to modeling individual variability in developmental trajectories. As described by Nagin and Tremblay (2005: 84): "Rather than assuming that the population distribution of trajectories varies continuously across individuals and in a fashion that can ultimately be explained by a particular multivariate distribution of population parameters (usually normal), it assumes that there may be clusters or groupings of distinctive developmental trajectories that themselves may reflect distinctive etiologies."

Group-based trajectory models are quickly becoming the standard statistical approach for understanding developmental sequences in other social science contexts and particularly in criminology. For example, these techniques have transformed our understanding of careers of criminal offending (Laub, Nagin, and Sampson 1998) and of the onset of physically aggressive behaviors among adolescents (Brame, Nagin, and Tremblay 2001; Nagin and Tremblay 1999). These methods have not been used to model work and family trajectories, even though work and family trajectories resemble other developmental sequences in their form. For example, careers of criminal offending tend to feature developmental trajectories like, "never offended," "always offended," "late-onset offending," and "late desistance from offending." These seem quite analogous, for example, to trajectories of women's work trajectories across the life course.

Group-based trajectory models are better suited to our research questions than traditional hierarchical or latent curve techniques, but they are also superior to more naïve approaches that researchers sometimes take to assigning individuals, *a priori*, to categories of work and family histories. For example, without resorting to any formal modeling we might simply suppose that between the ages of 36 and 53 female WLS graduates fall into one of the following employment status trajectory groups: (1) Consistently employed; (2) Consistently employed after delayed entry into the labor market; (3) Usually employed with some brief periods of unemployment; or

(4) Usually not employed. We could then use some semi-formal algorithm to assign women to the employment statuses trajectory group that most closely describes their experiences.

Nagin et al. (2003: 349) identify three problems with such naïve approaches, all of which are overcome by group-based trajectory modeling. First, there is no way to empirically or falsify the taxonomy of trajectories; they must be assumed *a priori*. Second, there is "the risk of simultaneously over- and under-fitting the data, thus creating trajectory groups that reflect only random variation and failing to identify unusual, but still real, developmental patterns." Third, such approaches provide no way to assess the precision with which individuals are assigned to the groups that comprise the taxonomy of trajectories. For example, even if we were to precisely identify the full set of trajectories of employment statuses that WLS women follow between the ages of 36 and 53, such naïve approaches provide no systematic way for determining the trajectory group to which any individual woman belongs.

Consequently, the primary emphasis and primary contribution of our work will be the estimation and utilization of group-based trajectory models. Below, we briefly outline group-based modeling techniques as they will be used to identify categories of work and family trajectories. Let $Y_i = \{y_{i1}, y_{i2}, y_{i3}, \ldots, y_{iT}\}$ represent the longitudinal sequence of measurements of some attribute of individual i over T time periods (e.g., employment or marital status as measured across ages 36 to 64), and let $P(Y_i)$ represent the probability of observing Y_i. Group-based trajectory models assume that there are J underlying trajectory groups in the population such that

$$P(Y_i) = \sum_{j=1}^{J} \pi_j P^j(Y_i) \qquad (1)$$

where $P^j(Y_i)$ is the probability of observing longitudinal sequence Y_i given membership in group j and π_j is the probability of group j (Jones and Nagin 2006; Nagin 1999). The model assumes that the random variables y_{it}, t=1,2,3,...,T, are independent conditional on membership in group j. Thus

$$P^{j}\left(Y^{i}\right)=\prod_{t=1}^{T} p^{jt}\left(y_{it}\right). \tag{2}$$

The values of π_j, j=1,2,3,...J, are estimated by a multinomial logit function:

$$\pi_j = e^{\theta_j} \Big/ \sum_{j=1}^{J} e^{\theta_j} \tag{3}$$

where θ_1 is normalized to zero (Jones and Nagin 2006). The functional form of $p^{jt}(y_{it})$ in Equation 2 is determined by whether y_{it} is a continuous variable or a binary variable. When y_{it} is a continuous variable, $p^{jt}(y_{it})$ is assumed to follow a censored normal distribution (to allow for the possibility of clustering at the minimum and maximum). When y_{it} is a binary variable, $p^{jt}(y_{it})$ is assumed to follow the binary logit distribution (Jones, Nagin, and Roeder 2001; Kim and Lee 2006; Nagin 1999; Nagin 2005). The link between time (or age, in our case) and the variable in question is modeled as a polynomial relationship; the software that estimates these models allows for up to fourth order polynomials. For example, when y_{it} is a binary variable it is assumed, conditional on membership in group j, that $p^{jt}(y_{it})$ follows the binary logit distribution:

$$p^{jt}\left(y_{it}\right)=\frac{e^{\beta_0^j+\beta_1^j Age_{it}+\beta_2^j Age_{it}^2+\beta_3^j Age_{it}^3+\beta_4^j Age_{it}^4}}{1+e^{\beta_0^j+\beta_1^j Age_{it}+\beta_2^j Age_{it}^2+\beta_3^j Age_{it}^3+\beta_4^j Age_{it}^4}} \tag{4}$$

where Age_{it} is individual i's age at time t and coefficients β_0^j, β_1^j, β_2^j, β_3^j, β_4^j determine the shape of the trajectory for group j. When y_{it} is continuous, the linkage between time (or age) and the variable in question is established via latent variable y_{it}^{*j} such that:

$$y_{it}^{*j} = \beta_0^j + \beta_1^j Age_{it} + \beta_2^j Age_{it}^2 + \beta_3^j Age_{it}^3 + \beta_4^j Age_{it}^4 + \varepsilon_{it}\,, \tag{5}$$

where disturbance ε_{it} is assumed to be distributed normally with a mean of zero and constant standard deviation σ (Jones and Nagin 2006; Jones, Nagin, and Roeder 2001; Nagin 1999; Nagin 2005). Models are estimated through maximum likelihood, where the maximization is performed using a general quasi-Newton procedure (Dennis, Gay, and Welsch 1981; Dennis and Mei 1979). The Bayesian Information Criterion (BIC) is relied upon for model selection (e.g., to

determine the number of trajectory groups). See Jones, Nagin, and Roeder (2001) for more information about model estimation.

Importantly for our purposes, Nagin and Tremblay (2001) developed a group-based methodology for *jointly* estimating two distinct but theoretically related trajectories (e.g., trajectories of both marital status and parity). Their technique—a modest extension of the modeling strategy outlined above—allows us to accomplish three important objectives. First, the model describes the form of jointly estimated trajectories. That is, the best-fitting model (determined using BIC) specifies a discrete number of trajectories and its parameter estimates define the shapes of the trajectories. (In related work, we have used these techniques to classify WLS graduates with respect to trajectories of occupational status across the life course (Raymo, Ho, Sweeney, and Hauser 2006). Second, the results of the model allow us to compute the probability that each graduate is a member of each trajectory group. Jones and Nagin (2006) and Nagin and Tremblay (2001) describe techniques for defining confidence intervals for such probabilities. Third, the results of the model allow us to compute the joint probability of membership in joint trajectory groups. As described by Nagin and Tremblay (2001: 18), these joint probabilities are useful for two reasons: "First, the joint probabilities can characterize the linkage in the developmental course of distinct but related behaviors. Second, the joint probabilities can measure differences within the population in the magnitude of this linkage." Extensions of these techniques to more than two trajectories are described by Nagin (2005).

The results of these group-based trajectory models—estimated separately for men and women, and separately for ages 36 to 53 and 54 to 64—allow us to empirically describe a finite set of work and family trajectories; the number of trajectory groups will certainly vary depending on which of the many attributes of WLS graduates' work and family histories are under consideration. For example, it may be that there are six trajectories of women's occupational socioeconomic standing between ages 36 and 53 but nine trajectories of their job complexity between those ages. The results of these models also determine which trajectories

best describe each graduate's life course. That is, if there are nine trajectories of women's job complexity between ages 36 and 53 we can determine the trajectory group to which each woman belongs. We then use information about trajectory group memberships to accomplish our major analytic goals.

Models of Financial Well-Being in Later Adulthood

We estimate separate models predicting multiple measures of financial well-being (total personal income, total household income, home ownership, and household net worth). For ease of presentation we generically refer to all response variables as "*Y*" in the following discussion.

Depending on the measurement scale of the response variable, we will estimate OLS (e.g., wealth) or binary logistic (e.g., home ownership) regression models. (In the equations below we assume continuous measurement of the dependent variable and use the notation of OLS regression models; this is simply for the sake of notational convenience.) All models will initially be estimated separately for men and women. We also estimate pooled models that allow us to directly test hypotheses about gender differences in the effects of work and family trajectories on *Y* and on changes in *Y*.

Below we describe six sets of analyses. Within each of the six sets of analyses we will estimate two different groups of models. These are labeled models "a" and "b" below.

In each "a" model the dependent variable is *Y* as measured at age 54 (and so we denote the outcome as Y_{54}). We express Y_{54} as a function of (1) trajectories of work and family experiences between ages 36 and 54, (2) *Y* as measured prior to age 54, and (3) a series of control variables. In each "b" model the dependent variable is *Y* as measured at age 65 (or Y_{65}). We express Y_{65} as a function of (1) trajectories of work and family experiences between ages 54 and 64, (2) *Y* as measured at age 54, and (3) a series of control variables.

By including $Y_{\text{Pre-54}}$ in the "a" models and Y_{54} in the "b" models we are attempting to account for the complex temporal ordering of work, family, and economic variables across the life course. We are also explicitly recognizing that apparent effects of work and family trajectories

between Time 1 and Time 2 on *Y* as measured at Time 2 may be biased by failing to account for *Y* as measured at Time 1.

This modeling strategy is analogous to modeling change in *Y* between Time 1 and Time 2. In the exposition that follows, we model change in *Y* by utilizing the "regressor variable" method in which *Y* at Time 2 is regressed on *Y* at Time 1 along with the independent variables. This approach may under-adjust for differences at Time 1 (Allison 1990). Alternatively, we might have utilized a "change score" (or difference-in-differences) approach in which the dependent variable is the difference between *Y* at Time 1 and *Y* at Time 2. According to Allison (1990), both strategies have their strengths and each can yield valid results. We have two primary reasons for preferring the "regressor variable" method. First, this method may be preferable when *Y* as measured at Time 1 may causally affect *Y* at Time 2. Second, the "change score" approach drops all observations in which *Y* does not change between Times 1 and 2; this may be problematic for some outcomes. We agree with Brand and Burgard (2008: 218) that "researchers should remain flexible in exploring alternative model specifications and report inferences from multiple models." Thus, while the exposition below is based on the "regressor variable" method, we also compare results from these models with results derived from the "change score" method where appropriate.

The "controls" included in the "a" and "b" models consist of measures of family socioeconomic background, educational attainment, adolescent cognitive ability, educational and occupational aspirations as measured in high school, childhood health, and other established covariates of the various measures of economic well-being. The controls are intended to account for indirect selection, or the possibility that observed associations between trajectories of work and family and *Y* are spurious owing to background variables that simultaneously influence *Y* (or changes in *Y*) and graduates' work and family trajectories.

ANALYSIS 1: We begin by modeling *Y* as a function of work and family trajectories

Model 1a: $Y_{54} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{36\text{-}54} + \beta_2 Y_{Pre\text{-}54} + \beta_3 \text{Controls} + \varepsilon$

Model 1b: $Y_{65} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{54\text{-}64} + \beta_2 Y_{54} + \beta_3 \text{Controls} + \varepsilon$

ANALYSIS 2: We model *Y* as a function of (1) work and family trajectories and (2) proximate predictors of *Y*; these proximate predictors will vary across outcomes

Model 2a: $Y_{54} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{36\text{-}54} + \beta_2 Y_{Pre\text{-}54} + \beta_3 \text{Proximates} + \beta_4 \text{Controls} + \varepsilon$

Model 2b: $Y_{65} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{54\text{-}64} + \beta_2 Y_{54} + \beta_3 \text{Proximates} + \beta_4 \text{Controls} + \varepsilon$

In Analysis 2, "Proximates" include indicators of work and family statuses and conditions as measured contemporaneously with *Y*. Together Analyses 1 and 2 allow us to assess the extent to which work and family trajectories affect economic well-being (and changes therein) in later adulthood. The combination of Analyses 1 and 2 allows us to assess the extent to which the effects of work and family trajectories are direct—such that they operate net of proximate predictors of *Y*—and the extent to which they are indirect, operating through their effects on more proximate predictors.

ANALYSIS 3: We model *Y* as a function of (1) work and family trajectories and (2) measures of turning points in work and family trajectories

Model 3a: $Y_{54} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{36\text{-}54} + \beta_2 Y_{Pre\text{-}54} + \beta_3 \text{Turning Points} + \beta_4 \text{Controls} + \varepsilon$

Model 3b: $Y_{65} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{54\text{-}64} + \beta_2 Y_{54} + \beta_3 \text{Turning Points} + \beta_4 \text{Controls} + \varepsilon$

ANALYSIS 4: We model *Y* as a function of (1) work and family trajectories; (2) proximate predictors of *Y*; and (3) measures of turning points in work and family trajectories

Model 4a: $Y_{54} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{36\text{-}54} + \beta_2 Y_{Pre\text{-}54} + \beta_3 \text{Turning Points} + \beta_4 \text{Proximates} + \beta_5 \text{Controls} + \varepsilon$

Model 4b: $Y_{65} = \beta_0 + \beta_1 \text{Work/Family Trajectories}_{54\text{-}64} + \beta_2 Y_{54} + \beta_3 \text{Turning Points} + \beta_4 \text{Proximates} + \beta_5 \text{Controls} + \varepsilon$

Analyses 3 and 4 address the hypothesis that turning points affect financial well-being (and changes therein) in later adulthood. Again, the combination of Analyses 3 and 4 allow us to assess the extent to which the effects of turning points are direct—such that they operate net of proximate predictors of *Y* and changes in *Y*—and the extent to which they are indirect, operating through these proximate predictors.

ANALYSIS 5: We model *Y* as a function of (1) work and family trajectories; (2) proximate predictors of *Y*; (3) measures of turning points in work and family trajectories; and (4) interactions between work trajectories and family trajectories

Model 5a: $Y_{54} = \beta_0 + \beta_1 \text{Work Trajectories}_{36\text{-}54} + \beta_2 \text{Family Trajectories}_{36\text{-}54} + \beta_3 Y_{\text{Pre-}54} + \beta_4 \text{Turning Points} + \beta_5(\text{Work Trajectories}_{36\text{-}54} \times \text{Family Trajectories}_{36\text{-}54}) + \beta_6 \text{Proximates} + \beta_7 \text{Controls} + \varepsilon$

Model 5b: $Y_{65} = \beta_0 + \beta_1 \text{Work Trajectories}_{54\text{-}64} + \beta_2 \text{Family Trajectories}_{54\text{-}64} + \beta_3 Y_{54} + \beta_4 \text{Turning Points} + \beta_5(\text{Work Trajectories}_{54\text{-}64} \times \text{Family Trajectories}_{54\text{-}64}) + \beta_6 \text{Proximates} + \beta_7 \text{Controls} + \varepsilon$

Analysis 5 addresses the hypothesis that the effects of work trajectories on financial well-being (and changes therein) in later adulthood vary across individuals with different family trajectories and that the effects of family trajectories on these outcomes vary across individuals with different work trajectories. Are the effects of work trajectories and family trajectories simply additive or are their effects interactive? To answer this question we compare the fit of models that (1) assign graduates to work trajectory groups independent of their family trajectory groups and that (2) assign work and family trajectory groups simultaneously, using the dual trajectory techniques introduced by Nagin and colleagues (Jones and Nagin 2006; Nagin and Tremblay 2001; Nagin and Tremblay 2005). If the latter models better fit the data (which we assess using BIC), then we will take this as evidence in support of Hypothesis 3.

ANALYSIS 6: We model *Y* as a function of (1) work and family trajectories; (2) proximate predictors of *Y*; (3) measures of turning points in work and family trajectories; (4) interactions between work trajectories and family trajectories; and (5) measures of spouses' work and family statuses.

Model 6a: $Y_{54} = \beta_0 + \beta_1$Work Trajectories$_{36\text{-}54} + \beta_2$Family Trajectories$_{36\text{-}54} + \beta_3 Y_{Pre\text{-}54} + \beta_4$Turning Points + β_5(Work Trajectories$_{36\text{-}54} \times$ Family Trajectories$_{36\text{-}54}$) + β_6Spousal Work and Family Statuses$_{36\text{-}54}$ + β_7Proximates + β_8Controls + ε

Model 6b: $Y_{65} = \beta_0 + \beta_1$Work Trajectories$_{54\text{-}64} + \beta_2$Family Trajectories$_{54\text{-}64} + \beta_3 Y_{54} + \beta_4$Turning Points + β_5(Work Trajectories$_{54\text{-}64} \times$ Family Trajectories$_{54\text{-}64}$) + β_6Spousal Work and Family Statuses$_{36\text{-}65}$ + β_7Proximates + β_8Controls + ε

Analysis 6 addresses the hypothesis that the effects of work and family trajectories on financial well-being in later adulthood are conditioned by graduates' spouse's work and family experiences. Here, we estimate models that only include indicators of spouses' work and family statuses, but we also estimate models that include interactions between graduates' work and family trajectories and spouses' work and family statuses.

Methodological Complications: Selective Mortality and Item-Level Missing Data

We have said nothing to this point about selective mortality. We begin by noting that relatively few respondents died prior to the 1993 surveys (7% of men, 4% of women). This means that selective mortality likely has little bearing on the validity of analyses that only consider outcomes as of 1993 (age 54). In any case, to handle selective mortality we begin by utilizing procedures developed by Heckman (1979). Heckman's two-stage selection procedure begins by modeling mortality as a function of a set of covariates, some of which do not appear in the model for the main outcomes. After estimating this selection equation, we compute the Inverse Mills Ratio (IMR) for each case, which is then included in the models above as an additional covariate that attempts to account for the sample selectivity induced by non-random patterns of mortality. Although widely used, these procedures have known limitations which stem primarily from the inability to identify appropriate instrumental variables—an issue of improper model specification. The fact that we have high-quality longitudinal data on living and deceased respondents puts us in a stronger position to productively use Heckman selection procedures (for example, because we have access to stronger and more defensible instrumental

variables).

We have also said nothing to this point about item-level missing data. A major strength of the WLS is the high quality of its key measures, including relatively low rates of item non-response. For example, wage rates can be calculated for 90% of respondents to the 1993 WLS graduate survey—even though survey items about income (and finances in general) typically experience higher rates of item non-response. Group-based trajectory models are quite flexible in their handling of missing data; only the very small percentage (<5%) of graduates with no information on employment histories would are excluded from models characterizing those histories, and only the very small percentage of graduates with no information on family histories are excluded from models characterizing those histories. Nonetheless, there is some missing data in the WLS. We utilize hot-deck imputation methods (Little and Rubin 1987), in which missing values are replaced on the basis of available values from similar respondents in the same study. An advantage of hot-deck imputation procedures over alternative techniques is that it preserves the distribution of the values.

Preliminary results

In this section, we describe WLS graduates' employment histories and marital and fertility histories through age 64. We then demonstrate that graduates' mental and physical health and financial well-being at age 65 vary significantly as functions of their work and marital histories between ages 54 and 64. The analyses that we present below are preliminary in a number of ways, including with respect to the complexity of our operationalization of work and family trajectories; our focus on a limited age range (54 to 64); our omission of key measures of turning points, more proximate predictors of outcomes, and childhood socioeconomic and health conditions; and our inattention to important methodological issues (e.g., selective mortality, missing data). Our modest goals here are (1) to demonstrate that the WLS data contain rich information about graduates' work and family histories; (2) to demonstrate that WLS graduates are heterogeneous with respect to their life-course patterns of work and family experiences; and

(3) to offer preliminary evidence that financial well-being in later adulthood varies as a function of trajectories of work and family histories.

WLS Employment Histories from Ages 36 to 64

We have nearly complete employment histories for WLS graduate respondents between ages 36 and 65. We also know a great deal about each of their spells of employment, including: (a) The date they began working for each employer; (b) The date they stopped working for each employer; (c) Their reason for ending each employment spell; (d) Whether they worked full- or part-time when they began working for each employer; (e) 1990 and 2000 US Census industry and occupation classifications for the job they held when they began working for each employer (which can be mapped to socioeconomic indices and to resources like O*Net which provide detailed information about working conditions and job requirements); (f) Pension coverage from each employer; (g) Health insurance coverage from each employer; (h) Whether they ever changed jobs (defined as a change in their most important activities or duties) while working for each employer; (i) The date that they changed jobs while working for each employer (if applicable); (j) Whether they worked full- or part-time after they changed jobs (if applicable); and (k) 1990 and 2000 US Census industry and occupation classifications for their new job with that employer (if applicable; again, these can be mapped to various resources.

Fig. 1 - All Men

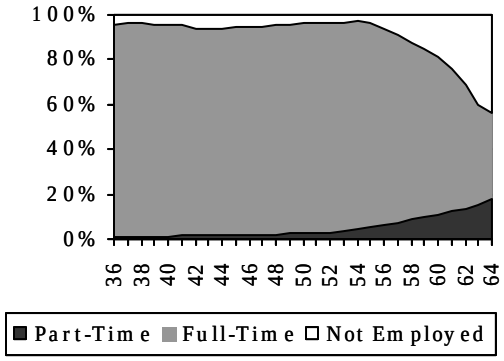


Fig. 2 - All Women

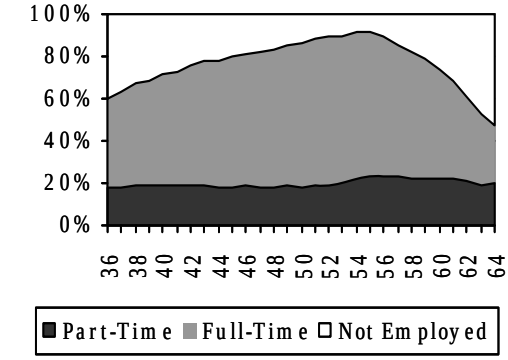


Fig. 3 - Modal Work Trajectories: **Men, Ages 36 to 53**

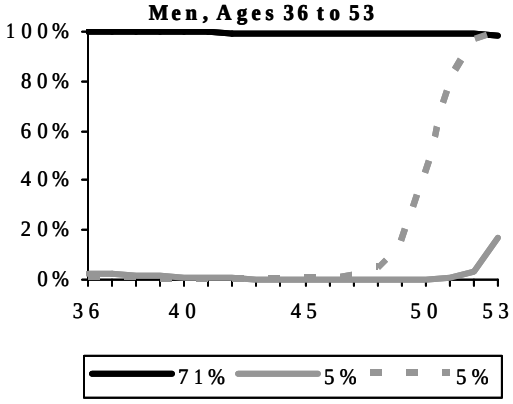
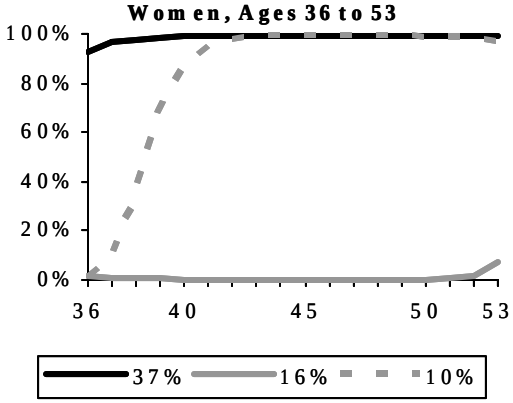


Fig. 4 - Modal Work Trajectories: **Women, Ages 36 to 53**



Although we could model life course trajectories of any of these attributes of WLS graduates' work, Figures 1 and 2 simply describe the percentages of men and women working full- and part-time at each age. Neither figure is surprising. Most men worked full-time until at least their mid-50s; thereafter, some stopped working and others shifted to part-time work. A sizable proportion of women moved into the paid labor market in their late 30s and 40s, presumably as children grew older and left home; many stopped working beginning in their mid-50s. At all ages, women were more likely than men to work part-time.

These aggregate patterns conceal considerable heterogeneity in men's and women's work histories. Figures 3 to 8 below are based on group-based trajectory models of the sort described above, and describe men's and women's employment status trajectories between ages 36 and 53 and, separately, between ages 54 and 64; similar figures could have been created for any of the attributes of work histories listed above. Again, we limit ourselves here to simple characterizations of trajectories of employment

statuses shown in these figures.

Figures 3 and 4 depict the most commonly observed employment status trajectories for men and women, respectively, between ages 36 and 53—that is, during the prime years of WLS graduates' labor force involvement. Predictably, the modal employment status trajectory for men includes those who were continuously employed between ages 36 and 53—this trajectory group includes 71% of men. The second and third largest (that is, most populous) trajectory groups, as shown in Figure 3, include men who did not work during most of this spell (at least until their late 40s); another 19% of men fall into one of eight other trajectory groups. (As we describe below, a key feature of the group-based trajectory modeling techniques that we employ is that they provide empirical evidence about the number of distinct trajectory groups present in the population.) On the other hand, as shown in Figure 4, the modal employment status trajectory for women—which consists of individuals who were continuously employed between ages 36 and 53—includes only 37% of women. About 16% of women were not employed across this age range; about 10% delayed employment until their late 30s; and the remaining 37% of women fell into one of seven other trajectory groups.

Fig. 5 - Modal Work Trajectories:
Men, Ages 54 to 64

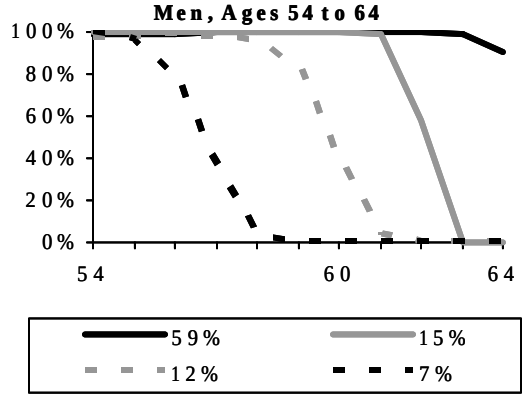


Fig. 6 - Modal Work Trajectories:
Women, Ages 54 to 64

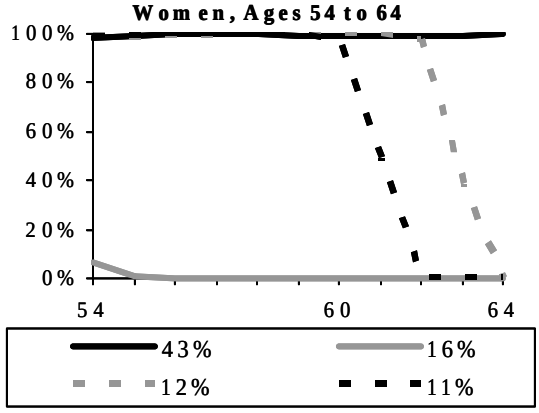


Fig. 7 - Modal Childbearing Trajectories:
Men, Ages 18 to 53

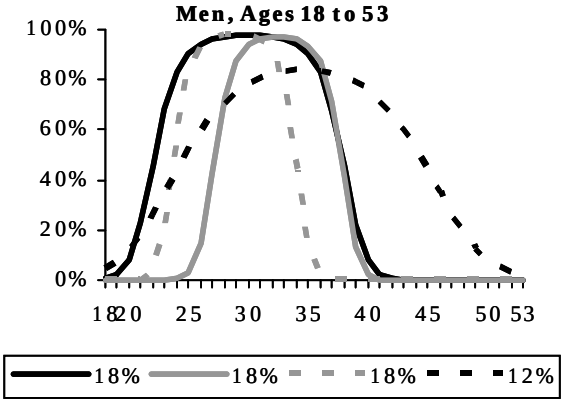
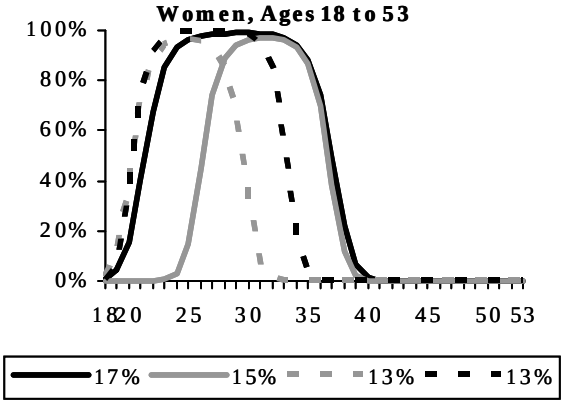


Fig. 8 - Modal Childbreaing Trajectories:
Women, Ages 18 to 53



Figures 5 and 6 depict the most commonly observed employment status trajectories for men and women, respectively, between ages 54 and 64—the years in which many WLS graduates begin the leave the paid labor force or to scale back their labor market activities. Among men, the modal group (59% of men) continued to work through age 64. However, the next three largest (that is, most populous) trajectory groups—comprising a total of 34% of men—stopped working by age 64 (albeit at different ages across groups). Among women, the modal group (43% of women) continued to work through age 64. The second largest trajectory group included the 16% of women who did not work in this age range; the third and fourth largest trajectory groups—comprising a total of 23% of women—stopped working by age 64.

A key point to be taken from Figures 3 through 6 is that male and female WLS graduates experienced heterogeneous trajectories of employment status between ages 36 and 64. In subsequent analyses we will explore many other attributes of WLS graduates' employment histories (beyond simply their employment

statuses)—including full-time/part-time work, aspects of job characteristics and working conditions, health and pension plan coverage, and many others. Based on our preliminary work, we expect substantial heterogeneity in WLS graduates' work histories when we characterize their work with respect to job conditions, socioeconomic status, pension coverage, health insurance coverage, and so forth.

WLS Marital and Fertility Histories from Ages 36 to 64

We have complete marital and childbearing histories for all WLS graduates through age 64. About 75% of men and women married exactly once; more than 80% of men and 75% of women were married when last interviewed in 2004. As with their work histories, these aggregate patterns of graduates' marital histories conceal considerable heterogeneity in their experiences. Only 67% of men and 60% of women followed the modal pattern—marrying only once and remaining married until the time of the 2004 survey. The remaining 33% of men and 40% of women either never married or experienced at least one marital transition after getting married for the first time. About 5% of men and 12% of women have experienced the death of a spouse.

More than half of all WLS graduates had exactly two or three children, but another 7% had none. More importantly, WLS graduates were quite heterogeneous with respect to their timing of childbearing. For demonstrative purposes, we have constructed a time series for each graduate that indicates whether or not they had at least one child below the age of 6 in each month between ages 18 and 53. Using group based trajectory modeling techniques described above, we have categorized WLS male and female graduates with respect to their trajectories on these histories of having children below the age of 6. (Of course there are many different ways in which we could characterize WLS graduates' marital and/or fertility histories; we choose this simple measure here for demonstration purposes only.

Figures 7 and 8 show the four largest (most populous) trajectory groups for men and women, respectively. These trajectory groups primarily reflect differences across subsets of WLS graduates with respect to the ages at which they began to have children, the ages at which

they stopped having children, and for how long they had children under the age of 6 (which is largely a function of number of children and birth spacing). Although it is true that the modal WLS graduate followed predictable (although gender-specific) life-course patterns of labor force participation, marriage, and childbearing, Figures 3 through 8 make clear that these broader patterns conceal a great deal of heterogeneity in life-course patterns in these important domains.

Variability in Well-Being across Employment and Marital Status Histories from Ages 54 to 63

Does WLS graduates' financial well-being vary as function of trajectories of work and family experiences? For the purposes of these preliminary analyses we consider graduates' *family net worth* based on an accounting of an array of financial assets and liabilities. Table 1 presents evidence about the extent to which this outcome—as measured both at age 54 and 65— varies significantly across men's and women's trajectories of employment and marital statuses between ages 54 and 64. The results of preliminary latent trajectory models indicate that for men there were seven distinct employment status trajectories and seven distinct marital status trajectories between ages 54 and 64. For women, there were eight distinct employment status trajectories and five distinct marital status trajectories.

The models described below are preliminary both technically and conceptually, and are simply intended to demonstrate that graduates' well-being varies as a function of their trajectories of work and family statuses. Furthermore, we only include work and family trajectories between ages 54 and 64 to simplify these preliminary analyses; as described below, more complete analyses will consider work and family trajectories between ages 36 and 53 and (separately) between ages 54 and 64. Our assessments of whether net worth (a continuous measure) varies across categories of work and family trajectories are based on Analysis of Variance *F*-tests.

Table 1. Net Worth by Trajectories of Employment and Marital Status

	MEN	WOMEN
Associations Between Age 54-64 <u>WORK</u> Trajectories and Outcomes at Ages 54 and 65		
Model A. Association Between Outcome at Age 54 and Work Trajectories Between Ages 54 and 64		
p-value from *F*-test	0.01	0.00
Model B. Association Between Outcome at Age 65 and Work Trajectories Between Ages 54 and 64		
p-value from *F*-test	0.01	0.01
Model C. Association Between Outcome at Age 65 and Work Trajectories Between Ages 54 and 64 Net of Outcome at Age 54		
p-value from improvement in *F* or c^2 (Based on *F*-test comparing Model C to a model that only includes outcome at Age 54)	0.00	0.00
Associations Between Age 54-64 <u>MARITAL STATUS</u> Trajectories and Outcomes at Ages 54 and 65		
Model A. Association Between Outcome at Age 54 and Marital Status Trajectories Between Ages 54 and 64		
p-value from *F*-test	0.00	0.00
Model B. Association Between Outcome at Age 65 and Marital Status Trajectories Between Ages 54 and 64		
p-value from *F*-test	0.00	0.00
Model C. Association Between Outcome at Age 65 and Marital Status Trajectories Between Ages 54 and 64 Net of Outcome at Age 54		
p-value from improvement in *F* or c^2 (Based on *F*-test comparing Model C to a model that only includes outcome at Age 54)	0.00	0.00

Note: The dependent variable is the natural log of net worth (in $1,000)

We recognize the complex temporal relationships between trajectories of work and family experiences and the sorts of outcomes we are considering. If we were to simply regress these four outcomes as measured at age 65 on work and marital status trajectories between ages 54 and 64 we would be making strong and unwarranted assumptions about the direction of causal relationships. Consequently, we begin—in Model A of Table 1—by considering relationships between net worth measured at age 54 on trajectories of work and family statuses between ages 54 and 64. In general the *p*-values (which indicate whether individual outcomes are significantly associated with trajectory group membership) make clear that WLS graduates'

health and financial well-being at age 54 are predictive of the trajectories of employment and marital statuses that they will follow over the next decade. For example, women with relatively low net worth at age 54 are especially likely to fall into the marital status trajectories that feature experiencing widowhood or being unmarried throughout the ages range 54 to 64; women with relatively high net worth at age 54 are especially likely to fall into the marital status trajectory that features continuous marriage through this age range.

Next, in Model B of Table 1 we regress net worth measured at age 65 on trajectories of employment and marital statuses between ages 54 and 64. We find strong evidence that trajectories of employment and marital statuses between ages 54 and 64 are predictive of net worth at age 65. Taken together, Models A and B suggest that financial well-being at age 54 predicts trajectories of employment and marital statuses between ages 54 and 64, and that these trajectories in turn predict well-being at age 65. But do trajectories of employment and marital status predict these outcomes at age 65 net of net worth as measured at age 54? That is, if we control for baseline measures of net worth do trajectories of employment and marital statuses predict changes in net worth between ages 54 and 64? As demonstrated in Model C of Table 1, the answer is "yes."

Summary of Preliminary Analyses

We have thus far (1) demonstrated that the WLS data contain rich and analytically valuable information about graduates' work and family histories; (2) demonstrated that WLS graduates are fairly heterogeneous with respect to their life-course patterns of work and family experiences; and (3) offered preliminary evidence that trajectories of work and family experiences are related to financial well-being in later adulthood. The preliminary analyses described in Table 1—which use a relatively unsophisticated technique for characterizing WLS graduates' work and family trajectories, which are limited to a single illustrative response variable, and which pertain only to ages 54 to 65—make clear that men's and women's financial well-being does vary significantly as a function of their work and family histories.

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