

Fleming, C. M., & Nurius, P. S. (2019). Incarceration and adversity histories: Modeling life course pathways affecting behavioral health. *American Journal of Orthopsychiatry*. Advance online publication. <https://doi.org/10.1037/ort0000436>

Incarceration and Adversity Histories: Modeling Life Course Pathways Affecting Behavioral Health

Christopher M. Fleming¹ and Paula S. Nurius²

¹ University of Oregon, Prevention Science Institute

²University of Washington, School of Social Work

Author Note

This research was supported in part by a Eunice Kennedy Shriver National Institute of Child Health and Human Development research infrastructure grant, R24 HD042828, to the Center for Studies in Demography & Ecology at the University of Washington, a Gates Foundation grant via the Foundation for Healthy Generations, and by an Institute of Education Sciences postdoctoral training grant, R324B180001, to the Prevention Science Institute at the University of Oregon. We would like to thank Dr. Jerry Herting (University of Washington) for providing valued and insightful review and input to this paper.

Contact: Christopher M. Fleming, Prevention Science Institute, University of Oregon, 6217 University of Oregon, Eugene OR, 97403-6217, cfleming@uoregon.edu

Abstract

A consequence of a growing incarceration rate is that an increasing number of children face having an incarcerated household member, a known contributor to diverse lifelong behavioral health risks such as substance use and mental health impairment. Few studies have explored how household incarceration uniquely contributes to these subsequent behavioral health concerns, nor mediational contributors to these associations, within a theoretical framework. Using state Behavioral Risk Factor Surveillance System survey data (n=14,001), this study tests pathways of household incarceration and Adverse Childhood Experiences (ACEs) to mental health impairment and substance use in adulthood. Within a life course stress process perspective, this study uses structural equation modeling to examine mediational pathways through adulthood incarceration and indicators of adulthood adversity, low income, and supportive resources. In line with stress process theorizing, results indicate significant direct and indirect paths of ACEs through nearly all theorized mediators, and indirect pathways of household incarceration, through incarceration and low income, to adulthood mental health impairment and substance use. Implications of these findings address preventive and interventional leverage points to mitigate long-term consequences of household incarceration and other childhood adversities.

Keywords: household incarceration, adverse childhood experiences, mental health, substance use, stress process

Public Policy Relevance Statement

Growing rates of incarceration have intergenerational implications for health and functioning. Findings from the current study highlight direct and indirect pathways through which childhood and adulthood incarceration and other adverse exposures are linked within life course stress processes toward development of adulthood substance use and mental health impairment. Implications for preventive and interventional leverage points are discussed.

Incarceration and Adversity Histories:

Modeling Life Course Pathways Affecting Behavioral Health

One of the more tangible but overlooked consequences of a growing rate of incarceration is its negative impact on a concomitant growing population of children and young relatives of detainees. The rate of incarceration in the United States has more than quadrupled since the 1970s and has led to the U.S. having both the highest incarceration rate and the largest prison population in the world, with disproportionate increases found among racial and ethnic minority groups (Travis, Western, & Redburn, 2014). This expansion in incarceration is particularly devastating to the now more than 2 million children and younger relatives of incarcerated household members, children who are now more likely to experience greater proximal and lifelong risks, including increased likelihood of behavioral health problems like mental health impairment and substance use (Mears & Siennick, 2016). More children than ever before in the United States have parents, caregivers, and extended family with incarceration histories (Uggen & McElrath, 2014), creating the potential for an increasingly large population with elevated life course risk.

Not yet well established in consideration of incarceration exposure and behavioral health implications are the specific effects of incarceration of childhood household members (often parents) as distinct from and relative to the broader set of adversity exposures that these children experience (Johnson & Easterling, 2012). Prior research using the Adverse Childhood Experiences (ACEs) index, which includes household incarceration, identifies childhood trauma exposure as a robust predictor of adulthood mental health issues, including depression, anxiety, and suicidal behavior (Anderson, Tiro, Price, Bender, & Kaslow, 2002; Chapman et al., 2004; Turner, Finkelhor, & Ormrod, 2006), as well as substance use (Mersky, Topitzes, & Reynolds,

2013). The majority of youth experience at least one adverse childhood experience (Felitti et al., 1998; Wade et al., 2016) before turning eighteen, with multiple adversities leading to more detrimental long-term outcomes (Dube, Williamson, Thompson, Felitti, & Anda, 2004; Schilling, Aseltine, & Gore, 2008).

Importantly, children who have been exposed to household incarceration are more likely to be exposed to other early life adversities. This includes parental substance use and mental illness (Phillips, Erkanli, Keeler, Costello, & Angold, 2006; Roos et al., 2016; Scott, Burke, Weems, Hellman, & Carrión, 2013) that are themselves influential contributors to greater behavioral health risks as these children age (Hunt, Slack, & Berger, 2017). These outcomes may be due, at least in part, to the parents' risk factors, including substance use, mental illness, and poor education, that associate not only with their own incarceration, but also with their children's risk of stressors, including family instability and material deprivation (Phillips et al., 2006).

Evidence for the long-term consequences of childhood adversity on adult functioning and outcomes has continued to demonstrate a need for considering likely pathways and targets of intervention (Korotana, Dobson, Pusch, & Josephson, 2016). By distinguishing household incarceration and other early and later life adversities in a life course stress process framework, we anticipate revealing relationships among these adversities and long-term behavioral health that have not yet been clearly identified in the literature. In the context of the growing prevalence of incarceration in the United States, urgency exists toward identifying specific effects of incarceration exposure both distinct from and in combination with other childhood adversities as well as the ripple effects of these early life exposures to subsequent risk and supportive experiences leading to adult behavioral health outcomes.

Household Incarceration within a Life Course Stress Process Framework

The stress proliferation model provides a template for understanding how stress begets stress over the life course, contributing to negative distal outcomes, such as poor mental health and substance use (Pearlin, Schieman, Fazio, & Meersman, 2005; Thoits, 2010). Early childhood adversities foster vulnerability to subsequent adulthood behavioral health issues through disruption of the stress response system, which ultimately impacts brain development, learning, and behavior (Shonkoff & Garner, 2012). Further, the repetition of exposures has been found to hamper capacity to recover, causing psychophysiological dysregulation (Danese et al., 2008) that leads to impairments in learning and the ability to adapt to new adversities (Shonkoff & Garner, 2012). In addition to biological consequences, repeated stress exposures and functioning dysregulation increase risk of a range of problematic conditions such as low socioeconomic status, stressful relationships and contexts that undermine adaptive capacities (Blane, Kelly-Irving, d'Errico, Bartley, & Montgomery, 2013). These earlier adversities, thus, serve as a catalyst for later life adversities and secondary stressors (e.g., contributing to poorer academic and workforce success, and maladaptive coping), culminating in further increased risk for behavioral health issues

As parents and caregivers make up the majority of household incarceration and are prime influences on a child's development, prior research on the influence and consequences of household incarceration has primarily focused on children of caregivers who have been incarcerated (Gottlieb, 2016). In childhood, parental incarceration is associated with internalizing and antisocial behaviors (Murray & Farrington, 2008; Murray, Farrington, & Sekol, 2012), as well as learning disabilities and developmental delays (Turney, 2014). In addition to increased risk of experiencing parental substance use, mental health issues, and separation (Scott

et al., 2013), youth with incarcerated parents also face increased risk of maltreatment, out-of-home placement, and the incarceration of other family members (Logan-Greene, Kim, & Nurius, 2016). Broader conceptualizations of household incarceration can reflect the influence of sibling and extended family stressors on children's long-term outcomes. For example, by triggering family conflict and creating other stress-bearing factors in the family, parental incarceration, and by extension household incarceration may produce stress environments toxic to the development of stable mental health and behavior in children (Aaron & Dallaire, 2010; Arditti, 2016; Murray & Farrington, 2008).

Parents' and caregivers' reduced potential for occupational opportunities and income as a result of an incarceration history also lowers the potential for positive outcomes for children by limiting the availability of supportive material resources and stability that would lead to a more successful developmental environment during childhood (Sykes & Pettit, 2015). For example, incarceration limits the available resources for children during their transition to adulthood by decreasing their likelihood of receiving income transfers and housing support from their parents (Siennick, 2016). These trajectories lead to greater long-term economic adversity, including increasing the odds of welfare receipt, lower income, and lower educational attainment (Mears & Siennick, 2016; Miller & Barnes, 2015). Alongside household incarceration, the broader index of ACEs has similarly been found to increase risk of poverty, unemployment, and poorer educational outcomes in adulthood (Metzler, Merrick, Klevens, Ports, & Ford, 2017).

Additionally, exposure to these stressors in childhood increases risk of negative health outcomes (Kalamakis & Chandler, 2015), poorer health-related quality of life (Gjelsvik, Dumont, Nunn, & Rosen, 2014), and trajectories of health risk (Nurius, Fleming, & Brindle, 2019). Health risk behavior is highest among individuals with multiple ACEs, with individuals

exposed to four or more ACEs being more likely to engage in substance use and to have other health risks including poor diet and obesity (Bellis, Hughes, Leckenby, Perkins, & Lowey, 2014; Campbell, Walker, & Egede, 2016). Apart from other ACEs, parental incarceration itself is associated with increased substance use and higher BMI (Roettger & Boardman, 2012; Roettger, Swisher, Kulh, & Chavez, 2011).

Further, these trajectories contribute to a reduction in supportive resources that would otherwise inhibit the development of later mental health issues directly or by mitigating the effects of associated adversities. For example, social support is a strong resource mediating the relationship between ACEs and depression in later adulthood, although higher levels of ACEs are associated with reduced social support (Cheong, Sinnott, Dahly, & Kearney, 2017) and exacerbation of risk. Similarly, stigma regarding mental health issues serves as a substantial barrier to mental health care access, whereas more accepting environments reduce this risk (Pederson et al., 2013). Likewise, higher early and later life adversity has been associated with weakened positive health behaviors, including physical activity (Nurius et al., 2019), an established protective factor for depressive symptoms (Du et al., 2015).

Further adding to the developmental risk projected by household incarceration and other childhood adversities is their impact on facilitating an intergenerational cycle of incarceration and related outcomes. Children who experience multiple ACEs are more likely to be incarcerated in adulthood (Roos et al., 2016). Incarceration is known to initiate trajectories toward mental health impairment (Turney, Wildeman, & Schnittker, 2012). Yet among these individuals, research has not clearly identified the unique contribution of their experiences of household incarceration, in addition to that of other ACEs and their own incarceration, to behavioral health outcomes.

The Present Study

The present study extends existing literature by using structural equation modeling to simultaneously test multiple theorized pathways of stress proliferation through which household incarceration, both separate from and in conjunction with other ACEs, are expected to contribute to later life mental health and substance use issues. We postulate that household incarceration and childhood adversities are correlated experiences that increase the likelihood of future adult incarceration and stress-proliferative mediators of low income and significant adverse experiences in adulthood and reduce the availability of supportive factors. Further, each of these paths leads to increased potential for negative behavioral health outcomes in adulthood, in this case substance abuse and poor mental health. Using a large representative population surveillance sample, this analysis allows simultaneous assessment of direct as well as indirect effects of early life predictors that constitute intergenerational pipelines of incarceration that culminate in eroded behavioral health.

Method

Sample

Data come from 14,001 respondents to the 2011 Washington State Behavioral Risk Factor Surveillance System survey—a state-level implementation of a national survey conducted in collaboration with the Centers for Disease Control and implemented through state health departments. Random-digit-dialing and a disproportionate stratified random sampling of households identified respondents for the survey. Surveys were conducted in both English and Spanish and were administered to non-institutionalized adults 18 years or older who reside in households with working landlines. Participants in the study were 60% female, and 87% were white, 1% black or African American, 5% Hispanic, 3% multiracial, and 4% from other races.

Only those respondents with valid responses to exogenous control variables were included in the present analyses, for a final sample size of 13,803.

Measures

Household Incarceration was assessed with the dichotomized (yes/no) item, “Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?” The survey assessed this as part of the ACEs module referring to experiences before age 18.

Adverse Childhood Experiences Score (ACEs). An index (range 0-7) was created as the sum of “Yes” responses to the remaining seven CDC categories of adverse experiences of youth under age 18. These categories include living with someone with serious mental illness or substance use issues, having parents who were divorced or separated, who physically hurt one another, or who were physically, sexually, or verbally abusive toward the respondent.

Adult Incarceration was assessed with the dichotomized (yes/no) item, “After age 18, did you serve time or were you sentenced to serve time in prison, jail, or other corrections facility?”

Low-Income was assessed as the sum of four dichotomous items (range 0-4). Consistent with other poverty index measurement approaches, we drew upon available socioeconomic and living standard indicators: having a current annual household income under \$25,000, currently being out of work or unable to work, being unable to see a healthcare provider due to the cost and being food insecure within the past year. Food insecurity was established with a yes response to one or more of five items: purchased food not lasting, being unable to afford to eat balanced meals, skipping or cutting meals in size due to lack of money, eating less because of a lack of money, and being hungry but unable to eat due to a lack of money.

Adult Adversity. Adult adversity is assessed as a summed index (range 0-5) of having

experienced one or more of five stressful experiences or risk behaviors believed to increase risk of poor behavioral health. Dichotomous indicators for homelessness, sexual assault, intimate partner violence, having health problems requiring specialized medical equipment, and currently provide regular care to others with illness or to unrelated children were included in this index.

Supportive Resources. A cumulative health support index, inclusive of items indicative of social support and mitigation of poor behavioral health outcomes, was created summing four items (range 0-4). Included were dichotomous indicators for being married or partnered, currently having people one could rely on for help, participating in common physical activities, and perceived low mental health stigma.

Substance Use. Substance use is an index of the frequency of use for several forms of higher-risk substance use—based on how many of the past 30 days respondents engaged in each of the following: binge drinking, marijuana use, and the recreational use of painkillers. These were summed to create an index with a range of 0 to 90.

Mental Health Impairment. Mental Health Impairment is a latent factor including 3 items: the number of days in the past month the respondent missed usual activities such as work or self-care due to a mental condition or emotional problem, the number of days in the past month the respondent felt they had poor mental health, and a serious mental illness index. The latter is based on the Kessler Psychological Distress Scale items-- feelings in the past month of being nervous, hopeless, restless, depressed, that everything was an effort, or worthless (Kessler et al., 2003).

Control Variables. Analyses control for gender, education (high school diploma/GED or not), and race, with mutually exclusive categories including White or Caucasian, Black or African American, Hispanic, other race, and multi-racial.

Analytic Plan

The present study uses structural equation modeling (SEM) to assess the relationship of household incarceration and other ACEs with mental health and substance use through both direct and indirect pathways. Analyses were conducted through two steps: confirmatory factor analysis established the validity of the three mental health items as a single construct and path analyses identified the strength of relationships and overall model fit of the theorized paths. The path model explores likely pathways from childhood adversities and household incarceration to mental health and substance use issues in adulthood, passing through mediators of adult incarceration, low income, adulthood adversities, and supportive resources. The model includes direct paths connecting each set of constructs, as well as multiple correlated variables within. Household incarceration and ACE items are conceptually aligned and were thus allowed to correlate with one another. Similarly, the four mediators of adult incarceration, low income, adult adversity, and supportive resources were allowed to correlate further with one another net of their shared antecedents, as these are theorized to collectively shape the stress proliferative and incarceration pipelines to adult behavioral health. Mental health and substance use symptoms are commonly comorbid and thus these constructs were also allowed to correlate in order to model this expected association. Lastly, indirect pathways extending from household incarceration and childhood adversities examine the cumulative contributions of more complex paths to mental health and substance use.

Although the data used are cross-sectional, and therefore do not allow for strict longitudinal assessment, each variable was modeled relative to the timeframe of its assessment. For example, household incarceration and ACEs are both based on childhood experiences, the four mediators indicate current statuses and events that have recently or ever occurred for the

respondent, and substance use and mental health are indicated for the past 30 days. As surveillance data are often designed on the basis of breadth rather than construction of scales with high internal consistency, the majority of constructs in the model were better supported as indices of observed variables.

Analyses used BRFSS recommended sampling weights based on demographic characteristics of the state of Washington to provide more accurate and representative estimates. Structural models included controls for gender, race, and education and were estimated using weighted least squares means and variance-adjusted (WLSMV) and a pairwise-present approach to missing data. To assess differences among individuals relative to household and adult incarceration, Wald difference tests examined mean differences of all study variables between groups. Analyses were conducted with MPlus 8.1 (Muthén & Muthén, 2017).

Results

[Table 1 about here]

Table 1 presents the weighted means and zero-order correlations among all study variables. The prevalence of household incarceration and adult incarceration were 8% and 6%, respectively. The mean number of ACEs within the sample was slightly under two; although the majority of the sample (60.7%) had one or fewer ACEs, 23.6% had 2-3, and 15.7% had four or more. All correlations were observed to be in the predicted directions, with adverse experiences, household incarceration, and adult incarceration being positively associated with mental health impairment variables and one another, and supportive resources being negatively associated with all other study variables. Correlations were generally of low to moderate magnitude (.06 to .40), with the largest magnitude associations found among the three mental health items (.49 to .62).

Comparisons of descriptive statistics between individuals with and without histories of

household incarceration (Table 2) show a pattern of significant differences across all study variables. For example, respondents whose household members had been incarcerated had three times the prevalence of incarceration themselves, as well as more than twice the number of ACEs, compared to individuals whose household members had never been incarcerated. A similar pattern is found when comparing individuals with and without incarceration histories themselves (Table 3), with those with incarceration histories having significantly lower levels of supportive resources and higher levels of all other study variables than those without such histories.

[Table 2 about here]

[Table 3 about here]

Confirmatory Factor Analysis (CFA)

Model fit of the CFA of the three mental health items was strong, with an RMSEA value of 0.008, CFI of .994 and TLI of .989. Factor loadings indicated strong relationships of the three items to the latent factor, with factor loadings ranging from 0.68 to 0.86.

Path Analysis

Figure 1 shows the results of the path analyses using the theorized pathways. Model fit was strong, with an RMSEA value of .014, CFI of .991, and TLI of .964. Only significant direct paths, along with their standardized estimates and significance level, are shown. For clarity, significant associations among the mediators are not shown, but are described below.

Direct Paths

The path analysis identified direct paths among the majority of theorized associations. ACEs associated directly with all four mediators, and both substance use and mental health impairment. Household incarceration had direct paths to adult incarceration, low-income, and

substance use, but not to mental health impairment. Adult incarceration, low-income, and adult adversity directly associated with substance use, and low-income, supportive resources, and adult adversity directly associated with mental health impairment.

[Figure 1 about here]

Correlations

Alongside the theorized direct associations, the results also indicated significant correlations among the theorized relationships. Household incarceration and ACEs had a moderate association ($r=.36, p<.001$). Among mediators, adult incarceration had moderate positive associations with low-income ($.25, p<.001$) and adult adversity ($.24, p<.001$) and a similarly negative association with protective resources ($-.21, p<.001$). Low-income had a moderate association with adult adversity ($r=.25, p<.001$) and a negative association with supportive resources ($r=-.25, p<.001$). Adult adversity and supportive resources had a modest, negative correlation ($r=-.10, p<.001$). Lastly, mental health impairment and substance use maintained a low magnitude, yet significant association with one another ($.05, p<.05$).

[Table 4 about here]

[Table 5 about here]

Indirect Paths to Mental Health

For both outcomes, indirect effects make large contributions to the total effects. Table 4 summarizes the indirect paths from household incarceration and ACEs to mental health. Although direct effects between household incarceration and mental health are not observed in the model, the indirect effects identify a significant pathway through low-income for which mediated effects are observed. The total effect of household incarceration, after accounting for race and other study variables, achieves a modest magnitude effect, due largely through these

observed indirect effects. The pathways from the cumulative ACEs demonstrate the strongest total overall effect on mental health, adding numerous mediated effects through indirect pathways to the significant direct effect on mental health. The combination of direct and indirect paths leads to an R^2 value for mental health of .31, or 31% of the variance in mental health explained by the preceding variables.

Indirect Paths to Substance Use

Table 5 details these same indirect paths to substance use. Unlike the stronger indirect effects of household incarceration with mental health, the total effects of predictors on substance use are mostly due to strong direct effects, with modest contributions of significant indirect effects through adult incarceration and low income. ACEs also contribute to greater substance use risk, both directly and through indirect paths, but these effects are comparatively smaller than those for mental health. The combination of direct and indirect paths give substance use an R^2 value of .07, or 7%, of the variance in substance use explained by the path model.

Discussion

This study extends the current research base through distinguishing household incarceration as a contributor to adult behavioral health impairment in the context of cumulative early life adversity exposure and later risk and supportive factors in adulthood. Findings establish good fit of the hypothesized model, revealing intercorrelations among the incarceration exposures and cumulative ACEs as well as a range of mediated effects captured in significant indirect pathways. In addition, the large representative sample used in this study allowed for complex modeling with sensitivity to traditionally low prevalence predictors, identifying significant lifelong risk, mental health, and substance use implications. This allows illumination of pathways for what is a vulnerable subpopulation of individuals with incarceration exposure.

The tested model indicates that household incarceration's effect on adult behavioral health exists at least partially through the indirect pathways, which aligns with stress proliferation theorizing that childhood adversities are part of a chain of stress potentiators that cumulatively contribute to mental health impairment and to substance use in adulthood. The impact of household incarceration on substance use is both direct and indirect through its long-term associations with elevated poverty and increased likelihood of incarceration in adulthood. Likewise, the effect of household incarceration on income also indirectly leads to greater mental health issues in adulthood.

Prior studies that have identified bivariate relationships of household and adult incarceration with behavioral health outcomes typically have not substantially assessed the role of other related factors serving mediating or moderating roles (Lee, Fang, & Luo et al., 2013). The direction and statistical significance of the zero-order correlations in the present study between household and adult incarceration and both mental health and substance use outcomes are consistent with that found in prior work. However, the path model in the present study imposes a more conservative assessment of direct effects, wherein once ACEs and other study variables and pathways are taken into account, the direct associations of these incarceration factors with mental health are reduced below significance. The current findings suggest that observed unadjusted associations between household and adult incarceration and some adulthood behavioral health issues may be at least partly attributable to effects on concurrent or intermediary factors that themselves raise the risk of later behavioral health issues.

This study also reaffirms the strength of the relationship between serious adverse experiences during childhood and various forms of subsequent adulthood hardships and reduced supportive resources. The strength of the relationship between ACEs and household

incarceration also exemplifies the embeddedness of household incarceration within broader contexts of childhood risk. Respondents who experienced household incarceration reported a significantly greater number of other ACEs in addition to lower income, more frequent substance use, greater adversity, and fewer supportive resources in adulthood. This is consistent with other findings that children of incarcerated parents are more likely to have exposure to childhood poverty, parental substance use, and violence in the home (Sykes & Pettit, 2015). As shown in this model, these childhood adverse experiences collectively increase the potential for risk and decrease the acquisition of supportive resources, cumulatively impacting the likelihood of mental health and substance use issues in adulthood.

Theorized paths from ACEs to adulthood risk and supportive resources were evident here. However, pathways from household incarceration alone, controlling for shared variance with other predictors, achieved significance only to low income and incarceration in adulthood among the four mediators. It is possible that household incarceration, net of model contributors such as other ACEs, is not directly consequential in relation to these subsequent adult factors. However, it is also plausible that the paucity of direct effects could be due to the wide variability of incarceration experiences. Although incarceration of caregivers as well as other family members has been found to be a traumatic stressor for children (Nichols & Loper, 2012), the quality of separation and thus its consequences can vary greatly (Wildeman, Wakefield, & Turney, 2013), particularly when other contributors such as supportive resources are considered. The significant pathways to low income and adult incarceration suggest that one fairly common effect of parental incarceration involves reduced material support and opportunities that commonly accompany incarcerated parents (Siennick, 2016), in addition to the other factors influencing the intergenerational prison pipeline that were not captured in the BRFSS survey

(e.g., repeated parental criminal offending).

When examined in conjunction with one another, the effect of household incarceration on subsequent incarceration is less robust than that of other accumulated ACEs, suggesting the value of assessing broader stress environments within which early life incarceration exposures tend to be embedded. Although family incarceration and a child's subsequent offending in adolescence and adulthood are closely related, this association is likely mediated by other household and environmental factors (Kjellstrand & Eddy, 2011; Murray, Catrien, Bijleveld, Farrington, & Loeber, 2015). The benefit of the ACEs index in this study comes in its capturing a broad scope of toxic stress environments known to undermine development and behavioral health. The observation that household incarceration maintains a unique effect in light of these additional stress components may exemplify intergenerational patterns of incarceration.

Practice, Policy, and Research Implications

This study identifies multiple pathways and leverage points through which intervention could be effectively applied. Findings reaffirm the association between toxic childhood stressors, including household incarceration, with subsequent adult incarceration (Bellis et al., 2014; Roos et al., 2016). The strong association between ACEs and adult incarceration suggests preventive practice and policy approaches that promote positive family environments and healthy childhood development to reduce ACEs and disrupt the prison cycle and consequences such as poor mental health and substance use (Baglio et al., 2014; Messina, Grella, Burdon, & Prendergast, 2007). Children with higher ACE exposures often have parents with higher early life adversity, signaling the value of parental support to interrupt negative trajectories for their children (Borja, Nurius, Song, & Lengua, 2019). Such preventive approaches may provide greater benefits in conjunction with the use of interventive approaches, such as cognitive-

behavioral therapy, that have been found to be effective at mitigating the effects of ACEs on adult mental health and substance use (Korotana et al., 2016). Similarly, incorporating the diverse needs of children with incarcerated and formerly incarcerated parents into existing case management services has found initial support from families and assisted them in managing children's behaviors and material needs (Phillips & O'Brien, 2012).

It is particularly notable that household incarceration contributes, both directly and indirectly, to substance use apart from the other adverse childhood experiences. Given that these other adversities include parental substance use, household incarceration therefore uniquely contributes to later substance use issues and mediating stressors in a manner not otherwise explained by childhood exposure to parents who have these issues themselves. These results suggest that behavioral health intervention and prevention may benefit from acting upon the subsequent secondary stressors related to household incarceration as a way of reducing long-term negative health outcomes (Roettger et al., 2011). For example, as low-income is identified here as a secondary contributor toward both behavioral health issues, intervening to reduce financial strains on youth and families with incarcerated members may prompt more positive behavioral health outcomes (DeFina & Hannon, 2010).

This study's finding of strong correlations between adult incarceration and adult adversity, lower income, and reduced supportive resources are indicative of the challenges that coincide with incarceration. Although the present study could not establish precise timing of all relationships, low income is a known pathway through which adult incarceration impacts mental health (Turney et al., 2012). In particular, an incarceration history presents long-term challenges for obtaining consistent employment, most often resulting in lower wages and greater odds of needing government assistance (Vishner, Debus-Sherrill, & Yahner, 2010). The association

between poverty, poor mental health, and substance use has been repeatedly established (Jenkins et al., 2008; World Health Organization and Calouste Gulbenkian Foundation, 2014). The findings of the present study support the promotion of effective programs and policies, such as linking current prisoners to educational and job opportunities (Seiter & Kadela 2003), that may produce substantial impacts on long-term behavioral health for a large portion of the population.

The consequences of household incarceration and childhood adversity on behavioral health should also be considered for their impact on broader social inequalities, particularly as considered in the context of mass incarceration and growing racial disparities in the prison population. Differential exposure to stressors in childhood can both arise from and contribute to cascades of racial and social class inequality. Children experience not only the direct consequences of their parents' stressor (e.g. incarceration), but also often suffer reduced or poorer quality attention, role modeling, and scaffolding from their parents as a result of their parents' adversities and stress (Thoits, 2010).

Among commonly assessed ACEs, household incarceration has proportionately increased the greatest in prevalence and, thus, is affecting considerably greater numbers of young people (Logan-Greene, Green, Nurius, & Longhi, 2014). Racial disproportionality in both incarceration rates and punishment severity thus may lead to a widening inequality in the larger population. As parents of particular race and income classes are more likely to be incarcerated, their children, collectively, have fewer opportunities (Wildeman & Wang, 2017), further widening the gap in positive outcomes for each generation. Coupled with increased school reliance on harsh disciplinary practices and zero tolerance policies that have shifted school responses to developmental (mis)behaviors and lower level misdemeanors of youth in punitive directions, schools are fostering more hostile environments for these youth and, at worst, facilitating a

school to prison pipeline (Mallett, 2016). In addition to encouraging changes in sentencing to be more responsive to this inequality, interventions that provide support for the children of incarcerated parents may have an important influence in narrowing this gap (Miller et al., 2013).

Adding to household incarceration's contributions toward social inequalities are racial differences among the adversities experienced by youth. Black children are more likely to have experienced not only household incarceration, but also neighborhood violence and family financial struggles (Maguire-Jack, Lanier, & Lombardi, 2019). Although white children are more likely to experience a parent with substance use issues, the forms of adversities more likely to be experienced by racial minority youth require broader systemic prevention effort and social change in order to have meaningful reductions in disparities (Maguire-Jack et al., 2019). Taken in conjunction with the results of this study, which find that youth experiencing household incarceration are also more likely to experience greater adversity, much greater contextual understanding of youth with incarcerated parents is necessary to reduce their resultant disparities.

Use of Surveillance Data: Strengths and Limitations

This study uses a large, general population survey to assess relationships that may be difficult to unearth with smaller sample sizes, providing an avenue for complex analyses with low-prevalence predictors such as household incarceration. Use of surveillance data allows a practical strategy for assessments of adversities and their relation to various life and intergenerational outcomes. Embedding early and later life stressors such as incarceration into routine health surveys opens access to community-based samples that not only offer data complementary to other sources, but also are more representative of the general population. This, in turn, provides insights of both local and national relevance regarding diverse indicators of social welfare and public health well-being across the life course.

However, the use of secondary surveillance data comes with the limitation that some constructs are not able to be theoretically precise, and thus the identified relationships may be weaker than latent constructs based on more prospectively theory-derived measures. For example, although the majority of incarcerated household members of children are caregivers and research has indicated that negative effects of other household member incarceration can convey similarly negative effects (Nichols & Loper, 2012), further research is necessary to fully address comparability.

Although this study uses cross-sectional data, constructs used in the structural equation model were oriented by the chronology of their wording, with the expectation that mediational items represent trajectories that follow childhood experiences and precede recent behavioral health outcomes. Although this usage follows a likely temporality of the measures, replication with longitudinal, prospective data would provide stronger evidence toward establishing the strength, directionality, and timeframes of the observed effects.

Lastly, these data are based upon one U.S. state with race/ethnicity characteristics that may not be representative of other regions. These data were collected via telephone survey, precluding currently incarcerated persons from these analyses and potentially underestimating relationships. Mean difference tests of groups by household and adult incarceration found significant variation in ACEs and all other study variables. However, the exclusion of individuals who may represent those with greater risks of adverse experiences may minimize the strength of association among relevant constructs.

Beyond these limitations, this study provides a unique lens with which to understand the proximal life course consequences of incarceration. It provides further evidence that incarceration is an intergenerational issue that exists within and contributes to broader

environments of toxic stressors, initiating chains of increased risk and depressed support across the life course and resulting in increased risk of diverse long-term behavioral health concerns. As such, this study provides important empirical linkages between early childhood contextual environments and successful adult development with profound meaning to an important social issue.

Conclusion

Childhood exposure to traumatic events poses serious long-term health consequences by initiating trajectories of cumulative adversity that amplify stress exposure and degrade behavioral health (Jones, Nurius, Song, & Fleming, 2018). The present study examines these effects specific to a unique risk trajectory of intergenerational and familial incarceration exposures within a broader context of childhood adversity. The pathways identified here provide target points for intervention that could reduce the impact of a growing incarceration rate that is creating larger risk pools across multiple domains of life.

References

- Aaron, L., & Dallaire, D. H. (2010). Parental incarceration and multiple risk experiences: effects on family dynamics and children's delinquency. *Journal of Youth and Adolescence*, 39(12), 1471-1484. doi:10.1007/s10964-009-9458-0
- Anderson, P. L., Tiro, J. A., Price, A. W., Bender, M. A., & Kaslow, N. J. (2002). Additive impact of childhood emotional, physical, and sexual abuse on suicide attempts among low-income African American women. *Suicide and Life-Threatening Behavior*, 32(2), 131-138. doi:10.1521/suli.32.2.131.24405
- Arditti, J. A. (2016). A Family Stress-proximal process model for understanding the effects of parental incarceration on children and their families. *Couple and Family Psychology: Research and Practice*. doi:10.1037/cfp0000058
- Baglivio, M. T., Epps, N., Swartz, K., Huq, M. S., Sheer, A., & Hardt, N. S. (2014). The prevalence of adverse childhood experiences (ACE) in the lives of juvenile offenders. *Journal of Juvenile Justice*, 3(2).
- Bellis, M. A., Hughes, K., Leckenby, N., Perkins, C., & Lowey, H. (2014). National household survey of adverse childhood experiences and their relationship with resilience to health-harming behaviors in England. *BMC Medicine*, 12(1), 72. doi:10.1186/1741-7015-12-72
- Blane, D., Kelly-Irving, M., d'Errico, A., Bartley, M., & Montgomery, S. (2013). Social-biological transitions: How does the social become biological? *Longitudinal and Life Course Studies*, 4, 136–146. doi:10.14301/llcs.v4i2.236
- Borja, S., Nurius, P. S., Song, C., & Lengua, L. (2019). Adverse childhood experiences and life course trends: Socioeconomic, health, and developmental implications. *Child and Youth Services Review*, 100, 258-266. doi:10.1016/j.childyouth.2019.03.007_

- Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine, 50*(3), 344-352. doi:10.1016/j.amepre.2015.07.022
- Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders, 82*(2), 217-225. doi: 10.1016/j.jad.2003.12.013
- Cheong, E. V., Sinnott, C., Dahly, D., & Kearney, P. M. (2017). Adverse childhood experiences (ACEs) and later-life depression: perceived social support as a potential protective factor. *BMJ open, 7*(9), e013228. doi:10.1136/bmjopen-2016-013228
- Danese, A., Moffitt, T. E., Pariante, C. M., Ambler, A., Poulton, R., & Caspi, A. (2008). Elevated inflammation levels in depressed adults with a history of childhood maltreatment. *Archives of General Psychiatry, 65*(4), 409-415. doi:10.1001/archpsyc.65.4.409
- DeFina, R. H., & Hannon, L. (2010). The impact of adult incarceration on child poverty: A county-level analysis, 1995-2007. *The Prison Journal, 90*(4), 377-396. doi:10.2139/ssrn.1442523
- Du, W.-J., Tan, J.-P., Yi, F., Zou, Y.-M., Gao, Y., Zhao, Y.-M., & Wang, L.-N. (2015). Physical activity as a protective factor against depressive symptoms in older Chinese veterans in the community: Result from a national cross-sectional study. *Neuropsychiatric Disease and Treatment, 11*, 803-813. doi:10.2147/NDT.S80295
- Dube, S., Williamson, D., Thompson, T., Felitti, V., & Anda, R. (2004). Assessing the reliability of retrospective reports of adverse childhood experiences among adult HMO members attending a primary care clinic. *Child Abuse & Neglect, 28*(7), 729-737.

doi:10.1016/j.chiabu.2003.08.009

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . .

Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258. doi:10.1016/S0749-3797(98)00017-8

Gjelsvik, A., Dumont, D., Nunn, A., & Rosen, D. (2014). Adverse childhood events:

Incarceration of household members and health-related quality of life in adulthood.

Journal of Health Care for the Poor and Underserved, 25(3), 1169-1182.

doi:10.1353/hpu.2014.0112

Gottlieb, A. (2016). Household incarceration in early adolescence and risk of premarital first

birth. *Children and Youth Services Review, 61*, 126-134.

doi:10.1016/j.childyouth.2015.12.020

Hunt, T. K. A., Slack, K. S., & Berger, L. M. (2017). Adverse childhood experiences and

behavioral problems in middle childhood. *Child Abuse & Neglect, 67*, 391-402.

doi:10.1016/j.chiabu.2016.11.005

Jenkins, R., Bhugra, D., Bebbington, P., Brugha, T., Fryers, M., Meltzer, J., . . . Jenkins, H.

(2008). Debt, income and mental disorder in the general population. *Psychological Medicine, 38*(10), 1485-1493. doi:10.1017/S0033291707002516

Johnson, E. I., & Easterling, B. (2012). Understanding unique effects of parental incarceration on

children: Challenges, progress, and recommendations. *Journal of Marriage and Family,*

74(2), 342-356. doi:10.1111/j.1741-3737.2012.00957.x

Jones, T. M., Nurius, P. S., Song, C., & Fleming, C. M. (2018). Modeling life course pathways

- from adverse childhood experiences to adult mental health. *Child Abuse & Neglect*, 80, 32-40. doi:10.1016/j.chiabu.2018.03.005
- Kalmakis, K. A., & Chandler, G. E. (2015). Health consequences of adverse childhood experiences: A systematic review. *Journal of the American Association of Nurse Practitioners*, 27(8), 457-465. doi:10.1002/2327-6924.12215
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., . . . Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry*, 60(2), 184-189. doi:10.1001/archpsyc.60.2.184
- Kjellstrand, J. M., & Eddy, J. M. (2011). Mediators of the effect of parental incarceration on adolescent externalizing behaviors. *Journal of Community Psychology*, 39(5), 551-565. doi:10.1002/jcop.20451
- Korotana, L. M., Dobson, K. S., Pusch, D., & Josephson, T. (2016). A review of primary care interventions to improve health outcomes in adult survivors of adverse childhood experiences. *Clinical Psychology Review*, 46, 59-90. doi:10.1016/j.cpr.2016.04.007
- Lee, R. D., Fang, X., & Luo, F. (2013). The impact of parental incarceration on the physical and mental health of young adults. *Pediatrics*, 131(4), e1188. doi:10.1542/peds.2012-0627
- Logan-Greene, P., Green, S., Nurius, P. S., & Longhi, D. (2014). Distinct contributions of adverse childhood experiences and resilience resources: A cohort analysis of adult physical and mental health. *Social Work in Health Care*, 53(8), 776-797. doi:10.1080/00981389.2014.944251
- Logan-Greene, P., Kim, B., & Nurius, P. (2016). Childhood adversity among court-involved youth: Heterogeneous needs for prevention and treatment. *Journal of Juvenile Justice*, 5(2), 68-84.

- Maguire-Jack, K., Lanier, P., & Lombardi, B. (2019). Investigating racial differences in clusters of adverse childhood experiences. *American Journal of Orthopsychiatry*. Advance Online Publication. doi:10.1037/ort0000405
- Mallett, C. (2016). The school-to-prison pipeline: A critical review of the punitive paradigm shift. *Child and Adolescent Social Work Journal*, 33(1), 15-24. doi:10.1007/s10560-015-0397-1
- Mears, D. P., & Siennick, S. E. (2016). Young adult outcomes and the life-course penalties of parental incarceration. *Journal of Research in Crime and Delinquency*, 53(1), 3-35. doi:10.1177/0022427815592452
- Mersky, J. P., Topitzes, J., & Reynolds, A. J. (2013). Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the U.S. *Child Abuse & Neglect*, 37(11), 917-925. doi:10.1016/j.chiabu.2013.07.011
- Messina, N., Grella, C., Burdon, W., & Prendergast, M. (2007). Childhood adverse events and current traumatic distress: A comparison of men and women drug-dependent prisoners. *Criminal Justice and Behavior*, 34(11), 1385-1401. doi:10.1177/0093854807305150
- Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Children and Youth Services Review*, 72, 141-149. doi:10.1016/j.chilyouth.2016.10.021
- Miller, A. L., Perryman, J., Markovitz, L., Franzen, S., Cochran, S., & Brown, S. (2013). Strengthening incarcerated families: evaluating a pilot program for children of incarcerated parents and their caregivers. *Family Relations*, 62(4), 584-596.

doi:10.1111/fare.12029

Miller, H. V., & Barnes, J. C. (2015). The association between parental incarceration and health, education, and economic outcomes in young adulthood. *American Journal of Criminal Justice*, 1-20. doi:10.1007/s12103-015-9288-4

Murray, J., Bijleveld, C. C. J. H., Farrington, D. P., & Loeber, R. (2015). Effects of parental incarceration on children. *Journal of Child & Family Studies*, 24(1), 220-222.

doi:10.1007/s10826-014-0042-1

Murray, J., & Farrington, D. P. (2008). Parental imprisonment: Long-lasting effects on boys' internalizing problems through the life course. *Development and Psychopathology*, 20(1), 273-290. doi:10.1017/S0954579408000138

Murray, J., Farrington, D. P., & Sekol, I. (2012). Children's antisocial behavior, mental health, drug use, and educational performance after parental incarceration: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 175-210. doi:10.1037/a0026407

Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus user's guide. Eighth edition*. Los Angeles, CA: Muthén & Muthén.

Nichols, E. B., & Loper, A. B. (2012). Incarceration in the household: Academic outcomes of adolescents with an incarcerated household member. *Journal of Youth and Adolescence*, 41(11), 1455-1471. doi:10.1007/s10964-012-9780-9

Nurius, P. S., Fleming, C. M., & Brindle, E. (2019). Life course pathways from adverse childhood experiences to adult physical health: A structural equation model. *Journal of Aging and Health*, 31(2), 211-230. doi:10.1177/0898264317726448

Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*, 46(2),

205-219. doi:10.1177/002214650504600206

Pederson, K. J., Lutfiyya, M. N., Palombi, L. C., Simmons, D. R., Steenerson, D. J., Hohman, K.

G., & Huot, K. L. (2013). Cross-sectional population based study ascertaining the characteristics of US rural adults with mental health concerns who perceived a stigma regarding mental health issues. *Health, 5*(4), 695-702. doi:10.4236/health.2013.54092

Phillips, S. D., Erkanli, A., Keeler, G. P., Costello, E. J., & Angold, A. (2006). Disentangling the risks: Parent criminal justice involvement and children's exposure to family risk.

Criminology & Public Policy, 5(4), 677-702. doi:10.1111/j.1745-9133.2006.00404.x

Phillips, S. D., & O'Brien, P. (2012). Learning from the ground up: responding to children affected by parental incarceration. *Social Work in Public Health, 27*(1-2), 29-44.

doi:10.1080/19371918.2012.629914

Roettger, M. E., & Boardman, J. D. (2012). Parental incarceration and gender-based risks for increased body mass index: Evidence from the national longitudinal study of adolescent health in the United States. *American Journal of Epidemiology, 175*(7), 636-644.

doi:10.1093/aje/kwr409

Roettger, M. E., Swisher, R. R., Kuhl, D. C., & Chavez, J. (2011). Paternal incarceration and trajectories of marijuana and other illegal drug use from adolescence into young adulthood: evidence from longitudinal panels of males and females in the United States.

Addiction, 106(1), 121-132. doi:10.1111/j.1360-0443.2010.03110.x

Roos, L. E., Afifi, T. O., Martin, C. G., Pietrzak, R. H., Tsai, J., & Sareen, J. (2016). Linking typologies of childhood adversity to adult incarceration: Findings from a nationally representative sample. *American Journal of Orthopsychiatry, 86*(5), 584-593.

doi:10.1037/ort0000144

- Schilling, E. A., Aseltine, R. H., & Gore, S. (2008). The impact of cumulative childhood adversity on young adult mental health: Measures, models, and interpretations. *Social Science & Medicine*, 66(5), 1140-1151. doi: 10.1016/j.socscimed.2007.11.023
- Scott, B. G., Burke, N. J., Weems, C. F., Hellman, J. L., & Carrión, V. G. (2013). The interrelation of adverse childhood experiences within an at-risk pediatric sample. *Journal of Child & Adolescent Trauma*, 6(3), 217-229. doi:10.1080/19361521.2013.811459
- Seiter, R. P., & Kadela, K. R. (2003). Prisoner reentry: What works, what does not, and what is promising. *Crime & Delinquency*, 49(3), 360-388. doi:10.1177/0011128703049003002
- Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1), e232. doi:10.1542/peds.2011-2663
- Siennick, S. E. (2016). Parental incarceration and intergenerational transfers to young adults. *Journal of Family Issues*, 37(10), 1433-1457. doi:10.1177/0192513X14550366
- Sykes, B. L., & Pettit, B. (2015). Severe deprivation and system inclusion among children of incarcerated parents in the United States after the great recession. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 1(2), 108-132. doi:10.7758/rsf.2015.1.2.06
- Thoits, P. A. (2010). Stress and health: Major findings and policy implications. *Journal of Health and Social Behavior*, 51(1_suppl), S41-S53. doi:10.1177/0022146510383499
- Travis, J., Western, B., & Redburn, F. S. (2014). *The growth of incarceration in the United States: Exploring causes and consequences*. Washington, D.C.: The National Academies Press.
- Turner, H. A., Finkelhor, D., & Ormrod, R. (2006). The effect of lifetime victimization on the mental health of children and adolescents. *Social Science & Medicine*, 62(1), 13-27. doi: 10.1016/j.socscimed.2005.05.030

- Turney, K. (2014). Stress proliferation across generations? Examining the relationship between parental incarceration and childhood health. *Journal of Health and Social Behavior*, 55(3), 302-319. doi:10.1177/0022146514544173
- Turney, K., Wildeman, C., & Schnittker, J. (2012). As fathers and felons: Explaining the effects of current and recent incarceration on major depression. *Journal of Health and Social Behavior*, 53(4), 465-481. doi:10.1177/0022146512462400
- Uggen, C., & McElrath, S. (2014). Parental incarceration: What we know and where we need to go. *Journal of Criminal Law & Criminology*, 104(3), 597-604.
- Visher, C. A., Debus-Sherrill, S. A., & Yahner, J. (2011). Employment after prison: A longitudinal study of former prisoners. *Justice Quarterly*, 28(5), 698-718.
doi:10.1080/07418825.2010.535553
- Wade, R., Cronholm, P. F., Fein, J. A., Forke, C. M., Davis, M. B., Harkins-Schwarz, M., . . . Bair-Merritt, M. H. (2016). Household and community-level Adverse Childhood Experiences and adult health outcomes in a diverse urban population. *Child Abuse & Neglect*, 52(Supplement C), 135-145. doi: 10.1016/j.chiabu.2015.11.021
- Wildeman, C., Wakefield, S., & Turney, K. (2013). Misidentifying the effects of parental incarceration? A comment on Johnson and Easterling (2012). *Journal of Marriage and Family*, 75(1), 252-258. doi:10.1111/j.1741-3737.2012.01018.x
- Wildeman, C., & Wang, E. A. (2017). Mass incarceration, public health, and widening inequality in the USA. *The Lancet*, 389(10077), 1464-1474. doi:10.1016/S0140-6736(17)30259-3
- World Health Organization and Calouste Gulbenkian Foundation. (2014). *Social determinants of mental health*. Geneva, CH: World Health Organization.

TABLES AND FIGURES

Table 1

Weighted Descriptive Statistics and Zero-Order Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10
1. Household incarceration	-									
2. ACEs	0.36	-								
3. Adult incarceration	0.14	0.17	-							
4. Low income	0.16	0.25	0.20	-						
5. Adult adversity	0.12	0.34	0.18	0.30	-					
6. Supportive resources	-0.06	-0.13	-0.11	-0.30	-0.14	-				
7. Substance use	0.14	0.15	0.17	0.15	0.13	-0.05	-			
8. Days missed work due to mental health	0.10	0.22	0.15	0.31	0.24	-0.19	0.09	-		
9. Poor mental health days	0.12	0.24	0.12	0.32	0.22	-0.20	0.11	0.49	-	
10. Mental health symptoms	0.17	0.33	0.13	0.40	0.28	-0.24	0.15	0.58	0.62	-
Mean	0.08 ^p	1.75	0.06 ^p	0.73	0.44	2.46	1.42	1.08	3.84	3.17
SD	-	1.84	-	1.02	0.78	5.02	0.97	4.48	7.89	3.83
Range	0-1	0-7	0-1	0-4	0-5	0-4	0-90	0-30	0-30	0-24

Note. All correlations significant at $p < 0.001$. ^pSample proportion.

Table 2
Weighted Descriptive Statistics of Study Variables by Household Incarceration Group

	Parent(s) never incarcerated (n=12766)		Parent(s) incarcerated (n=605)		<i>p</i>
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>	
ACEs	1.55	1.70	3.95	1.92	***
Adult incarceration	0.05 [∧]	-	0.17 [∧]	-	***
Low-income	0.67	0.99	1.26	1.16	***
Adult adversity	0.42	0.76	0.77	0.97	***
Supportive resources	2.49	0.96	2.26	1.01	***
Substance use	1.21	4.56	3.76	8.38	***
Days missed work due to mental health	0.96	4.18	2.40	7.00	**
Poor mental health days	3.57	7.61	7.10	10.11	***
Mental health symptoms	2.99	3.68	5.23	4.74	***

Note. *** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$ [∧]Sample proportion.
p-values via Wald Difference Test (1 df).

Table 3
Weighted Descriptive Statistics of Study Variables by Adult Incarceration Group

	Self never incarcerated (n=12872)		Self incarcerated (n=489)		<i>p</i>
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>	
ACEs	1.67	1.80	3.01	2.08	***
Household incarceration	0.07 ^ᵖ	-	0.24 ^ᵖ	-	***
Low-income	0.67	0.98	1.55	1.25	***
Adult adversity	0.42	0.76	1.03	1.08	***
Supportive resources	2.49	0.96	2.05	1.02	***
Substance use	1.19	4.49	4.94	9.81	***
Days missed work due to mental health	0.90	4.06	3.89	8.41	***
Poor mental health days	3.64	7.65	7.81	10.75	***
Mental health symptoms	3.04	3.67	5.36	5.43	***

Note. *** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$ ^ᵖSample proportion. *p*-values via Wald Difference Test (1 df).

Table 4

Structural Model Indirect Paths to Mental Health

<u>Household Incar. to Mental Health</u>	<u>Est.</u>	<u>S.E.</u>	<u>P-Value</u>
Household Incar. → Adult Incar. → Mental Health	0.003	0.003	n.s.
Household Incar. → Low Income → Mental Health	0.020	0.005	***
Household Incar. → Adult Adv. → Mental Health	0.001	0.002	n.s.
Household Incar. → Supportive Res. → Mental Health	0.002	0.002	n.s.
Total Indirect Effects	0.025	0.007	***
Total Direct Effects	0.002	0.014	n.s.
Total Effects	0.027	0.015	†
<u>ACE Score to Mental Health</u>			
ACEs → Adult Incar. → Mental Health	0.014	0.011	n.s.
ACEs → Low Income → Mental Health	0.074	0.005	***
ACEs → Adult Adv. → Mental Health	0.039	0.005	***
ACEs → Supportive Res. → Mental Health	0.015	0.003	***
Total Indirect Effects	0.142	0.010	***
Total Direct Effects	0.189	0.018	***
Total Effects	0.332	0.015	***

Note. ***p<0.001 **p<0.01 *p<0.05 †p<0.10 n.s.=non-significant

Table 5
Structural Model Indirect Paths to Substance Use

<u>Household Incar. to Substance Use</u>	<u>Est.</u>	<u>S.E.</u>	<u>P-Value</u>
Household Incar. → Adult Incar. → Substance Use	0.007	0.004	*
Household Incar. → Low Income → Substance Use	0.006	0.002	**
Household Incar. → Adult Adv. → Substance Use	0.000	0.001	n.s.
Household Incar. → Supportive Res. → Substance Use	0.000	0.000	n.s.
Total Indirect Effects	0.013	0.004	**
Total Direct Effects	0.075	0.013	***
Total Effects	0.089	0.013	***
<u>ACE Score to Substance Use</u>			
ACEs → Adult Incar. → Substance Use	0.029	0.009	**
ACEs → Low Income → Substance Use	0.023	0.004	***
ACEs → Adult Adv. → Substance Use	0.015	0.004	***
ACEs → Supportive Res. → Substance Use	0.000	0.002	n.s.
Total Indirect Effects	0.067	0.008	***
Total Direct Effects	0.061	0.018	***
Total Effects	0.128	0.016	***

Note. ***p<0.001 **p<0.01 *p<0.05 †p<0.10 n.s.=non-significant

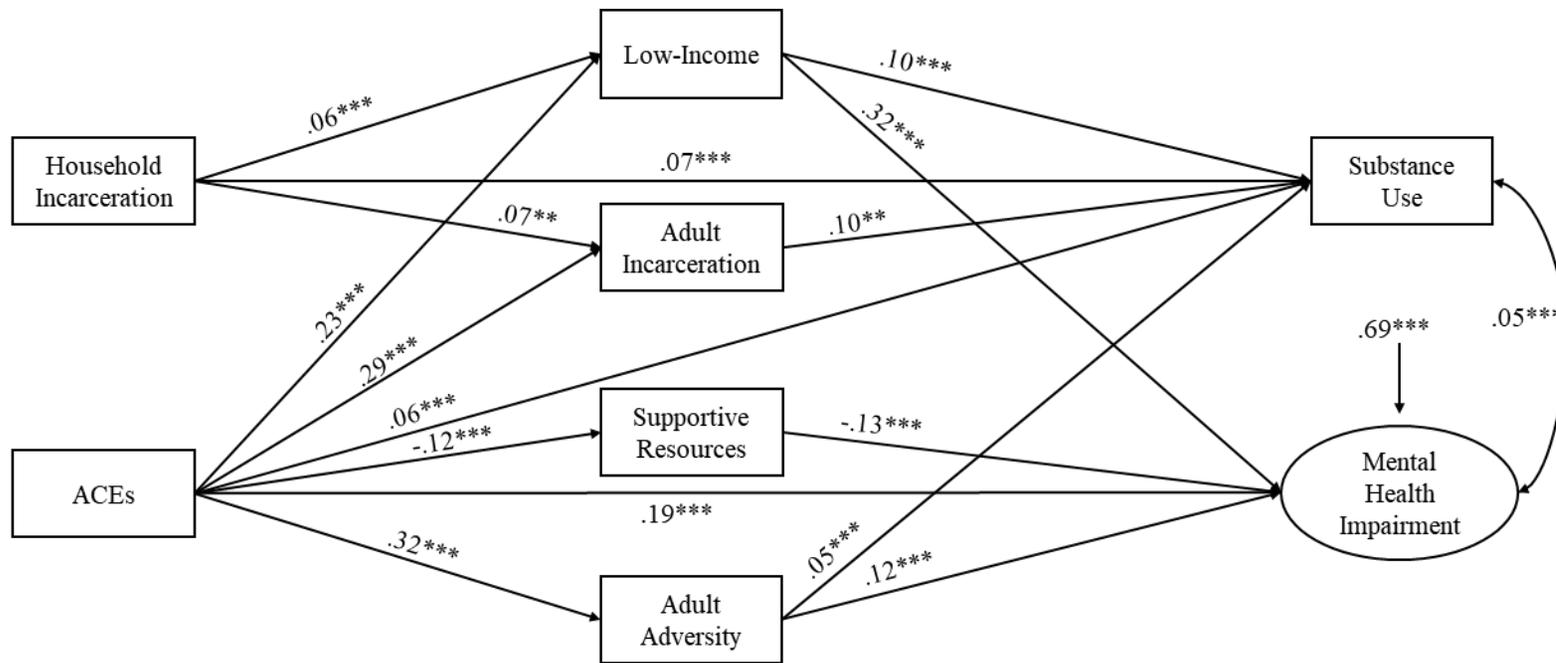


Figure 1: Path Model Estimates

Note: * p<.05 ** p<.01 ***p<.001. Standardized estimates and significant paths shown. Model fit: CFI: 0.991; TLI: 0.964; RMSEA: 0.014.

Model controls for race, sex, and education. Significant correlations observed between household incarceration and ACEs (0.36, p<.001); between adult incarceration and low income (.25, p<.001), supportive resources (-.21, p<.001), and adult adversity (.24, p<.001); between low income and supportive resources (-.25, p<.001) and adult adversity (.25, p<.001); and between adult adversity and supportive resources (-.10, p<.001).