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Does the Timing of Incarceration Impact the Timing and Duration of Homelessness? Evidence from “The Transitions to Housing” Study

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ABSTRACT

Compared to their non-homeless peers, chronically homeless adults are much more likely to have a history of incarceration. In turn, homelessness is associated with increased morbidity, lack of access to adequate healthcare services, and decreased life expectancy. This study investigates whether age at first incarceration is associated with age at first homeless experience and with lifetime duration of literal homelessness. Study participants are homeless adults entering permanent supportive housing (PSH) in Los Angeles County, California, that have experienced incarceration prior to their first experience of homelessness ($n = 230$). Multivariate linear regressions were conducted to determine association between age at first incarceration with: 1) age at first literal homelessness and 2) lifetime duration of literal homelessness. Results indicate that incarceration as a juvenile, and young adult is significantly associated with earlier literal homelessness experiences and may be associated with longer durations of literal homelessness, for adults entering PSH. Moreover, women incarcerated as juveniles and entering PSH first experienced literal homelessness earlier than comparable men. Our findings suggest the need for long-term supportive services for persons incarcerated before 25 years old, especially for women. Moreover, these findings refine the working knowledge that prior incarceration increases risk for prolonged homelessness and can help agencies complete more accurate risk assessments.

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Incarceration; homelessness; juvenile; youth; prisoner reentry

Background

An estimated 26% of juvenile justice involved youth or young adults will at some point experience homelessness (Tam, Freisthler, Curry, & Abrams, 2016). Research through the life course perspective identifies *chains of risk* in which initial exposure to a stressful situation predisposes individuals to further adverse life events (Ben-Shlomo & Kuh, 2002; Padgett, Smith, Henwood, & Tiderington, 2012; Pearlin & Skaff, 1996;).

Incarceration is a particular type of stressful event that can have a cascade of negative consequences throughout one's life. For example, incarceration depresses employment outcomes of young black men aged 16–24 and 25–34 (Holzer, Offner, & Sorensen, 2005) and is associated with poorer health outcomes later in life (Barnert et al., 2017; Massoglia, 2008; Schnittker & John, 2007), increased housing insecurity (Metraux, Roman, & Cho, 2007), material hardship (Western, Braga, Davis, & Sirois, 2015), and overt discrimination (Turney, Lee, & Comfort, 2013).

The relationship between incarceration and homelessness, in particular, is well established (Bobashev, Zule, Osilla, Kline, & Wechsberg, 2009; Gelberg, Linn, & Leake, 1988; Greenberg & Rosenheck, 2008a; Greenberg & Rosenheck, 2008b; Metraux et al., 2007). For example, two national studies by Greenberg and Rosenheck (2008a, 2008b) demonstrate that persons currently in jail or prison are 7 to 11 times and 4 to 6 times, respectively, more likely to have a history of homelessness. Consistent with the life course perspective, studies have further suggested that the timing of stressful events, such as age at first incarceration, or homelessness, may affect life outcomes. For example, in a sample of 350 adults aged 50 years and older experiencing homelessness, Brown et al. (2016) find that those exposed to homelessness before the age of 25 encounter higher levels of discrimination, imprisonment, alcohol and drug problems, and mental health problems when compared with peers who first confronted homelessness later in life. Similarly, analyzing data from the National Longitudinal Study of Adolescent Health (Add Health), Barnert et al. (2017) find that incarceration during adolescence and early adult years is associated with poorer mental and physical health; moreover, the greater the duration of incarceration, the worse the health outcomes in later adulthood.

Cumulative disadvantage may therefore provide a framework for understanding how early exposure to adverse life events can lead to worse outcomes over the life course. Within this approach, early adverse experiences (e.g., incarceration) may have long-term negative consequences on later life outcomes (e.g., poorer health, homelessness). Briefly, our conceptual model is based on prior models of incarceration and homelessness, and evidence that incarceration during adolescence and early adult years disrupts the development of legal human capital (e.g., education, work experience, job skills). For example, early incarceration affects high school completion (Hjalmarsson, 2008; Metraux et al., 2007), and may actually encourage investment in criminal human capital and antisocial behavior, which would increase the productivity of criminal (versus legal) labor (Bayer, Hjalmarsson, & Pozen, 2009; Stevenson, 2017). Furthermore, such circumstances could lead to employment in low-skilled, low-paying jobs and detachment from the formal labor market (Apel & Sweeten, 2010). As aforementioned, youth incarceration is associated with worse mental and physical health in adulthood and greater barriers to employment, specifically for young black men. Finally, incarceration as underage youth or young adults could lead to early disruptions of family and social ties, further leading to the deterioration of social capital and prosocial behavior (Hill, Roberts, Grogger, Guryan, & Sixkiller, 2010; Stevenson, 2017; Laub & Sampson, 1993). All these consequences of early incarceration can compound over time, leading to greater adversity (e.g., homelessness) and risky behavior (Bobashev et al., 2009; Laub & Sampson, 1993) later in life.

This study investigates associations between the timing of first incarceration and the timing of the first episode of literal homelessness and lifetime duration of homelessness among a group of homeless adults transitioning to permanent supportive housing (PSH). “Literal homelessness” is defined as living in a shelter, on the street, in an abandoned building, in a garage or shed, in an indoor public place, in a vehicle, or on public transportation (Tsemberis, McHugo, Williams, Hanrahan, & Stefancic, 2007; Wenzel, 2009). Using data from the “Transitions to Housing” study (Wenzel, 2014), we specifically examine whether early incarceration (i.e., before age 25 years) is associated with earlier and lengthier experiences of literal homelessness compared with individuals incarcerated after age 25 years. We also examine age-graded effects to determine whether individuals incarcerated before age 18 years, experience homelessness at even earlier ages and for longer durations than their comparable counterparts.

Based on our conceptual framework, we hypothesize that individuals incarcerated during adolescence and young adulthood have an earlier onset of homelessness and experience longer durations of lifetime homelessness compared with individuals incarcerated after age 24 years. Moreover, individuals incarcerated as juveniles are likely to have worse outcomes (i.e., first literal homelessness at an earlier age, longer durations of literal homelessness) compared with individuals incarcerated as transitional age youth (TAY; aged 18–25 years). To our knowledge, no study has evaluated the relationship between age at first incarceration and subsequent experiences of homelessness.

Relationship between age at first incarceration, age at first homelessness, and duration of homelessness

A substantial amount of research has explored the relationship between incarceration and homelessness. Some research has explored the relationship between homelessness and contact with the criminal justice system from the perspective of Irwin’s (1985) conceptualization of “rabble management” (Gowan, 2002; Metraux & Culhane, 2006). From this point of view, the criminal justice system, through arrests and incarceration, is used as a form of social control, where numerous activities of the homeless are criminalized (Irwin, 1985; Metraux et al., 2007). Therefore, “rabble management” would increase contact with criminal justice system actors, which would then lead to an increase in the incarceration of already homeless individuals. Metraux and Culhane (2006) argue that taken together with the social services offered in jails and prisons (e.g., mental health services, substance abuse services, education, and job training), carceral institutions could be viewed, at the extreme, as a form of temporary housing.

Other researchers have focused on understanding the association between incarceration and homelessness within a prisoner reentry context. Within this context, inadequate planning of an individual’s transition from an incarceration back into society (Metraux et al., 2007; Metraux & Culhane, 2006), as well as the effect of imprisonment on social networks (Gowan, 2002; Metraux et al., 2007; Cox, 2018), labor market outcomes (Metraux et al., 2007; Cox, 2010), and securing stable affordable housing (Geller & Curtis, 2011), lead to a greater likelihood of homelessness after an incarceration. Geller and Curtis (2011) find that among a nationally representative sample of unmarried families in large cities, formerly incarcerated men have more than two times the

odds of homelessness, and almost two times the odds of other indicators of housing insecurity such as frequent moves and relying on others for living expenses. They find that possible mechanisms underlying the relationship between housing insecurity and incarceration operate through reduced earnings and public housing restrictions for men who lived in, or had significant others living in, public housing before their incarceration. Herbert, Morenoff, and Harding (2015) also find that earnings and social support are protective factors against homelessness and housing insecurity among formerly incarcerated individuals, and that the criminal justice system may be a driver of housing insecurity (e.g., moving because of intermediate punishments, treatment, imprisonment, or absconding status). In an evaluation of the Reentry Housing Pilot Program (RHPP) implemented by Washington State among a cohort of high-risk offenders, Lutze, Rosky, and Hamilton (2014) find that participants who receive a housing intervention with wraparound services, are less likely to recidivate.

The research elucidates a bidirectional relationship between incarceration and homelessness, which can lead to a cycle of institutionalization (Metraux et al., 2007; Gowan, 2002). Part of this reverse causality occurs because populations of individuals who are incarcerated and homeless often overlap, and are drawn from the most marginalized groups in society (Western et al., 2015; Metraux et al., 2007). Western et al. (2015) describe this phenomenon as “correlated adversity, [where] a person’s multiple disadvantages and injuries may be more important in their complex combination than individually” (p.1513). They specifically describe the prisoner reentry process as social integration that relies on social support, housing, and the ability to sustain a living. They find that age, mental illness, and substance use influence successful reintegration such that older individuals and those with histories of substance abuse and mental illness, experience greater hardship (e.g., less social support, more housing insecurity, greater job instability) both before and after prison. Western et al.’s (2015) findings highlight that there may be heterogeneous effects of incarceration on reentry outcomes. For example, their analysis suggests that the effect of incarceration on housing insecurity, with one domain of housing insecurity being homelessness (see Cox et al., 2019), may depend on the age of the person when released.

Our study is unique in its attempt to understand whether the timing of the first incarceration impacts the timing and the duration of homelessness. Specifically, we estimate the effect of age at first incarceration on the age at first homelessness and the lifetime duration of homelessness. Building on the conceptual framework proposed in Laub and Sampson (1993), Metraux and Culhane (2006), Metraux et al. (2007), and other findings in the literature, we conceptually model the relationship between the age at first incarceration and the age at first homelessness to depend on social support, the ability to earn a living, substance use, and health status (both mental and physical). Because we focus on understanding the impact of the age at incarceration (versus incarceration in general), our framework is based on cumulative disadvantage. Laub and Sampson (1993) and Sampson and Laub (1997) discuss cumulative disadvantage from the perspective of delinquency. They argue that early experiences with the criminal justice system (e.g., arrests, conviction, incarceration) during adolescence and as TAY can lead to stigmatization, and ultimately, to weakened social and institutional bonds through disruption of family ties, decreases in the stock of

social capital and investments in social capital, and labor market detachment. Moreover, the likelihood of these early adverse experiences leading to poor adult outcomes is higher when preexisting deficits and disadvantages are present.

Therefore, incarceration during adolescence and early adult years affects the development of legal human capital (Aizer & Doyle, 2015; Hjalmarsson, 2008) and non-cognitive skills, which may lead to employment in low-skilled, low-paying jobs and detachment from the formal labor market (Apel & Sweeten, 2010). In addition, incarceration as an adolescent is associated with worse mental and physical health in adulthood, and a deterioration of family bonds and social capital (Hill et al., 2010; Laub & Sampson, 1993; Stevenson, 2017). Based on the aforementioned literature, all of these factors can lead to a greater adversity and risky behavior (Bobashev et al., 2009; Laub & Sampson, 1993) later in life, leading to an earlier age at homelessness, further incarceration as an adult, and longer durations of homelessness. Incarceration as a youth is also a direct pathway to homelessness because of insufficient coordinated transition planning (Britton & Pilnik, 2018; Walker, Valencia, Bishop, Irons, & Gertseva, 2018). Similar to adults, extended periods of incarceration may disrupt family ties, and a felony conviction may create barriers to living with family receiving housing assistance. Moreover, to the extent that preexisting family conflict precedes the incarceration, the youth may have few stable housing alternatives after release. Long-term housing for adolescents may only be available through child welfare services, and access to these beds may be limited to only those who overlap in both systems (Walker et al., 2018).

Consequently, we hypothesize that early experiences with the criminal justice system, namely, incarceration, one of the most severe forms of punishment, leads to an earlier age at first literal homelessness (through the direct and indirect channels discussed above) and to longer durations of literal homelessness. Figure 1 presents our conceptual framework. Notably, incarceration as a youth likely increases the likelihood of criminal behavior (for the aforementioned reasons) and thus incarceration as an adult (Aizer & Doyle, 2015). Additionally, incarceration can be viewed as a form of temporary to long-term housing for single unaccompanied men, and this may delay the

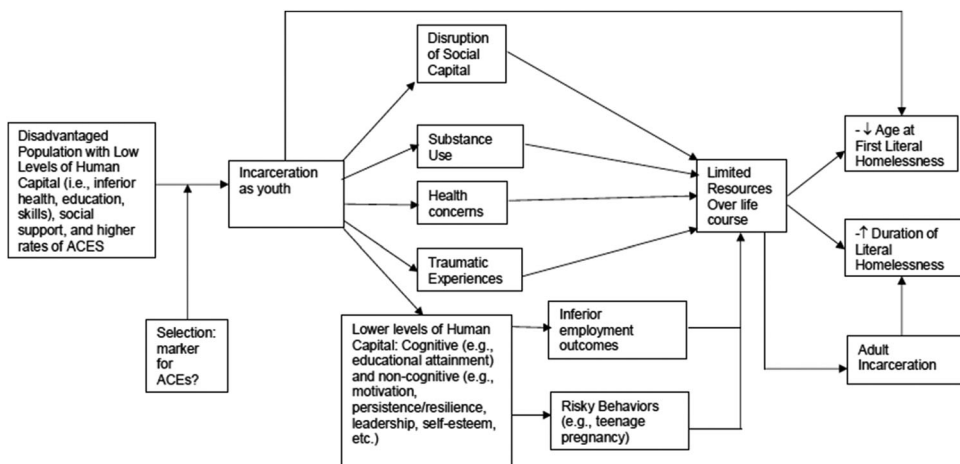


Figure 1. Conceptual model: Age at first incarceration, age at first homelessness, and duration of homelessness holding constant time served.

age at first literal homelessness. However, longer time served could lead to greater disadvantages and thus more entrenched homelessness. Therefore, it is important to understand the effect of an early incarceration at the extensive margin (i.e., whether an individual was incarcerated at a specific age) and the intensive margin (i.e., how the duration of incarceration affects our outcomes of interest).

Data

Data was collected as part of a larger longitudinal study examining changes in HIV risk behavior and social networks as homeless adults transition to PSH, an evidence-based approach to address chronic homelessness (Tsemberis et al., 2007). The study specifically explored how PSH is associated with HIV risk and prevention behaviors over time and it captured changes in social networks, drug use, mental health symptoms among PSH residents, and programmatic components that may impact HIV risk among PSH residents (Wenzel et al., 2017).

Staff members at 26 PSH provider agencies in Los Angeles County, California, referred participants during the baseline recruitment period (August 2014–October 2015). Referrals occurred via one of four methods: 1) with the client's permission, a partner-agency staff member provided the interested client's name and contact information to the project manager; 2) an interested client directly called the project manager after receiving the contact information from a partner-agency staff member; 3) a partner-agency staff member and the client contacted the project manager together; or 4) potentially eligible clients were approached at agencies during large lease-up or other move-in related events.

All interested clients were screened for study eligibility before researchers proceeded with the informed consent process. Clients were eligible for participation if they were at least 39 years old (turning the age of 40 during their study participation), spoke English or Spanish, were currently homeless, were moving into PSH without minor children, and were moving into housing within 20 miles of downtown Los Angeles or in the Long Beach area of Los Angeles County. The minimum age cutoff of 39 years old (turning the age of 40 over the course of the study) was chosen to decrease variation in the developmental stages within the life course of the study sample and fits the generativity versus stagnation stage of Erik Erikson's Eight Ages of Man theory, which tends to begin at approximately 40 years old (Winetrobe et al., 2017).

Interviewers obtained informed consent from participants in English or Spanish. The study was approved by the University of Southern California Institutional Review Board and received a Certificate of Confidentiality from the U.S. Department of Health and Human Services. Each interviewer conducted four interviews for each participant—baseline (three months before or within five days of moving in), and at 3, 6, and 12 months from the move-in date. This study uses only baseline data. Each interview was conducted at a housing organization, public area, or the participant's apartment, and the duration was approximately 1.5 hours to finish. Interviews were conducted in English or Spanish, depending on the participant's preferred language. Responses were recorded on an iPad using Qualtrics survey software. Participants were rewarded US\$20 for completing the baseline interview. Additional details regarding the variables included in the study questionnaire, which were either taken or

adapted from previous research by the authors or other well-known surveys, are available in Winetrobe et al. (2017).

During the study's recruitment period, 599 individuals at partnering agencies and at move-in or lease-up events completed eligibility screenings, and 63 were screened as ineligible (10.5%). Of the remaining 536 initially deemed eligible, we scheduled and completed baseline interviews with 88% or 472 individuals (15 participants scheduled interviews but did not show up and could not be rescheduled; 49 could not be contacted after completing the screening). Additionally, 51 participants who screened as eligible and completed the baseline interview were subsequently excluded: one participant moved from a PSH location to another housing location and was therefore no longer homeless; one participant withdrew after completing the baseline interview and before moving into housing; one participant died before moving into housing; and 48 participants did not move into PSH within three months after our study recruitment period. Thus, the final baseline sample was 421 participants.

For research purposes, this analytic sample was restricted to formerly incarcerated individuals who experienced their first incarceration prior to their first incidence of homelessness, leaving an analytical sample of 225. Participants were excluded if they had never been incarcerated ($n = 104$), were not incarcerated prior to their first experience of homelessness ($n = 87$), or were missing data for any variables included in these analyses ($n = 11$). Thus, the analytic sample comprised 225 complete cases of study participants who reported being incarcerated prior to their first experience of literal homelessness.

Methods and variables

We began our analysis by estimating unadjusted mean differences for our dependent variables (age at first instance of literal homelessness and lifetime duration of literal homelessness), and by determining any significant distributional differences in demographic and other characteristics (using, e.g., chi-square and Analysis of Variance tests) between the three incarceration groups (i.e., first incarceration before 18 years old, between 18 and 24 years old, and at 25 years old or higher). We then estimated linear regressions to determine the association between age at first incarceration and our dependent variables, holding relevant factors constant. Analyses were conducted in Stata/SE 14.1 (StataCorp, 2015).

Dependent variables measured lifetime experiences of literal homelessness, that is, living in a shelter, on the street, in an abandoned building, in a garage or shed, in an indoor public place, in a vehicle, or on public transportation (Tsemberis et al., 2007; Wenzel, 2009). Study participants were asked their age at first instance of literal homelessness and total time spent in literal homelessness, as adapted from the literature (Wenzel, 2009).

History of incarceration was measured with items adopted from Add Health (Harris, Halpern, & Whitsel, 2009). Participants who reported spending time in a correctional facility were asked how old they were the first time they were incarcerated (Harris et al., 2009). The key independent variable was constructed as a categorical variable that measured age at first incarceration: less than 18 years old, between 18 and 24 years old, and at 25 years old or older. Due to the simultaneous relationship between incarceration and homelessness (see Ivanich & Warner, 2019 for a discussion of youth homelessness and police contact), age at first incarceration is constructed

such that the first incarceration occurred *before* the first episode of literal homelessness.

Following the conceptual framework (see [Figure 1](#)), control variables are incorporated into the model that are correlated with both dependent variables (i.e., age at first literal homelessness and duration of literal homelessness) and the key independent variable (age at first incarceration). Specifically, demographic variables measuring birth cohort (dummy variable equal to 1 if the individual is part of Generation X and 0 otherwise), gender (indicator variable equal to 1 if female and 0 if male), race (three dummy variables equal to 1 if white, black, or other and 0 otherwise), and ethnicity (indicator variable equal to 1 if Hispanic and 0 if otherwise) were included in regressions to capture unobserved characteristics correlated with independent and dependent variables, and that the likelihood of incarceration has changed substantially over time and is highly correlated with gender, race, and ethnicity. Specifically, Pettit & Western (2004) find that the likelihood of incarceration has changed substantially over time and that this is especially true for African American men. Moreover, incarcerated women tend to be more disadvantaged than men; therefore, these women compared with men may face greater barriers to reentry (Cox, 2012; Cox, 2016). Finally, race may create additional barriers to successful reentry because of, for example, discrimination in the labor market (see Pager, Western, & Suggie, 2009; Pager, Western, & Bonikowski 2009). Birth cohort is defined as follows: the silent generation is comprised of individuals born 1928 to 1945, Baby boomers are those born 1946 to 1964, and Generation X are born 1965 to 1980 (Dimock, 2018).

Following the conceptual framework (see section II), the model also contains variables measuring non-cognitive human capital and social support, cognitive human capital, health status (mental and physical), and substance use. Social support and other forms of non-cognitive human capital were captured by two categorical variables that measure relationship status and foster care involvement, a variable measuring the number of hours spent alone in the past three months, and a binary variable equal to 1 if the respondent participated in volunteer work in the past three months and zero otherwise (Humphries & Kosse, 2017). Relationship status was constructed as six mutually exclusive dummy variables equal to 1 if an individual reported being married, in a serious relationship, widowed, divorced, separated, or never married and 0 otherwise. Married and serious relationship categories form the model's reference group.

Foster care involvement was captured by an indicator variable equal to 1 if the respondent reported ever being part of the foster care system and 0 otherwise. Cognitive human capital was measured as the highest grade of education completed and the number of years the respondent worked full-time over their lifetime. Health status was captured by three indicator variables equal to 1 if the respondent had been diagnosed by a healthcare professional with or displayed symptoms of post-traumatic stress disorder (PTSD), had been diagnosed with any chronic mental illness, or had been diagnosed with any chronic physical illness and 0 otherwise. Finally, drug use and other risky behaviors were incorporated by using two dichotomous variables equal to 1 if the respondent reported ever using hard drugs or misusing prescription drugs and 0 otherwise, a binary variable equal to 1 if the respondent had ever taken drugs intravenously, and the total number of sexual partners reported by the

respondent in the past three months. Lifetime alcohol use was not controlled for because almost no variation was observed: Almost the entire (98.7%) analytical sample indicated that they had used alcohol over their lifetime.

We performed additional robustness checks to test for effects at the extensive and intensive margins by regressing age at first literal homelessness and duration of literal homelessness on total time incarcerated by age (“dose response,” intensive margin), and a categorical variable representing the quintiles of age at incarceration (extensive margin) among the analytical sample whose first incarceration was younger than age 18 years. Specifically, using this restricted (but more homogenous) sample, we re-ran our analyses using the total amount of time spent in jail or detention before age 18 years (Harris et al., 2009) and the quintiles of age at incarceration as an adolescent as our key independent variables. This technique addresses concerns with selection bias *between* groups; however, our results could still be biased if there remain differences *within* the group first incarcerated before age 18 years that are correlated with total time spent incarcerated as an adolescent, age at first incarceration as an adolescent, and our dependent variables, and if these differences are not accounted for in the regression.

Results

Table 1 compares the unadjusted means for the dependent and independent variables. For the dependent variables, mean age at first instance of literal homelessness for the analytic sample is 40 years, and the average total days spent in literal homelessness is approximately 2,228 days. However, when this number is disaggregated by age at first incarceration, we observe that age at first literal homelessness increases with age at first incarceration. Specifically, individuals incarcerated at age 25 years or later experience their first incident of literal homelessness at approximately age 46 years on average, whereas those incarcerated as adolescents and young adults have mean ages of approximately 35 years and 41 years, respectively, at their first instance of literal homelessness ($P < .0001$). Similarly, the duration of homelessness was significantly longer for individuals incarcerated earlier than age 25 years, and this was especially true for individuals incarcerated as adolescents ($P = .0001$). In general, those incarcerated as adolescents have on average spent 3,095 days in literal homelessness, while those first incarcerated as a TAY or as an adult (Age >24) spent, on average, 1,853 and 1,598 days, respectively, in literal homelessness.

For the key independent variable, the average age at first incarceration is approximately 21.6 years. However, 36% of the analytic sample was first incarcerated prior to the age of 18 years, 36% were incarcerated between age 18 and 24 years, and 28% were incarcerated at the age of 25 years or older. For individuals first incarcerated as an adolescent, the average age at the first incarceration was approximately 14 years. The average age at first incarceration for individuals incarcerated as a TAY and as an adult is approximately 20 years and 33 years, respectively. Participants also reported spending an average of approximately 2,669 total days incarcerated (youth and adult). However, this number significantly varies with age at first incarceration. Homeless adults incarcerated before age 18 years experienced a greater time incarcerated over their lifetime with an average of approximately 4,606 days, compared with an average of approximately

Table 1. Summary statistics by age at first incarceration.

Variable	Total analytic sample		First incarceration age < 18		First incarceration 18 ≤ age ≤ 24		First incarceration age ≥ 25		Pearson χ^2 test ^a $P > \chi^2$
	Mean (N)	SD	Mean (N)	SD	Mean (N)	SD	Mean (N)	SD	
N	225		81		80		64		–
Age at First Literal Homelessness	40.120	12.905	34.728	14.157	40.600	11.449	46.344	9.811	<.0001 ^b
Total Days of Literal Homelessness	2227.879	2317.415	3095.365	2720.729	1853.135	1981.126	1598.397	1795.802	0.0001 ^b
Age at First Incarceration	21.573	8.736	14.136	2.349	19.913	2.014	33.063	7.109	–
Age at First Incarceration									
First Incarceration Age < 18	36% (81)	0.481	–	–	–	–	–	–	–
First Incarceration 18 ≤ Age ≤ 24	36% (80)	0.480	–	–	–	–	–	–	–
First Incarceration Age ≥ 25	28% (64)	0.452	–	–	–	–	–	–	–
(Quintiles) Age at First Incarceration									
(1) First Incarceration 7 ≤ Age ≤ 12	–	–	21% (17)	0.410	–	–	–	–	–
(2) First Incarceration 13 ≤ Age ≤ 14	–	–	26% (21)	0.441	–	–	–	–	–
(3) First Incarceration Age = 15	–	–	17% (14)	0.380	–	–	–	–	–
(4) First Incarceration Age = 16	–	–	22% (18)	0.418	–	–	–	–	–
(5) First Incarceration Age = 17	–	–	14% (11)	0.345	–	–	–	–	–
Total Days Incarcerated	2668.554	3471.825	4606.338	3874.447	2142.502	3144.406	873.613	1715.966	<.0001 ^b
Total Days Incarcerated Age < 18	187.405	448.081	520.568	621.749	0	0	0	0	–
Total Days Incarcerated Age ≥ 18	2481.150	3277.794	4085.770	3634.760	2142.502	3144.406	873.613	1715.966	<.0001 ^b
Age	55.032	7.447	55.642	8.151	54.516	6.909	54.904	7.220	0.625 ^b
Generation X	25% (57)	0.436	26% (7)	0.441	29% (23)	0.455	20% (13)	0.406	0.506
Female	18% (40)	0.383	9% (7)	0.283	21% (17)	0.412	25% (16)	0.436	0.013 ^a
Black	64% (144)	0.481	68% (55)	0.470	60% (48)	0.493	64% (41)	0.484	0.828 ^c
Hispanic ^a	15% (33)	0.355	14% (11)	0.345	19% (15)	0.393	11% (7)	0.315	0.828 ^c
Other	11% (24)	0.309	6% (5)	0.242	16% (13)	0.371	9% (6)	0.294	0.828 ^c
White	20% (44)	0.398	19% (15)	0.391	19% (15)	0.393	22% (14)	0.417	0.828 ^c
Ever Used Hard Drugs?	80% (181)	0.398	88% (71)	0.331	80% (64)	0.403	72% (46)	0.453	0.059
Ever Misused Prescription Stimulants	29% (66)	0.456	40% (32)	0.492	31% (25)	0.466	14% (9)	0.350	0.003
Have You Ever Used Any Drug by Injection	25% (57)	0.436	37% (30)	0.486	24% (19)	0.428	13% (8)	0.333	0.003
Number of Total People Had Anal or Vaginal Sex Within the Past 3 Months?	0.844	2.232	0.852	2.026	0.488	0.857	1.281	3.350	0.105 ^b
Diagnosed or Symptoms of PTSD	54% (122)	0.499	62% (50)	0.489	56% (45)	0.499	42% (27)	0.498	0.058
Any Chronic Mental Health Condition	72% (163)	0.448	81% (66)	0.391	71% (57)	0.455	63% (40)	0.488	0.038
Any Chronic Physical Health Condition	88% (199)	0.320	84% (68)	0.369	94% (75)	0.244	88% (56)	0.333	0.137 ^a
Ever Part of Foster Care?	12% (27)	0.326	20% (16)	0.401	5% (4)	0.219	11% (7)	0.315	0.014 ^a

(continued)

Table 1. (Continued)

Variable	Total analytic sample		First incarceration age < 18		First incarceration 18 ≤ age ≤ 24		First incarceration age ≥ 25		Pearson χ^2 test ^a $P > \chi^2$
	Mean (N)	SD	Mean (N)	SD	Mean (N)	SD	Mean (N)	SD	
Married/Serious Relationship	14% (32)	0.350	15% (12)	0.357	11%	0.318	17% (11)	0.380	0.881 ^a
Widowed	5% (11)	0.216	2% (2)	0.156	5% (4)	0.219	8% (5)	0.270	0.881 ^a
Divorced	27% (61)	0.446	26% (21)	0.441	29% (23)	0.455	27% (17)	0.445	0.881 ^a
Separated	10% (23)	0.304	10% (8)	0.300	11% (9)	0.318	9% (6)	0.294	0.881 ^a
Never Married	44% (98)	0.497	47% (38)	0.502	44% (35)	0.499	39% (25)	0.492	0.881 ^a
Number of Hours Spent Alone on a Typical Day in the Past 3 Months	8.424	7.557	9.568	10.545	8.044	4.929	7.453	5.345	0.211 ^b
Volunteer Work in Past 3 Months	29% (65)	0.454	30% (24)	0.459	26% (21)	0.443	31% (20)	0.467	0.792
Highest Grade Completed	14.342	3.561	13.383	2.952	14.213	2.988	15.719	4.438	0.0003 ^b
Number of Years Worked Full-Time in Lifetime	17.507	13.229	14.531	13.040	18.275	13.100	20.313	13.077	0.026 ^b

^aFisher's exact test is used for cell sizes less than or equal to 5.

^bANOVA was used to test for differences since there are more than two comparison categories and the variable of interest is continuous.

^cLikelihood Ratio estimated using an ordered logit to test if race and ethnicity significantly impact age at first incarceration.

^dRace and Ethnicity are not mutually exclusive. In particular, out of the 33 Hispanics in the sample, only 13 are listed as only Hispanic. The remaining 20 are listed as either White, Black, or other.

^eHighest grade completed codes no formal education as a 1, therefore, high school diploma/GED is coded as 13 years of education.

2,143 days among those first incarcerated from age 18 to 24 years, and an average of approximately 874 days among those incarcerated after the age of 24 years.

Table 1 also presents descriptive statistics for characteristics correlated with homelessness and age at first incarceration and a comparison of means for these characteristics for the three incarceration groups. The comparison of means demonstrates that the groups differ as predicted by the conceptual framework: Individuals with early exposure to the adverse experience of incarceration had greater rates of substance abuse and risky behaviors (i.e., hard drug use, misuse of prescription stimulants, and intravenous drug use), chronic mental health problems including PTSD, less social support and other types of non-cognitive human capital (as measured by foster care involvement, marital status, time spent alone in the past three months, and volunteer experience in the past three months), and lower levels of cognitive human capital (as measured by highest grade completed and the number of years the participant worked full-time).

Specifically, there are significant differences by age of incarceration for age at first literal homelessness ($P < .0001$), total days of literal homelessness ($P = .0001$), total time incarcerated ($P < .0001$), total time incarcerated as an adult ($P < .0001$), gender ($P = .013$), use of hard drugs ($P = .059$), use of prescription stimulants ($P = .006$), use of drugs by injection ($P = .003$), having ever been diagnosed with PTSD ($P = .058$), having ever been diagnosed with a chronic mental health condition ($P = .038$), highest grade completed ($P = .0003$), having ever been part of the foster care system ($P = .014$), and number of years worked full-time ($P = .026$). Therefore, we estimate the effect of age at first incarceration, holding these factors constant.

Table 2 presents multiple linear regression results for age at first instance of literal homelessness by measuring the association between age at first incarceration and age at first instance of literal homelessness along the extensive margin, with and without covariates that influence this relationship. Results demonstrate that age at first incarceration significantly affects the timing (i.e., age) of the first literal homelessness experience, and this effect is large. Moreover, including covariates thought to mediate the relationship between age at first incarceration and age at first instance of literal homelessness does not largely affect the magnitude and significance of our findings, and this can be observed by comparing the results in Equations 1–3.

Equation 3, the fully specified model, demonstrates that even after controlling for the variables suggested by the theoretical model, such as total time spent incarcerated, drug use, and other variables correlated with risky behavior (i.e., lifetime intravenous drug use and number of sex partners in the past three months), chronic physical and mental health conditions, social support and other variables correlated with non-cognitive skills, cognitive human capital (i.e., education and number of years worked full-time), and demographic variables, individuals first incarcerated during adolescence and as TAY experience homelessness approximately 9.8 and 5.1 years before those first incarcerated after the age of 24. The difference in age at first instance of literal homelessness was also significant between individuals first incarcerated as adolescents and those incarcerated as TAY: individuals first incarcerated prior to age 18 years, experience their first homelessness almost 4.7 years prior to those incarcerated as TAY. Other variables that significantly affect age at first homelessness are hard

Table 2. Age at first literal homelessness.

	All			Youth
	Equation 1	Equation 2	Equation 3	Equation 4 ^b
Criminogenic Factors				
First Incarceration Age < 18	-11.6154*** (1.9944)	-11.3376*** (1.9206)	-9.7955*** (2.4787)	
First Incarceration 18 ≤ Age ≤ 24	-5.7438** (1.7721)	-5.1766** (1.7275)	-5.1385** (1.8503)	
First Incarceration Age ≥ 25 (Omitted Group)				
(Quintiles) Age at First Incarceration				
(1) First Incarceration 7 ≤ Age ≤ 12				12.9968* (5.8158)
(2) First Incarceration 13 ≤ Age ≤ 14				10.5673* (5.0658)
(4) First Incarceration Age = 16				8.3431 (5.7976)
(5) First Incarceration Age = 17				9.2757 (6.3738)
(3) First Incarceration Age = 15 (Omitted Group)				
Total Time Incarcerated Age < 18				-0.0082* (0.0033)
Total Time Incarcerated Age ≥ 18				-0.0004 (0.0006)
Total Time Incarcerated (Youth and Adult)			0.0002 (0.0004)	
Demographic Variables				
Generation X		-8.0554*** (1.4930)	-7.0826*** (1.9100)	-8.6281 [†] (4.5435)
Silent Generation and Baby Boomers (Omitted Group)				
Female		-0.4885 (1.6503)	1.8367 (2.1748)	-11.3953 (8.1351)
Male (Omitted Group)				
Race/Ethnicity				
Black		0.4720 (2.2367)	0.6308 (2.3680)	5.0453 (5.4073)
Hispanic ^a		2.0569 (2.6770)	1.4633 (2.7889)	7.9440 (6.3266)
Other		-0.6888 (2.7513)	-0.1321 (2.9807)	-4.2321 (7.5521)
White (Omitted Group)				
Drug Use and Other Risky Behaviors				
Ever Used Hard Drugs?			-4.6032* (2.1376)	-7.4657 (5.0885)
Ever Misused Prescription Stimulants			2.2655 (2.1544)	-0.3023 (4.2701)
Have You Ever Used Any Drug by Injection			0.0472 (2.1602)	-7.0239 [†] (4.1653)
Number of Total People Had Anal or Vaginal Sex With in the Past 3 Months?			-0.3860 (0.2777)	-0.1828 (0.6860)
Health Factors				
Diagnosed or Symptoms of PTSD			-1.1900 (1.8142)	6.2260 (4.4700)
Any Chronic Mental Health Condition			-2.9963 (2.1326)	-5.3483 (5.4279)
Any Chronic Physical Health Condition			0.7169 (2.5568)	4.0769 (4.4933)
Social Support and Other Non-Cognitive Factors				
Ever Part of Foster Care?			-3.0233 (2.7468)	2.1274 (5.6637)
Relationship Status				
Widowed			-5.9245 (3.7827)	6.4994 (10.9691)

(continued)

Table 2. (Continued)

	All			Youth
	Equation 1	Equation 2	Equation 3	Equation 4 ^b
Divorced			0.1725 (2.6937)	0.5752 (6.8210)
Separated			−1.3020 (3.2915)	1.5333 (7.2116)
Never Married			−0.9866 (2.4182)	0.6180 (5.2863)
Serious Relationship/Married (Omitted Group)				
Number of Hours Spent Alone on a Typical Day in the Past 3 Months			−0.0361 (0.0850)	−0.0450 (0.0988)
Volunteer Work in Past 3 Months			−0.4915 (1.9440)	−0.9166 (4.5960)
Human Capital/Cognitive Factors				
Highest Grade Completed			0.1955 (0.2264)	0.3216 (0.6246)
Number of Years Worked Full-Time in Lifetime			0.0938 (0.0813)	−0.0032 (0.1573)
Constant	X	X	X	X
N	225	225	225	81
R-squared	0.1301	0.2089	0.2915	0.3654

Heteroskedastic robust standard errors in parentheses.

[†] $p < .10$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

^aHispanic is not mutually exclusive to race categories.

^bThe analytical sample consists only of individuals incarcerated before age 18 and their first spell of literal homelessness.

Notes: The Dependent Variable is the respondent's age at first instance of literal homelessness. The sample consisted only of individuals who experienced their first homeless spell after their first incarceration.

drug use and birth cohort. Individuals who indicate hard drug use at some point experienced homelessness roughly 4.6 years earlier than those who do not, and individuals born in Generation X experience their first literal homelessness approximately 7.1 years earlier than those from the baby boomer and silent generations, holding other factors constant.

As aforementioned, at first incarceration, the three age groups differ systematically on many observable characteristics, suggesting selection bias. Nonetheless, because the data include information on the reported age at first incarceration and the reported total number of days incarcerated as an adolescent and as an adult, we limit the sample only to those who experienced their first incarceration before 18 years. These variables allow us to estimate the effect along the extensive (i.e., regression of age at first literal homelessness on a categorical variable created using the quintiles of age incarcerated as a youth) and intensive margins (i.e., dose-response of the number of days incarcerated before age 18 years and after age 18 years). This specification allows us to address selection bias concerning group membership (i.e., whether individuals in the group incarcerated as adolescents differ from those only incarcerated as TAY or as adults age 25 years or older) because everyone in the restricted sample experienced their first incarceration as an adolescent.

The extensive margin analysis will also allow us to determine whether or not there are heterogenous effects based on the timing (age) of the first incarceration as an adolescent. Equation 4 shows that the timing of the first incarceration as a youth

significantly affects the age at first incarceration for individuals incarcerated at ages less than 15 years, holding other factors constant. Specifically, individuals incarcerated between the ages of 7 and 12 years, and those incarcerated at age 13 or 14 years, experience their first literal homelessness roughly 13 years and 10.6 years later than those incarcerated at age 15 years. Although not statistically significant, individuals incarcerated at age 16 and 17 years, experience their first literal homelessness roughly eight years and nine years, respectively, after those incarcerated at age 15 years.

Equation 4 also shows that age at first incarceration has a significant effect on the intensive margin (i.e., the amount of time incarcerated less than 18 years of age). Specifically, age at first homelessness decreases by .0082 years each day incarcerated prior to age 18 years; however, time spent incarcerated as an adult does not significantly affect age at first incarceration among the restricted sample. On average, individuals incarcerated prior to 18 years old spend approximately 520.6 days incarcerated as an adolescent, which translates to a decrease of 4.27 years in age at first instance of literal homelessness. Similar to regressions with the full analytic sample, individuals incarcerated as adolescents who are also part of Generation X experience literal homelessness sooner than those who do not: Those in Generation X become literally homeless roughly 8.6 years prior to those in the silent or baby boomer generation. Although the magnitude is slightly larger for the effect of hard drug use on the age at first homelessness in Equation 6, when compared to Equation 3, the effect is no longer statistically significant in the restricted sample. However, intravenous drug use among individuals incarcerated as youth is associated with a marginally significant decrease in the age at first literal homelessness by roughly seven years.

Table 3 displays the multiple regression for lifetime duration of literal homelessness. Equations 1–3 demonstrate that incarceration as a TAY does not significantly affect lifetime duration of literal homelessness relative to individuals incarcerated at age 25 years or older at the extensive margin. However, the results also show a statistically significant, relatively large, effect of incarceration as an adolescent on the lifetime duration of homelessness that decreases in magnitude and significance as variables hypothesized to mediate this relationship (Figure 1) are included in the model. Specifically, experiencing a first incarceration during adolescence is associated with an increase in the lifetime duration of literal homelessness by approximately 1,497 days, compared with individuals incarcerated after age 24 years. However, once variables from the conceptual framework are incorporated into the model (Equation 3), the effect of an incarceration as an adolescent relative to individuals incarcerated as an adult decreases by roughly 1,167 days and is no longer statistically significant. Additional analyses¹ uncover that both total time spent incarcerated (as a youth and an adult) and highest grade completed completely mediate the effect of age at first incarceration on the lifetime duration of literal homelessness. Other factors that significantly influence the lifetime duration of literal homelessness are total time incarcerated, relationship status, and highest grade of education. Total time incarcerated increases the duration of literal homelessness by .134 days for each day incarcerated, or 48 days for each year confined. Individuals who have never been married

¹Available from the authors upon request.

Table 3. Lifetime duration (days) of literal homelessness.

Variables	All			Youth Equation 4 ^b
	Equation 1	Equation 2	Equation 3	
Criminogenic Factors				
First Incarceration Age < 18	1496.9681*** (376.4981)	1422.4285*** (381.4420)	330.3641 (439.5278)	
First Incarceration 18 ≤ Age ≤ 24	254.7383 (315.2369)	298.8849 (324.6166)	−228.9697 (345.2056)	
First Incarceration Age ≥ 25 (Omitted Group)				
Total Time Incarcerated (Youth and Adult)			0.1338 [†] (0.0791)	
(Quintiles) of Age at First Incarceration				
(1) First Incarceration 7 ≤ Age ≤ 12				−881.1619 (845.5124)
(2) First Incarceration 13 ≤ Age ≤ 14				−1126.5252 (917.6420)
(4) First Incarceration Age = 16				−2191.8012* (968.9050)
(5) First Incarceration Age = 17				−2048.2843 [†] (1156.8914)
(3) First Incarceration Age = 15 (Omitted Group)				
Total Time Incarcerated Age < 18				0.6917 (0.6851)
Total Time Incarcerated Age ≥ 18				0.2695* (0.1181)
Demographic Variables				
Generation X		−265.8722 (306.6462)	−586.3855 (390.3501)	−1884.1839* (914.0413)
Silent Generation and Baby Boomers (Omitted Group)				
Female		−527.9277 [†] (275.2178)	−209.9319 (380.3399)	2240.4393 [†] (1208.8000)
Male (Omitted Group)				
Race/Ethnicity		347.0322	263.4307	97.5769
Black		(426.6500)	(463.1669)	(737.0775)
Hispanic ^a		−365.8977 (425.7605)	−633.7213 (465.7450)	−1919.8225** (684.5679)
Other		17.0611 (446.5384)	513.1256 (526.6230)	1747.8449 (1207.1155)
White (Omitted Group)				
Drug Use and Other Risky Behaviors				
Ever Used Hard Drugs			618.5685 (418.7217)	1108.2511 (1067.4040)
Ever Misused Prescription Stimulants			98.8770 (439.7397)	459.8082 (802.1682)
Ever Used Any Drug by Injection			400.0594 (429.5999)	1121.2512 (711.4436)
Number of Total People Had Anal or Vaginal Sex With in the Past 3 Months			−18.4502 (54.0034)	−235.6135 (183.3329)
Health Factors				
Diagnosed or Symptoms of PTSD			−67.8394 (329.5963)	425.2517 (686.3223)
Any Chronic Mental Health Condition			−27.3426 (389.6939)	−1341.3143 (894.8976)
Any Chronic Physical Health Condition			−358.0325 (405.0504)	384.5995 (730.1995)
Social Support and Other Non-Cognitive Factors				
Ever Part of Foster Care?			309.6527 (511.9788)	600.5523 (883.6050)
Relationship Status				
Widowed			138.4955 (601.7058)	−4517.4308* (1895.9447)
Divorced			596.9342	394.2165

(continued)

Table 3. (Continued)

Variables	All			Youth
	Equation 1	Equation 2	Equation 3	Equation 4 ^b
Separated			(425.6519) 850.5795 (542.0156)	(1190.6297) —811.3534 (1087.1537)
Never Married			920.2758* (451.4579)	810.8352 (1254.5000)
Serious Relationship/Married (Omitted Group)				
Number of Hours Spent Alone on a Typical Day in the Past 3 Months			—8.1045 (18.7420)	—8.0497 (21.6260)
Volunteer Work in Past 3 Months			—457.8700 (337.9289)	—2245.8105** (822.2830)
Human Capital/Cognitive Factors				
Highest Grade Completed			—124.4497** (42.9129)	—162.8536 [†] (91.6145)
Number of Years Worked Full-Time in Lifetime			—15.9227 (15.8607)	—12.3967 (31.5983)
Constant	X	X	X	X
N	225	225	225	81
R-squared	0.0811	0.1035	0.2551	0.4850

Heteroskedastic robust standard errors in parentheses.

[†] $p < .10$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

^aHispanic is not mutually exclusive to race categories.

^bThe analytical sample consists only of individuals incarcerated before age 18 and their first spell of literal homelessness.

Notes: The Dependent Variable is the total number of days literally homeless. The sample consisted only of individuals who experienced their first homeless spell after their first incarceration.

experience literal homelessness for roughly 920 days longer than married individuals. Finally, every year of education reduces the duration of lifetime literal homelessness by approximately 124 days. Therefore, individuals with a college degree experience 496 fewer days of literal homelessness than an individual with a high school diploma.

To understand selection bias between groups, we once again restrict our sample to only those individuals incarcerated prior to age 18 years and estimate the effect of age at first incarceration as a youth along the extensive margin and the intensive margin. In terms of the extensive margin, Equation 4 shows that relative to individuals incarcerated at age 16 years and 17 years, those incarcerated at age 15 spend a statistically significant 2,192 days and a marginally significant 2,048 days longer in literal homelessness, respectively. Although not statistically significant, individuals incarcerated at ages less than 13 years and between the ages of 13 and 14 years also spend shorter periods in literal homelessness relative to those incarcerated at age 15 years. Finally, Equation 4 of Table 3 also demonstrates a statistically significant effect along the intensive margin for time incarcerated as an adult among the restricted sample. Individuals incarcerated as an adolescent who were also incarcerated as an adult spend approximately .27 more days in literal homelessness for each day incarcerated as an adult. Thus, the average respondent in our restricted sample was incarcerated for roughly 4,086 days as an adult, and is thus estimated to spend approximately 1,103 additional days in literal homelessness.

Other factors that significantly affect the duration of literal homelessness for respondents incarcerated as an adolescent are Generation X, gender, Hispanic, relationship status, volunteer status in the past 3 months, and the highest grade completed. Specifically, individuals in Generation X have a total duration of homelessness that is 1,884 days fewer than those in the silent and baby boomer generations, but this relationship is likely mechanical. Women incarcerated as youth spend a marginally significant 2,240 days longer in homelessness than men. Hispanic respondents that were incarcerated as a youth spend 1,920 fewer days in literal homelessness than non-Hispanics. Individuals with a deceased spouse also spend approximately 4,517 fewer days in literal homelessness than those who are married or in a serious relationship; however, caution should be taken when interpreting this result because of the extremely small cell size. Individuals who have volunteered in the past three months had roughly 2,246 fewer days in literal homelessness than those who did not. Finally, each additional year of education completed is associated with a marginally significant decrease in the total time in literal homelessness by approximately 163 days.

Discussion

Research suggest that early exposure to adversity may lead to even greater challenges in later life. In this study, we investigate the impact of the relationship between an adverse experience (i.e., incarceration) during adolescence and early adulthood on age at first homelessness and lifetime duration of literal homelessness. Incarceration during adolescence and early adult years has been shown to disrupt development of legal human capital, such as high school completion (Aizer & Doyle, 2015) and may actually encourage investment in criminal human capital (Stevenson, 2017) (e.g., auto theft), which could lead to employment in low-skilled, low-paying jobs, detachment from the formal labor market, and an incarceration as an adult. Moreover, as aforementioned, incarceration as an adolescent is also associated with worse mental and physical health in adulthood and greater barriers to employment, specifically for young black men. Incarceration as an adolescent or young adult could lead to early disruptions of family and social ties and thus to deterioration of social support (Hill et al., 2010, Laub & Sampson, 1993; Stevenson, 2017). Finally, an early incarceration can be a path to homelessness because of poor coordination during the transition from confinement back into society. Therefore, we hypothesized that confinement during the formative years of development could lead to a greater cumulative disadvantage over the life course. As a result, an early incarceration could lead to earlier experiences of literal homelessness and to longer lifetime durations of homelessness.

We find that experiencing an incarceration as an adolescent and young adult is associated with a lower age of first instance of homelessness by 9.8 and 5.1 years, respectively, compared with individuals incarcerated after age 24 years, holding other factors constant. The findings provide evidence that incarceration at earlier ages is associated with relatively large decreases in the age at first literal homelessness, and this effect is significantly worse for individuals incarcerated earlier in adolescence versus those incarcerated after age 18 years. This effect persists in magnitude and significance even after controlling for the potential mechanisms representing social capital, substance use, traumatic experiences,

health, and human capital. Because the average age at first literal homelessness is approximately 35 for individuals incarcerated prior to the age of 18 years, it seems unlikely that the large effect that remains after controlling for potential mediators represents the direct pathway to homelessness through insufficient coordinated reentry services.

Our findings based on the restricted sample also suggest that the effect is unlikely to be driven by selection bias between individuals incarcerated as adolescents and those incarcerated as adults. Specifically, when we restrict the sample to those first incarcerated prior to age 18 years, incarceration is marginally significant for the difference between those incarcerated at age 13 and 14 years relative to age 15 years. Although not significant, the large differences between individuals incarcerated at age 15 years relative to the other quintile age groups, suggest that incarceration at age 15 years may be driving the effect among adolescents, and that this age group may be especially vulnerable to the impact of incarceration on the timing of literal homelessness. The results also suggest that the length of incarceration matters, particularly among individuals incarcerated as adolescents. Specifically, every day incarcerated as an adolescent decreases the age at first homelessness by .0082 years. Thus, those incarcerated for 365 days as a youth will experience homelessness approximately 2.6 years before those incarcerated for only 48 days. In general, these findings suggest that early incarceration is important along the extensive and intensive margins for age at first literal homelessness. In other words, outcomes later in life are influenced not only by the experience of incarceration as an adolescent and TAY (i.e., extensive margin) but also the duration of the exposure (i.e., intensive margin).

Similarly, we find that individuals exposed to their first incarceration earlier in adolescence have longer durations of literal homelessness, but this finding appears to operate through total time spent incarcerated and education. In other words, once we control for total time incarcerated or education in the model, the effect diminishes significantly in magnitude and is no longer statistically significant. However, the restricted sample results suggest that age at first incarceration affects the total duration of literal homelessness at both the extensive and intensive margins among the group of individuals incarcerated younger than 18 years, and this effect persists even after controlling for education and total time spent incarcerated. Among this group, individuals incarcerated at age 15 years spend significantly longer in literal homelessness than those incarcerated at age 16 and age 17 years (and those incarcerated at an age less than 15 years, but these differences are not statistically significant), even after controlling for total time incarcerated. These results are consistent with the findings of Aizer and Doyle (2015), that is, the effect of juvenile incarceration on high school completion and incarceration by age 25 years is stronger for individuals incarcerated at ages 15–16 years. Nonetheless, when we disaggregate total time spent incarcerated, we observe that the effect of total time incarcerated is driven by the time incarcerated as an adult, not as a youth. Therefore, the effect of incarceration during adolescence on the duration of literal homelessness is observed to operate through the association between incarceration as an adolescent and longer durations of incarceration as an adult.

Notably, although the mechanisms conceptualized in the theoretical model only moderately affect the relationship between the timing of incarceration (i.e., incarcerated at an age less than 18 years and incarcerated at age 18–24 years, relative to an incarceration at

age 25 years or older) and the timing of literal homelessness (the coefficients reduce by approximately 16% and 11% in the full model, respectively), they have a more significant impact on the relationship between the timing of the first incarceration and the duration of literal homelessness. Specifically, the difference between individuals incarcerated as a youth and those incarcerated at age 25 years or older decreases by 78% in the full model. Also notable is that time served for individuals incarcerated as an adolescent is over two and five times those incarcerated as a TAY and as an adult, respectively. As discussed in one study, this finding could be because individuals incarcerated as adolescents experience heightened housing insecurity and thus may commit more serious crimes to avoid homelessness leading to extended periods of incarceration as an adult. If this reason were true, and because the average age at first literal homelessness is roughly 35 years, it would suggest that adult incarceration could be a form of temporary housing, delaying the onset of the first literal homelessness until much later in life.

It is also plausible that if the definition of homelessness were expanded to include other forms of homelessness more commonly experienced by youth, but not captured in the definition of literal homeless (e.g., doubling up, couch surfing, etc.), then we might observe a much earlier age at first literal homelessness. Regardless, even after controlling for total time incarcerated, and other mechanisms, there remains a significant gap in the age at first literal homelessness for those incarcerated as adolescents and TAY relative to those incarcerated as adults. Moreover, the restricted sample analysis suggests that, holding constant the age at first incarceration as an adolescent, total time incarcerated as an adult, and other factors, the total time incarcerated as an adolescent has a significant direct effect on the age at first homelessness.

Because we could not control for social capital and non-cognitive skills at the time of the youth's incarceration, the effect of age at incarceration could be picking up aspects of past social networks and non-cognitive skills that are not adequately controlled for with the more current variables in the model. Specifically, because we could not observe reentry services provided at the time of release from the incarceration, and because our variables that measure social capital and other non-cognitive skills may not completely capture their dynamic aspects, the direct effect of adolescent and TAY incarceration on the age at first homelessness is plausibly picking up family conflict and/or poor non-cognitive skills at the time of release, in addition to poor reentry management.

Other variables that significantly affect the timing of literal homelessness are hard drug use and Generation X for individuals incarcerated prior to age 18 years, holding other factors constant. This suggests that formerly incarcerated persons with a history of hard drug use should receive additional support to combat homelessness. The significance of Generation X might suggest that structural factors have changed over time resulting in earlier ages of homelessness, aside from the changes in the duration of incarceration and the likelihood of incarceration. One possibility could be deinstitutionalization, although mental health is controlled for in the model.

Additional variables that significantly affect the duration of literal homelessness are educational attainment, as well as volunteer work, ethnicity, and gender for individuals incarcerated at an age less than 18 years. Education is a protective factor for the duration of literal homelessness: individuals who have completed higher levels of education experience fewer days in literal homelessness. Specifically, an individual with only a high

school diploma will spend approximately 496 days longer in literal homelessness than an individual with a college degree, and this effect is larger for individuals incarcerated as an adolescent. Hispanics incarcerated as adolescents spend significantly less time in literal homelessness, which could be due to access to social (familial) networks that are better at providing housing (Baker, 1994; Castañeda, Klassen, & Smith, 2014). Moreover, individuals incarcerated as adolescents who volunteer have significantly lower durations of homelessness. This finding provides evidence that soft skills correlated with volunteering (e.g., prosocial behavior, leadership skills, developing social capital, etc.) (Wilson & Musick, 1999) may be a protective factor against longer spells of literal homelessness. This effect could operate, for example, through non-cognitive skills associated with intrinsic motivation or building informal networks, which similar to employment, might offer greater benefits (e.g., through expansion of informal networks) in finding housing solutions. Finally, women incarcerated as adolescents seem to be especially vulnerable to longer durations of literal homelessness, which mirrors the findings in the literature that incarcerated women are more disadvantaged compared with men (Cox, 2012).

Conclusion and limitations

Our findings provide additional evidence that incarceration prior to age 25 years, especially during adolescence, is an adverse experience with long-term consequences. Timing of incarceration is observed to directly affect age at first literal homelessness, even after controlling for potential mediators such as education, social support and other non-cognitive skills, substance use and other risky behaviors, chronic health conditions, and other forms of human capital. Early incarceration also affects the lifetime duration of literal homelessness for individuals incarcerated as adolescents. However, this effect is partially mediated by the mechanisms discussed in the conceptual framework and completely mediated by the total time spent incarcerated and education. Restricting the sample to those incarcerated during adolescents, we observe that the total time spent incarcerated as an adult is driving the effect of total time spent incarcerated on the duration of literal homelessness. Although we observe some evidence that sample selection is not driving our results, we cannot rule out that incarceration early in life is simply a marker for individuals who are more economically and socially disadvantaged. For example, a large body of literature has linked child maltreatment, especially neglect, and unstable family circumstances to juvenile delinquency (Ryan & Testa, 2005) and juvenile detention (Jonson-Reid & Barth, 2000). While we control for one form of child welfare involvement, foster care, age at first incarceration may still be correlated with unobservable measures of maltreatment and neglect during childhood. Restricting the sample to individuals incarcerated as an adolescent helps to address the selection bias between the main age groups, but not necessarily within age groups.

Ultimately, this study identifies two groups—individuals incarcerated as adolescents and young adults—that may benefit from early intervention of services because of their greater risk of having earlier experiences and somewhat longer durations of homelessness. The problem of homelessness among the incarcerated population should be viewed within a reentry context, especially if the transition from incarceration to society is considered within the lens of deinstitutionalization (Metraux et al., 2007). Our findings suggest

that incarcerated youth and young adults should be provided additional support and services, such as substance abuse prevention, education, opportunities to improve their social capital, and housing support that can help them avoid future incarcerations and homelessness. To the extent that exposing youth and young adults to incarceration is associated with greater housing insecurity, this could lead to increased social costs for combating homelessness and create barriers to intergenerational mobility among communities disproportionately impacted by adolescent incarceration.

We also find evidence that women incarcerated during their youth may need additional support because they are more vulnerable to longer durations of homelessness compared with men who are incarcerated as adolescents. This finding likely reflects that incarcerated women tend to be more economically disadvantaged than men (Cox, 2012). Finally, because of the racial disparities in juvenile detention, this study may help explain the disproportionately high rates of homelessness among minorities, specifically African Americans (Engen, Steen, & Bridges, 2002). Our findings suggest that long-term supportive services are necessary for individuals incarcerated before 25 years old, especially for women. Moreover, these findings refine the working knowledge that prior incarceration increases the risk of prolonged homelessness and can aid agencies in more accurate risk assessments.

A few caveats should be considered when interpreting this study's results. Caution should be applied when interpreting some of the results because of small cell sizes (e.g., only eight women were first incarcerated as juveniles). In addition, the study sample comprises middle-aged to older formerly incarcerated homeless individuals; therefore, the results may not be generalizable to formerly incarcerated youth and young adults who are homeless. Another concern regarding generalizability is that because the original sample was collected among persons transitioning from homelessness to PSH, it may represent neither the broader homeless population nor the formerly incarcerated population. Moreover, we are missing data on offense type (although this is partially controlled for through total time incarcerated) and incarceration history is self-reported; thus, recall error or false reporting could bias our results. In a study conducted by Lemieux, Roy, Martin, Latimer, and Crocker (2017), however, researchers found self-reported history of incarceration to be as reliable as administrative data and stated that either could be used with reliability. Additionally, we cannot directly test the mechanism quality of reentry services because we do not observe this variable in the data. We also do not have information on the type of adult correctional facility individuals were incarcerated in; however, this variable will be correlated with total time incarcerated, which is included in our model. Finally, this analysis is cross-sectional; thus, we cannot fully understand the dynamic process behind the timing of first incarceration and transitions in and out of homelessness.

Future research should replicate this work with a more representative sample using a longitudinal study design, include a younger cohort of individuals, and should more precisely determine the mechanisms through which incarceration might lead to greater homelessness among individuals exposed to an early incarceration over time. Given disproportionate rates of incarceration among minorities, future studies should also estimate how much of the racial disparities in homelessness (and housing insecurity in general) are explained by racial disparities in juvenile and young adult incarceration.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Informed consent

This research involved human participants. Interviewers obtained informed consent from participants in English or Spanish. The study was approved by the University of Southern California Institutional Review Board and received a Certificate of Confidentiality from the U.S. Department of Health and Human Services.

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