Cities 117 (2021) 103335

Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities

Household characteristics or neighborhood conditions? Exploring the determinants of housing spells among U.S. public housing residents☆

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ARTICLE INFO

Keywords:
Public housing
Poverty
Welfare
Spells
Neighborhoods

ABSTRACT

Designed as a temporary housing option for low-income individuals, public housing has often been argued to be a permanent home for many of its residents. Longer durations of time spent on housing assistance have led to debates around public housing as more of a cause than an effect of poverty spells. This article analyzes the determinants of exit among public housing residents. Using a sample from the Panel Survey of Income Dynamics, this article ascertains the individual characteristics and neighborhood factors associated with longer spell durations. The results suggest that most public housing residents exit public housing in the first 5 years. In terms of individual characteristics, spell length, age and income played a modest role in understanding public housing exits. In addition, neighborhoods with higher levels of poverty and median household income had significant positive effects on the odds of exiting public housing. However, the effect sizes of household characteristics and neighborhood conditions were relatively small when considering the post-1996 era of policy reform. The results suggest that public housing exits may largely be due to shifts in housing policy and social welfare programs rather than household characteristics and neighborhood conditions.

1. Introduction

In many urban centers around the world, housing-related household expenses are rising faster than salary and wage increases (Chen, 2006; Wetzstein, 2017). Wetzstein (2017) attributes this to three post-global financial crisis trends: 1) accelerated (re)urbanization of capital and people, 2) the provision of cheap credit, and 3) the rise of intra-society inequality. In their wake, urban spaces have become exclusionary spaces, forcing governments to respond.

Many countries have employed diverse strategies to support housing options for those in need, including subsidized housing. For instance, China has been constructing public rental housing at an unprecedented rate since 2010, exceeding the target of 36 million by 2015 set in its 12 Five-Year Plan and housing 11.3 million families that had been suffering from housing insecurity (Li et al., 2019). Similarly, Australia has established a governmental obligation to maintain a core social housing sector and the need to develop and deliver affordable housing options that are non-discriminatory, encourage social and economic participation, and provide choice (Berry et al., 2006). In the UK, subsidized housing, commonly known as social housing, accommodates millions of households, constituting >25% of the housing in the country (Stone, 2003). Since its inception in the United States in 1937, public housing has served as a major form of housing in many urban areas such as New York City, Chicago, Philadelphia, Puerto Rico, and Boston. Other countries have had their own share of governmentally sponsored subsidized housing (e.g. social housing, cooperatives, tenant-based vouchers). Yet, as many countries have targeted different social welfare programs for budget cuts, the size and form of housing assistance has become precarious. As Turner and Elsinga (2005) suggest, since World War II, the debate over the role of government to supply housing assistance reflects a broader trend for governments to move away from a market-regulating approach to a market-enabling approach. Political disputes on the costliness of housing allowances and the need for reform have been similar across the United States and other countries such as the UK and Australia.

Originally designed as a temporary housing option for low-income individuals in the U.S., public housing has become more permanent for some of its residents (Crump, 2002; Dinzey-Flores, 2007). Longer

☆ I would like to thank Paul Jargowsky, Brandi Blessett, Natasha Fletcher, Christopher Goodman and Junia Howell for their comments on earlier versions of this research. I would also like to thank Eva Bombeck, Belle Durkin, Emma Kerr, Sierra Polston and Michael Sorensen for their excellent research assistance. Previous versions of this paper were presented at the annual meetings of the Association for Public Policy Analysis and Management and the Urban Affairs Association.

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https://doi.org/10.1016/j.cities.2021.103335
Received 19 November 2018; Received in revised form 29 April 2021; Accepted 26 June 2021

durations of time spent on housing assistance have led to debates around whether public housing causes poverty rather than relieving it (Crump, 2002; Freeman, 1998; Friedman, 1966). Individuals not progressing economically are often subjected to accusations of failures of personal responsibility. In addition, those receiving public assistance are often thought of as dependent upon government aid (Magnet, 2000; Murray, 2008). However, the extent to which people live in poverty and stay in poor neighborhoods is more nuanced than explanations of subversive, individual behavior. As such, researchers have shifted to examine the structural conditions leading to poverty spells (e.g. Bane & Ellwood, 1996; Jargowsky, 1997; Massey & Denton, 1993), including the importance of the changing neighborhood context in understanding economic mobility (Sharkey & Faber, 2014; Wilson, 1987).

This paper seeks to understand the dynamics surrounding housing spells among public housing residents in the U.S. Given current trends in residential mobility (Frost, 2020), it is important to explore mobility patterns among those on housing assistance. This paper contributes to previous literature on housing spells among public assistance recipients by assessing the determinants of exit by ascertaining household and neighborhood characteristics. As a result, it investigates several questions surrounding public housing exits: *Do public housing residents have long durations of housing spells? What are the determinants of exit among public housing residents? Lastly, to what extent do household characteristics and neighborhood conditions explain public housing exits?* While other papers focus on household composition to answer these questions, this paper also looks at *where* people live, drawing upon the neighborhood effects literature (See Dantzler & Rivera, 2018).

This paper begins with a discussion of two dominant frameworks for understanding residential mobility (or the lack thereof): the life-course framework and the neighborhood effects framework. Given the focus on housing assistance programs and the contextual features of neighborhood conditions, previous research is discussed to unearth the relationship between changes within households and residential mobility across time and space. The data, methods, and hypotheses used to test the research questions follow. The results are then discussed along with possible limitations. The paper ends with the conclusion, policy recommendations, and suggestions for future research. This paper sheds light on the individual and contextual factors that contribute to housing assistance spells. Furthermore, it highlights how residential mobility among housing assistance recipients may be primarily due to policy changes, while household or neighborhood factors serve as a secondary set of causes.

2. Literature review

2.1. Framing poverty dynamics and differential outcomes

Poverty dynamics are inherently complex and positioning economic mobility as a linear progress has caused scholars to understand mobility through a myriad of frames. Many theoretical frameworks have been used to explain poverty dynamics, focused on cultural explanations of social pathologies, rational choice explanations, the influence of neighborhood effects, and life-course explanations (e.g. Bane & Ellwood, 1996; Jargowsky, 1997; Sharkey, 2013; Wilson, 1987). This paper uses two dominant perspectives to explain housing spells in public housing, both of which past research has used to explain residential mobility: the life-course framework and the neighborhood effects framework. While such frameworks are not exhaustive of all the ways in which people experience poverty, they allow for considerable differences in the contextual features shaping life outcomes.

The life-course framework suggests that as individuals move through their lives, their housing needs may change due to events and individual transitions such as the addition of children, changes in household income, and higher educational attainment (Elder, 1985; Hareven, 2000). In life-course analyses, the focus is on shifts in events understanding that changes can happen across varied lengths of time. In the case of residential mobility among public housing residents, this perspective predicts that spell duration among young, single, and childless individuals is shorter than their elderly, married, parental counterparts (Freeman, 1998). It likewise suggests that those with more education and higher income will live in public housing for shorter periods. Other studies have used this perspective to understand transitions across families and subsequent mobility patterns (e.g. Morrow-Jones & Wenning, 2005; Clark & Lisowski, 2017). However, this paper focuses on public housing residents as a unique group to ascertain the effects of the changes in one's household. This approach can also shed light on the barriers of residential mobility, and more broadly, socioeconomic mobility.

The neighborhood effects framework centers on identifying the specific mechanisms and processes of neighborhood change that limit or promote socioeconomic mobility among families (Wilson, 1987). In contrast with Lewis' (1966) cultural of poverty thesis of a unique social pathology among the urban poor, Wilson (1987) pointed to the structural features of neighborhoods in inhibiting social mobility. Shifts in the American economy have had dramatic effects on inner-city U.S. neighborhoods whose primary predicament, as Wilson (1987) argued, was joblessness reinforced by growing social isolation. It is well understood that intergenerational stagnation is common, and research has focused on how being raised in poor families, in non-intact families, in welfare-dependent families, and "underclass neighborhoods" facilitates or hinders upward mobility (Corcoran, 1995). Sharkey (2013) argues racial inequality is the primary consequence of persistent neighborhood stratification, finding that only 30% of Black children who grew up in the poorest quarter of American neighborhoods live in more prosperous neighborhoods as adults compared to 60% of White children who grew up in similar neighborhoods. A more recent look at intergenerational mobility by Chetty and Hendren (2018) found substantial variation in the causal effects of U.S. counties across metro areas. Counties with less concentrated poverty, less income inequality, "better" schools, dual-parent households, and lower crime rates tended to produce more positive outcomes for children in poor families. However, for children, the results varied across gender lines (Chetty & Hendren, 2018). At the same time, DeLuca and Dayton (2009) found that housing programs have helped families move to much safer, less segregated, and less disadvantaged neighborhoods. Some housing programs have early education benefits (DeLuca & Dayton, 2009), but these gains were not maintained in the long run. Therefore, taken together, the research on neighborhood effects provides mixed results on the key differences across households that predict social, and thus, residential mobility.

By looking at determinants of exits among public housing residents, this paper adds to the existing literature in several ways. The inter- or intra-generational processes by which families remain in poverty provides key insights into other life-course perspectives. There is evidence to suggest that families with fewer resources may be more vulnerable to neighborhood conditions (Ellen & Turner, 2003). Therefore, to understand spell duration among public housing residents, neighborhood effects have largely been studied in a manner to explain the spatial isolation of poor, minority communities (e.g. Jargowsky, 1997; Massey & Denton, 1993; Wilson, 1987). Federal housing policy has greatly contributed to the concentration of poverty in minority communities in urban America (Ellen & Turner, 2003; Massey & Denton, 1993). The isolation disadvantaged residents experience in public housing has made it difficult for residents to access opportunities and resources that would aid them in escaping poverty (Ellen & Turner, 2003). It also may make them unlikely to move out. In line with Sharkey and Faber's (2014) argument surrounding the dichotomous treatment of neighborhoods, this paper explores the contextual effects on a particular subgroup. Building on this research, the current study examines the relationship between life-course changes, neighborhood conditions and spell duration among public housing residents.

2.2. Determinants of housing assistance spells

While the research on urban poverty is vast, the literature on housing spells among housing assistance recipients is scant. For example, Hungerford's (1996) analysis seeks to understand the barriers to leaving housing assistance. He examines the duration of spells among U.S. housing assistance recipients using the Survey of Income and Program Participation between 1986 and 1989. His research suggests that female heads of households, the elderly, and the less educated are less likely to leave housing assistance than their male, and more educated counterparts (Hungerford, 1996). Yet, much like Bane and Ellwood (1996), Hungerford (1996) suggests that people who receive assistance for long periods of time consume the most resources and are disproportionately represented in the recipient pool at any particular point in time. Following this logic, long-term public housing residents create an additional financial burden requiring more assistance from local housing authorities and public agencies authorized to manage these units. Moreover, leaving housing assistance is related to receiving other forms of welfare (Hungerford, 1996). Individuals who receive housing assistance as well as other forms of public assistance have a higher chance of leaving public housing altogether.

Other research has examined the determinants of housing spells within specific housing authorities. Bahchieva and Hosier (2001) use administrative data from the tenant files of the New York City Housing Authority (NYCHA) and assert that NYCHA has longer spells than most other public housing authorities. Using a hazard rate to model the probabilities of exit, the researchers propose a model that predicts that the median length of stay in NYCHA public housing is 16 years for residents aged 21 to 41 and 23 years for residents aged 41 to 61 (Bahchieva & Hosier, 2001). They found that the individuals most likely to exit public housing are younger, single, and White or non-Latinx immigrants (Bahchieva & Hosier, 2001). However, findings from NYCHA cannot be extrapolated to other cities, as it operates in one of the most expensive housing markets in the country and is by far the largest housing authority.[1]

Some other studies have focused explicitly on the cultural and contextual factors surrounding spell duration among housing assistance recipients. The most notable of these is Lance Freeman's (1998) exploratory study on the dynamics of public housing where he used a set of proxies for cultural explanations including family background and geographic region. While Freeman (1998) notes that measuring culture can be "constrained by the amorphous nature of the concept" (p. 341), he provides a unique analysis of the Panel Survey of Income Dynamics, a national U.S. longitudinal data set from 1986 to 1992. The results suggest the longer one lives in public housing, the lower the odds of moving, although the decline varies across households. Rates of exit were positively associated with households who had more availability of other housing options. In addition, family structure and human capital measures play more of a modest role. Freeman (1998) also finds that most households leave public housing within 5 years. Yet, his study only included a limited set of structural conditions.

In a subsequent study, Freeman's (2005) study of duration dependence on housing assistance combined public housing residents and housing voucher recipients.[2] Data was collected from the Multifamily Tenant Characteristics System (MTCS)/Tenant Rental Assistance Certification System (TRACS) from 1995 through 2002. This data provides records on housing assistance recipients across the U.S. His results suggest that the availability of other housing options, an individual's race/ethnicity, disability status, and other life-cycle factors[3] have the largest effects on exiting housing assistance. Thus, with many people leaving within relatively short stints of time, he too finds little evidence to suggest that duration dependence exists. However, his analysis conflates the social environment in which housing assistance programs operate since he did not delineate between different types of housing assistance programs.

Other scholars have sought to understand housing spell dynamics across a variety of contexts. McClure (2018) uses HUD administrative data on recipients of public housing, vouchers and other project-based housing and finds that recipients, on average, stay on assistance for 4 to 6 years after entry, and that approximately 80% leave by years 9 to 11. Yet, McClure (2018) was not able to provide definitive reasons for changes in the length of stay of residents. However, he did find that racial and ethnic minorities seem to stay for longer durations in the Housing Choice Voucher program, but the influence of race and ethnicity is less within the public housing and the Section 9 project-based housing programs (McClure, 2018). His results suggest that within places that rents in the private market are comparatively high and the availability of rental housing comparatively low, individuals and families in assisted housing tend to stay longer across the U.S. (McClure, 2018). However, research on housing spells is not confined to the U.S. as other countries facilitate their own housing assistance programs. In a study in Sweden, Chen (2006) finds single parents have longer duration of assistance than married couples. However, Chen (2006) finds no evidence for negative duration dependence. Chen (2006, 2008) also finds that after 1997, policy reforms, which reduced the income threshold for households as well as the housing allowance amount, led to sharp increases in the leaving speed of recipients. The findings suggest that spell duration may be a primary function in policy and programmatic changes. Other studies have seen similar trends (e.g. Dantzler & Rivera, 2018; Dantzler, 2021). In two studies in different jurisdictions in China, Li et al. (2018, 2019) suggest that the main barrier to exit is limited availability in the rental market. Studies of Australia reveal similar results (Wiesel et al., 2014; Wiesel & Pawson, 2015).

Because of the dynamics surrounding housing assistance, more specifically spells within public housing, it becomes necessary to look at public housing separately if public assistance is thought to create some sort of dependent culture. The degree to which people utilize the program becomes much more nuanced than other welfare analyses. Public housing has a long history including influences from mismanagement, racial discrimination, and segregation. As other scholars have discussed (Dantzler & Rivera, 2021; Goetz, 2013; Owens et al., 2020; Vale, 2013), the preferences of individual housing authorities have drastic impacts on the direction of their management actions, including policies surrounding time limits and work requirements as well as the availability of different housing assistance programs. These preferences may well affect duration of receipt more than the characteristics of recipients. Therefore, identifying the determinants of housing spells can drive better policy. Considering the history of U.S. public housing, concerns surrounding welfare dependency, and the growing urban housing affordability crisis, it is important to understand the dynamics surrounding those receiving government support.

2.3. Duration dependence

As with many other studies of social welfare programs, duration dependency tends to be an area of theoretical and practical concern. Duration dependence is the notion that the longer an individual receives a form of assistance, the less likely they are to relinquish it. The

[1] According to HUD's Residential Characteristics Report (2020), 63% of New York City's public housing residents have lived in their units for 10 or more years. This is significantly higher than the U.S. rate of 34% for this spell duration.

[2] Freeman (2005) discusses other housing assistance programs including the Below Market Interest Rate Program, Section 202, Section 236, Section 811, Rent Supplement, and Rental Assistance Programs.

[3] Life-cycle factors include marital status, age, and the presence of children (Freeman, 2005).

continued reliance on this form of assistance is expected as recipients develop a "taste" for it (Bane & Ellwood, 1996). Within poverty studies, the question of "duration dependence" was an implicit idea within Lewis' (1966) "culture of poverty" thesis. This narrative surrounded much of welfare reform in the 1980s and 1990s as a deterrent of social mobility and perceived reliance on government funding. Even more recently, comments surrounding public housing, poverty and dependency have been made by the former HUD Secretary (Crunden, 2017, May 3). But in fact, individuals may continuously use a form of public assistance only when they have exhausted other options. Moreover, available options may not provide a greater level of support. Given the history of public housing, as discussed before, it is important to consider this dynamic since other scholars found little evidence to support this claim.

Given previous research on housing assistance spells, this paper adds to the literature in a number of ways. First, the paper uses data for a longer period of time to consider household changes and public housing exits across the U.S. The life-course framework points to the significance of understanding different events across a household that may influence mobility patterns. Second, the paper incorporates a number of measures at the neighborhood-level that may help contextual people *in* place. The neighborhood effects framework points to the significance of understanding the structural conditions surrounding where people live. Lastly, this paper considers changes in policy eras as a way to understand differential outcomes among households across neighborhoods. It is important to note that it is beyond the scope of this paper to determine whether longer spells are associated with a greater 'taste' for public housing. However, with the U.S. shifting to other types of housing assistance (e.g. vouchers, mixed-income communities), it is worth investigating the extent to which this change has affected mobility patterns among public housing residents.

3. Data

This paper uses the publicly available version of the Panel Survey of Income Dynamics (PSID), data based on a nationally representative sample of individuals and families living in the United States gathered by the Institute for Social Research at the University of Michigan since 1968. It is a longitudinal, cross-sectional data set consisting of household and family dynamics, uniquely suited for this particular study. The publicly available version contains information on whether or not a person lived in public housing from 1968 to 1972 and from 1986 to the present. Freeman's (1998) work used this data from 1986 to 1992. This paper draws on data from 1987 to 2011. This variation allows for the examination of differences among study participants' exits in terms of individual characteristics and neighborhood conditions. The individual characteristics are spell duration, number of spells in public housing, a dummy variable to account for exits after 1997 (to note different policy reform eras), and sociodemographic information. Sociodemographic information consists of the head of household's age, race, number of children and dependents, marital status, income (measured in the thousands), amount of additional public assistance (measured in the thousands), educational attainment, and disability status. Parental effects included perceived income level during childhood (poor, average, or rich/wealthy) and childhood family structure (both parents, one parent, or neither, i.e., adopted or grew up with another family member). Following Freeman (1998), these parental effects were included to account for measures of intergenerational poverty, recognizing the importance of analyzing transmissions of poverty statuses and welfare participation (Gottschalk et al., 1994; Sharkey, 2013). These controls are transformed into dummy variables with "1" denoting "Yes", "0" otherwise.

Given the history of public housing, it is important to note the time period in which the exit occurred to see if there are stark differences with the odds of exit. Exits that occurred after 1997 differ from earlier exits, arguably due to the impact of 1990s welfare reform (Dantzler & Rivera, 2018; Phinney, Danziger, Pollack, & Seefeldt, 2007), which include de-concentration policies and as the increased use of housing vouchers and scattered-site properties instead of traditional public housing (Crump, 2002). Thus, public housing exits may reflect changes in housing and social welfare policies rather than individual choice. This may include a number of reforms and regulations. Given the changes in welfare reform and public housing initiatives, higher rates of exit are expected in the post-1996 period.[4] However, due to data limitations, specific policies cannot be pinpointed. Moreover, given the lag in the actual effects of such policies, I rely on policy eras versus particular years.[5] The reform variable was coded as "1" if the exit year was after 1996, and "0" if before 1997. Other studies such as Chen's (2006) focus on Sweden and Dantzler & Rivera's focus on the U.S. (2018) discuss and employ this methodological choice finding higher levels of exit after 1997.

Age was treated as a continuous variable. A group of dummy variables for race were included with White, Black, Hispanic, and "Other Racial Groups" denoting other representative categories, with "Yes" coded as "1" and "No" coded as "0". White heads of household served as the reference case. Other racial groups make up a small percentage of this sample (0.05). This small group consists of heads of households who identified as Native American/Indigenous Peoples, Asian/Pacific Islander, or multi-racial identities or some "other" racial group. The presence of children or dependents in the household was treated as a continuous variable. Marital status was separated into a categorical variable for individuals who were single, married, or in some other type of marital status (separated, divorced, widowed). Single heads of household served as the reference group. Income and additional public assistance were measured in the thousands (in 2010 U.S. dollars). Education was treated as a categorical variable denoting stages of educational attainment. This includes whether or not a person graduated from high school, received a general education diploma (GED), or attended post-secondary training including college or vocational training (PSID, 2019). Health issues can be a strong determinant of obtaining adequate housing (Kleit & Manzo, 2006). Therefore, disability status was included, defined as any type of physical or nervous condition. The dummy variable for "disability" status was coded as "1" if a person had any physical and/or nervous condition, "0" otherwise.

To ascertain different neighborhood conditions, a number of measures were included in this analysis. Variables representing different neighborhood conditions were obtained from the 1990 and 2000 Decennial Census as well as the American Community Survey 5-Year Estimates between 2007 and 2011. These variables included the poverty rate, housing vacancy rate, median gross rent, median household income, and unemployment rate. All variables were analyzed at the

[4] Several policy changes affected public housing policy in the late 1990s. In 1992, the National Commission on Severely Distressed Public Housing made recommendations to address inadequate housing conditions. Programs like HOPE VI led to massive demolition and redevelopment of public housing sites across the nation. Moreover, in 1998, President Bill Clinton passed the Quality Housing and Work Responsibility Act (QHWRA) which made drastic changes to eligibility requirements for applicants and residents of public housing. The QHWRA developed new programs to help transition families out of public housing including an expansion of the Section 8 program along with additional funding for HOPE VI redevelopment because of the growing concern of poverty concentration in the 1990s (Dantzler & Rivera, 2018; Goetz, 2012). It is for these reasons that a post-1996 variable is used as a threshold to ascertain the effects of the latter policy reform era.

[5] For methodological reasons, I include another table in the appendix with dummy variables for each observation year instead of the policy reform era. The use of year dummy variables versus a policy reform produced similar results. However, there were a couple differences. Yet, given the vast similarities between the models and the literature surrounding the historiography of public housing, I decided to keep the policy reform variable given. See Appendix 1 for more information.

census tract level except for the unemployment rate, which was used at the county level given that many people do not work in the same neighborhoods as where they live. While census tracts are imperfect in determining defined neighborhoods, they are a convenient geographical unit on which to base neighborhood measures (Coulton et al., 2001). The median gross rent was used as a percentage of household income to denote issues of housing affordability instead of actual dollar amounts. Linear interpolations were used to provide measures of neighborhood conditions during years in between actual PSID observations.[6] Table 1 supplies a table of summary statistics for the PSID data used in this paper:

These summary statistics are for the final sample of the PSID—that including only completed spells beginning after 1986, since the start of previous spells is unknown. Frequencies are given for categorical variables. The minimums, maximums, means, and standard deviations are given for numerical values. Missing values were also recoded to reflect non-integer values in order to not obscure the descriptive statistics.

4. Methods and hypotheses

An event history analysis is used to analyze the effects of individual and neighborhood characteristics on the likelihood of exiting public housing. An event history analysis is based on the premise that events occur, and certain circumstances influence the occurrence of these events (Allison, 1984), although the direct reasons may not be specifically known. It is best suited to analyzing discrete time intervals in public housing due to its consideration of censoring (specifically right-censoring) and non-normality (Cleves et al., 2008). Non-normality suggests that the distributions of time to an event occurring may not be normally distributed. First, this paper employs a Kaplan-Meier estimate to graph the probability of exit for the overall sample over the 24 years of observation. Spells are allowed to start at any point in the analysis. Therefore, $t = 1$ and not the year of entry.

The event history analysis model can be depicted as a logistic regression as such:

$$\text{Log}\,[\mathrm{P}_{\mathrm{it}}/(1-P_{\mathrm{it}})] = \alpha_{\mathrm{t}} + \beta' \mathrm{x}_{\mathrm{it}}$$

The dependent variable is the failure of the event, in this case, exiting public housing. The dependent variable has the same form as the standard likelihood function. The dependent (or outcome) variable is the probability of an event occurring at a particular time to a particular individual, to which the individual is "at risk" (Raya & Garcia, 2012), based on a number of explanatory variables (Allison, 1984). The state of an individual (i) is observed from year $t = 1$ or their entry into public housing to year $t = T_i$, or their exit from public housing (Raya & Garcia, 2012). The individual observed in this analysis is the head of household, the person with the ability to dictate whether a family moves or not. Entries into and exits from public housing drive the variation in the number of households across the years of observation. Truncation exists on both ends of the spectrum of the heads of households for entries before 1986 and exits after 2011. However, restricting the sample to only observed entries after 1986 handles issues of left truncation.

Model 1 considers the effect of spell duration and the number of spells on the odds of exiting public housing. Different spells are based on observed entries and exits of public housing with at least 1 year of residency. If a household moved from one public housing unit to another, that spell duration was counted as continuous. Model 2 builds upon Model 1 and considers the head of household's age, race, number of children or dependents, marital status, income (measured in thousands), the amount of additional public assistance (measured in thousands), educational attainment, disability status, and the parental effects. Model 3 considers neighborhood conditions including the housing vacancy rate, percentage of income spent on the median gross rent, median household income (measured in thousands), and poverty and unemployment rates. Model 3 also includes the policy reform dummy variable to account for public housing exits after 1997. Odds ratio, robust standard errors, Wald Chi-Squares, Pseudo R^2 and P-Values, and mean variance inflation factors are given. Family weights were applied along with clustering of households.

Given past research (e.g. Bahchieva & Hosier, 2001; Chen, 2006; Chen, 2008; Dantzler & Rivera, 2018; Freeman, 1998, 2005; Hungerford, 1996), this paper hypothesizes that single, younger, unmarried, childless heads of households to have higher odds of exiting public housing. Higher odds of exit among households whose heads have higher levels of education, higher income, and no disability status are also expected. The parental effects outlined are exploratory in nature. Heads of household who grew up with both parents in the household, with more income, and/or in neighborhoods with lower levels of poverty and unemployment, higher median gross rent, and higher vacancy rates, median household income are hypothesized to have higher odds of exiting public housing. Greater neighborhood resources theoretically predict more available housing options as well as access to economic resources. This analysis builds off Freeman's (1998) study by using a longer stint of time and additional measures at the neighborhood level to ascertain the determinants of exit. Given the specific history of public housing, it separates this program out from other housing assistance programs to understand the determinants of exit (Freeman, 2005; Hungerford, 1996).

5. Results

The following results have both descriptive and explanatory power. Using a Kaplan-Meier graph, Fig. 1 illustrates the length of spells of heads of household in the sample during the full period of observation:

This graph illustrates an overview of public housing exits with the survivor function modeling the probability of exit from Years 1 to 24. The survivor function drops from 100% to <25% within the first five years of residency. Moreover, after 10 years, the probability of exit declines to approximately 12%. There, most people in public housing leave in <5 years, but a relatively small percentage stay much longer. Mobility rates for public housing residents seem to be in line with general trends among renters. A recent report found that renters have a similar average time in residence, from 4.1 years in 2007 to 4.5 years in 2017 (Frost, 2020). Given this dynamic, it is important to analyze the contextual differences across households and neighborhoods. Table 2 provides the results of the event history analysis:

Model 1 suggests that individuals who have spent a long time in public housing have a sharply declining odds of exiting. The odds of a person exiting public housing between 2 and 5 years is approximately 46% lower than a person in year 1 ($t = 1$). A person with a spell length from 6 to 10 years has 71% lower odds of exiting than a person with 1 year. A person with 11 or more years of duration has an odds ratio of 89% lower of exiting public than a person with one year of residency. Although the spell duration results were statistically significant, the number of spells for an individual was not. The declining odds ratio with longer spell durations may imply some issues of duration dependence. This result is consistent with previous literature that looks at exits based on time spent in public housing; however, as Freeman (1998) discusses, there may be some unobserved heterogeneity due to left out variable

[6] Scholars commonly use linear interpolations to approximate a value to an unsampled point based on weighted averages from neighboring points. Since time is measured in years, averages are based on the averages of the years before and after the interpolated value. While it is possible that such a technique may introduce some bias when it comes to neighborhood changes, I follow Weden et al.'s (2015) argument about neighborhood interpolations. In their investigation of potential biases, they argue that the distribution of the algebraic error at the tract level is generally balanced between overestimation and underestimation, although slightly higher than the county level. Other studies have used this method in understanding public housing exits (See Dantzler & Rivera, 2018).

Table 1
Summary statistics of PSID & neighborhood conditions, 1987–2011.

Variables	Observations	Mean	Standard deviations	Min	Max
Spell duration (#)	5189	2.971	2.750	1	24
Completed observed spells (#)	5189	1.404	0.697	1	5
Reform	3983	0.458		0	1
Individual characteristics					
Age (#)	4837	49.440	20.089	18	96
Female	4837	0.604	0.489	0	1
Head of household income ($)	4837	$8,568.46	$13,055.92	$0.00	$178,906.00
Additional public assistance ($)	4837	$126.06	$684.07	$0.00	$12,684.00
Race (reference group = White)					
White	4837	0.494		0	1
Black	4837	0.478		0	1
Hispanic	4837	0.012		0	1
Other races	4837	0.016		0	1
Education (reference group = did not graduate)					
Did not graduate high school	4837	0.371		0	1
Graduated with H.S. diploma	4837	0.330		0	1
Completed GED	4837	0.045		0	1
Pursued post-secondary training	4837	0.254		0	1
Disability status	4837	0.336		0	1
Family structure (reference group = single)					
Head married	4837	0.202	0.402	0	1
Other marital status	4837	0.403	0.491	0	1
Children/dependents	4837	1.087	1.382	0	9
Parental effects					
Income - poor	4837	0.478		0	1
Income - average/varied	4837	0.323		0	1
Income - rich	4837	0.199		0	1
Household - grew up with both	4837	0.649		0	1
Neighborhood conditions (after interpolation)					
Poverty rate (%)	3983	13.932	10.776	0	100.000
Vacancy rate (%)	3983	9.571	8.182	0	100.000
Median gross rent (%)	3983	28.635	6.906	0	50.092
Median household income ($)	3983	$54,160.46	$25,120.86	$0	$230,299.00
Unemployment rate (%)	3983	7.349	2.573	1.730	41.675

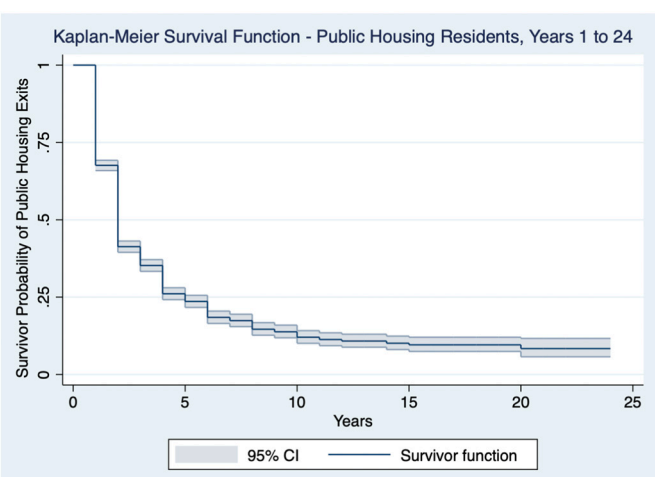

Fig. 1. Survivor function of public housing exits based on spell duration.

bias in the absence of other control variables.

Model 2 includes individual level characteristics. It reveals a similar relationship between spell duration and the odds of exiting as Model 1. Spell duration, age and income had positive effects on the odds of exiting public housing. Other variables such as "individuals of other race groups" and "high school completion" were statistically significant at the 90% confidence level. The number of spells was also statistically insignificant. However, the covariates do not fully explain the duration dependence revealed in Model 1. Age had a negative effect on the odds ratio, with youth predicting higher odds of exiting. For every one-unit increase in the age of the head of household, there is a 0.01% decrease in the odds of exiting. From year to year, that does not denote a practically significant outcome. However, with longer durations of residency, this effect increases. In regard to race, the only significant effect was among individuals identifying as neither White, Hispanic nor Black. However, the sample size of this group is relatively small for much explanatory value. As expected, income had a positive effect on public housing exits but marginally. Yet, additional assistance was not found to be significant in this case. This suggests that while income does have a positive effect, it may not be the most important factor in explaining why public housing residents move.

Individuals who received a high school diploma or GED had lower odds of exiting public housing than those with neither. This result runs counter-intuitive to what one may think about additional education. However, it may also suggest that individuals with additional credentials may be working towards other aspects of human capital accumulation while receiving the benefit. Contrary to Freeman (1998), the perception of familial income level and the presence of both parents in the familial household did not have a significant effect on the odds of exiting public housing. Other variables associated with race, the number of children or dependents, income, having additional public assistance, and one's disability status yielded insignificant results as well. Turning to neighborhood conditions complicates these results even further.

Model 3 does have similar relationships as other models. When controlling for different neighborhood conditions, the odds of exiting public housing are starkly higher in earlier years of residency relative to later years of duration. Spell duration was statistically significant at the 99% confidence level. The declining odds ratio for spell length still reflects issues of duration dependence. As in Models 1 and 2, the number of spells was not statistically significant. The effects of individual-level characteristics are similar to previous models. Age was statistically

Table 2
Odds ratios of individual characteristics & neighborhood conditions of PSID data, 1987–2011.

Variables	(Model 1)	(Model 2)	(Model 3)
	Odds ratio	Odds ratio	Odds ratio
DV: exit (yes = 1, no = 0)			
Spell duration: 2–5 yrs.	0.542***	0.556***	0.470***
	(0.054)	(0.058)	(0.072)
Spell duration: 6–10 yrs.	0.291***	0.292***	0.214***
	(0.056)	(0.059)	(0.056)
Spell duration: 11+ yrs.	0.108***	0.121***	0.088***
	(0.056)	(0.067)	(0.052)
Completed spells	0.887	0.940	0.932
	(0.068)	(0.080)	(0.087)
Individual effects			
Age		0.990**	0.990**
		(0.004)	(0.005)
Female		0.942	0.893
		(0.125)	(0.132)
Black		0.967	1.014
		(0.115)	(0.136)
Hispanic		1.067	1.050
		(0.444)	(0.449)
Other racial groups		1.883*	3.208***
		(0.617)	(1.198)
Children/dependents		0.965	0.936
		(0.047)	(0.047)
Married		1.283	1.339
		(0.230)	(0.260)
Other martial statuses		1.265	1.343*
		(0.183)	(0.220)
Income ($1000s)		1.013***	1.009
		(0.005)	(0.006)
Additional assistance ($1000s)		0.986	0.979
		(0.052)	(0.058)
Received high school diploma		0.774*	0.879
		(0.102)	(0.126)
Completed GED		0.678*	0.796
		(0.144)	(0.169)
Some college-level training		1.009	1.154
		(0.141)	(0.181)
Disability status		1.140	0.997
		(0.150)	(0.141)
Parental effects			
Parents: average income		1.110	1.143
		(0.150)	(0.171)
Parents: rich/wealthy		1.104	1.229
		(0.155)	(0.188)
Grew up with both parents		01.002	1.029
		(0.108)	(0.119)
Neighborhood conditions			
Rental vacancy rate (%)			1.000
			(0.008)
Median gross rent (%)			0.996
			(0.009)
Median household income ($1000s)			1.008***
			(0.003)
Poverty rate (%)			1.018**
			(0.007)
Unemployment rate (%)			0.963
			(0.023)
Reform			1.951***
			(0.312)
Constant	1.297**	1.625*	1.119
	(0.163)	(0.454)	(0.477)
Observations	5189	4837	3983
Wald χ^2	83.26	130.41	131.57
Pseudo R^2	0.035	0.056	0.063
P-value	0.000	0.000	0.000
Mean VIF	1.15	1.47	1.53

Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.10$.

significant. Individuals who identify as a member of another race have much higher odds of exiting (3.208) than their White counterparts, with the level of significance rising from 90 to the 99% confidence level. This may be due to the movement of people within this group to other forms of housing assistance or the available of housing options in more diverse areas. However, the definitive reason for this effect is unclear.

Marriage was not found to be statistically significant in Model 3. However, divorce, separation, or the death of partner was associated with 34% higher odds of exiting than single individuals. This may be partly due to the receivership of the housing assistance being tied to one individual member versus the other. However, the significance of income declines when controlling for neighborhood conditions, from a 1.013 in Model 2 to a 1.009% change in Model 3. Yet, its statistical significance drops as well alluding to the importance of considering the contextual effects of the neighborhood in understanding residential mobility. Moreover, education becomes insignificant when controlling for neighborhood effects. The parental effects also did not exhibit any significant results. This may be because neighborhood context is a better proxy of economic success than perceptions of income and traditional family structures.

Some neighborhood conditions had a significant impact. Interestingly, both higher median household income and poverty rate are associated with higher odds with exiting. The odds of exiting public housing increase by a factor of 1.008 with a one unit increase in the median household income of one's neighborhood. An increase in the poverty rate increases the odds of an individual exiting public housing by a factor of 1.018. The correlation with poverty rate defies the idea that public housing is a trap, especially within poorer neighborhoods (Crump, 2002). In the absence of causal evidence, these results are difficult to explain, but past research implies one should look to evictions (Desmond, 2016) and other barriers to exit (Chen, 2006; Chen, 2008; Wiesel et al., 2014; Wiesel & Pawson, 2015) as well as mobility intentions (Dantzler & Rivera, 2018). Exits within high income neighborhoods may reflect a different set of reasons surrounding mobility trends as compared to neighborhoods with higher levels of poverty. The results provide nuance to simple explanations regarding residential mobility.

Lastly, the reform variable yields an interesting result. Individuals living in public housing after 1996 are 95% more likely to exit than before 1997. This result suggests the post-1996 policy reform period had one of the largest effects on public housing exits. Since the post-1996 period denotes a time period in which a number of measures were employed as alternatives to traditional public housing including housing choice vouchers, scattered-site properties, HOPE VI, the Rental Assistance Demonstration and the Moving-To-Work Demonstration Program (See Schwartz, 2014, 2017 for full description), exits from public housing were likely to be higher due to the changing number of available public housing and private market rental units and increased attention to mobility rates among residents receiving housing assistance.

Given the frameworks used in this study, the paper suggests that both life-course factors and neighborhood effects do play varying roles in understanding spell duration among public housing exits. However, it is even more important to consider the policy environment in which social welfare programs take place. The volatility of U.S. housing policy and social welfare programs across political parties may directly impact mobility patterns more than household changes or neighborhood conditions.

6. Limitations

While the results provide a mixed review of previous studies centered on understanding spell duration among housing assistance recipients, it is important to note some of the limitations of this paper as well as some of the areas for future research to explore. First, since the analysis looks across residents among several housing authorities, there may some unobserved heterogeneity in terms of the discretion used by individual

authorities to encourage exits from public housing. As said before, an exit can serve as a voluntary and involuntary indicator of mobility. Second, at the federal level, there have been a number of federal changes in the allocation of public housing units including demolition processes (Goetz, 2013) as well as shifts in the composition of the target population (Vale, 2013). The policy reform variable provides some support for this finding. However, future studies should continue to evaluate specific policy changes to more accurately tease out their impact on housing assistance recipients and their surrounding neighborhoods. Third, since the paper relies on the publicly available version of the PSID, there may be some issues of error in self-reporting (See Shroder, 2002). Yet, given the nature of how one becomes a resident within public housing specifically, it is not likely that reliance on self-reporting would greatly bias the estimates. Lastly, this paper focuses on life events and neighborhood conditions *while* residents live in public housing. Additional analyses may shed further light on the short and long-term impacts of living in public housing across time and space, in addition to their movement to other forms of housing tenure (e.g. vouchers, affordable housing units, private rental units). Given the conflicting literature on MTO and other U.S. housing programs, the impact of mobility patterns is still an area of academic and practical concern. Furthermore, research like this would be greatly improved by having a qualitative component to determine whether long spells are associated with a greater taste for public housing or a reflection of neighborhood and community preferences among lower-income households.

7. Conclusion

This paper presents a refined method of ascertaining the contextual effects using longitudinal data with the ability to follow individuals for extended amounts of times. In all the models, the odds of exiting public housing are starkly higher in earlier years versus later years. This supports some duration dependence, but only for a small number of households (approximately <12% past Year 10). Likewise, major housing policy reforms have sharply reduced spell duration, and spell length is relatively short for the majority of households in the sample. This is consistent with the previous literature (Chen, 2006; Dantzler & Rivera, 2018; Freeman, 1998; Freeman, 2005; McClure, 2018), which constantly challenges this notion that public housing entraps all or most of residents (Crump, 2002). This paper's greatest contribution to the literature lies in its ability to highlight the differential impact of neighborhoods. The odds of exiting public housing are higher in neighborhoods with higher levels of poverty and higher levels of income. This results in a bifurcated understanding of exits among housing assistance recipients in low and high-income neighborhoods. More broadly, it raises additional questions in relation to residential mobility across different neighborhoods. The proxy for policy reform also suggests that exits from public housing tend to be higher in the post-1996 policy era. Yet, it is worth mentioning that exits do not necessarily indicate self-sufficiency as some people have experienced multiple housing assistance spells or may be evicted from their units. Due to data limitations, this paper was not able to ascertain the individual motivations for housing exits (See Dantzler & Rivera, 2018). However, future research should attempt to unpack the multiple dimensions surrounding residential mobility, particularly for subsidized households in changing urban areas. Moreover, future studies should explore the long-term effects of living on housing assistance as it relates to neighborhood stability or individual and family social mobility. It is quite plausible that the benefits and costs of housing assistance may not be realized until later in an individual's life course or among subsequent generations.

Policies aimed at reducing housing spells by imposing time limits and work requirements overlook the increasing urban housing crisis. Most rental households are spending $\geq$ 30 % of their monthly income on housing expenses, with approximately 23% spending $\geq$ 50% of their monthly income on rent (U.S. Census Bureau, 2020). And a large majority of low-income renters were severely cost burdened even before the pandemic (Joint Center for Housing Studies Report on The State of the Nation's Housing 2021). Housing authorities with relatively high durations of housing spells must reconsider time limits altogether as subsidized housing may be the only way certain places keep some individuals from homelessness (Wiesel & Pawson, 2015). Reducing exits among residents may reduce turnover costs as well as increase revenue from higher paying tenants. Other housing authorities with relatively low durations of housing spells must look at the long-term impact of exiting public housing as it relates to residential stability and economic mobility. Exiting public housing does not necessarily mean an individual or family has reached self-sufficiency. As Leibson Hawkins (2005) argues, self-sufficiency as a policy goal may result in policy changes that reduce the welfare rolls. However, a reduction does not necessarily mean that individuals and families have improved their economic, educational, or social outlook. Reducing aid to those in need may increase the immediate need for funding from other social welfare programs as individuals and families experience other types of financial insecurity. As this paper shows, eras of policy reforms may have the most significant effect on residential stability. The choice to stay in one's home may be less of a choice made by a person or family and more of a reaction to larger policy changes or increasingly unaffordable housing markets. Future studies should consider how individual and collective public policies interact with residential mobility patterns.

With many countries facing a growing urban housing crisis (Wetzstein, 2017), sustained governmental aid for affordable housing may be one of the few measures that can help reduce inequality within cities and across regions. Longer spell durations should be expected as housing assistance recipients should not be blamed for their inability to secure an affordable home within an increasingly expensive global urban housing market.

CRediT authorship contribution statement

Prentiss A. Dantzler: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Writing – Original Draft Preparation, Writing – Review and Editing, Visualization

Declaration of competing interest

The authors declare that they have no known competing financialinterestsor personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cities.2021.103335.

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