CHAPTER 24

Characterizing the Life Course as Role Configurations and Pathways

A Latent Structure Approach

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The life course is a multi-faceted phenomenon. It involves a complex interplay among psychological orientations and behaviors; past experiences and future actions; age and cohort influences; network, historical, and institutional contexts that provide an environment of opportunities and constraints; and the interconnections among social roles that change over time in that environment. All of these coalesce to set the stage for life chances and personal wellbeing throughout one's life. The life course itself constitutes a social institution, cutting pathways through time and creating a gravity of sorts, varyingly attracting individual lives into role configurations conforming to age-graded norms. Research on the life course and the development of accompanying theories thus grapples with a wide array of issues, have numerous foci, and draw upon a number of disciplines in order to understand the social context of human lives over time (Elder, 1994).

George (*this volume*) argues that life course research involves two rather distinct avenues of inquiry. One focuses on the life course *itself*. This work examines the shape and structure of

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Handbook of the Life Course, edited by Jeylan T. Mortimer and Michael J. Shanahan. Kluwer Academic/Plenum Publishers, New York, 2003.

the life course, its historical emergence, its structural and cultural underpinnings, and the impact of historical events on the life course. The core of this work is variation in the life course and an examination of the social characteristics and conditions that generate diversity. A second body of research incorporates life course principles into a variety of substantive areas. Questions of stability and change, timing and order, the occurrence and sequencing of social roles, social relations, and social experiences are all important aspects of research in fields like stratification, social psychology, and social movements (Hagan, 2001; Warren, Hauser, & Sheridan, 2002; Wheaton, 1990). They are also central to research on a wide array of topics like work, family, health, and involvement in crime and deviance (Conger & Elder, 1994; Han & Moen, 1999; Sampson & Laub, 1993).

In both areas of inquiry, however, it is somewhat ironic that the life course as a *multifaceted phenomenon* is seldom precisely operationalized and measured. This is especially so if one adheres to Elder's (1985) characterization of the life course as the age-graded movement through social institutions or if one conceptualizes the life course as the interlocked trajectories, or pathways, of social roles over time. This phenomenon, as a whole, has seldom been the object of inquiry. Instead, researchers most often identify some specific aspect of the life course (e.g., the transition from school to work or the timing of first birth), operationalize its dimensions such that it is amenable to inquiry using traditional statistical techniques (e.g., linear and logit regressions or event history models), and then assess the implications of the empirical results. Such work ultimately dissects the life course into various components and focuses attention solely on these components. Although useful to a degree in our efforts to understand individual components of the life course, this approach necessarily limits attention to the specific (out-of-context) aspects of the life course. This, in turn, limits our efforts to understand the life course as a biographical, multi-faceted phenomenon and to understand the consequences for life chances in a multiplex of domains.

In this chapter we elaborate existing theory and introduce a statistical approach consistent with understanding the life course as probabilistically interlocked trajectories, or pathways, of social roles over time. Specifically, we draw upon Elder's (1985) conceptualization of the life course as the interdependent trajectories of social roles over time and propose a two-tiered latent class model derived from this conceptual understanding. This framework allows us to identify *configurations of social roles* over time and *life paths* that link these role configurations over the life course.

Below, we discuss the theoretical foundation and statistical mechanics of this approach, and demonstrate its utility for modeling the life course. We further provide an empirical example, focusing on the extended pathway from mid-adolescence to mid-adulthood in a national sample of Americans. We then discuss the applications of this framework for a wide range of life course issues. Finally, we conclude with some comments on the potential of this approach to address key theoretical and empirical issues in both life course research and the social sciences in general.

CONCEPTUALIZING THE LIFE COURSE—TRAJECTORIES AND TRANSITIONS

Elder (1985, p. 30) characterizes the life course as a "multidimensional concept of interdependent careers or trajectories—work life, marriage, and parenthood." A key aspect of the life course is thus the age-structured movement into, through, and out of social institutions, and the age-structured configuration of roles an individual takes on. Individual experience and

agency interact with the broader social and cultural context to shape the occurrence, timing, and order by which individuals move through different institutional contexts and assume configurations of social roles.

Two concepts, *trajectories* and *transitions*, are considered central descriptors of the life course (Elder, 1985). Trajectories most often refer to long-term involvement in or connection to social institutions and corresponding roles. Conceptually similar to notions of "careers," trajectories can be charted by linking institutionally defined roles or "states" over time and are often characterized by specific events with a definable sequence, duration, and order. Institutionally defined role trajectories, in essence, indicate the degree to, and the way in, which someone is embedded in a particular institutional context over time.

The companion concept, transitions, typically refers to specific events that move an individual into or out of various institutional contexts and corresponding role configurations. We identify the transition to marriage by the event of actually "getting married." Transitions out of school can involve the dropping out of high school, graduating, or, as of late, simply quitting higher education. Transitions into work involve the acquisition of full-time, full-year work.

Each of these indicates movement from one set of roles to another, or a change in an individual's socially and/or institutionally defined role configurations. These transitions may be thought of as embedded in trajectories that give them specific form and meaning. They help to define trajectories by indicating when a particular trajectory began or ended and indicate duration, how long a particular trajectory has lasted. Information on the timing of such transitions in individual lives allows social scientists to consider the degree to which trajectories and transitions correspond or deviate from social expectations and whether this is consequential for life chances (Hogan, 1978; Marini, 1984; Rindfuss, Swicegood, & Rosenfeld, 1987).

Trajectories and transitions provide a useful conceptual apparatus to help us understand and describe the totality of the life course. They indicate stability or change over time in a given social role. Yet, they also provide tools for mapping out broader life course dynamics. Seldom can we describe the totality of the life courses by a single set of trajectories and transitions alone. Instead, an individual's life course involves the *interplay among multiple trajectories and transitions*, and the variable ways in which these interconnected trajectories unfold in concert over time (Elder, 1985, p. 32).

Life course trajectories are interdependent phenomena, with each trajectory in part influenced by the shape of other trajectories. Marriage, for example, may follow from the completion of school and movement into full-time work due to the stabilizing of socioeconomic resources (Hogan, 1978; Neugarten, Moore, & Lowe, 1965). Likewise, occurrences within one trajectory may also influence occurrences within another trajectory. Problems in higher education, for example, may lead to greater commitment to work or vice versa. Problems in higher education may also lead to an earlier than anticipated marriage, which then influences the onset of parenthood (Schneider & Stevenson, 1999).

Understanding the life course as such a dynamic phenomenon thus requires attention to an unfolding, multidimensional process that transcends individual trajectories or even pairs of trajectories. It requires attention to the simultaneous interlocking of various trajectories over time and how this, rather than the individual trajectories, characterizes the life course.

METHODOLOGICAL CHALLENGES

Standard methodological and statistical approaches cannot easily accommodate such theoretical issues. Several problems arise. Most generally, identification or designation of cause and effect becomes problematic. In much traditional research, causes and effects are clearly

delineated, or at least they are articulated as aspects of an endogenous system in which initial effects become later causes. The notion of interlocked trajectories suggests that separating causes from effects may not be so easy.

First, the interlocking or conjoining of trajectories may not be the result of causal relations among variables in the traditional sense. Instead, they may reflect a process that is largely responsive to broader social or cultural conditions and/or norms. Elder (1998) notes in his classic study that the impact of the Great Depression was diverse: it simultaneously affected various life course trajectories. The economic downturn influenced who was working, when people moved into work, the timing of marriage, and consequently the timing of parenthood. More recently, scholars of the transition to adulthood suggest that a changing economy has altered school to work transitions, causing increased overlap and lengthening the time taken to move into full time work (Shanahan, 2000). Such structural change has further consequences for the occurrence and timing of marriage and parenthood (Oppenheimer & Lewin, 1999). A focus on causal relations, in the traditional counterfactual sense, may hide the life course as a biography, shifting inquiry away from the whole and towards individual parts as though these were independent processes.

Issues of cause and effect are further complicated by the emphasis on agency in life course research (Elder, 1994). In any context, agency can involve orientations towards the past, the present, and the future (Emirbayer & Mische, 1998). It can involve the effects of past experiences on current behaviors. It can involve the rational calculation and assessment of current situations and circumstances. It can involve a projection into the future that then serves to orient present activities. Interlocked trajectories that define the life course may thus involve the effects of the past on the future but also the anticipated future on the present. Hence, anticipated effects may produce what is often considered (by the researcher) to be the cause of that effect, a phenomenon that Marini and Singer (1984) refer to as "reverse causation." Individual propensities may also lead one to be more past oriented, more present oriented, or more future oriented. Such orientations may structure the overall interlocking of an individual's trajectories over time. In the context of multiple, interconnected orientations, explicit designations of cause and effect in the life course may ultimately bear little resemblance to the reality of decision-making and choice in the life course.

Life course inquiry of the type that we have highlighted also suggests the necessity of defining an object of study based on the simultaneous interplay among multiple factors over time. This type of formulation is difficult to reconcile with traditional scale-based approaches to measurement that focus on the attenuation of measurement error through the use of multiple, substitutable items, such as LISREL-like measurement models.

Though not impossible, an examination of the life course as a whole is not well accomodated with statistical models that require a researcher to clearly delineate independent and dependent variables, exogenous and endogenous variables, causes and effects. These include traditional regression models, path analysis and structural equation models, and even models that are designed for modeling temporally dynamic processes, such as the usual growth curve models and traditional event history models. Hence, researchers relying on many of the traditional statistical techniques typically have few tools to examine the life course as a phenomenon involving multiple trajectories or pathways.

As a final concern, it is not straightforward how one effectively examines *heterogeneity* in life courses with many popular statistical techniques. A key issue in life course theory is the degree to which life courses vary across individuals, across social groups, across various contexts, and across historical time, and then the degree to which this variation is consequential for the human experience (Elder, 1994). In the face of this, contemporary research has adopted

two approaches. One approach has been the transformation of components of the life course into measurable variables. Examining the interlocked trajectories of education and marriage, for example, is studied by examining the association between educational attainment (i.e., number of years completed, highest degree) and age at first child (Marini, 1978). Heterogeneity is then measured by the variation in specific variables. With few exceptions, this branch of research is forced to examine one particular type of interlock. Within this framework, heterogeneity is by definition restricted to that which can be detected through that one particular type.

A second approach examines the order and timing of social roles. In this case, researchers are confronted with literally thousands of combinations indicating movement into and out of roles over time (Hogan, 1978; Marini, 1984; Rindfuss et al., 1987). Heterogeneity here is extreme, even when stringent and often unrealistic restrictions are placed on the data (see discussions in Hogan, 1978; Rindfuss et al., 1987). While there appears to be more promise in the latter approach, there is still the problem of how one would identify meaningful variation, conceptually or empirically. Such work recognizes the importance of heterogeneity in life courses but has not developed a means of organizing such information to delineate the actual structure(s) of the life course and how these vary across groups, contexts, and time periods. In the end, the explicit focus on heterogeneity in the structure of the life course that is a centerpiece of contemporary theory has little visibility in contemporary research.

To be sure, we are not arguing here that traditional approaches are not useful in understanding various aspects of the life course. They have been the cornerstone of contemporary life course research, and much about the life course has been learned over the past 30 or so years in this endeavor. We do however note that their conceptual origins and key statistical features are not particularly consistent with key features of contemporary life course theory. The conceptualization of the life course as a multi-dimensional process, the potential interchange of (hypothesized) cause and effect, contingency and interaction in social roles over time, the simultaneity and reversibility of social roles over time, and the resulting heterogeneity that all of these in concert introduce into the structure and process of human lives make for an empirical phenomenon that is less than conducive to examination with many traditional statistical approaches. Against this backdrop, we propose in the following section a two-stage latent class model that allows us to examine the life course as a whole, to identify *configurations of social roles* over time and *life paths* that link these role configurations over the life course.

EXTENDING THE BASIC FOUNDATION—ROLE CONFIGURATIONS, LIFE PATHS, AND THE LATENT CLASS MODEL

Before elaborating the latent class model as a tool for understanding the life course as a whole, we first make explicit the conceptual foundation underlying this approach. Our theoretical foundation rests firmly on the trajectory and transition concepts described earlier. Yet, it focuses the lens more tightly on the life course as age-graded sets of role configurations and pathways through the changing nexus of these role configurations over the course of individual lives.

More precisely, we view individuals as being probabilistically distributed across various role configurations and life paths, partly insofar as others view and treat individuals differently in different interactions and insofar as individuals view themselves differently across those different interactions. To see this more concretely, let $i(t)$ for any one individual be a

vector denoting the observed role configurations at age t. For example, $i(t)$ could be a vector of 1's and 0's denoting the presence or absence, respectively, of some combination of roles for individual i at age t. More generally, $i(t)$ denotes a multidimensional matrix or cross-classification of a set of observed variables defining various states of some social roles at age t. In our example below, we focus on the presence or absence of schooling, work, family, and parental roles.

Next, let $m(t)$ denote the latent role configuration underlying the observed role configuration $i(t)$ at age t. Heuristically, $m(t)$, under a good fitting model (to be discussed below), can be thought of as the minimal intrinsic set of unobserved role configurations giving rise to the observed role configurations in $i(t)$. Finally let j denote the age-graded life path characterized by the probabilistic transitions through the latent and observed role configurations.

With this theoretical framework, the life course is fully characterized by a set of joint probabilities, denoted here as $\pi_{i(1)\ldots i(T)m(1)\ldots m(T)j}$, describing an individual's chances, from ages $t = 1, \ldots, T$, of experiencing transitions through specified observed role configurations $i(1) \ldots i(T)$, latent role configurations $m(1) \ldots m(T)$, and latent life path j. Moreover, individuals observed in a specific role configuration at age t, as given by the vector $i(t)$, may be characterized by the probability of "being on" or "coming from" a specific (latent) life path, $\pi_{i(t)|j}$, or probabilistically "spread across" the diverse $j = 1, \ldots, J$ (latent) life paths.

These conditional probabilities are useful tools both in the description of the interconnectedness of life chances across "role domains" over various life paths in a specific society and historical era (e.g., how do types of schooling, work, marital, and parental roles interrelate over time in the predominant life path in a specific society). They also contribute to the prediction of subsequent role transitions for individuals (e.g., to dropping out of school or to unemployment). Moreover, researchers may assess the impact of the probability distributions of "being on" or "coming from" specific life paths on subsequent outcomes of interest (e.g., criminal or delinquent behavior, or various health-related episodes). Insofar that these probabilities accurately characterize varying life chances and life paths in a society, assessing the impact of these conditional probabilities on subsequent outcomes in individuals' lives constitutes no less than assessing the impact of the "life course" on such outcomes.

We describe these probabilities here, beginning with the standard latent class assumptions (see discussion in Clogg, 1995) linking the joint probability $\pi_{i(1)\ldots i(T)m(1)\ldots m(T)j}$ to the product of conditional probabilities of the observed role configurations given the latent role configurations and life paths. Using the above notation, the standard conditional independence assumption allows us to equate

$$\pi_{i(1)\ldots i(T)m(1)\ldots m(T)j} = \pi_{i(1)|m(1)\ldots m(T)j} \cdots \pi_{i(T)|m(1)\ldots m(T)j}\pi_{m(1)\ldots m(T)j} \tag{1}$$

Standard (full information) techniques to estimate the relevant probabilities and latent class model parameters in this case dictate that we obtain the entire transition matrix for the observed role configurations over the T ages. This presents one of the most daunting empirical issues confronting any attempt to understand the life course in this manner due to exceedingly sparse data in the cross-classification of observed role configurations over time. Consider, for example, a relatively coarse coding scheme in which we have four role variables—a dichotomy for schooling (in school or out of school), a trichotomy for work (full time employed, part time employed, not employed), trichotomy for marital status (never married, married, separated/divorced/widowed), and a dichotomy for having or not having children. At any one age, their cross-classification gives $2 \times 3 \times 3 \times 2 = 36$ cells. Now consider the transition matrix cross-classifying this role configuration matrix across five time periods/ages.

This cross-classification forming the observed transition matrix has over 60 million cells ($36^5 = 60{,}466{,}176$). To obtain an average of five cases per cell, so that one may reasonably assume that the large sample properties hold for the standard estimators of parameters for most models of contingency tables (e.g., loglinear, logit, and related models), a sample size of over 300 million ($5 \times 36^5 = 5 \times 60{,}466{,}176 = 302{,}330{,}880$) is necessary. Clearly, there is no sample currently known to the social science community that can reasonably be used in this context. Nor is it likely that a data set of this size will exist in the near future.

To solve this problem we consider some additional assumptions, to supplement those of the standard latent class model, that effectively restrict the observed role configurations and latent life paths to interact only through the latent role configurations. This appears as a reasonable restriction given that the latent role configurations under a good fitting latent class model contain all of the sample information regarding the association among the observed role configurations (Clogg, 1995). That is to say, the latent role configurations are sufficient, from a statistical and informational standpoint, to understand the associations among the observed role configurations. These additional assumptions, which we elaborate in Appendix A, that lead to this restriction allow for a two-stage estimation of the probabilities in Equation (1), alleviating the need to construct the entire observed role configuration transition matrix. Thus, by allowing for a reasonable restriction, we are thus able to solve an otherwise intractable problem.

Incorporating the assumptions from Appendix A into Equation 1, we obtain

$$\begin{aligned} \pi_{i(1)\ldots i(T)m(1)\ldots m(T)j} &= \pi_{i(1)|m(1)} \cdots \pi_{i(T)|m(T)} \pi_{m(1)|j} \cdots \pi_{m(T)|j} \pi_j \\ &= [\pi_{i(1)_1|m(1)} \cdots \pi_{i(1)_k|m(1)}] \ldots [\pi_{i(T)_1|m(T)} \cdots \pi_{i(T)_k|m(T)}] \pi_{m(1)|j} \cdots \pi_{m(T)|j} \pi_j \end{aligned} \tag{2}$$

Equation (2) reveals the core set of probabilities to be obtained in the estimation and calculation of the latent life path probabilities and the conditional probabilities discussed above. Equation (2) also reveals the separability of the probabilities that allows for the two-stage estimation procedure. As each set of $[\pi_{i(t)_1|m(t)} \cdots \pi_{i(t)_k|m(t)}]$ can be separated from one another, as well as from the $\pi_{m(1)|j} \cdots \pi_{m(T)|j} \pi_j$, estimation of the model parameters may be broken down into two steps. First, we obtain maximum likelihood estimates for each set of $\lfloor \pi_{i(t)_1|m(t)} \cdots \pi_{i(t)_k|m(t)} \rfloor$ parameters by constructing the observed role configuration cross-classification at each age t and estimating the usual latent class model on each cross-classification. At this stage, full maximum likelihood estimates for each set of parameters $\lfloor \pi_{i(t)1|m(t)} \cdots \pi_{i(t)k|m(t)} \rfloor$ are obtained. With sufficient sample sizes, the estimates, say $\lfloor \hat{\pi}_{i(t)_1|m(t)} \cdots \hat{\pi}_{i(t)_k|m(t)} \rfloor$, will have the usual properties associated with maximum likelihood estimators—they will be consistent, asymptotically unbiased, and efficient.

To obtain estimates for the set of $\pi_{m(1)|j} \cdots \pi_{m(T)|j} \pi_j$ parameters, the second stage uses multiple random draws from a uniform distribution for each sample case to distribute a case across each of the $m(t)$ latent classes based on the estimated conditional probabilities $\hat{\pi}_{m(t)|i(t)}$ obtained at the first stage. We then estimate the usual latent class model on the realizations of the latent transition table obtained from that distribution of cases. (See Clogg, 1995 for discussion related to using multiple random draws on some distribution as a method for assigning cases to latent classes.)

Given the assumptions discussed in Appendix A and described above, as the multiple random draws tend toward infinity, estimates for the $\pi_{m(1)|j} \cdots \pi_{m(T)|j} \pi_j$ at the second stage using typical ML algorithms will upon convergence be *conditional* maximum likelihood estimators, conditional on the estimates obtained at the first stage. These conditional ML estimators will be consistent, asymptotically unbiased, and efficient in the local likelihood

area defined by the (global) ML estimates obtained in the first stage. These conditional estimators are more desirable, in that their asymptotic properties are more likely to hold and they will have less sampling variability, than their full maximum likelihood counterparts obtained from the complete, but considerably sparse, transition matrix of the full set of observed role configurations.

Estimation of this two-stage latent class model yields a number of parameters that have substantive importance in modeling the life course. At the outset, goodness-of-fit may be assessed separately for the latent role configuration models at each age t and the latent life path models. Statistics for the independence (one class) model assess whether there are significant associations between roles in the context of latent role configurations or between role configurations over time in the case of latent life paths. Goodness-of-fit statistics also provide guidance on the number of classes that are necessary to characterize the latent structure of role configurations at each age t and of life paths. These indicate the extent of heterogeneity in role configurations at a given point in time or life paths over time.

As with all latent class models, conditional probabilities of manifest variables given latent classes may be obtained. These define the nature of the different classes of latent role configurations and/or latent life paths. For the former, these describe the conditional probability of each of the various roles given a particular latent class of role configurations. For the latter, these describe the conditional probability of a particular latent role configuration given a particular class of latent life path.

Latent class probabilities are useful in substantively interpreting the nature of the life course. These indicate the probabilistic distribution of cases across the latent classes or the likelihood that any random individual would be characterized by a given latent class. Some classes may have high probabilities; others may have low probabilities. Latent class probabilities indicate the expected distribution of cases across role configurations or life paths. Thus, they indicate typical and atypical patterning of roles or pathways between roles over the life course.

Similarly, latent life path probabilities indicate the degree to which a specific life path is prominent in a society. Aside from using the goodness-of-fit statistics to assess the number of latent life paths in a society, these probabilities indicate the propensity for individuals in a society to adhere to a specific type of life path, as characterized by the interrelated role configuration pathways. Importantly, these probabilities help to answer the questions of whether a given path is normative (in a modal sense), whether there is a modal/normative path at all (a modal/normative path would not exist if all paths were about as equally likely to occur in the population), and whether there are rare non-normative or what may be considered deviant pathways.

Finally, another quantity of interest is the probability of observing a specific role, say k, at some age t given latent life path j. This probability, denoted here as $\pi_{i(t)_k|j}$, may be calculated from the basic model probabilities found in Equation (2),

$$\pi_{i(t)_k|j} = \sum_{m(t)} \pi_{i(t)_k|m(t)} \pi_{m(t)|j} \tag{3}$$

Calculating the probabilities in Equation (3) for each role and each latent life path, and combining these over time either graphically or in tabular form, produces over-time changes in the probabilities of each role within given life paths. These show the temporal unfolding of multiple roles and the explicit conjoining of trajectories of different social roles that characterize a specific latent life path in a specific society at a specific historical era. Furthermore,

examination of expected probabilities provides evidence of the probability of occurrence, probabilistic order, and probabilistic timing of various social roles over time. Variation in such probabilities across life paths indicates heterogeneity in life paths. Thus, they directly demonstrate the variable nature of the life course and reveal the temporal process by which lives unfold over time.

MODELING THE LIFE COURSE: AN EMPIRICAL EXAMPLE

To provide an example of the usefulness of our approach, we use data from the National Longitudinal Survey of Youth, 1979 (NLSY79). These data were collected from a nationally representative sample of 12,686 young men and women who were 14 to 22 years old when they were first surveyed in 1979. Individuals were surveyed annually through 1994 and then on a biennial basis. A key strength of the NLSY79 data is its excellent sample retention. Retention rates for those considered eligible for interview have remained close to 90%, including the specific period in which we study (U.S. Department of Labor, 2000). The longitudinal structure of the data allows us to model the life course over an extended period of time.

In keeping with Elder's (1985) definition of the life course as the age-graded movement through social institutions over time, we focus on education, work, marriage, and parenthood. These constitute the major institutions in Western societies; alone and in concert they are seen as the key markers in the transition to adulthood (Booth, Crouter & Shanahan, 1999; Shanahan, 2000). We define school involvement simply as whether respondents reported being *in school* at the time of the interview. We define work as either being *unemployed*, being employed *part-time* (less than 35 hours per week), and being employed *full-time* (35 hours or more per week). We differentiate marital status in terms of being *single* (never married), being *married*, or being *separated, divorced, or widowed* at the time of each interview. Finally, we define parenthood in terms of whether each respondent had ever *had children* at any point prior to each interview.

While more complex operationalizations are possible, these are well-suited to our interest in modeling interlocked pathways of social roles over time. For all of these states, we examine their joint occurrence at discrete four-year intervals. With this strategy, we assess the degree to which each role is achieved by a specific age. (We also examine whether roles appear and disappear within each time interval as a check against our delineation of the interconnected paths that make up the modern life course.) Specific choice of interval should be made on both theoretical and empirical grounds. Our interest in broadly mapping the life course over an extended period of time and the inherent limitations of sparseness in large N-way tables requires a broad time span while maintaining a reasonable number of time points. With the NLSY79 data, a 4-year interval allows us to effectively model the life course over 16 years, from late adolescence to mid-adulthood. This time period characterizes almost the entire longitudinal series of these data. Researchers with other objectives would choose either shorter or longer time frames. We discuss this issue further in a later section of this chapter.

Our analytic sample consists of respondents who were 15 or 16 years of age during the 1980 data collection. With this group, we can examine movement from adolescence through adulthood. We increase our sample size and statistical power by focusing on two adjacent birth cohorts. This increases our ability to consider greater heterogeneity in the structure of the life course. At the same time, these cohorts are closely related in historical time and are thus unlikely to have experienced unique cohort or period effects that could also impact upon

the structure of the life course (Alwin *this volume*; Elder 1998; Glenn *this volume*). As our analysis is largely for descriptive purposes, we do not differentiate by gender, race, or class, although each of these may structure the life course in important ways. Our sample consists of 2,152 respondents.

Latent Role Configuration Results

We begin by examining goodness of fit statistics for the first stage analysis of latent role configurations. Table 24-1 shows five panels and includes the likelihood ratio chi-square statistic (L^2), degrees of freedom (*df*), the index of dissimilarity (D), and Raftery's (1995) Bayesian Information Criterion (BIC). Each panel corresponds to a specific age, beginning with ages 15 and 16 (the 1980 wave of data collection) and concluding with ages 31–32 (the 1996 wave of data collection). In each panel, four models are compared. This includes a null (one-class) model, a two-class model, a three-class model, and a four-class model. These models indicate the number of classes of latent role configurations that effectively characterize the sample at each age. As these models are not hierarchical, model selection is based on overall goodness of fit.

The one-class null model, if it were to fit the data well, would indicate that the observed social roles were independent of one another. Deviations away from a good fit, for this null model, indicate the degree to which the various social roles have significant associations among themselves. At no stage of the life course does the null model even approach a good fit. In each case, the ratio of L^2 to degrees of freedom is over ten indicating very poor fit. Hence, the important life course principle that social roles cohere in significant ways over the life span is borne out in these data.

Table 24-1. Goodness of Fit Statistics for Latent Role Configurations

Ages	Latent classes	L^2	df	D	BIC
15–16	I	444.59	35	—	—
	II	**50.33**	**23**	**0.0180**	**−126.17**
	III	37.08	18	0.0150	−101.05
	IV	13.45	15	0.0030	−101.67
19–20	I	1033.09	35	—	—
	II	281.79	23	0.1200	105.28
	III	**26.56**	**16**	**0.0280**	**−96.22**
	IV	11.50	9	0.0110	−57.56
23–24	I	443.47	35	—	—
	II	**83.39**	**22**	**0.0600**	**−82.44**
	III	67.40	15	0.0420	**245.66**
	IV	38.18	9	0.0340	−29.66
27–28	I	421.84	35	—	—
	II	**69.46**	**22**	**0.0610**	**−96.37**
	III	41.58	16	0.0280	−79.02
	IV	30.11	10	0.0220	−45.27
31–32	I	352.36	35	—	—
	II	91.99	22	0.0610	−73.83
	III	**28.09**	**15**	**0.0240**	**−84.98**
	IV	13.58	9	0.0180	−54.26

Beyond this starting point, the number of classes that effectively summarize the interconnections between social roles varies by stage of the life cycle. During adolescence, a two-class model provides a good fit to the data. This model has a L^2 to degrees of freedom ratio that is just over two, an index of dissimilarity of 0.018, and the lowest BIC value of −126.172. The more complex three- and four-class models provide only minimal improvement in fit when compared to the two-class model.

In late adolescence (ages 19–20), a three-class model effectively summarizes the associations between school, work, marriage, and parenthood. This model has a L^2 to degrees of freedom of less than two, an index of dissimilarity of 0.028 and a BIC of −96.223. At ages 23–24, we opt for a two-class model on the grounds that the L^2 to degrees of freedom ratio is less than four, the index of dissimilarity is less than 0.10 (0.060), and this model has the lowest BIC (−82.436). The more complex three- and four-class models do not improve on the L^2 to degrees of freedom ratio, show some small improvement in the index of dissimilarity, yet show poorer fit on the BIC statistic. During the late 20s, a two-class model again effectively summarizes the association between roles. This model has a L^2 to degrees of freedom ratio that is just over three, an index of dissimilarity of 0.061 and a BIC of −96.365. More complex models show minimal improvement in the L^2 to degrees of freedom ratio, some marginal improvement in the index of dissimilarity, yet generally smaller BIC statistics. There is clear support for a three-class model in the early 30s (L^2/df = 1.87, Δ = 0.024, BIC = −84.976). At this age, the four-class model does not improve fit along any dimension.

Substantively, the number of classes in the preferred models indicates variation in latent role configurations at each age. Understanding the qualitative aspects of these latent role configurations requires examination of the conditional and latent class probabilities. These are shown in Table 24-2. Beginning in adolescence (ages 15–16), there are two distinct latent role configurations. In the first, individuals have a very high probability of being in school (0.9746), high probabilities of not working (0.6213) or if working, working part-time (0.3467) rather than full time (0.0320). They have virtually no probability of marriage (0.0014) or post-marriage roles of being separated, divorced, or widowed (0.0000), and a very low probability of having children (0.0117). This role configuration has a very high likelihood (0.8908) suggesting that 89% of the sampled population can be characterized by this role configuration. Substantively, this role configuration indicates the primacy of the student role, the secondary prevalence of the part-time work role, and very little adoption of familial roles.

In contrast, the second latent role configuration indicates respondents with comparatively low probabilities of being in school (0.1261) and a moderate probability of being employed full-time (0.3050). There is a higher but still relatively low probability of being married (0.1629), and a moderate probability of having children (0.2156). This latent role configuration has a latent class probability of 0.1092 indicating that just over 10% of the sampled population would conform to this pattern of social roles. The apparently early exit from school, combined with elevated risk of early entry into full-time work, marriage, and parenthood at such an early age may suggest that this latent role configuration captures "precocious" transitions (Newcomb & Bentler, 1988) that some suggest are associated with increased involvement in deviance and diminished life chances in later life. At the same time, this group lacks significant probabilities in *any* of the social roles and hence appears "roleless" and adrift from the major institutions in society. Studies of straight and deviant pathways through life (Robins & Rutter, 1990) might focus on the later patterning of social roles that would appear to stem from this early, somewhat deviant configuration.

There is more variability in latent role configurations in later adolescence (ages 19–20) as indicated by the best fitting three-class model. The first class describes individuals who

TABLE 24-2. Conditional Probabilities for Latent Role Configurations

		Ages 15–16		Ages 19–20			Ages 23–24		Ages 27–28		Ages 31–32		
Latent class		I	II	I	II	III	I	II	I	II	I	II	III
Role													
School	No	0.0254	0.8739	0.1615	0.9257	0.9696	0.9071	0.9593	0.9148	0.9620	0.9177	0.9597	0.9446
	Yes	0.9746	0.1261	0.8385	0.0743	0.0304	0.0929	0.0407	0.0852	0.0380	0.0823	0.0403	0.0554
Work	None	0.6213	0.6378	0.5011	0.3209	0.5662	0.1749	0.3618	0.1754	0.3508	0.2039	0.4042	0.0228
	Part-time	0.3467	0.0571	0.4510	0.0739	0.1063	0.0702	0.0936	0.0680	0.0666	0.1642	0.1744	0.1174
	Full-time	0.0320	0.3050	0.0480	0.6051	0.3275	0.7550	0.5445	0.7567	0.5826	0.6319	0.4214	0.8598
Marital Status	Single	0.9886	0.8243	0.9894	0.8356	0.4692	0.6448	0.2701	0.5669	0.1930	0.7280	0.2283	0.0004
	Married	0.0014	0.1629	0.0106	0.1468	0.4480	0.3041	0.5620	0.3570	0.6245	0.1775	0.5910	0.8152
	Other	0.0000	0.0128	0.0000	0.0176	0.0828	0.0511	0.1679	0.0761	0.1826	0.0945	0.1806	0.1844
Children	No	0.9883	0.7844	0.9648	0.9962	0.1419	0.9808	0.0359	0.9789	0.0021	0.9619	0.0249	0.1970
	Yes	0.0117	0.2156	0.0352	0.0038	0.8581	0.0192	0.9641	0.0211	0.9979	0.0381	0.9751	0.8030
Latent Class Probabilities		0.8908	0.1092	0.2800	0.4513	0.2687	0.5163	0.4837	0.3688	0.6312	0.1990	0.4967	0.3044

maintain high involvement in education (0.8385). This is coupled with little adoption of full-time work (0.0480), moderate involvement in part-time work (0.4510), and a likelihood of not being employed in any capacity that is quite large (0.5011). At the same time, the probability of any family role is very low (0.0106 and 0.0352 for marriage and parenthood, respectively). This suggests a life stage characterized by extended involvement in education, likely higher education, limited involvement in work, and the absence of family formation. This role configuration characterizes just over a quarter (0.280) of the sampled population.

A second role configuration involves comparatively little involvement in school (0.0743) and a much greater likelihood of full time work (0.6051). This is coupled with a low likelihood of marriage (0.1468) and a very low likelihood of parenthood (0.0038). This pattern of roles has the highest probability of occurrence (0.4513). Just over 45% of the sampled population could be characterized by this role configuration. The third class has the lowest likelihood of being in school (0.0304), bifurcated involvement in work (a likelihood of 0.5662 of not working and a likelihood of 0.3275 of working full-time), moderate likelihood of marriage (0.4480), and a high probability of having children (0.8581). The likelihood of this role configuration is similar to that of the first latent class (0.2687) with just over a quarter of the sampled population being characterized by this pattern of roles.

At ages 23–24, variability is lower. Two latent role configurations effectively characterize the latent structure of the life course. The first role configuration involves a low probability of school (0.0929), a high likelihood of full-time work (0.7550), yet only a moderate probability of marriage (0.3041) and a very low probability of parenthood (0.0192). This role configuration can be seen to characterize just over half (0.5163) of the sampled population.

The second latent class has an even lower likelihood of being in school (0.0380), a lower likelihood of full-time work (0.5445) and greater likelihood of not working at all (0.3618). It also has a greater likelihood of marriage (0.562), marital disruption (0.1679), and an almost certainty of having children (0.9641). This patterning of roles has a probability of 0.4837 and characterizes individuals whose life course involves a greater primacy of family, rather than work, roles.

During the late 20s, the similarity of the first class with the first latent role configuration 4 years earlier is remarkable. This class has a low probability of being in school (0.0852), an almost identical likelihood of full-time work (0.7567), a small increase in the likelihood of marriage (0.3570), yet an almost identical likelihood of parenthood (0.0211). However, the likelihood of this role configuration is markedly lower. The probability of this patterning is 0.3688 (as opposed to 0.5163), suggesting that just over one third of the sampled population would be characterized by this role configuration.

The second latent class at ages 27 and 28 is also remarkably similar to that observed 4 years earlier. Compared to the other latent class at this age, this second class has a comparatively lower likelihood of being in school (0.0380), lower likelihood of full-time work (0.5826) yet greater likelihood of not working (0.3508). This is coupled with a high probability of marriage (0.6245) or the post marriage roles of being separated, divorced, or widowed (0.1826), and an almost certainty of having children (0.9979). This latent role configuration is likely to characterize almost two thirds of the sampled population (0.6312). While latent role configurations may change little between the early and late 20's, the distributions across roles configurations and thus the modal character of social roles changes significantly.

Variability in role configurations increases in the early 30's. This point in the life course requires three latent classes to adequately characterize social roles. The first class has a low probability of involvement in school (0.0823), a moderate to large probability of full-time work (0.6319), yet still little probability of marriage (0.1775) or parenthood (0.0381).

Comparatively, this latent role configuration is infrequent. Only 20% (0.1990) of the sampled population are likely to have this pattern of roles in their early 30's.

The second class has even less likelihood of schooling (0.0403) and less likelihood of full-time work (0.4214). The probability of part-time work is similar, yet the likelihood of not working at all is almost double (0.4042). Such differences are, however, minor compared to those with respect to family roles. The likelihood of marriage is over three times greater (0.5910) and the likelihood of having been married is almost twice as great (0.1806). Even more dramatic, this class has an extremely high probability of having children (0.9751), substantially greater than that of either marriage or full-time work. Interestingly, this role configuration is likely to characterize almost half (0.4967) of the sampled population at this age. Family roles appear to be the defining dimension of this latent class.

The final aspect of the latent structure of social roles in the early 30s involves an equally low probability of being in school (0.0554), yet much greater likelihood of full-time work (0.8598) and virtually no likelihood of not working (0.0228). This is coupled with a high probability of being married (0.8152) or having been married (0.1844) and a high likelihood of having children (0.803). In concert, this role configuration characterizes the joint managing of work and family and characterizes almost one third of the sampled population (0.3044).

Before considering latent life paths and the derivative interlocking of role pathways over time, it is worth noting two things. First, this analysis considers the simultaneous or joint occurrence of multiple social roles at given points in the life cycle. This is significant as much research has been premised on the notion of a primary or dominant role (see discussions in Hogan, 1978 and Rindfuss et al., 1987). Our analysis suggests that it is difficult to identify a priori a primary or dominant role without explicit consideration of other roles. At various ages, latent role configurations indicate equal probabilities of different roles. In this respect, our approach is consistent with understanding phenomena in terms of the conjoint occurrence or non-occurrence of multiple roles in time.

Second, role variability over the life cycle is significant. As indicated by the number of latent classes, role configurations are more complex immediately following adolescence and during the early 30s. One explanation for this may be that a "normative" life course (Neugarten et al., 1965) provides options, choices and role conflicts at discrete ages. In the case of late adolescence, individuals in the late 20th century were faced with the discrete choice between continued education or entry into the labor force or family roles. These opportunities produce variability in role configurations given individuals who opt for different roles and thus made specific transitions from one role into another. This variability effectively disappears during the mid-to late 20s as most respondents have finished their schooling (most higher education degrees would be completed by ages 23 or 24 or at least be in some form of terminal phase). Role choices and role variability at this stage of the life course are thus constrained to work and family with little change in latent structure through the mid-to late 20s.

Increased variability in the early 30s suggests a somewhat different process. It suggests the variable ways in which individuals both adopt and *manage* multiple, jointly occurring roles. For one group, work and family remain detached; individuals have high likelihood of full-time work but low likelihood of any family role. This is distinct from a second group that shows significant involvement in family roles, yet comparatively less involvement in full-time work. Both these groups differ from a third group that combines full-time work, marriage, and parenthood. Thus, variation emerges not so much through discrete life course options but more through the strategies and practices by which individuals manage the overlap of existing roles. The identification of this variation and its meaning suggests the importance of greater systematic inquiry into this period of the life course, mid-life.

Latent Life Path Results

The identification of latent role configurations at successive stages provides the empirical backdrop for illumination of the dynamic structure of the life course. This is accomplished through the second stage latent class analysis that links latent role configurations over time. Inspection of goodness of fit statistics (see Table 24-3) indicates that the null model provides a very poor fit to the data ($L^2 = 2978.08$, 71 *df*). Latent role configurations thus have significant associations over time. The likelihood of a latent role configuration at one point of the life cycle is associated with a significantly greater or lower likelihood of having particular role configurations at other points in the life course. At the same time, there is very strong support for a three-class model, indicating three distinct "paths" through the school, work, marriage, and parenthood. This is demonstrated by a low ratio of the likelihood chi-square statistics to degrees of freedom (less than 1), an index of dissimilarity of 0.0402, and the lowest BIC of −330.3654. This model clearly provides a better fit to the data than a two-class model and a four-class model does not substantially improve on model fit.

The conditional probabilities associated with these latent life paths are shown in Table 24-4. Conditional probabilities within latent life paths indicate transition from and to latent role configurations. If latent role configurations were identical at each age, these conditional probabilities would indicate the specific likelihood of the transition or movement

Table 24-3. Goodness of Fit Statistics for Latent Life Paths

Latent classes	L2	df	D	BIC
I	2978.08	71	—	—
II	396.06	56	0.1388	−33.69
III	**37.99**	**49**	**0.0402**	**−330.37**
IV	30.33	41	0.0319	−284.31

Table 24-4. Conditional Probabilities for Latent Life Paths

		Latent life path		
Ages	Latent role configuration	I	II	III
15–16	**I**	0.9562	0.9325	0.7796
	II	0.0438	0.0675	0.2204
19–20	**I**	0.4348	0.3738	0.0129
	II	0.5290	0.5781	0.2666
	III	0.0362	0.0482	0.7205
23–24	**I**	0.9896	0.5350	0.0064
	II	0.0104	0.4650	0.9936
27–28	**I**	0.9971	0.0275	0.0116
	II	0.0029	0.9725	0.9884
31–32	**I**	0.5378	0.0077	0.0132
	II	0.1950	0.6342	0.7050
	III	0.2672	0.3580	0.2818
Latent class probabilities		0.3446	0.3262	0.3291

from and to stationary role configurations. Here, however, interpretation of these probabilities is complicated by the variable content of the latent role configurations at each age. For example, latent life path I indicates individuals who have a very high likelihood of being in latent role configuration I during adolescence (0.9562). This is followed by a high likelihood of transitioning to either latent role configuration I (0.4348) or latent role configuration II (0.5290) in late adolescence but an extremely low likelihood of transitioning to latent role configuration III (0.0362). In both the mid- and the late 20s, such individuals are very likely to have latent role configuration I (0.9896 and 0.9971) but are very unlikely to have latent role configuration II (0.0104 and 0.0029). In the early 30s, these individuals become more diversified across latent role configurations. They have the greatest likelihood of having latent role configuration I (0.5378), but also moderate probabilities of having latent role configuration II (0.1950) or latent role configuration III (0.2672). Other latent life paths indicate different patterns of latent role configurations over time and all are approximately equal in likelihood.

To render these conditional probabilities more meaningful we calculate expected role probabilities given (or within) each latent life path. As described earlier in Equation (3), these are calculated by multiplying the conditional probability of a latent role configuration within a latent life path (Table 24-4) by the conditional probability of a particular role within a latent role configuration (Table 24-2) and then summing over latent role configurations at each age. These conditional probabilities are then graphed at each age in order to describe the variable structure of the life course as indicated by the latent life paths. This is shown in Figure 24-1.

Latent life path I begins with very high involvement in school in adolescence that extends into adulthood (0.94 to 0.4). This is likely indicative of movement into higher education. The effective transition out of school between the ages of 19–20 and 23–24 (0.09) is accompanied by movement out of part-time work (from 0.24 to 0.07) and significant movement into full-time work (from 0.35 to 0.75). In many respects, this pattern describes classic conceptions of the school-to-work transition: the rapid acquisition of work following the completion of full-time schooling. Family roles in this life path effectively "lag" those of work. The probability of marriage is virtually zero in adolescence, shows only a small increase in the late teens and early 20s (from 0.01 to 0.10), but then increases steadily through the 20s and early 30s (from 0.1 to 0.3 to 0.35 to 0.4). Importantly, the likelihood of marriage occurs at a much lower rate than that of work indicating that individuals are effectively moving into full-time work *before* they move into marriage. Equally important, the probability of parenthood lags that of full-time work and marriage. The likelihood of having children is effectively zero up until ages 27–28 and then increases sharply through the early 30s (from less than 0.05 to 0.41). Life path I characterizes individuals who have children *after* moving into full-time work and getting married. This life path characterizes about one third of the sampled population, and has a structure similar to classic notions of the normative (Neugarten et al. 1965) or orderly (Hogan 1978) life course.

Latent life path II also involves high (0.92) involvement in school during adolescence that extends through the early 20s (0.36). This is coupled with steady movement out of part-time work (from 0.33 to 0.22 to 0.08) and steady movement into full-time work (from 0.05 to 0.38 to 0.66) by ages 23–24. This pattern of transitions is accompanied by the acquisition of family roles, particularly parenthood, during the early 20s. The probability of parenthood is very low (less than 0.10) up until ages 19–20, but then increases sharply through the mid-to late 20s. By ages 27–28, the likelihood of having children is almost 1.0. The likelihood of marriage follows a similar trajectory, but at a lower rate (from 0.2 at ages 23–24 to 0.60 at ages 27–28). Both rates appear to plateau between the late 20s and early 30s. It is further significant that the probability of parenthood passes that of full-time work as the latter plateaus

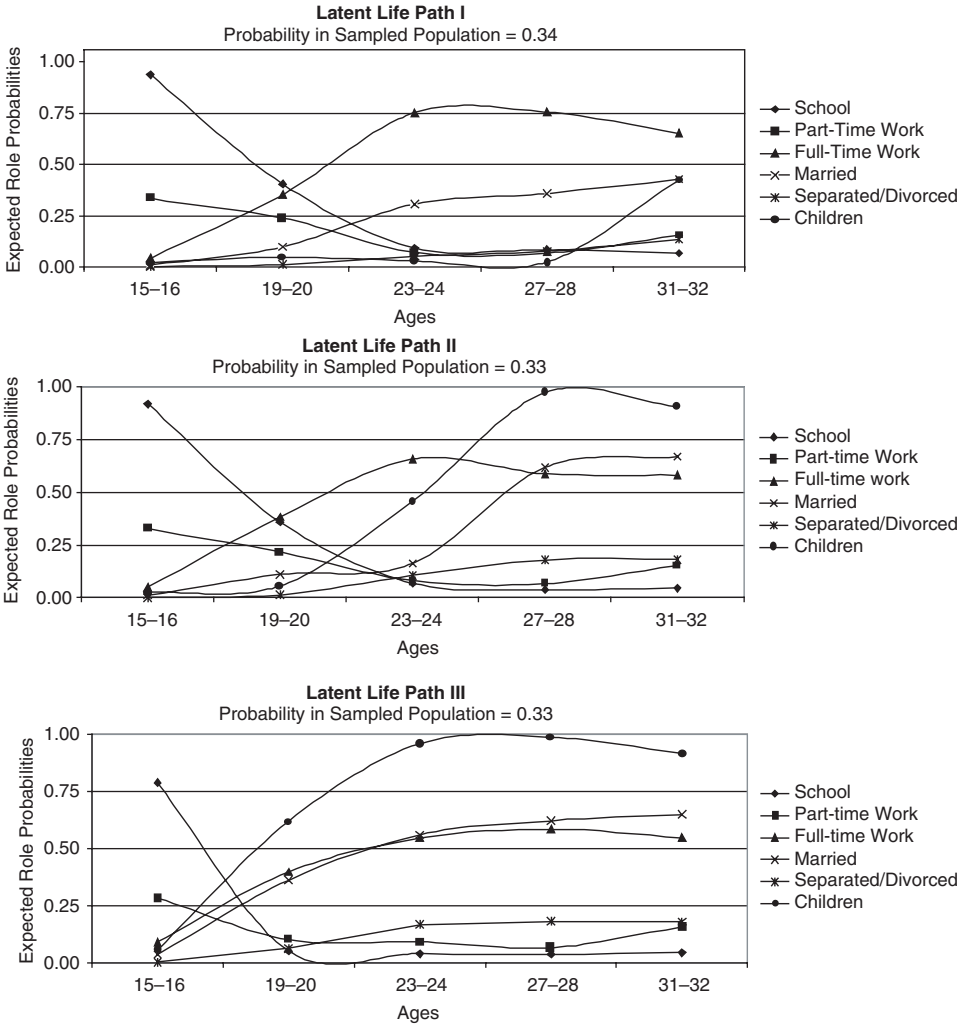

FIGURE 24-1. Expected role probabilities for each latent life path.

or even declines at a level below that observed for latent life path I. The likelihood of marital disruption increases steadily during the 20s and remains at a moderate level (0.20) through the early 30s. This life path characterizes the classic "work–family" linkage and the ensuing adjustment and accommodation of the multiple, overlapping involvement in work and family. It can be seen to typify about one third of the sampled population.

The final latent life path is distinct along all dimensions. Individuals characterized by this life path have comparatively less involvement in school in adolescence (0.78) and rapidly move out of school. By ages 19–20, their probability of being in school is extremely low (less than 0.05), indicating very little involvement in higher education. Movement out of school is much quicker when compared to the education trajectories of the other life paths. Importantly, the rapid movement out of school is accompanied by a rapid onset of parenthood. Between ages 15–16 and ages 23–24, the probability of parenthood increases from 0.06 to 0.96. In relation to other life paths, parenthood comes much earlier in the life course for this life path. The

likelihood of full-time work and marriage appear to trend with parenthood, although at much lower levels. The likelihood of marriage increases from mid-adolescence to ages 19–20 (from 0.04 to 0.36), before plateauing (0.6) in the mid-20s and early 30s. Marriage thus appears much earlier in this life path. The likelihood of full-time work shows a similar trajectory, but has levels that are considerably lower (approximately 0.55 through the 20s and early 30s) than those observed in the other life paths. Finally, the likelihood of marital disruption increases steadily in this life path. This life path appears to characterize those individuals who make the transition to adulthood largely in the context of parenthood not necessarily accompanied by either marriage or full-time work. As with the other two latent life paths, this life path characterizes about one third of the sampled population.

Generally, the latent life paths as shown in Figure 24-1 provide an over-time snapshot of the interplay of probabilistic pathways of social roles that characterize the life course.* They simultaneously describe the timing of social roles, their probabilistic ordering, and the general diversity that exists in the structure of the life course. Importantly with respect to that diversity, for our nationally representative sample there appears to be no true normative life path in the modal sense. That is, each latent life path is characteristic of about one third of the sampled population, indicating maximal diversity probabilistically across these three latent life paths. Moreover, the general fact that there is considerable, yet probabilistically structured, variability in pathways through life indicates an opportunity to integrate holistic, multifaceted depictions of the life course within existing theoretical and empirical work.

FURTHER APPLICATIONS

Our example illuminates the potential of a two stage latent class approach, to delineate the interplay of pathways, the probabilistic timing and order of social roles, and heterogeneity in the life course. Yet, this example has only scratched the surface of the utility of such models to key theoretical questions in life course research. In this section, we discuss further applications for the latent class model of role configurations and life paths in studying the life course.

At the outset, a latent role configuration and life path approach could be used to examine other periods of the life course. Our example showcases the method by considering a broad slice of the life course. Nonetheless, this approach is equally useful in considering specific, shorter segments of the life course. These could include particularly pivotal stages such as the transition to adulthood (Booth, Crouter & Shanahan, 1999), the much understudied period of mid-life where work, marital, and parenting roles undergo considerable fluctuation (Gerson, 1985), or the later years characterized by movement out of work (Han & Moen, 1999). At the other extreme, such models could examine even broader periods of the life course such as those considered in Clausen's (1991) seminal work.

Our example is also quite specific. It examines the movement into and out of key social roles, notably involvement in school, work, marriage, and parenthood. The probabilistic role configured life path theoretical foundation and accompanying two-stage latent class

*Note that the probability of full-time work appears to decline in the last time period in all latent life paths. This is very likely a result of changes to the CPS module in the NLS that were designed to mirror methodological changes in the CPS instrument that were implemented in 1994. Methodological assessments of CPS data indicate that the new instrument increased the likelihood of the classification of "part-time" work (Polivka & Miller, 1994). Consistent with this interpretation, trajectories of part-time work in our analysis show a concomitant increase in probability in the last time period, suggesting that some reclassification from full-time worker to part-time worker did occur.

empirical methods we advance in this chapter are sufficiently flexible that one could consider social roles in greater detail, focusing on such issues as types of work, qualitative dimensions of marriage, and various dimensions of parenting and how these change over time. One could also consider the life course at different levels. This may involve examining the intersection of psychological orientations at various ages and how they unfold in consort with entry into and exit out of social roles.

For example, Gerson (1985) showcases the importance of human agency in life course studies by demonstrating the variable ways in which "orientations" towards work and family both shape and are shaped by experiences within social roles. For some, orientations may produce role transitions, like the case of family orientations inducing parenthood rather than continued education or full-time work after high school. For others, experiences in social roles may change orientations which, in turn, may induce subsequent changes in social roles. Those who leave the labor force to become full-time parents, or vice versa, often manifest the influence of role experience on orientations. In the context of the latent life path model, one might include "orientations" as the subjective counterpart of objectively observed role configurations at different points in time, thus accounting for heterogeneity in orientation-role linkages. For some in the study population, orientations may lead roles and role transitions, for yet others orientations may lag roles and role transitions. Results from this type of orientation-role analysis have the potential to reveal important connections and complexities among agency and social roles in the life course. Moreover, such research would nicely augment existing work that links social psychology and life course studies (George, 1996) to understand the role of human agency in the shaping of lives over time (Elder, 1994).

At what may be considered the opposite extreme, the intersection of individual life courses and the institutional configurations and contexts within which life courses play out may be fruitfully researched from within a latent life path framework. This may involve the examination of unfolding lives over time in concert with dynamic institutional contexts. Recall that, from a latent life path perspective, individuals may be viewed as probabilistically distributed across various role configurations and life paths. Social institutions, on the other hand, may be characterized by configurations of rules and, over the life of some social institution, the different pathways through various rule configurations over time. Analysis of this role/rule nexus from a latent life path perspective, as detailed in Eliason, Macmillan, and Stryker (2002), should serve to bring in to focus those aspects of the life course that are strongly shaped by society's social institutions, as well as those aspects of social institutions shaped by the life course.

Extending investigation of the life course could also involve inquiry into the social and psychological determinants of latent life paths. Our method generates a latent "variable" indicative of an unfolding process. This latent variable could be studied as an outcome of personal and social characteristics in childhood and adulthood using conventional analytic approaches. Through latent class assignment of individual respondents, researchers could model the probability of one latent life path relative to another using conventional binary or multinomial regression approaches (Long, 1997). At the same time, conditional probabilities of latent class assignment given combinations on observed characteristics could be used to construct ratio level measures that would be suitable for conventional OLS regression. Several extensions of this sort seem particularly promising. Clausen (1991), for example, argues that "planful competence" in adolescence sets the stage for a more successful adult life, including greater career success, greater marital stability, and personality resemblance through late adulthood. Consistent with this, we would encourage inquiry into the effect of planful competence and other important psychological constructs (i.e., self-esteem, locus of control, self-efficacy, gender role orientations)

on the likelihood of particular life paths. Likewise, we would encourage research on social and behavioral determinants. Through the notions of "linked lives" (Elder, 1994), considerable research documents the role that others play in shaping life fortunes. Notions of "cumulative continuity" further suggest that early behaviors, both normative and deviant, can have profound effects on the structure of the life course (Caspi, Elder, & Herbener, 1990; Hagan, 1991; Sampson & Laub, 1993). A consideration of such factors in the context of multiple, interlocked pathways of social roles would enhance our understanding of the precursors of the variable ways in which individuals move into and through social institutions over the life course.

Implicit in both a life course perspective and the latent life path approach described in this chapter is the idea that the specific ways in which lives unfold over time is consequential for life chances. Elder's (1998) classic work on children of the Great Depression, for example, demonstrates how the timing of social roles was shaped by both personal and historical circumstances and how these were ultimately consequential for personal development. Likewise, research on "disorder" in the life course (Featherman & Carter, 1976; Hogan, 1978; Rindfuss et al., 1987) suggests that disorderly lives influence such things as income attainment, education, marital stability and the likelihood of parenthood. Against this backdrop, we see two roles for a latent life path perspective.

First, latent life paths can be seen as determinants of the qualitative aspects of social roles (i.e., occupational status, income attainment, marital satisfaction, child-rearing practices) or can be used as a determinant of psychological well-being and general life satisfaction (George, 1999). A latent life path approach could even be broadened to examine the intergenerational consequences of parental life courses for children's life courses, children's attainments, and children's well-being. Second, latent life paths could be seen as linking functions between social origins and destinations. The longitudinal links between early familial states and later life chances has occupied a central position in life course research. This approach informs studies of status attainment (Duncan, Featherman, & Duncan, 1972; Sewell & Hauser, 1974), marriage and divorce (Johnson & Booth, 1998), psychological well-being (Elder, George, & Shanahan, 1996), and crime and deviance (Sampson & Laub, 1993). Yet, researchers have seldom, if ever, studied explicit pathways through life as a mechanism that links origins and destinations. Likely due to methodological limitations, research has instead focused on specific variables (i.e., education in status attainment) or one or two role trajectories (i.e., the overlap of work and family roles). A consideration of life paths that indicate the interlocking of multiple role trajectories, their timing and order, would augment existing work by highlighting further contingencies in intergenerational and developmental processes.

The central aspect of most, if not all, previous applications is that they identify a priori one or more life courses or paths, and then proceed to examine their origins and consequences. Yet, a latent class approach is also amenable to direct comparison of latent structures across groups. This is done most easily by comparing models in which conditional probabilities are not constrained in any way with models in which some or all conditional probabilities are constrained to be equal. By doing so the analyst may directly and precisely examine any across-group differences in the (latent) structure of role configurations and/or life paths. Perhaps an obvious starting point for this type of research would be the assessment of latent role configurations and life paths across race, class, and/or gender, and the intersections among these. Explicit comparisons of life course structures across social groups would provide an important starting point for inquiry into the complex interplay of agency, structure, and culture in the shaping of life paths.

Elaborating further, latent life paths, their origins, and their consequences can be examined in light of broad historical contexts. Life course research explicitly attempts to account for

"lives in historical times" by understanding human development as a product of historical context and the opportunities and constraints that it provides (Elder, 1994). One line of research focuses on the implications of broad historical circumstances, including the post-war economic boom (Blau & Duncan 1967; Modell 1989) and more recently the slow down in the American economy during the 1980s and early 1990s (Conger & Elder 1994; Furstenberg et al., 1999). Other research considers the developmental consequences of specific historical events, including the Great Depression (Elder, 1998), World War II (Elder, 1987; Sampson & Laub, 1996), and more recently, the Vietnam War (Hagan, 2001). Modell (1999) has recently called for greater consideration of history in the study of the life course, while Glenn (*this volume*) notes the continued importance of age, period, and cohort for social scientific inquiry.

In light of this, a further application of our approach would consider the effects of historical circumstances on latent role configurations and life paths. This might involve several dimensions. First, an examination of latent role configurations and life paths across birth cohorts would serve to identify variation in the structure of the life course over time. Such work would augment existing inquiry into historical shifts in the order and timing of life course experiences (Hogan, 1978; Modell, Furstenberg, & Hershberg, 1976). Second, research could consider the implications of significant historical events on life paths. This would involve consideration of adjacent cohorts for whom the timing of birth or particular role exits differentially expose them to historical events (Elder, 1998). In addition to revisiting classic questions like the impact of the Great Depression or World War II, researchers could address contemporary questions such as the life course implications of the recessions of the 1980s and early 1990s. Third, research should consider the contextualizing effect of historical conditions, the degree to which they interact with personal and social attributes and behaviors to determine specific life paths and the degree to which life paths interact with history to shape their consequences. Such research would build upon the recent work of Shanahan and colleagues and their inquiry into historical contingencies in expressions and consequences of human agency (Shanahan, Elder, & Miech, 1997; Shanahan, Miech, & Elder 1998).

In addition to historical considerations, life course inquiry is increasingly situated within the context of globalization and involves cross-national research. The GLOBALIFE project at the University of Bielefeld, for example, seeks to study the influence of global processes in OECD societies on the transition to adulthood, changes in career mobility and forms of employment and unemployment, the development of gender-specific patterns in work-family linkages, and the transition from employment to retirement (http://alia.soziologie.uni-bielefeld.de/~globalife/summary.htm). Other research compares the transition to adulthood under different national contexts, highlighting the impact of institutional structures on life course fortunes (Heinz, 1991). An application of our approach could examine the overall structure of the life course or specific segments across nations. Such research would assess whether the structure of the life course was substantively consistent, whether it was consistent along some dimensions but not others, or whether the overall structure bears little similarity across institutional and national contexts. This work would be not only useful in describing cross-national variation in the life course but would also set the stage for research into the structural, cultural, and institutional features of nations that shape the modern life course. (See also our related comments above on linking the life course to institutional contexts over time.)

Finally, further research should consider the implications of specific life events, their timing and their order, for both the overall unfolding of the life course and its implications. This issue has been a central feature of traditional life course inquiry. Greenberger and Steinberg (1986), for example, argue that early movement into full-time (or at least high-intensity) work leads to a host of psychological and behavioral problems. Similarly, Furstenberg and colleagues

(1987) have devoted considerable attention to adolescent parenthood and its consequences for personal and social well-being. Using our approach, researchers could "fix" particular states at particular ages to consider the specific ways in which life paths unfold thereafter. In the context of the key research traditions indicated, this could involve specifying a life path to contain childbearing or full-time work in adolescence. One could further consider similarity and difference in the consequence of having a particular life course experience, such as early transition into full-time work or adolescent parenthood, across different social groups. As such work echoes broader concerns about the race, gender, and class contexts of human development, research in this vein would further illuminate the structural context of the life course.

CONCLUSIONS

Our purpose in this chapter is 2-fold. First, we highlight the need for further inquiry into the life course. For reasons that appear to center around the difficulty that many traditional empirical methods have in addressing the theoretical sophistication developed to understand the life course, the life course as a *multidimensional*, *dynamic* process has seldom been studied. The challenge this level of theoretical sophistication has posed for traditional empirical methods has had important consequences for life course research and our ability to examine the richness of the life course. In one respect, much of the empirical research that rests on traditional empirical techniques has had a difficult time addressing key questions arising from developments in life course theory. In part because of these difficulties, empirical research over the past couple of decades has not lived up to its promise, falling short of generating that rich and reliable body of knowledge on both precursors and consequences of the variable structure of the life course. By focusing more on the oft out-of-context individual components of the life course, and less so on the nexus of roles and pathways that make up the life course as an institutional whole, our cumulative understanding of the life course, its origins, and its consequences suffers. This need not be the case.

Hence, a second objective of this chapter was to propose a perspective and method for effectively modeling the life course *as an institutional whole*, to provide an illustration of its utility, and to elaborate its applicability to key questions arising from theories of the life course. Our formulation of a two-stage latent class approach is derived directly from, and thus consistent with, key concepts and theories buttressing our understanding of the life course. Specifically, the empirical model we present expands on the ideas of trajectories and transitions, conceptualizing the life course as probabilistically distributed life paths through age-graded role configurations. By comparing contemporary life course theory, contemporary research, and the approach offered in this chapter, we hope to indicate the important advantages of this approach for extending our knowledge of the life course.

It is important to also point out that we do not think our approach answers all life course questions. Its utility stems from its ability to capture and represent a multidimensional, time varying process. Hence, it shifts attention from explicit causes and effects between or among components of the life course to viewing the life course as a complex whole. Yet, it also has limitations. These include limitations on the volume of information it can handle (i.e., number of variables and number of periods), problems in modeling "turning points" due to a focus on summarizing a holistic time bound process, and traditional problems of unobserved heterogeneity that characterize most statistical approaches.

As a final comment, our approach may offer a means of synthesizing current research on the life course. George (*this volume*) differentiates life course research as studies of the life

course and studies that apply life course concepts (i.e., order, timing, linked lives) in other substantive areas of inquiry. She predicts that the former, while interesting, will not play a large role in the future of life course research. Such work, she argues, paints too broad a picture of life course contours and diversity, is not useful for fine grained analysis, is ill-suited to hypothesis testing and causal inference, and is often not generalizable. Instead, she suggests that the future of life course research will rest on the use of life course concepts in other areas of research. In many respects we agree with her critique. Yet, we see it as a challenge that motivates our work on the utility of latent class techniques for modeling the modern life course, and the accompanying probabilistically based theoretical view of the life course. From our perspective, neither informal, non-systematic studies of the life course nor the incorporation of specific, decontextualized elements of the life course into other areas of research yield a particularly strong life course social science. We hope that this chapter provides both a theoretical and empirical foundation for bridging these avenues of inquiry such that it incorporates the best of both areas and ultimately lives up to the important theoretical ideas of the architects of a life course perspective (Elder, 1994; Modell, 1989; Thomas & Znaniecki, 1927).

APPENDIX A. STATISTICAL ASSUMPTIONS UNDERLYING THE LATENT LIFE PATH MODEL

The two-stage estimation of the latent life path model described in the text requires the following additional statistical assumptions. See the text for a more substantive description of these assumptions.

Assumption 1. The observed role configurations at age t are conditionally independent of the observed role configurations at age t', given the joint distribution of the latent role configurations and latent life path over $t = 1, \ldots, T$; That is, $i(t) \otimes i(t') \mid [m(\mathrm{t}), j]$.

Assumption 1 states that the latent structure contains all of the information about the relationship in the transition table involving the observed role configurations. This is the typical conditional independence assumption for latent class models, but restated in the current context.

Assumption 2. The observed variables making up the cross-classification of observed role configurations at age t are conditionally independent given the latent role configuration at age t; $i(t)_k \otimes i\,(t)_{k'} \mid m\,(t)$ where k and k' index observed component variables k and k' of $i(t)$.

Assumption 2 states that the latent role configuration at age t contains all of the information about the relationship in the cross-classification of observed role configurations at age t. This too is very similar to the standard conditional independence assumption. However, in this case the assumption is specific to a subset containing only the information on role configurations at age t.

Assumption 3. The latent role configuration at age t, $m(t)$, is conditionally independent of the latent role configuration at age t', $m(t')$, given the latent life path j; $m(t) \otimes m(t') \mid j$.

Assumption 3 states that the latent life path contains all of the information about the relationship in the latent transition table. Again, this is similar to the standard conditional independence assumption. Here, however, this assumption is specific to the conditional

independence relation among the latent role configurations (as given in the corresponding [latent] transition table) given the latent life path.

Assumption 4. Conditional independence of (a) the joint distribution of latent role configuration at age t' and the latent life path and (b) the observed role configuration at age t given the latent role configuration at age t; $[m(t'), j] \otimes i(t) \mid m(t)$.

Assumption 4 states that the relationship between a latent role configuration at age t' and the latent life path is not influenced directly by the observed role configuration at age t, conditional on the latent role configuration at age t. This assumption is noticeably different from the standard conditional independence assumption. Essentially, this assumption restricts the observed role configuration at one point in time from having a direct impact on the relationship between the latent life path and the latent role configuration at some other point in time. We hasten to point out that this relationship at t' can indeed be influenced by the *latent* role configuration at t. And it is through this latent mechanism that the observed role configuration at t may then *indirectly* influence the relationship between a latent role configuration at age t' and the latent life path.

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