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**Working Paper**

## Is there only one way out of in-work poverty? Difference by gender and race in the US

WZB Discussion Paper, No. SP I 2019-601

**Provided in Cooperation with:**

WZB Berlin Social Science Center

*Suggested Citation:* Struffolino, Emanuela; Van Winkle, Zachary (2019) : Is there only one way out of in-work poverty? Difference by gender and race in the US, WZB Discussion Paper, No. SP I 2019-601, Wissenschaftszentrum Berlin für Sozialforschung (WZB), Berlin

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### **Discussion Paper**

SP I 2019–601

January 2019

Research Area

**Dynamics of Social Inequality**

Research Group

**Demography and Inequality**

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**Is there only one way out of in-work poverty? Difference by gender and race in the US**

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Wissenschaftszentrum Berlin für Sozialforschung (2019)

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## Abstract

### **Is there only one way out of in-work poverty? Difference by gender and race in the US**

by Emanuela Struffolino and Zachary Van Winkle

The persistency of in-work poverty during the last decades challenges the idea that employment is sufficient to escape poverty. Research has focused on the risk factors associated with in-work poverty, but scholars know little about individuals' experiences after exiting it. The Sequence Analysis Multistate Model procedure is applied to three high-quality longitudinal data sources (NLSY79, NLSY97, and PSID) to establish a typology of employment pathways out of in-work poverty and estimate how gender and race are associated with each pathway. We identify five distinct pathways characterized by varying degrees of labor market attachment, economic vulnerability, and volatility. White men are most likely exit in-work poverty into stable employment outside of poverty, while Black men and women likely remain vulnerable and at-risk of social exclusion as well as recurrent spells of in-work poverty. Gender and race differences persist even after controlling for labor market related characteristics and family demographic behavior.

**Keywords:** Gender, Race, In-Work Poverty, Sequence Analysis, Event History Analysis

## INTRODUCTION

Understanding how individuals successfully escape in-work poverty is central for stratification and life course research. The working poor, employed individuals who live in households with incomes below the poverty threshold<sup>1</sup>, represent a worrisome phenomenon that can engender social exclusion (Brady et al. 2010). However, individuals' experiences of in-work poverty vary considerably. For some individuals, working and being poor is a long-lasting condition, while for others in-work poverty is a short and sporadic event. Besides the duration of in-work poverty, some individuals experience multiple, recurring spells of in-work poverty. Similarly to poverty (Bane and Ellwood 1986; Duncan et al. 1993; Fouarge and Layte 2005; Stevens 1994), frequent in-work poverty can exacerbate social inequality between social groups that can have spill-over effects on other life domains. This is of special interest in the United States, where the primary segment of the labor market is difficult to access for women and individuals from minority groups. Not holding a stable and protected job not just inhibits chances for upward mobility, but also exposes these groups to a higher risk of in-work poverty. Most importantly, the intersection between gender and race has been found to be crucial for the interplay between both employment and family life (e.g. Aisenbrey and Fasang 2017).

Since the mid-1980s, scholarship on poverty has focused on the temporal dynamics of poverty spells, i.e. duration and patterns, (Bane and Ellwood 1986; Leisering and Leibfried 1999), but has recently been enriched by life-course accounts of how family and employment transitions trigger poverty (Dewilde, 2003; Vandecasteele, 2010). In contrast, most research on the working poor (see Kenworthy and Marx [2018] for a review) has studied either the association between in-work poverty and individual factors, e.g. education and family structure, ascriptive characteristics, e.g. gender and race, or macro-level factors that shape the prevalence of in-work poverty across countries (e.g., Crettaz and Bonoli 2011; Filandri and Struffolino 2018; Lohmann and Crettaz 2018). The few longitudinal accounts of in-work poverty study the probability of entering and exiting the working poor as a function of changes in employment status and family structure (e.g., Vandecasteele and Gieselmann [2018] for the UK). A recent contribution adopting a life-course perspective on the US demonstrates that the associations between family demographic transitions, e.g. entering parenthood and marriage, and the probability of in-work poverty vary starkly across individuals' life courses (Van Winkle and Struffolino 2018). However, understanding the temporal dynamics of how individuals not just enter but also successfully exit in-work poverty are conducive to informing theory and

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<sup>1</sup> See <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html> for historical thresholds.

designing effective anti-poverty policies. Yet we do not know how frequent it is to leave in-work poverty. Further, we do not know about the pathways of employment and economic wellbeing that individuals take after exiting in-work poverty and whether they differ across social groups.

This paper aims at filling these gaps and addresses three research questions: First, what pathways out of an in-work poverty episode exist in the US? Specifically, we assess the heterogeneity of employment and economic wellbeing trajectories following transitions out of in-work poverty. This thick description (Abbott 2016) is needed, because scholars lack empirical knowledge on whether individuals and their households tend to escape in-work poverty permanently or rather regress into in-work poverty again. Second, to what extent are pathways out of in-work poverty associated with gender and race? This allows us to gauge if and to what extent gender and race are linked with more or less successful pathways out of in-work poverty. Third, are gender and race differences in the pathways out of in-work poverty attributable to average differences in individual characteristics? Particularly, we attempt to account for the associations between gender and race, and pathways out of in-work poverty with composition differences in labor market related characteristics and family demographic behavior.

This paper presents the first substantive application of a novel methodological approach: the Sequence Analysis Multistate Model (SAMM) procedure (Studer, Struffolino, and Fasang 2018). SAMM enhances our understating of how time-constant and time-varying individual and household characteristics are associated with different sequences of events following transitions out of in-work poverty at any point of the life course. SAMM brings together two methodological traditions in life course sociology: sequence analysis for the study of holistic life course patterns and event history analysis for the study of the probability and the timing of life course transitions. To construct and analyze employment and economic wellbeing trajectories following in-work poverty spells, we combine three panel data sources – the 1979 and 1997 National Longitudinal Surveys of Youth (NLSY79 and NLSY97) as well as the Panel Study of Income Dynamics (PSID). Our observational window is therefore exceptionally ample, ranging between age 18 to 50 from 1968 to 2011 for cohorts born between 1930 and 1984.

Our findings are the first to demonstrate the heterogeneity of pathways out of in-work poverty: immediate or progressive recovery from in-work poverty, continuous vulnerability, cyclical in-work poverty, and impoverished unemployment. Further, our results highlight persistent differences by gender and race in the probability to exit in-work poverty through more and less advantaged pathways. For example, we show that white men most likely to exit in-work poverty

into stable employment outside of poverty, while Black men and women tend remain at-risk of poverty outside of employment and often regress into additional spells of in-work poverty. These gender and race differences persist even after controlling for labor market related factors, i.e. educational attainment, work experience, and occupational group, as well as family demographic behavior, i.e. parental home leaving, fertility, and marital union and dissolution.

Our results have important implications for theories and concepts surrounding in-work poverty. As is the case for poverty (Duncan et al. 1993), the static dichotomy between the “working poor” and the “working non-poor” is misleading. Our approach shows that one can account for varying degrees of labor market attachment, economic vulnerability, and volatility only when looking at individual experiences as they unfold over time. Further, we demonstrate that standard approaches that do not consider how individual pathways unfold over the years following in-work poverty mask important gender and race inequalities. Our results indicate that behavioral theories in poverty research are not adequate to explain how gender and race differences arise after in-work poverty spells have ended.

## **TRENDS IN-WORK POVERTY IN THE UNITED STATES**

Both great fluctuation and stability characterize the prevalence of in-work poverty in the United States across the last fifty years. The standard approach to measure poverty in the US relies on an absolute threshold, which is a function of household composition and is adjusted yearly for inflation. For example, the federal poverty limit for a single adult in 2018 was \$12,140 before taxes and government transfers and \$23,900 for a household with three members.<sup>2</sup> In-work poverty in the US is commonly defined as individuals over age 16 that have been employed for at least 27 weeks over the year and whose household income lies below the federal poverty line. This measure contrasts with the relative poverty approach, adopted for example by Eurostat, which considers individuals whose equivalized household income is below 60% of the national median as poor.<sup>3</sup>

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<sup>2</sup> The January 2018 poverty guidelines are calculated by taking the 2016 Census Bureau's poverty thresholds and adjusting them for price changes between 2016 and 2017 using the Consumer Price Index (CPI-U) (<https://aspe.hhs.gov/poverty-guidelines>).

<sup>3</sup> EUROSTAT considers individuals who worked at least 7 months, or approximately 28 weeks, as employed and defines equivalized household incomes using the modified OECD scale below 50-66% of the median as at risk of poverty. The choices concerning the number of hours or weeks of work to identify workers, what type of income or benefit should be considered to determine the poverty status, and where to set the threshold between poor and non-poor remain subject of lively debates (Crettaz 2013). A general agreement exists on the fact that the unit of analysis has to be the household, especially when aiming at lifting

Absolute and relative poverty stem from different research traditions and definitions of poverty. Absolute poverty thresholds are defined based on the costs needed to purchase the minimum amount of goods that are deemed necessary for survival (Sen 1994). As the term absolute implies, the amount of goods and their cost may remain constant over time, even if average incomes increase. For example, the US absolute poverty threshold is set approximately as three times the cost of a minimum food diet in 1963 adjusted for inflation to current prices. Relative poverty thresholds take a deprivation approach to poverty. In this tradition, impoverished individuals are at risk of social exclusion if they do not command enough resources to participate in activities and achieve the standard of living that is customary in their society (Townsend 1979).

Figure 1 displays the proportion of employed individuals that live in households under the absolute and relative poverty thresholds and their 95 percent confidence intervals between 1971 and 2018 by gender and race. The left panel presents information for men and the right for women. There are six trends shown within each panel: the share of white (black line), Black (blue line), and Hispanic (green line) individuals that are employed, but live in households under the absolute poverty threshold are presented as solid lines and those under the relative poverty threshold are shown as dashed lines. Individuals are considered to be employed if they worked 27 or more weeks in the previous year. Households are under the absolute poverty threshold if their gross household income is below the US Census Bureau poverty threshold. In contrast, the relative poverty threshold is based on the national income distribution of a given year. Households with a net equivalized household income below 60 percent of the median are considered to be under the relative poverty threshold.

*[here Figure 1: Proportion of Employed Men and Women in Absolute and Relative Poverty by Race in the United States, 1971–2018]*

As shown in Figure 1, the proportion of employed white men and women in absolute and relative poverty has remained remarkably stable between the 1970s and 2010s. On average, nearly 3 percent of white working men and 4 percent of white working women live in households below the federal poverty limit. At its highest point, approximately 4.5 percent of white women and 4 percent of white men in work lived in poverty following the early 1980's

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individuals out of poverty by increasing the number of earners (Filandri and Struffolino 2018; Lohmann and Marx 2018; Thiede, Lichter, and Sanders 2015).



recession. Relative in-work poverty rates are higher, but similarly stable for white men and women, roughly 9 and 10 percent, respectively.

The share of employed Black and Hispanic men and women that are poor is considerably higher and more variable across time compared to white men and women. In fact, absolute in-work poverty rates for Blacks and Hispanics are more similar to the relative in-work poverty rates of white men and women. While the share of working Black and Hispanic men in poverty was similar during the 1970s, these trends began to diverge during the 1980s. In 1971, approximately 10 percent of employed Hispanic and Black men lived in absolute poverty. Following the passage of the Personal Responsibility and Work Opportunity Act in 1996, well over 13 percent of Hispanic working men lived in households under the federal poverty limit and over 30 percent lived in households under the relative poverty threshold, compared to 24 percent in 1971. In-work absolute and relative poverty rates decreased for Black men, reaching a low of 4 and 17 percent, respectively, in the year 2000.

In contrast to men, in-work poverty rates for Black and Hispanic women converged by the mid-1990s. Before then, working Black women were more likely to be poor than Hispanic women during the 1970s and 1980s. In 1971, 16 and 31 percent of employed Black women lived in households under the absolute and relative poverty thresholds, compared to 7 and 18 percent for Hispanic women. By 1996, 10 percent of both Black and Hispanic women lived in households under the federal poverty limit and 28 percent under the relative poverty limit. Those rates have since changed only to a small degree.

Besides gender and race, other individual and household characteristics have been found to be associated with an increased risk of in-work poverty (Kenworthy and Marx 2018; U.S. Bureau of Labor Statistics 2016). Having less than high school education, working part-time, and being between age 25-43 are important individual predictors of in-work poverty. Household-related characteristics, e.g. living in a household with children, being the sole breadwinner, and living in a rural area, increase the risk of in-work poverty by restricting earnings opportunities. Interestingly, in-work poverty rates by household composition have not changed substantially between the 1990 and 2010 (Thiede, Sanders, and Lichter, 2018), despite increases in the aggregate generosity of the US welfare system<sup>4</sup> (Spar 2006). A potential explanation is that welfare support over the last 30 years increased for the disabled and the elderly, while it decreased for single mothers and their children as well as for families with the lowest incomes (Danziger 2010; Moffitt 2015).

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<sup>4</sup> This holds true both when considering social insurance and welfare programs separately and together with other programs introduced between 1935 and 1996 (see Moffitt [2015] for a review).

## BACKGROUND

### *Life Course Research on Poverty*

In this section, we discuss the development of poverty theories that bring a life course approach to stratification research. In the following section, we then discuss how those approaches might apply to research on in-work poverty. Cross-sectional studies on poverty tend to underestimate the rise in the risk of poverty (Sandoval, Rank, and Hirsch 2009). Variation in annual in-work poverty levels are not only generated by period events, e.g. recessions, but also by changes in population structure. For example, factors with a stable cross-sectional risk of in-work poverty may become more widespread across the population, e.g. single parenthood or separation (Brady, Finnigan, and Hübgen 2017). Most importantly, cross-sectional trends may mask important shifts in the prevalence of in-work poverty over the life course, e.g. across age groups. Extending the previous example, the risk of entering in-work poverty associated with entering parenthood may strengthen across the life course. Therefore, the prevalence of in-work poverty would increase as the average age at first birth increases.

(Rowntree 1901) recognized over a century ago that poverty should be considered longitudinally as it emerges and persists at different stages of the life course. Two streams of sociological literature have embraced this idea: First, classical studies on poverty have adopted a longitudinal perspective incorporating time as crucial dimension (Bane and Ellwood 1986; Duncan et al. 1993; Fouarge and Layte 2005; Stevens 1994). These studies highlight that poverty is specifically located in time and individual biographies (Leisering and Liebfried 1999). This approach argues that life courses are institutionalized by the welfare state and that poverty emerges from the exposure to normatively defined, non-insured social risks. Second, the life-course approach (Elder, 1998; Elder & Rockwell, 1979) emphasizes that life-courses are multidimensional and unfold in specific historical and social contexts. Life course sociologists argue that the temporal dynamics of events and transitions in different life domains as well as how these domains mutually affect one another are dependent on contextual factors at the family and societal level. For example, the transition onto the labor market and the transition into marriage were tightly linked during the mid-20<sup>th</sup> century. This was a time when stable, gainful and lifetime employment following high school was widespread in the US, which allowed couples to leave home and found families earlier than their parents and their children.

A recently developed approach, the political economy of the life course (Dewilde 2003), bridges these two streams by considering how initial advantages and disadvantages accumulate over time (Dannefer 2003; Merton 1968). Specifically, this approach extends the idea that the

welfare state, the market, and the family shape individuals' life courses and locate them in specific social groups. Stratification occurs not only between individual life courses, but also within them. Therefore, it is essential to analyze trajectories of economic wellbeing as they unfold over time. To date, most of the empirical research adopting a life course approach has focused on education, family, and employment trajectories. Although poverty is a relatively rare event, it should be included as an additional life course dimension for two reasons: First, economic wellbeing, specifically poverty, has long lasting consequences for other domains. Second, the direction and the strength of the association between poverty and family dynamics depend on the phase of the life course at which family transitions occur (Daly 2018; Sandoval et al. 2009; Settersten and Mayer 1997).

Studies that embrace this perspective generally analyze only at the risk and the timing of entering and exiting poverty multiple times over a given observational window. These studies attribute permanent or recurrent poverty spells to durable individual and household characteristics or to "state dependence". State dependence refers to the higher likelihood of experiencing a spell in a specific state (in-work poverty) in the future *just because* of prior spells in that state. According to this perspective, slipping into poverty once has scarring effects as it triggers processes that make future poverty more likely, such as demoralization, habituation, stigmatization, and depreciation of human capital (Ayllón 2013; Cappellari and Jenkins 2004; Valletta 2006). However, these studies tend to analyze poverty spells as a series of isolated life course events and consider the likelihood of being poor at time  $t+1$  given poverty at time  $t$ . This limits our understanding of the temporal dynamic of poverty. (Arranz and Cantó 2012) argue that researchers should study individual poverty trajectories that account for both poverty and non-poverty spells to better estimate the aggregate intertemporal poverty risk.

#### *Extending a Life Course Perspective to In-Work Poverty*

We adopt and extend this approach to in-work poverty: we argue that in-work poverty needs to be studied longitudinally as a life course process. Moreover, we propose a typology of relevant states that combines individual labor market status and household economic hardship to identify differences in pathways after exiting from in-work poverty to go beyond the dichotomy poor/non-poor.

First, the temporal dynamics of in-work poverty require that researchers pay attention to how different degrees of disadvantage in terms of economic wellbeing and labor market attachment are located along the life course. However, to the best of our knowledge, the few studies that use longitudinal data to consider how in-work poverty risks develop over the life course share the

same limitations as those focusing on poverty. Recent evidence on the US shows that critical family demographic transitions, e.g. leaving the parental home, union formation and dissolution, as well as parenthood, are associated with the probability of belonging to the working poor (Van Winkle and Struffolino 2018). Further, the strength of these associations varies across the life course and tend to be stronger for women than men. (Giesselmann 2015) finds that while in-work poverty is more common among workers entering the labor market in Germany, those at later stages of their career are more susceptible to in-work poverty in the UK. Vandecasteele and Gieselmann (2018) estimate the risk of entering and exiting in-work poverty in the UK and conclude that being in in-work poverty seems to be rather transitory and occurs at specific phases of the life course. No research has gone beyond estimating the risk of entering and exiting in-work poverty to consider the pathways experienced by individuals once they successfully exit an in-work poverty spell. Further, there is no research on whether differences in these pathways exist across social groups.

Second, focusing solely on the risk of entering or exiting in-work poverty (being the alternative states a generic in/out in-work poverty dichotomy) masks important elements for theory on in-work poverty dynamics. Adopting this dichotomous definition of the outcome allows for identifying only patterns of cyclical in-work poverty or persistent disadvantage in in-work poverty. Accounting for the actual experience of individuals requires, instead, linking the exit from in-work poverty to alternative states that signify different degrees of income vulnerability and labor market attachment. In other words, exiting in-work poverty has to be conceptualized as a process that can lead to different possible mid-term outcomes.

We extend previous propositions (Filandri and Struffolino 2013; Vandecasteele and Gieselmann 2018) and define a typology of relevant states that combines individual labor market status and household economic hardship. Figure 2 displays possible states along these two dimensions between which individuals and households can move over time. On the one hand, an individual can exit in-work poverty through an improvement in economic wellbeing associated with his/her labor market participation. Depending on the increase in economic wellbeing, households are either lifted well above the poverty line or remain at-risk-of poverty. In the latter case, the intermediate status implies high levels of vulnerability. This is important, because vulnerability is a weakening process. The lack of resources exposes individuals not only to the negative consequences related to relative poverty, but also inhibits their recovery or their ability to take advantage of opportunities to recover when they occur (Spini, Bernardi, and Oris 2017). On the other hand, exiting in-work poverty can occur through the transition to unemployment while remaining in poverty. In this case, individuals slip into a state of social

exclusion. Employment is considered as the one of the necessary factors to prevent social exclusion, which is understood as being severely materially deprived and living in a household with a very low work intensity (Eurostat 2018). Also in this case, an intermediate state of living in a household at risk-of-poverty while being unemployed represents a vulnerable condition, because unemployment increases the risk of social exclusion.

Referring to social exclusion/inclusion implies adopting a dynamic approach: social exclusion is a process that emerges as a consequence of multiple factors associated with the persistence of unemployment and poverty over time (Atkinson 1998; Negri and Saraceno 2000; Paugam 1998). Therefore, we argue that our typology has high heuristic potential when applied to the study of longitudinal dynamics of in-work poverty that goes beyond classifying individuals and households at specific time points.

*[here Figure 2: Individual Labor Market Status & Household Economic Status]*

As we are the first to examine pathways out of in-work poverty, we refrain from formulating specific expectations about how these processes look like empirically. However, the following longitudinal pathways could be characterized by stability in one state or by multiple transitions between several states. For example, precarious pathways out of in-work poverty may lead to stability within non-poor employment after having been at risk of poverty for a number of years or may lead back to in-work poverty within a short time.

## **EXPECTATIONS**

### *Differences in Pathways Out of In-Work Poverty by Gender & Race*

The US labor market is highly segmented in a primary labor market, which provides stable employment relationships and chances for upward mobility, and a secondary labor market, which is characterized by short-term contracts and frequent periods of unemployment (Berg and Kalleberg 2001; Griffin, Kalleberg, and Alexander 1981; Kalleberg and Sorensen 1979). Individuals belonging to the primary labor market segment are more likely to leave in-work poverty towards non-poor employment, while those in the secondary segment may never completely escape in-work poverty.

Numerous studies have documented that men are more likely to be employed within the primary sector, while women are commonly employed in the secondary sector or do not

participate on the labor market (Reid and Rubin 2005). This is especially the case for Black and Hispanic women, who are more likely to experience low prestige careers often interrupted by unemployment and inactivity (Aisenbrey and Fasang 2017). In light of these differences, we expect that *pathways out of in-work poverty are stratified by gender and race (H1)*. For example, pathways out of in-work poverty for men, especially for white men, could be characterized by stable employment outside of poverty, while pathways out of in-work poverty for women, especially for Black and Hispanic women, might entail multiple transitions in and out of the labor market and persistent poverty.

#### *Accounting for Gender & Race differences*

Similarly to poverty (see Brady [forthcoming] for a recent review), theoretical explanations for in-work poverty refer to behaviors, structure, and politics. We explore two mechanisms stemming from behavioral theoretical explanations of poverty. The first mechanism refers to the accumulation of resources over time that are associated with labor market participation, while the second associates poverty to family demographic behavior. Specifically, we extend these explanations to consider if compositional differences between groups account for gender and race differences in pathways out of in-work poverty.

The first approach links poverty with resources that individuals command to avoid labor market disadvantage and life course. Educational attainment, occupational position, and work experience are considered the most important labor market related resources. In the US, those with less human-capital related resources are more likely to regress into poverty or have difficulties re-entering the labor market if they have exited it (Daly and Valletta 2006; Valletta 2006; Worts, Sacker, and McDonough 2010). Further individuals in lower skilled occupational groups are more likely to experience unemployment and those with more employment interruptions are less likely to be re-hired (e.g., Gangl 2004).

Average differences in the level of labor market related resources could generate disparities in pathways out of in-work poverty between gender and racial groups. Blacks and Hispanics tend to be less educated than whites, hold more precarious jobs, and have less high-quality work experience (Aisenbrey and Fasang 2017; Ryan and Siebens 2012), which decreases their chances to leave in-work poverty successfully. During the mid-20<sup>th</sup> century, men were more educated than women. However, the education gender gap has tightened and even reversed in recent decades, women may experience more advantageous pathways out of in-work poverty. Overall, we expect that *gender and race differences in labor market resources account for gender and race differences in pathways out of in-work poverty (H2)*.

The second approach concerns family demographic behavior, especially leaving the parental home, entering parenthood as well as union formation and dissolution. While marriage has a protective function and shields individuals from in-work poverty, separation and entering parenthood increase the risk of in-work poverty (Thiede et al. 2018; Van Winkle and Struffolino 2018). Leaving the parental home is a poverty-risk factor (Aassve et al. 2007), due to the scarce amount of resources available when young adults transition onto the labor market. Fertility transitions as well as union formations and dissolutions affect both the number of potential earners in the household, but also the economic needs of households (e.g., Hübgen 2018; Uunk 2004).

Again, average differences in family demographic behavior may produce gender and race disparities in pathways out of in-work poverty. Compared to whites, Black men and women are more likely to leave the parental home early, enter parenthood early and outside of marriage (Sweeney and Raley 2014; Wu and Wolfe 2001), as well as form and dissolve a marital union compared to whites (Bulanda and Brown 2007; Sweeney and Phillips 2004). As for gender, Van Winkle and Struffolino (2018) show that marriage had a protective function against in-work poverty for women, while separation increased it across the life course. Parenthood was instead positively associated with in-work poverty mostly for women at early stages of the transition to adulthood. Therefore, *we expect gender and race differences in family demographic behavior to account for gender and race differences in pathways out of in-work poverty (H3).*

## **DATA & METHODS**

### *Data*

To test our hypotheses, we combine data from three high quality data sources – the 1979 and 1997 National Longitudinal Surveys of Youth (NLSY79 and NLSY97) as well as the Panel Study of Income Dynamics (PSID). It is necessary to combine data sources to realize a sufficient number of observations that exit in-work poverty. The NLSY79<sup>5</sup> consists of 12,686 respondents born between 1957 and 1964 that were first interviewed in 1979. The NLSY97<sup>6</sup> sample consists of 8,948 respondents born between 1980 and 1984 that were first interviewed in 1997. While the NLSY79 and NLSY97 are nationally representative cohort panels, the PSID is a nationally

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<sup>5</sup> The NLSY79 survey is sponsored and directed by the U.S. Bureau of Labor Statistics and conducted by the Center for Human Resource Research at The Ohio State University. Interviews are conducted by the National Opinion Research Center at the University of Chicago.

<sup>6</sup> The NLSY97 survey is sponsored and directed by the U.S. Bureau of Labor Statistics and conducted by the National Opinion Research Center at the University of Chicago, with assistance from the Center for Human Resource Research at The Ohio State University.

representative household panel. The PSID<sup>7</sup> sampled approximately 18,000 individuals within 5,000 households in 1968, with occasional refreshment samples. All three studies continued to collect economic, sociological and demographic information annually, however currently all three studies are collected on a biennial basis, starting in 1994 for the NLSY79, 1997 for the PSID, and 2011 for the NLSY97.

### *Individual employment trajectories*

We construct trajectories for respondents as sequences using annual information on labor market attachment, household income, and household size. To define our sequence states, we cross-tabulate labor market status with the poverty status of the respondent's household. As in Figure 2, in any given observation period, a respondent can either be "working and not poor" (WNP), "working and at-risk of poverty" (WAR), "working and poor" (WP), "not working and not poor" (NWNP), "not working and at-risk of poverty" (NWAR), or "not working and poor" (NWP).

We consider respondents to be employed if they worked over 20 hours a week averaged over the previous year. This corresponds with working full-time for at least 26 weeks or working part-time for a full year. Respondents that worked under 20 hours a week averaged over the past year are defined as not working. The relative poverty threshold is defined as 60 percent of the median net equivalized household income. Therefore individuals are "working and at-risk of poverty" if they were employed for at least an average of 20 hours in the previous year and command household incomes under the relative poverty threshold. Respondents that are working, but have household incomes over the relative poverty threshold are characterized as "working and not poor". Conversely, respondents that are not working and live in households under the relative poverty threshold are "not working and at-risk of poverty". We use the US Census Bureau poverty thresholds to define our absolute poverty thresholds. Note that these thresholds also vary by household composition. Therefore, working individuals with gross household incomes under the absolute poverty threshold are defined as "working and poor", and those not working then as "not working and poor". Incorporating both the relative and absolute poverty thresholds when defining our sequence states allow us to identify the cross-sections of poverty and employment status conceptualized in Figure 2. For example, "not working and poor" corresponds to social exclusion, "not working and at-risk of poverty" to the danger of social

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<sup>7</sup> The collection of data used in this study was partly supported by the National Institutes of Health under grant number R01 HD069609 and R01 AG040213, and the National Science Foundation under award numbers SES 1157698 and 1623684. We use an amended version of the WZB-PSID code for data preparation generated by David Brady and Ulrich Kohler.



exclusion, and those “working and at-risk of poverty” as being characterized by considerable vulnerability.

We only use annually collected information between ages 18 and 50 to create our sequences, i.e. excluding data after 1994 for the NLSY79, 1997 for the PSID, and 2011 for the NLSY97. The maximum sequence length is 16 years up to age 37 for the NLSY79, 14 years up to age 31 for the NLSY97, and 27 years up to age 50 for the PSID. Our combined sample consists of 37,925 sequences (see Table A1 for descriptive statistics on the study samples).

### *Methods*

We combine approaches from sequence analysis (SA) and event history analysis (EHA) to empirically identify pathways out of in-work poverty and estimate how the probability of exiting through those pathways varies by gender and race. EHA and SA are commonly portrayed as stemming from two different – and even opposing – traditions of life course research (Billari 2005). EHA is concerned with the timing of transitions, such as the age of first birth, and seeks to identify the probability or hazard of those transitions. SA is interested in trajectories that consist of a longitudinal series of categorical states, such as employment life courses, and aims to identify patterns of sequential equivalence. While EHA developed out of a stochastic data modeling culture, SA is embedded within the tradition of narrative positivism that makes no assumptions about data generation.

In the field of life-course sociology, EHA has been used in numerous studies on school-to-work and work-to-retirement transitions, transitions to parenthood as well as marriage and separation. Since its introduction to the social sciences by Andrew Abbott in the 1980s (Abbott and Forrest 1986; Abbott and Hrycak 1990), SA has become an established method to study life course patterns, especially family, education, employment, and retirement trajectories. For our research question, EHA and SA by themselves are insufficient, because our aim is to estimate how time-varying factors affect the probability of following a specific pathway after the end of an episode in in-work poverty. We therefore use sequence analysis multistate models (SAMM), a stepwise procedure that allows the study of the relationship between time-varying covariates and the hazard of following distinct trajectories of categorical states following a given transition (Studer, Stuffolino, and Fasang 2018). SAMM enables us to 1) empirically identify pathways out of in-work poverty, 2) estimate the associations between gender and race with each pathway out of in-work poverty, and 3) estimate the extent that these associations are attenuated by labor market related characteristics and family demographic behavior. The SAMM procedure consists of five steps, which are discussed in detail below.

### *Step I: Identifying Subsequences Out for In-Work Poverty*

The first step consists of the extraction of subsequences from individuals' sequences. A subsequence is a sequence of consecutive states of a given length that begins with a given transition and is at least one state shorter than the original sequence. Subsequences enable researchers to isolate trajectories that immediately following a given transition. Our subsequences begin with a transition out of the state "working and poor" and are five years long. Therefore, each sub-sequence we extract begins with the state "working and poor" followed by the next four states observed.

*[here Figure 3: Example of subsequences' extraction]*

An example of the extraction of five subsequences beginning with a transition out of in-work poverty from four sequences of varying lengths is displayed in Figure 3. The third sequence is relatively simple, consisting of one year "working and not poor" at age 18, followed by two years "working and poor", and ending at age 28 after 8 years of "working and not poor". We can extract one subsequence from this sequence starting from the third time point, "working and poor", followed by the next four time points, "working and not poor". Similarly, we can extract one subsequence from sequence 1 and 5. In sequence 5, the extracted subsequence also begins with the third state, "working and poor", but is followed by one year "working and at-risk" and then three years "working and not poor". The subsequence extracted from sequence 1 is more complex, with one year of "not working and not poor", followed by one year "working and not poor" and finishing with two years "not working and not poor". Notice that the last state observed in sequence 1 is "working and poor". However, this cannot be the beginning of a subsequence as we do not observe a transition out of in-work poverty or four additional years of observation. Finally, we are able to extract two subsequences from sequence 4, because we observe 2 transitions out of in-work poverty. The first subsequence begins at age 18 and ends with two years of in-work poverty at ages 21 and 22. The second subsequence starts immediately after at age 23 with a second transition out of in-work poverty. Therefore, individual sequences can provide multiple subsequences that may even overlap with one another. Note that we cannot extract any subsequences from sequence 2, as in-work poverty is not experienced at any point. Therefore, this individual will not contribute to the analyses discussed further below. In total, we extract 7,337 subsequences with a length of 5 years that begin with a transition out of the state "working and poor".

### *Step II: Calculating Dissimilarities between Subsequences*

We calculate a pairwise distance matrix between subsequences using the longest common substring (LCS) distance measure.<sup>8</sup> We choose LCS over other sequence distance measures, such as dynamic hamming distance or optimal matching with substitution costs, because it emphasizes ordering as opposed to timing in sequences (Studer and Ritschard 2016). This is important, because our subsequences are relatively short and there is relatively little variance in the timing of events across subsequences.

*[here Figure 4: Alignment of subsequences at time t]*

LCS distances are calculated in four steps: First, the subsequences that were extracted in step I above are aligned as displayed in Figure 4. This means that all subsequences begin with the state “working and poor” at time 1. The following states are then located at time 2, 3, 4, and 5. In the second step, the substrings for each subsequence are generated. Substrings contain all the elements, i.e. single states and an order of states without durations, within a given subsequence that can be obtained by deleting any element within that sequence. Third, the number of substrings that every subsequence pair share is quantified as a count metric. That count reflects the similarity of each subsequence pair. In a fourth and final step, this count is transformed to reflect dissimilarity.

### *Step III: Clustering Subsequences*

In our next step, we apply a cluster analysis on the set of subsequences using the LCS distance matrix. We use the partitioning around medoids (PAM) clustering algorithm that separates an initial set of sequences in subgroups characterized by the highest possible within-group homogeneity and between-group heterogeneity (Studer 2013). Medoids are representative sequences that have the smallest dissimilarity to the other sequences of the cluster they belong to. We choose a five cluster solution after a close consideration of both the average width silhouette (AWS) values and substantive reasons. The AWS value for the three, four, and five clusters solution is 0.39, 0.28, and 0.29 respectively: we opted for a five-cluster partition as it

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<sup>8</sup> Note that LCS stands for the longest common subsequence rather than the longest common substring. We use the term substring to avoid confusion.

allows us to isolate clusters that are not simply characterized by one single state but rather by more pronounced dynamics between states.

#### *Step IV: Mixed Effects Competing Risks Cox Hazard Regressions*

Besides identifying pathways out of in-work poverty, the aim of this paper is to estimate gender and race differences in these pathways and to account for these differences. To this end, we use the clusters as the dependent variables in mixed effects Cox hazard regressions with competing risks. These models extend upon simple Cox hazard regressions in two ways: First, this strategy allows us to model multiple failure types. Specifically, we can estimate the gender and race differences in the hazard of exiting in-work poverty through each cluster or pathway identified in step three. Second, mixed effects Cox hazard regressions retrieve unbiased standard errors for multiple failures or censors per individual. In particular, these models correct for frailty, i.e. or individual's differential propensity to exit in-work poverty and to contribute multiple failures to the estimation sample.

Simple Cox hazard regressions model the time specific hazard or risk of a given event for an individual based on a baseline hazard function and a number of predictor variables and coefficients. In our case, process time begins when an individual enters in-work poverty and ends upon that individual's exit out of in-work poverty or until the individual is no longer observed, i.e. right censored. To reduce the problem of left censoring, we exclude individuals whose first observation is in the state "working and poor". The hazard of exiting in-work poverty into any other state  $\lambda$ , at a specific time  $t$ , for a given individual  $j$ , is modelled as:

$$\lambda_j(t) = \lambda_0(t)e^{X_j\beta} \tag{1}$$

where the individual predictor variables and their coefficients  $X_j\beta$ , are multiplicatively related to the baseline hazard of exiting in-work poverty into any other state  $\lambda_0$ . The multiplicative relatedness between the baseline hazard and the covariates, or the proportional hazards assumption, is integral for the non-parametric form of the model. In this model, the values of individual covariates are free to vary over time. Note that the model as formulated in equation 1 allows only one failure type and only one failure per subject, but can be extended to include multiple failures per subject by estimating clustered standard errors.

For our purposes, we need to extend this model to account for multiple failure types and failures per subject. To accomplish this, we estimate a number of mixed effects Cox models with competing risks. Here the time specific hazard  $\lambda(t)$ , of a failure type  $k$ , for the  $i^{\text{th}}$  failure or censor of an individual  $j$ , is modelled as:

$$\lambda_{ij,k}(t) = \lambda_{0k}(t)e^{X_{ij}\beta + b_j} \quad 2a$$

where the individual predictors and their coefficients  $X_{ij}\beta$ , are multiplicatively related to the baseline hazard specific to the failure type  $\lambda_{0k}$ . In this case, process time begins when an individual enters in-work poverty and ends when an individual exits in-work poverty through the failure type, i.e. cluster. As an example, consider the subsequences displayed in Figure 4 again. The observations, i.e. the subsequences, from sequence 1 and 5 spend only one year in the state “working, poor” before exiting. Therefore, they are at risk of exiting in-work poverty through a given pathway for one year. In contrast the second observation, i.e. subsequence, from sequence 4 spends three years within the state “working, poor” before exiting. Equation 2a is therefore not only modeling the probability to exit in-work poverty through a specific cluster, but also the time spent within the state “working and poor” before exiting.

The estimated standard errors are corrected for multiple failures and censored spells from individuals by incorporating individual random intercepts  $b_j$ , into the regression models:

$$b_j \sim N(0, \sigma^2) \quad 2b$$

As is the case in applications with linear mixed random effects models, the variance of our random intercepts is assumed to be normally distributed with a mean of zero and a variance of  $\sigma^2$ , as displayed in equation 2b.

### *Analytical strategy*

Our analytical strategy proceeds in three steps related to three questions: 1) how persistent is in-work poverty, 2) how do individuals exit in-work poverty, and 3) what gender and race differences are there in how individuals exit in-work poverty? First, simple Cox hazard regressions as displayed in equation 1 are used to model the hazard of exiting in-work poverty into any state. This allows us to establish a baseline for how common it is to exit in-work poverty in the US and whether in-work poverty is a long- or short-term event in peoples' lives. Further, we estimate gender and race differences in the hazard to exit in-work poverty and to what extent those differences are accounted for by compositional differences. The analytical sample for these analyses consist of 7,289 individuals that contribute 9,578 spells of in-work poverty after list wise deletion of observations with missing values on our independent variables discussed below. Of those 9,578 spells, we observe 8,883 exits out of in-work poverty. Before list wise deletion, our sample consists of 13,398 observations spells and 12,406 exits.

In our second step, we address how individuals exit in-work poverty. Specifically, we discuss the empirical pathways out of in-work poverty that we identified using cluster analysis on the

5,828 subsequences we extracted in steps I above. When discussing these clusters, we pay special attention to their qualitative differences and their distribution across the sample.

Finally, use mixed effects Cox hazard regressions with competing risks to establish what gender and race differences in the pathways out of in-work poverty exist and whether we can account for those differences. To this end, we estimate three stepwise competing risks Cox hazard regressions as in equations 2a: Model 0 is a baseline model that estimates gender and race differences in the hazard of exiting in-work poverty through each pathway we identified. In model 1, we include indicators for educational attainment, work experience, and occupational group. Educational attainment is measured in years of education corresponding with the highest grade completed. Work experience reflects the cumulative number of years employed since age 18. We use a revised version of the one-digit ISCO scheme to group occupation into i) management and professionals, ii) technical, sales, and administrative support, iii) service, iv) farming, fishing, craft, and production, v) operators, fabricators, and laborers, and vi) military service or out of the labor force. Model 2 includes three family demographic indicator variables: 1) whether the respondent lives in the parental home, 2) whether the respondent is childless, has one child, two children, or three or more children, and 3) whether the respondent has never been married, is married, or is separated or divorced. All models are adjusted for respondents' year of birth, age, age-squared, and the study. Further, all covariates that vary across time, e.g. educational attainment or the number of children, are entered into the models as time-varying covariates. Before list wise deletion of missing values on our core independent variables, we observe 5,828 individuals that contribute 6,990 subsequences, i.e. exits out of in-work poverty, and 10,859 spells of in-work poverty. After list wise deletion our sample drops to 4,344 individuals, 4,887 subsequences, and 7,590 spells.

Note that our race variable distinguishes between whites, Blacks, and Hispanics. We exclude Native Americans, Asian Americans, and Pacific Islanders to ensure that the white category comprises only individuals of European or Western descent or ancestry. This is important to ensure that our categories do not combine groups that are not equally privileged (compared to whites) or not equally marginalized (compared to Blacks and Hispanics). We include gender and race as a single categorical variable in all models, i.e. white men, white women, black men, etc., to adequately account for intersectionalities between gender and race. We have conducted several robustness checks to ensure that our results are not driven by decisions on modeling or other factors, such as the inclusion of weighting schemes, the differentiation between never married and cohabiting, the length of subsequences, and selection into in-work poverty. A thorough discussion of these robustness checks can be requested to the authors.

## RESULTS

### *Cox Regression Results: Exiting In-Work Poverty*

Before examining the pathways out of in-work poverty, it is important to ascertain whether in-work poverty represents a short phase in individuals' lives or is more persistent. To this end, we estimate four Cox regressions on the hazard of exiting in-work poverty. The coefficients of these models represent changes in the hazard to leave the state "working and poor" regardless of the following state. These results are available upon request.

*[here Figure 5: Kaplan-Meier Survival Estimates on Exiting In-Work Poverty by Gender and Race]*

In the baseline models, we see that Black and Hispanic men as well as Black women have a lower propensity to exit in-work poverty compared to white men. The survival curves by gender and race displayed in Figure 5 demonstrate that differences emerge relatively early, but diminish after 4 years within in-work poverty. Nearly 80 percent of white men exit in-work poverty within one year, while only 70 percent of Black and Hispanic men and only 60 percent of Black women escape in-work poverty within a year. These differences, in the magnitude of roughly 10 percentage points, remain until the fifth year within in-work poverty. Nearly all individuals, regardless of gender or race, exit in-work poverty after six years. These differences, although small and attenuated slightly, remain statistically significant even after controlling for both labor market related factors and family demographic behavior.

In sum, we do observe some gender and race disparities in the timing and propensity to exit in-work poverty. Further, these disparities cannot be completely attributed to compositional differences. However, the gender and race differences in the hazard of exiting in-work poverty give us no indication of what happens to individuals in the years following their exit out of in-work poverty. A fast exit out of in-work poverty does not necessarily mean recovery, for example, if individuals exit the labor force, but continue to live in impoverished households or regress into another spell of in-work poverty.

### *Cluster Analysis Results: Pathways Out of In-Work Poverty*

What pathways do individuals follow after transitioning out of in-work poverty? The results of our second analysis step, sequence and cluster analysis on subsequences beginning with a

transition out of in-work poverty, are displayed as relative frequency sequence plots in Figure 6 (see Fasang and Liao [2014] for relative sequence plots). Each plot depicts 100 subsequences that represent their cluster.<sup>9</sup> As can be seen, every subsequence begins in the state “working and poor”. We extract a five-cluster solution: 1) immediate recovery, 2) progressive recovery, 3) continuous vulnerability, 4) cyclical in-work poverty, and 5) impoverished non-employment.

*[here Figure 6: Relative Frequency Sequence Plots of Pathways Out of In-Work Poverty Clusters]*

The cluster “immediate recovery”, comprising 18.5 percent of all subsequences, is characterized by a direct exit out of in-work poverty into stable employment outside of poverty. Compared to all other clusters, this is the most advantageous pathway out of in-work poverty. Individuals in our largest cluster, 37.6 percent of all subsequences, tend to achieve employment outside of poverty. However, rather than an immediate transition into stable employment, men and women in the “progressive recovery” cluster experience an instable transition out of in-work poverty. Although most experience spells of employment while being at-risk of poverty, others temporarily exit the labor market or regress back into in-work poverty. Approximately 17 percent of transitions out of in-work poverty are characterized by “continuous vulnerability”. While these individuals remain employed and exit absolute poverty, they continue to live in households that are at constant risk of poverty.

Two of our clusters, “cyclical in-work poverty” and “impoverished non-employment”, represent extremely turbulent and precarious pathways out of in-work poverty. Slightly over 16 percent of all subsequences are characterized by a regression back into in-work poverty within four years. Many of these individuals escape in-work poverty by exiting the labor market or slipping out of absolute poverty. Our final cluster, comprising just under 11 percent of all transitions out of in-work poverty, regress not into in-work poverty, but remain either at-risk of poverty or in absolute poverty outside of the labor market. As we expected, there is no single pathway out of in-work poverty, but rather a number of pathways characterized by different degrees of economic vulnerability, labor market attachment, and volatility.

The composition of our cluster varies by gender and race as well as labor market related factors and family demographic behavior. Descriptive statistics on these clusters by sample are available upon request. Although the “immediate recovery” cluster contains roughly 18.5

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<sup>9</sup> Summary statistics on the representativeness of each subsequence and the plots as a whole are available upon request.



percent of the subsequences, just over 13 and 14 percent of Black and Hispanic men's subsequences belong to that cluster, respectively. Rather, Hispanic men are over proportionally represented in the “progressive recovery” cluster, and Black men in the “impoverished non-employment” cluster. Both white men and women as well as Hispanic women are overrepresented in the “immediate recovery” cluster, while Black women are in the clusters characterized by “continuous vulnerability”, “cyclical in-work poverty”, and “impoverished non-employment”. Interestingly, the average levels of educational attainment and work experience is similar across all clusters. There are however slight differences by occupation: managers, professionals as well as technical, sales, and administrative staff are more common in the “progressive recovery” cluster, while laborers are most common in the “cyclical in-work poverty” cluster. Adults with three or more children are slightly overrepresented in the “cyclical in-work poverty” cluster, while childless adults tend to be in the “progressive recovery” group. Divorced individuals are more common in the “continuous vulnerability” and “impoverished non-employment” clusters than singles and married men and women.

#### *Competing Risks Cox Regression Results: Exiting In-Work Poverty via Pathways*

Are there gender and race differences in pathways out of in-work poverty and can these differences be accounted for by labor market related factor or family demographic behavior? The results of the competing risk Cox models for the hazard of leaving in-work poverty through one of the five pathways we identified are available upon request. The gender and race coefficients and their 95 percent confidence intervals are presented in Figure 6 with white men as the reference category. The results of models using the other gender-race categories are available upon request. The name of the cluster, i.e. the failure type of the given model, is shown on the left side of Figure 7. For every cluster and every gender-race category, three coefficients are presented. The markers in black denote the coefficients for the baseline model that adjusts only for respondents' year of birth, age, age-squared, and the study. The markers in grey are the coefficients from the first model that additionally adjusts for educational attainment, work experience, and occupation. Coefficients from the third model, which additionally controls for leaving the parental home, the number of children, and marital status, are displayed in blue. The coefficients denote changes in the hazard rate of transitioning out of in-work poverty through a given pathway compared to leaving through the other pathways or remaining in in-work poverty. Positive values indicate faster and more likely transitions, while negative values indicate slower and less likely transitions.

*[here Figure 7: Competing risk Cox model for the probability of leaving in-work poverty through one of the five pathways (ref. White men)]*

As can be seen in Figure 7, gender and race in the baseline model are associated with our pathways out of the working poor. Compared to white men, all other gender-race groups are less likely to exit in-work poverty through the “immediate recovery” pathway and more likely to exit through the “cyclical in-work poverty” pathway. For example, the hazard for Black women of “immediate recovery” compared to remaining in in-work poverty or exiting using another pathway is 1.2 lower than white men, but only 0.2 lower for white women. Black men and women as well as white women have a higher propensity than white men to leave the working poor into a trajectory of “continuous vulnerability”, while having a lower propensity to leave into a trajectory of “impoverished non-employment”, together with Hispanic women. Finally, the hazard for black men and women to depart into the “progressive recovery” pathway is lower compared to white men. In sum, our results support our expectation that pathways out of in-work poverty are stratified by gender and race (H1).

Including educational attainment, labor market experience, and occupational group in the models influences the gender-race associations with the pathways out of in-work poverty only to a small degree. No point estimates between the baseline model and model 1 are statistically different from one another and only a limited number of estimates are no longer statistically different from zero. For example, white women are no longer statistically less likely to leave in-work poverty through the “immediate recovery” pathway compared to white men, and Black women are no longer statistically less likely to leave through the “continuous vulnerability” pathway. Our results do not support our expectation that gender and race differences in the pathways out of in-work poverty are attributable to compositional differences in labor market related resources (H2).

Similarly, leaving the parental home, the number of children, and marital status changes the relationship between gender-race categories and pathways out of in-work poverty to a small degree. Again, no gender and race point estimates from model 2 are statistically different from the baseline model and none become statistically insignificant. If family transitions have a noticeable impact on any coefficients, then it is for Black and Hispanic women. For example, the estimated hazard that Black women exit through the “progressive recovery” pathway compared to white men decreases from -0.56 in model 1 to -0.37 in model 2. For Black men, the decrease is only from -.26 in model 1 to -.20 in model 2. In sum, the results from model 2 do not support

our expectation that compositional differences in family demographic behavior account for the gender and race pathway differences we observe (H3).

## **DISCUSSION**

In-work poverty is exceptionally high in the United States, despite work being promoted as primary way out of poverty (Lichter and Crowley 2002; Moffitt 2015). Unlike the case of poverty, the temporal dynamics of in-work poverty have not been widely considered in the literature so far. We argue that adopting a longitudinal approach and going beyond a binary definition of entering and exiting in-work poverty is necessary not just to reach a thick description of how stratification emerges from the heterogeneity of trajectories characterized by different degrees of labor market attachment, economic vulnerability, and volatility, but also to advance theory on in-work poverty dynamics.

Against this background, we extended the life-course approach to the field of in-work poverty and analyzed individual experiences after exiting in-work poverty. Specifically, we addressed three research questions: First, what pathways out of an in-work poverty episode exist in the US? Second, to what extent are pathways out of in-work poverty associated with gender and race? Third, are gender and race differences in the pathways out of in-work poverty attributable to average differences in individual characteristics? By combining three high-quality longitudinal data sources (NLSY79, NLSY97, and PSID) and applying the SAMM procedure, we were able to identify a typology of 5-year-long pathways out of in-work poverty and estimate gender and race differences in the likelihood of following each pathway after exiting in-work poverty.

We identified five distinct pathways out of in-work poverty that are characterized by varying degrees of labor market attachment, economic vulnerability, social exclusion, and volatility. We find striking gender and race differences in pathways out of in-work poverty: white men are the most likely to exit in-work poverty into stable employment outside of poverty, while Black men and women are more likely to remain trapped in vulnerable pathways outside of employment and often regress into new spells of in-work poverty. Sizeable gender and race differences persisted even after controlling for labor market related resources and family demographic behavior. Our results suggest that behavioral theories in poverty research are not sufficient to explain why stratification by gender and race arises within individuals' life courses after in-work poverty spells have ended.

A potential explanation for the persistence of such differences might fall under general discrimination mechanisms. Discrimination can act at different steps following individuals' exit out of in-work poverty and affect individuals differently depending on their social location in the intersection between gender and race. For example, white men will be most likely to receive promotions, lifting them out of in-work poverty. In contrast, Black and Hispanic men and women are more likely to lose their jobs following layoffs. When trying to re-enter the labor market, women may find it more difficult than men and Blacks and Hispanics may find it more difficult than whites to establish themselves in high paying occupations. Moreover, discrimination by gender and race as well as opportunities for high paying jobs likely varies remarkably across states, because of baseline differences in the integration of minorities in the labor market. Unfortunately, no data sources are available that enable the incorporation of SAMM with detailed geographical data.

A limitation of our study may hint at where future research and data collection should head to improve our understanding of in-work poverty dynamics and to inform policy. First, measuring relative (in-work) poverty at the household level using the equivalized household income is the prevalent strategy. The assumption behind this indicator is that low wages are only one of the factors that contributes to household poverty and that household characteristics, such as the number of dependent children, can avoid or lead to an increase of the poverty risk. When considering how the changes in household composition affect the likelihood of in-work poverty, the number of members is accounted for on both sides of the equation. Although this is necessary to reflect changes in the social reality experienced by individuals as a consequence of family demographic dynamics. Interestingly, our results indicate that changes in household composition due to childbirth, marriage, and divorce cannot account for gender and race differences in how individuals exit in-work poverty.

The definition of household (equivalized) income and, therefore of the working poor, relies on a more debatable assumption. Specifically, that wages from work are pooled within households and resources are equally distributed among households' members. Our data do not allow for a formal test of this assumption and therefore household income at each point in time might underestimate the poverty status of specific individuals within households. Unfortunately, this is generally the case when studying poverty. Future data collection and analyses should attempt to incorporate longitudinal data that provide explicit information on within-household redistribution and individual consumption.

Future research on longitudinal dynamics of in-work poverty should ideally incorporate an account of whether specific pathways in and out of in-work poverty are driven by changes in

wage-related factors. Although this would indeed more closely grasp the social reality of these dynamics, these factors are part of the definition of in-work poverty itself. Our approach represents a step forward in this respect in two ways: First, we were able to account for the effect of time-varying individual and household characteristics for each subsequence out in work poverty extracted from individuals' trajectories. Second, we gained a closer picture of individuals' and households' experiences by adopting a typology of states that goes beyond the static dichotomy between the "working poor" and the "working non-poor". We account for both relative poverty and for unemployment as alternative states that can trigger different degrees of vulnerability and social exclusion. Specifically, this allowed us to explore the risk of falling into absolute in-work poverty as one possible condition of living in a household below the relative poverty threshold, which itself is an indicator of vulnerability. We could identify an especially disadvantaged trajectory of impoverishment unemployment following an in-work poverty spell, which hints at scarring effects of in-work poverty on future labor market prospects. We demonstrate that important gender and race differences only emerge and persist when looking at pathways after transitioning out of in-work poverty than incorporate varying degrees of economic uncertainty, volatility and temporary exclusion from the labor market.

As we have demonstrated, the SAMM procedure is useful to identify heterogeneous pathways out of in-work poverty. Further, we were able to uncover gender and race inequalities that otherwise would be masked by simply modeling the exit from in-work poverty. We believe that SAMM will be useful for a wide range of research areas within and beyond sociology. For example, this procedure can uncover the pathways individuals take after exiting welfare dependency or following participation in active labor market programs. An important question in urban sociology and social stratification research revolves around how the quality of housing change following an eviction and whether the presence of children leads to more trajectories that are amenable. Another relevant area of research in the US is related to how employment and family trajectories develop after incarceration and whether state policies influence those pathways.

Although we concentrated on the US, future research should implement a comparative strategy to shed light on how macro-level factors affect pathways out of in-work poverty and how they are stratified. The risk factors identified for the US mirror those found in European countries (see Crettaz [2013] for a review), although there is great cross-national variation in the prevalence of in-work poverty among different social groups. Cross-national differences in the prevalence of in-work poverty have been related to macro-level institutional factors (see Lohmann and Crettaz [2018] for a review), such as labor market regulations (Brady et al. 2010;

Crettaz and Bonoli 2011; Filandri and Struffolino 2018; Lohmann 2009) and social policies (Brady, Baker, and Finnigan 2013; Lohmann and Crettaz 2018; Lohmann and Marx 2018). Further, these institutional arrangements are thought to filter the negative effects that global macroeconomic trends, such as skill-biased technological change and globalization, have on in-work poverty (Brady et al. 2010; Crettaz 2015; Nollmann 2009). However, we do not know whether the same pathways out of in-work poverty exist in other country-contexts and whether they are socially stratified.

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Figure 1: Proportion of Employed Men and Women in Absolute and Relative Poverty by Race in the United States, 1971–2018



Source: 1971–2018 Current Population Surveys (CPS) and Annual Social and Economic Supplements (ASES); Employment defined as working 27 weeks or more; Proportions and 95% confidence intervals displayed; Absolute poverty (solid lines) defined as households with gross household incomes below US Census Bureau poverty thresholds; Relative poverty (dashed lines) defined as households with net equivalized household incomes below 60 percent of the median; Data weighted.

Figure 2: Individual Labor Market Status & Household Economic Status

		Individual	
		Working	Not working
Household	Poor	In-work poverty	Social exclusion
	At risk of poverty	Vulnerability	Danger of social exclusion
	Not poor	Social inclusion (due to employment)	Social inclusion (due to the household)

Note: Adapted and extended from Filandri and Struffolino (2013) and Vandecasteele and Gieselmann (2018).

Figure 3: Example of subsequences' extraction

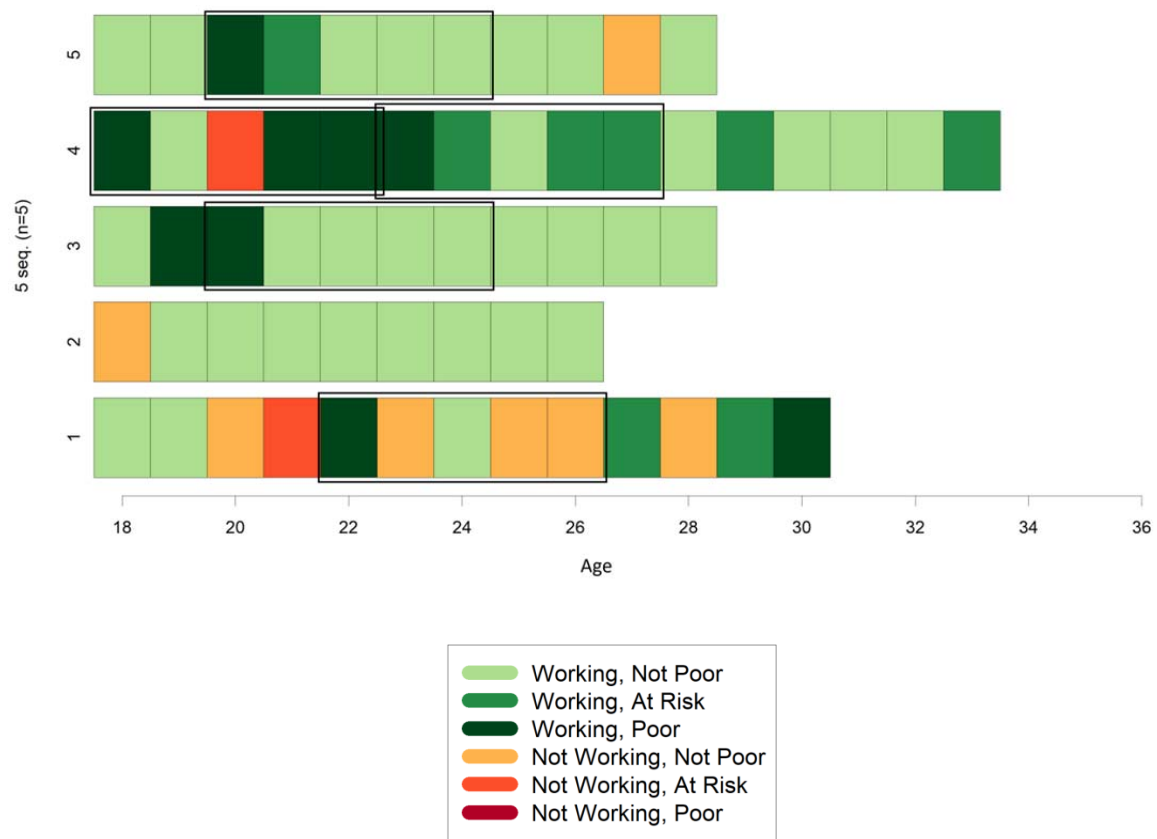


Figure 4: Alignment of subsequences

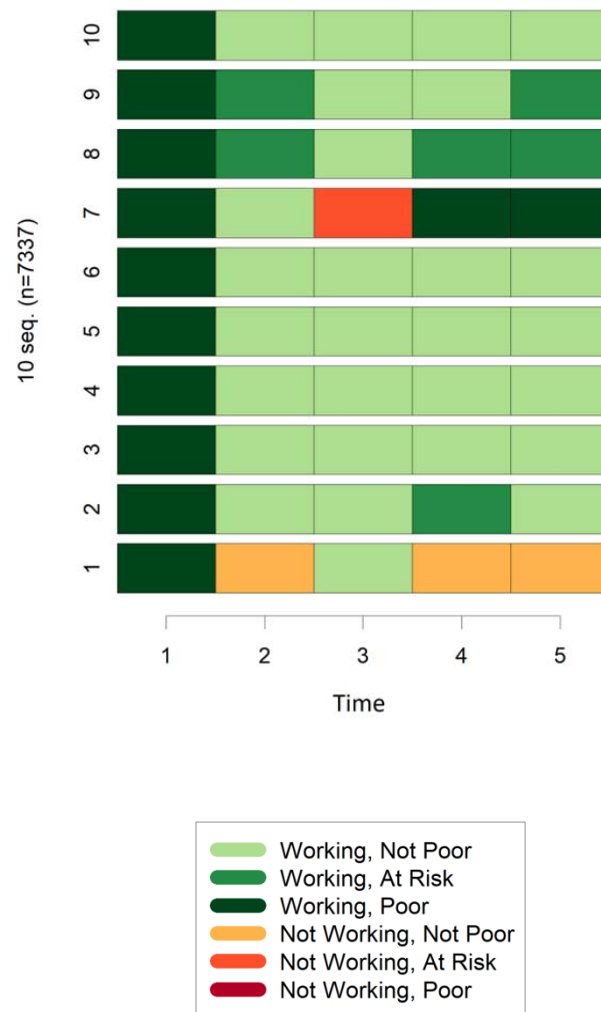
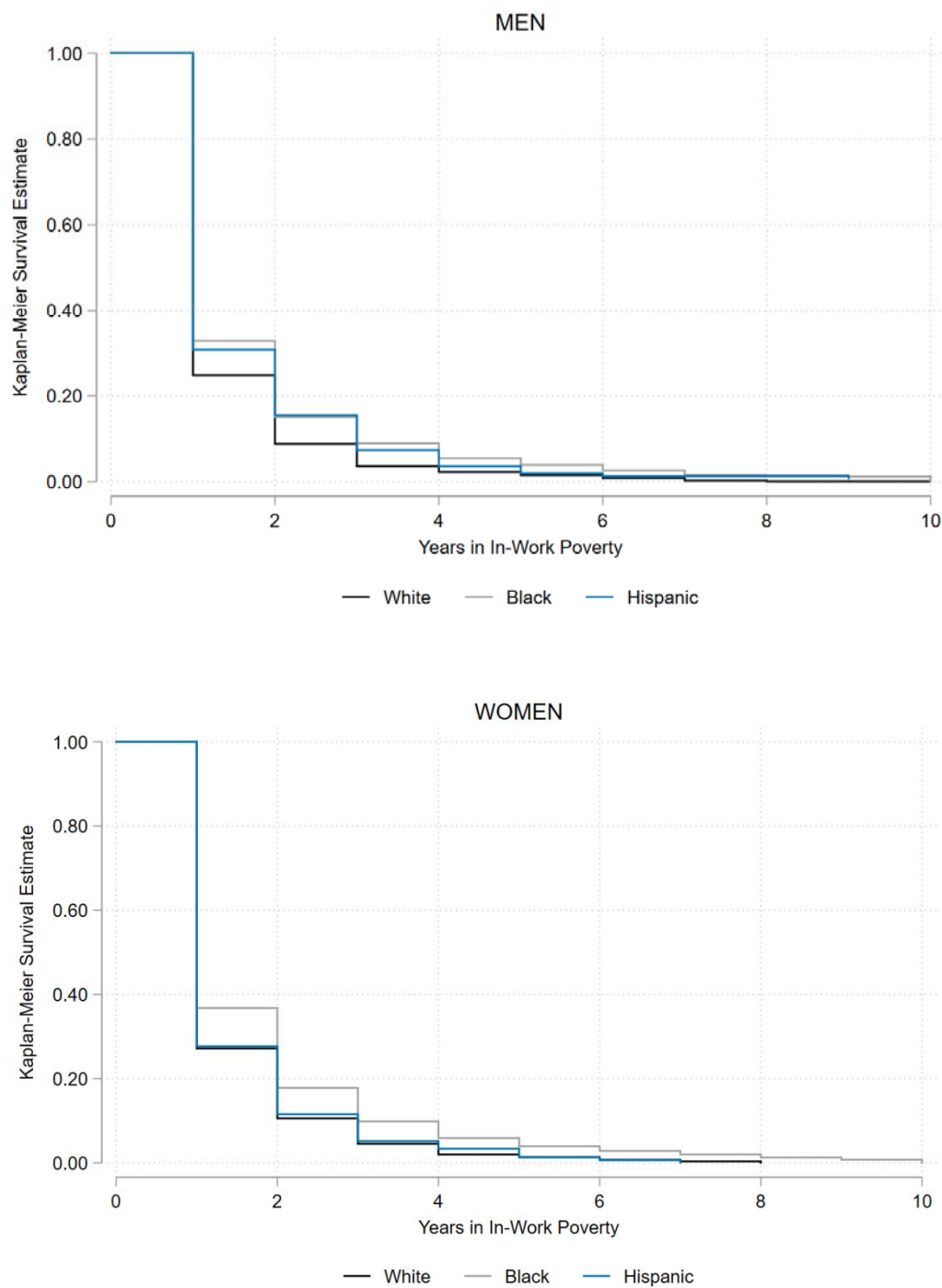


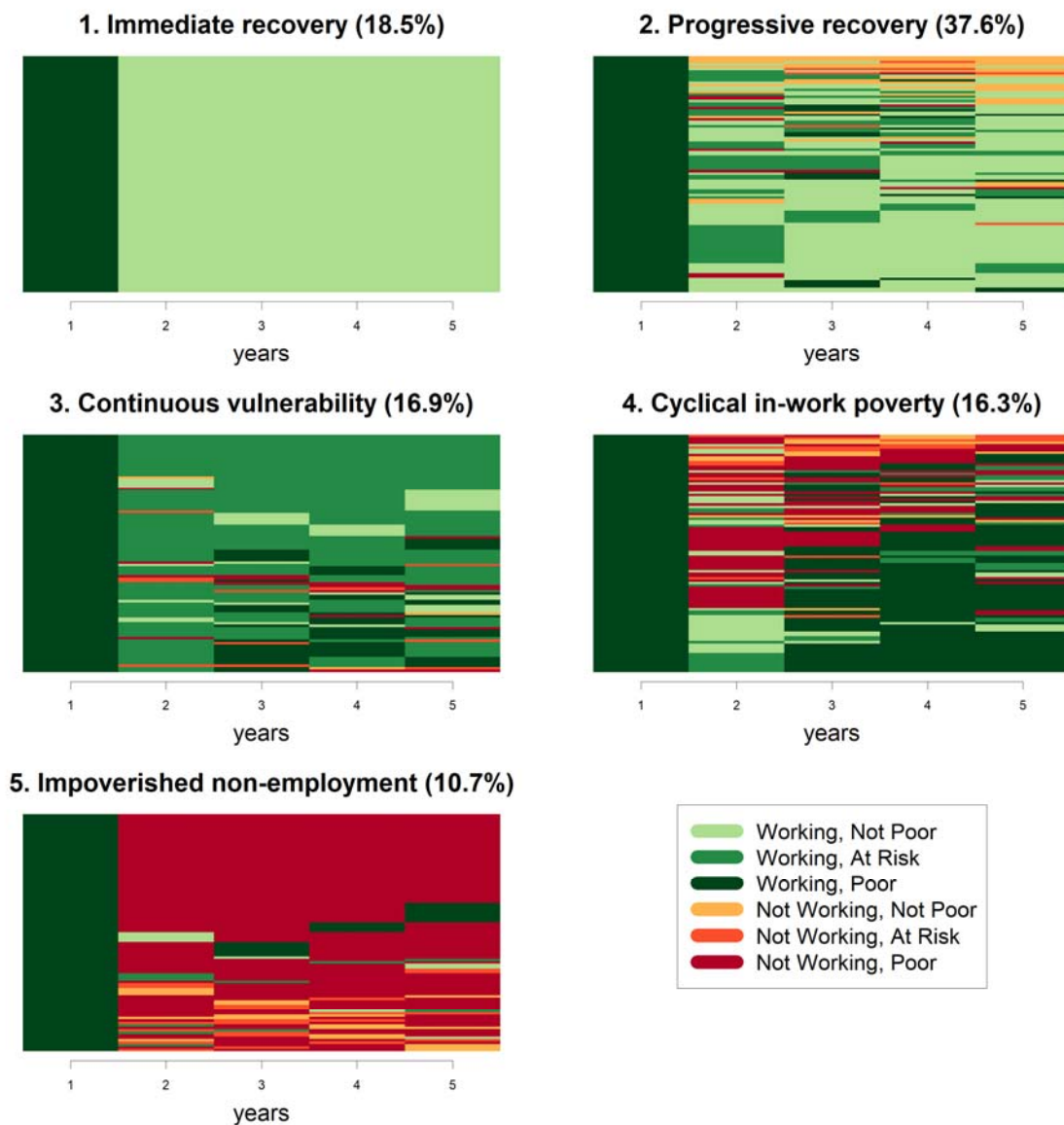
Figure 5: Kaplan–Meier Survival Estimates on Exiting In-Work Poverty by Gender and Race



Note: Differences between subject groups not statistically significant with the exception of white men compared to others after 6 years within in-work poverty. Source: NLSY79, NLSY97, PSID, authors' calculations.

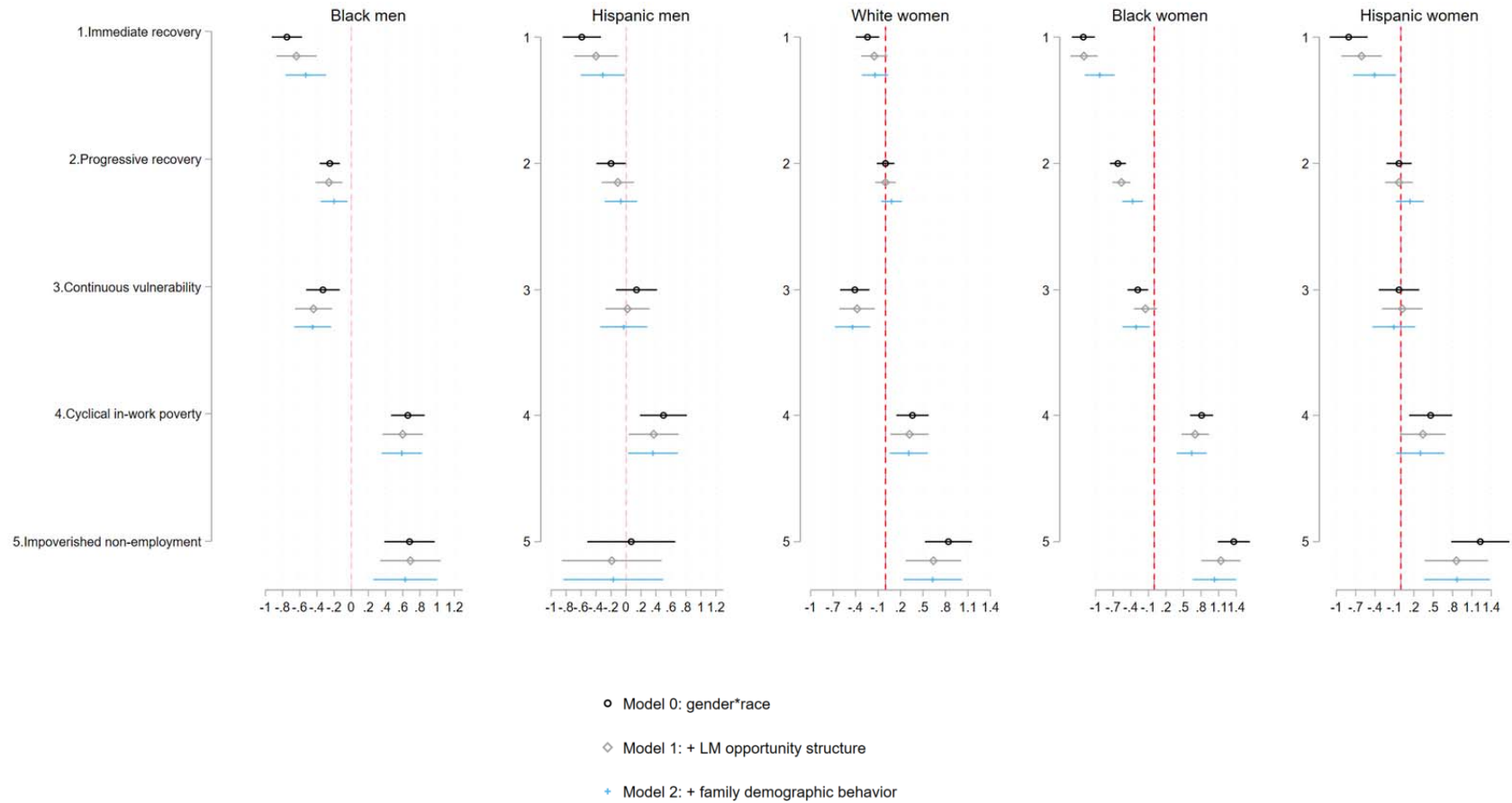


Figure 6: Relative Frequency Sequence Plots of Pathways Out of In-Work Poverty Clusters



Source: NLSY79, NLSY97, PSID, authors' calculations.

Figure 7: Competing risk Cox model for the probability of leaving in-work poverty through one of the five pathways (ref. White men)



Note: Unstandardized coefficients and 95% confidence intervals displayed; All models control for survey, year of birth, age, age-squared, time.  
Source: NLSY79, NLSY97, PSID, authors' calculations.

