

# Health Care Use and Health Behaviors Among Young Adults With History of Parental Incarceration

Nia Heard-Garris, MD, MSc,<sup>a,b,c,d</sup> Tyler N.A. Winkelman, MD, MSc,<sup>a,e,f,g</sup> Hwajung Choi, PhD,<sup>h</sup> Alex K. Miller, BS,<sup>a,i</sup> Kristin Kan, MD, MPH, MSc,<sup>b,c,d</sup> Rebecca Shlafer, PhD, MPH,<sup>j</sup> Matthew M. Davis, MD, MPP<sup>b,c,d,k,l,m</sup>

abstract

**OBJECTIVES:** To determine if longitudinal associations exist between parental incarceration (PI) and health care use or health behaviors among a national sample of young adults.

**METHODS:** We used the National Longitudinal Survey of Adolescent to Adult Health to examine associations between history of mother incarceration (MI) and father incarceration (FI), health care use, and 3 dimensions of health behaviors (eg, general health behaviors, substance use, and other risky behaviors) ( $N = 13\,084$ ). Multivariable logistic regression models accounted for individual, family, and geographic factors and generated adjusted odds ratios (aORs).

**RESULTS:** Over 10% of the sample had a history of PI before the age of 18. History of MI and FI were both associated with forgone health care (aOR = 1.65 [95% confidence interval (CI), 1.20–2.27], aOR = 1.22 [95% CI, 1.02–1.47], respectively), prescription drug abuse (MI aOR = 1.61 [95% CI, 1.02–2.55], FI aOR = 1.46 [95% CI, 1.20–1.79]), and 10 or more lifetime sexual partners (MI aOR = 1.55 [95% CI, 1.08–2.22], FI aOR = 1.19 [95% CI, 1.01–1.41]). MI was associated with higher likelihood of emergency department use (aOR = 2.36 [95% CI, 1.51–3.68]), and FI was associated with illicit injection drug use (aOR = 2.54 [95% CI, 1.27–5.12]).

**CONCLUSIONS:** The effects of incarceration extend beyond incarcerated individuals. PI histories are associated with lower health care use and unhealthy behaviors in young adulthood. By addressing barriers to health care and health-harming behaviors, health care providers and policy makers may reduce health disparities among this population.

FREE

<sup>a</sup>Robert Wood Johnson Foundation Clinical Scholars Program, University of Michigan Medical School, Ann Arbor, Michigan; <sup>b</sup>Division of Academic General Pediatrics and <sup>c</sup>Mary Ann & J. Milburn Smith Child Health Research, Outreach, and Advocacy Center, Stanley Manne Children's Research Institute, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois; <sup>d</sup>Departments of <sup>e</sup>Medicine and <sup>f</sup>Pediatrics, Hennepin Healthcare, Minneapolis, Minnesota; <sup>g</sup>Center for Patient and Provider Experience, Minneapolis Medical Research Foundation, Hennepin Healthcare, Minneapolis, Minnesota; <sup>h</sup>Department of Internal Medicine, University of Michigan Medical School, University of Michigan, Ann Arbor, Michigan; <sup>i</sup>University of Michigan Medical School, University of Michigan, Ann Arbor, Michigan; <sup>j</sup>Division of General Pediatrics and Adolescent Health, Department of Pediatrics, University of Minnesota, Minneapolis, Minnesota; and <sup>k</sup>Departments of <sup>l</sup>Pediatrics, <sup>m</sup>Medicine, <sup>n</sup>Medical Social Sciences, and <sup>o</sup>Preventive Medicine, Feinberg School of Medicine, Northwestern University, Chicago, Illinois

Dr Heard-Garris conceived and designed the study, acquired data, conducted data analysis and interpretation, and drafted the initial manuscript; Dr Winkelman conceived and designed the study, acquired data, conducted data analysis and interpretation, and provided critical revisions to the manuscript; Dr Choi assisted in data analysis and interpretation and provided critical revisions to the manuscript; Mr Miller conducted the literature review for the study and provided critical revisions to the manuscript; Dr Kan conceived and designed the study, acquired and interpreted data, and provided critical revisions to the manuscript; Dr Shlafer interpreted data and provided critical revisions to the manuscript; Dr Davis interpreted data, provided critical

**WHAT'S KNOWN ON THIS SUBJECT:** A history of parental incarceration (PI) is associated with poor physical and mental health outcomes into adulthood. However, the relationship between PI and health care use and multidimensional health behaviors has been understudied.

**WHAT THIS STUDY ADDS:** Young adults with PI histories are less likely to use health care and more likely to engage in unhealthy behaviors compared with peers without PI.

**To cite:** Heard-Garris N, Winkelman T.N.A., Choi H, et al. Health Care Use and Health Behaviors Among Young Adults With History of Parental Incarceration. *Pediatrics*. 2018; 142(3):e20174314

The United States has the highest incarceration rate in the world, and nearly 60% of incarcerated adults are parents to minor children.<sup>1–3</sup> At least 5 million children in the United States have had a parent who lived with them go to jail or prison.<sup>1</sup> Black, low-income, and rural children experience disproportionately high rates of parental incarceration (PI).<sup>2,4</sup> Most children experience the incarceration of a father; however, maternal incarceration is increasingly more common because of rising incarceration rates among women.<sup>2</sup> Mothers tend to have slightly more children than fathers at the time of incarceration.<sup>2,5,6</sup> Although incarceration may have a marked impact on an incarcerated individual's life, it also disrupts the family unit and thereby negatively affects his or her children.<sup>7</sup>

PI has been identified as 1 of several adverse childhood experiences (ACEs), a group of traumatic or persistent childhood experiences associated with poor physical and mental health across the life course.<sup>8–11</sup> PI is associated with learning delays and behavioral problems,<sup>12–15</sup> perhaps because of the traumatic separation from a parent, the loss of parental resources, and the lack of social support.<sup>7,12</sup> The authors of a growing body of literature indicate that PI is detrimental to health in childhood and adulthood. The prevalence of asthma, HIV and AIDS, depression, anxiety, and posttraumatic stress disorder is higher among individuals with a history of PI.<sup>16,17</sup>

In contrast to what is known about the health of individuals who experience PI, little is known about their health care use and health behaviors in young adulthood, which are strong determinants of health.<sup>18</sup> The impact of PI on health-related behavior is important to examine because understanding these relationships can inform

interventions to improve the health of individuals with a history of PI.

We used a large, nationally representative sample of young adults to evaluate the relationship between PI before the age of 18 and health care use and health behaviors. We hypothesized a priori that PI would be associated with lower levels of health care use and a higher prevalence of unhealthy behaviors compared with individuals without PI.<sup>19,20</sup>

## METHODS

### Data

We used data from the National Longitudinal Study of Adolescent Health to Adult Health (Add Health), a nationally representative cohort study following adolescents into adulthood in the United States. Add Health is a multisurvey, multiwave study in which systematic sampling methods with implicit stratification are used. High schools serve as the primary sampling unit for the clustered design. The sample design ensures adequate representation by region, urbanicity, school size, school type, and ethnicity.<sup>21</sup> During wave 1 (1994–1995 school year), 18 924 adolescents (12–19 years old) completed in-home interviews, were assigned a sample weight, and were invited to continue in follow-up waves. In wave 4 (2008), 13 861 respondents (24–32 years old) who were in wave 1 completed follow-up surveys and were assigned a sample weight. Written informed consent was obtained from the participants. Additional information on the sampling procedures and study design is documented elsewhere.<sup>21</sup>

### Study Population

Among eligible participants with wave 1 and wave 4 sample weights, 13 084 (94.4%) had complete data and were included in our analytic sample. Sociodemographic data were drawn from wave 1 and combined

with wave 4 self-reported health care use, health behaviors, and PI history.

## Measures

### PI

In wave 4, respondents were asked if their biological mother or father ever spent time in jail or prison. Respondents were also asked their age at the first and most recent time their biological mother or father went to jail or prison. We included individuals who reported any history of mother incarceration (MI) or father incarceration (FI) after birth and before the age of 18.

### Health Care Use

Data on health care use were collected in wave 4. Respondents were asked about forgone care, worsening health problems because of lack of health care, the timing of annual dental examinations, the receipt of mental health counseling, the timing of physical examinations, and the usual source of care (Table 1). Time since last physical examination was categorized into 2 categories: <1 year and >1 year or never. Location of care was categorized as a primary care setting (ie, hospital-based clinic; community health clinic; health maintenance organization; private medical office; school, college, or work clinic; military hospital or clinic; or respondent “never gets sick”) and emergency department (ED) or non-primary care site.

### Health Behaviors

In wave 4, respondents were asked questions regarding their general health behaviors, substance use, and other high-risk behaviors (Table 1). Respondents were asked about television screen time, fast food and sugary drink consumption, frequency of physical fitness center use, and sunblock use. We defined excessive screen time as >50 hours per week (3.5 times higher than the national average for ages 25–34 and 1.5 times

**TABLE 1** Health Care Use and Health Behaviors Survey Questions, National Longitudinal Study of Adolescent Health, 2007–2008

---

Health care use

Forgone care: has there been any time in the past 12 mo when you thought you should get medical care, but you did not?

Worsening health problems: in the past 12 mo, did a health problem get worse because you did not get care when you thought you should?

Annual dental examination: in the past 12 mo, have you had a dental examination by a dentist or dental hygienist?

Mental health counseling: in the past 12 mo, have you received psychological or emotional counseling?

Annual physical examination<sup>a</sup>: how long ago did you last have a routine checkup?

Usual source of care<sup>b</sup>: where do you usually go when you are sick or need health care?

General health behaviors

Television: in the past 7 d, how many h did you watch television or videos, including VHS, DVDs, or music videos?

Fast food: how many times in the past 7 d did you eat food from a fast food restaurant, such as McDonald's, Burger King, Wendy's, Arby's, Pizza Hut, Taco Bell, Kentucky Fried Chicken, or a local fast food restaurant?

Sugary drinks: in the past 7 d, how many regular (nondiet) sweetened drinks did you have? Include regular soda, juice drinks, sweetened tea or coffee, energy drinks, flavored water, or other sweetened drinks.

Fitness center use: on average, how many times per wk do you use a physical fitness or recreation center in your neighborhood?

Sunblock: when you go outside on a sunny day for >1 h, how likely are you to use sunscreen or sunblock?

Substance use

Cigarettes: during the past 30 d, on how many days did you smoke cigarettes?

Prescription drugs: have you ever taken any prescription drugs that were not prescribed for you, taken prescription drugs in larger amounts than prescribed, more often than prescribed, for longer periods than prescribed, or taken prescription drugs that you took only for the feeling or experience they caused?

IV drug use: have you ever injected (shot up with a needle) any illegal drug, such as heroin or cocaine?

Problem drinking

1. How often have you been under the influence of alcohol when you could have gotten yourself or others hurt, or put yourself or others at risk, including unprotected sex?
2. How often have you had legal problems because of your drinking, like being arrested for disturbing the peace or driving under the influence of alcohol or anything else?
3. How often have you had problems with your family, friends, or people at work or school because of your drinking?
4. Have you ever continued to drink after you realized drinking was causing you any emotional problems (such as feeling irritable, depressed, or uninterested in things or having strange ideas) or causing you any health problems (such as ulcers, numbness in your hands and/or feet, or memory problems)?
5. Have you ever given up or cut down on important activities that would interfere with drinking, like getting together with friends or relatives, going to work or school, participating in sports, or anything else?

Problem drug use

1. How often have you been under the influence of (favorite drug) when you could have gotten yourself or others hurt, or put yourself or others at risk, including unprotected sex?
2. How often have you had legal problems because of your (favorite drug) use, like being arrested for disturbing the peace or anything else?

Other risky behaviors

Lifetime sexual partners: with how many partners have you ever had vaginal intercourse, even if only once?

Sex in exchange for money: in the past 12 mo, how many times have you paid someone to have sex with you or has someone paid you to have sex with them?

Gambling problems: has your gambling ever caused serious financial problems or problems in your relationships with any of your family members or friends?

---

DVD, digital video disc; VHS, Video Home System.

<sup>a</sup> Categorized into <1 y and >1 y or never.

<sup>b</sup> Categorized as a primary care setting (ie, hospital-based clinic; community health clinic; health maintenance organization; private medical office; school, college, or work clinic; military hospital or clinic; or respondent never gets sick) and ED or non-primary care site.

the amount of television associated with adverse health outcomes).<sup>22–24</sup> Substance use behaviors included cigarette smoking, prescription drug abuse, illicit intravenous (IV) drug use, and alcohol use. Respondents were determined to have problem drinking or problem drug use if their substance use–related behavior endangered the respondent or others, caused legal problems, caused problems with family and friends, or interfered with school or work. Questions about other risky behaviors included the number

of lifetime sexual partners ( $\leq 9$  vs  $\geq 10$  lifetime partners),<sup>25,26</sup> sex in exchange for money in the past 12 months, and any gambling problems.

### Covariates

We controlled for wave 1 sociodemographic factors associated with health care use and health behaviors in our analysis, including (1) individual factors, such as sex, race and/or ethnicity, and age; (2) family characteristics, such as family structure (2 parents, 1 parent, or no biological parents in the household),

parental education (no resident parent, less than high school, high school, and college or higher), and receipt of public assistance; and (3) geography, such as the geographical classification of the respondent's residence (urban, suburban, rural, or other).<sup>16,27</sup>

### Statistical Analysis

We summarized sociodemographic characteristics of our study population by PI history. We created 3 categorical variables for no PI

**TABLE 2** Analysis Sample Characteristics, National Longitudinal Study of Adolescent Health, 2007–2008

	No PI (Lifetime) (95% CI)	MI (<18 y) (95% CI)	FI (<18 y) (95% CI)
	Weighted % <sup>a</sup> , <i>n</i> = 10 908	Weighted % <sup>a,b</sup> , <i>n</i> = 269	Weighted % <sup>a,b</sup> , <i>n</i> = 1230
Sex, female, %	49.7 (48.2–51.1)	54.3 (46.2–62.2)	51.0 (47.1–55.0)
Race and/or ethnicity, %			
Non-Hispanic white	68.6 (62.6–74.0)	47.2 (36.2–58.5)	57.4 (50.1–64.4)
Non-Hispanic Black	13.1 (9.9–17.2)	34.3 (25.2–44.8)	23.0 (17.1–30.3)
Hispanic	11.3 (8.2–15.3)	11.4 (6.7–18.6)	14.2 (10.5–19.1)
Non-Hispanic, other race and/or ethnicity	7.0 (5.4–9.1)	7.1 (2.9–16.3)	5.4 (3.6–7.9)
Age, mean <sup>c</sup>	15.3 (15.0–15.6)	15.5 (15.2–15.7)	15.5 (15.2–15.7)
Family structure, %			
2-parent household	65.5 (63.4–67.5)	13.5 (8.8–20.3)	27.3 (23.5–31.4)
1-parent household	31.8 (30.0–33.6)	63.7 (54.8–71.8)	65.7 (61.9–69.3)
No biological parents in household	2.8 (2.2–3.4)	22.7 (15.5–32.1)	7.0 (5.2–9.4)
Mother's education, %			
No resident mother	3.5 (3.1–4.0)	10.4 (6.4–16.4)	5.4 (3.9–7.3)
Less than high school	16.2 (13.9–18.7)	27.8 (21.1–35.7)	25.6 (21.7–29.8)
High school, trade school, or GED education	41.4 (38.7–44.2)	42.7 (35.2–50.5)	44.5 (39.8–49.3)
College education or higher	38.9 (35.6–42.3)	19.1 (12.5–25.7)	24.6 (20.6–29.1)
Father's education, %			
No resident father	21.3 (19.4–23.3)	49.9 (41.3–58.4)	48.7 (44.7–52.7)
Less than high school	13.5 (11.5–15.7)	14.7 (10.1–21.0)	18.5 (15.2–22.3)
High school, trade school, or GED education	30.5 (28.0–33.1)	23.2 (17.0–30.8)	23.8 (20.2–27.9)
College education or higher	34.7 (31.4–38.2)	12.2 (7.0–20.2)	9.0 (7.0–11.3)
Received public assistance, %	7.4 (6.1–8.9)	28.3 (21.2–36.6)	25.3 (21.7–29.4)
Geography, %			
Suburban	40.7 (35.4–46.1)	25.4 (18.3–34.1)	28.8 (23.6–34.6)
Urban	27.5 (23.1–32.4)	47.9 (38.2–57.8)	38.8 (31.9–46.1)
Rural	28.8 (24.1–33.9)	21.3 (14.8–29.7)	28.7 (22.2–36.1)
Other	3.1 (2.3–4.1)	5.4 (2.6–10.9)	3.8 (2.6–5.5)

CI, confidence interval; GED, General Equivalency Development.

<sup>a</sup> Reflects the representative proportion in the target US population. Percentages may not total 100% because of rounding.

<sup>b</sup> Columns may not sum to the total number of participants (*N* = 13 084) because 0.7% (*n* = 95) of individuals experienced both MI and FI before the age of 18 and are reflected in both categories; 5.9% (*n* = 772) of individuals had MI or FI after the age of 18.

<sup>c</sup> Age at wave 1 mean age (2007–2008).

history, MI history, and FI history. We also used descriptive statistics to describe the prevalence of PI and the mean age at first episode of PI in our sample. We used unadjusted and adjusted logistic regression models to examine associations between PI and our outcome variables. We modeled PI as 2 independent variables indicating history of MI or history of FI. This approach allowed us to isolate the impact of MI and FI for individuals who experienced incarceration of 1 or both parents. In unadjusted analyses, only MI and FI were included in the model. In adjusted analyses, we controlled for all previously described covariates. In all analyses, we conducted them using Stata 14.0 (Stata Corp, College Station, TX); accounted for the clustered, stratified survey design; and used survey weights to generate national population estimates

unless otherwise noted.<sup>28</sup> This study was approved by the University of Michigan Medical School Institutional Review Board.

## RESULTS

Table 2 illustrates the weighted sociodemographic characteristics of our sample by history of PI. Of the 13 084 individuals in the analysis sample, 10.7% experienced any PI (2.1% experienced MI and 9.4% experienced FI before 18 years of age). Non-Hispanic Black individuals had a disproportionately high prevalence of PI, accounting for 34.3% of individuals reporting MI and 23.0% of individuals reporting FI, while representing only 14.8% of our sample (data not shown). A large proportion of individuals with PI

were from 1-parent households and urban areas.

For individuals with PI histories, the mean age at first PI episode was 10.7 years (8.8–12.6) for those with MI and 10.8 years (9.2–12.3) for those with FI (data not shown).

## Unadjusted Analyses

In Table 3, we display the unadjusted odds ratios (ORs) of health care use patterns and health behaviors among individuals with a history of MI or FI compared with individuals without a history of PI. Young adults with MI and FI had significantly higher odds of forgone health care. Individuals with FI only had higher odds of having a health problem worsen because of lack of care. Dental health care use was significantly less common among individuals with an MI or FI history. Individuals with

FI had significantly higher odds of having had counseling within the past year. Although neither MI nor FI was associated with delayed annual physical examinations, young adults with a history of PI were significantly more likely to report using the ED or a non–primary care site as their usual source of care.

Individuals with PI were more likely to engage in several unhealthy behaviors. Any history of MI or FI was associated with drinking sugary drinks, smoking cigarettes, and having 10 or more lifetime sexual partners. Whereas MI history was positively associated with high-risk behaviors, including having sex in exchange for money, FI was associated with obesogenic behaviors (ie, related to fast food consumption and sedentary behaviors), lower sunblock use, and higher substance use (ie, prescription drug abuse, illicit IV drug use, and problem drug use). Neither MI nor FI was associated with gambling problems.

### Multivariable Analyses

Multivariable results of the association between MI or FI and health care use and health behavior outcomes are presented in Table 4.

In adjusted analyses, MI and FI remained significantly associated with forgone health care. FI history remained statistically significantly associated with worsening health problems because of lack of health care. Individuals with MI were significantly less likely to receive annual dental examinations compared with peers; however, this association was no longer significant for individuals with FI. Adjusted odds of having recent psychological counseling were significantly higher for young adults with FI compared with those without FI. The ED as a usual source of care remained significant for individuals with MI only.

**TABLE 3** Unadjusted ORs of Health Care Use and Health Behaviors by PI

	MI	FI
	Unadjusted OR (95% CI)	Unadjusted OR (95% CI)
<b>Health care use</b>		
Forgone health care	1.95*** (1.42–2.68)	1.44*** (1.20–1.72)
Worsening health problem(s)	1.50 (0.89–2.52)	1.70*** (1.35–2.14)
Annual dental examination	0.58*** (0.43–0.78)	0.74*** (0.62–0.88)
Mental health counseling	1.13 (0.70–1.83)	1.47** (1.15–1.87)
Annual physical examination	1.25 (0.84–1.85)	1.04 (0.86–1.25)
Usual source of care in ED or non–primary care setting	3.31*** (2.31–4.73)	1.76*** (1.39–2.23)
<b>General health behaviors</b>		
>50 h of television watched per wk	0.82 (0.30–2.21)	2.14*** (1.37–3.34)
Fast food ≥4× per wk	1.31 (0.87–2.00)	1.39*** (1.14–1.70)
Sugary drinks ≥4 per wk	1.49* (1.05–2.11)	1.63*** (1.34–1.98)
Fitness center use ≥4× per wk	0.67 (0.37–1.19)	0.65** (0.47–0.89)
Sunblock use	0.87 (0.56–1.34)	0.55*** (0.45–0.67)
<b>Substance use</b>		
Cigarette smoking (within 30 d)	1.86*** (1.34–2.59)	1.71*** (1.45–2.00)
Problem drinking <sup>a</sup>	1.21 (0.85–1.72)	1.18 (0.97–1.42)
Prescription drug abuse	1.38 (0.88–2.15)	1.41*** (1.16–1.71)
Illicit IV drug use	0.91 (0.22–3.79)	2.51* (1.22–5.19)
Problem drug use <sup>b</sup>	1.23 (0.55–2.76)	1.80*** (1.34–2.40)
<b>Other high-risk behaviors</b>		
10+ lifetime sexual partners <sup>c</sup>	1.77** (1.25–2.50)	1.30*** (1.11–1.51)
Sex in exchange for money	2.75** (1.40–5.37)	1.24 (0.69–2.23)
Gambling problems	1.38 (0.58–3.32)	1.67 (0.95–2.3)

CI, confidence interval.

<sup>a</sup> Drinking that put yourself or others at risk, including unprotected sex, drinking that led to legal problems, or drinking that caused problems with family, friends, work, or school.

<sup>b</sup> Using drugs that put yourself or others at risk, including unprotected sex or drinking that led to legal problems.

<sup>c</sup> Vaginal sex only.

\*  $P < .05$ .

\*\*  $P < .01$ .

\*\*\*  $P < .001$ .

Individuals with FI were significantly more likely to watch 50 hours or more of television per week, consume sugary drinks, and less likely to use sunblock than individuals without FI. MI history was not significantly associated with these general health behaviors in adjusted analyses.

Young adults with MI or FI history had significantly higher adjusted odds of smoking cigarettes, drinking problems, and prescription drug abuse compared with peers without a PI history. For individuals with FI, adjusted odds of using illicit IV drug use and problem drug use were also significantly higher.

MI and FI were associated with significantly higher odds of having ≥10 sexual partners. MI remained significantly associated with having sex in exchange for money in adjusted analyses.

### DISCUSSION

In this nationally representative study of young adults, we found a consistent association between the incarceration of a mother or father and suboptimal health care use and unhealthy behaviors. Our findings suggest a history of MI or FI is independently associated with activities detrimental to health, including higher levels of ED use, obesogenic behaviors, substance use, and other high-risk behaviors. Adverse health care use patterns and more health-harming behaviors may ultimately contribute to poor health outcomes throughout the life course for young adults with a history of PI.

Authors of previous studies have demonstrated that children with PI histories and young adults with a history of MI, exclusively, experience barriers to health care.<sup>29,30</sup> Our

**TABLE 4** Adjusted ORs of Health Care Use and Health Behaviors by PI

	MI	FI
	Adjusted OR (95% CI)	Adjusted OR (95% CI)
Health care use		
Forgone health care	1.65** (1.20–2.27)	1.22* (1.02–1.47)
Worsening health problem(s)	1.29 (0.76–2.22)	1.51** (1.18–1.95)
Annual dental examination	0.67** (0.50–0.90)	0.89 (0.75–1.07)
Mental health counseling	1.14 (0.71–1.85)	1.60*** (1.23–2.08)
Annual physical examination	1.47 (0.96–2.25)	1.13 (0.94–1.36)
Usual source of care in ED or non–primary care setting	2.36*** (1.51–3.68)	1.22 (0.98–1.53)
General health behaviors		
>50 h of television watched per wk	0.66 (0.27–1.58)	1.63* (1.03–2.56)
Fast food ≥4× per wk	1.10 (0.69–1.75)	1.15 (0.94–1.43)
Sugary drinks ≥4 per wk	1.29 (0.90–1.87)	1.37** (1.10–1.69)
Fitness center use ≥4× per wk	0.71 (0.39–1.31)	0.75 (0.54–1.04)
Sunblock use	1.14 (0.71–1.83)	0.67*** (0.54–0.82)
Substance use		
Cigarette smoking (within 30 d)	1.77*** (1.26–2.50)	1.53*** (1.28–1.82)
Problem drinking <sup>a</sup>	1.70** (1.17–2.49)	1.46*** (1.21–1.75)
Prescription drug abuse	1.61* (1.02–2.55)	1.46*** (1.20–1.79)
Illicit IV drug use	0.96 (0.19–4.77)	2.54** (1.27–5.12)
Problem drug use <sup>b</sup>	1.38 (0.59–3.23)	1.74*** (1.25–2.41)
Other high-risk behaviors		
10+ lifetime sexual partners <sup>c</sup>	1.55* (1.08–2.22)	1.19* (1.01–1.41)
Sex in exchange for money	2.16* (1.05–4.45)	1.03 (0.57–1.85)
Gambling problems	1.34 (0.56–3.20)	1.77 (0.98–3.20)

CI, confidence interval.

<sup>a</sup> Drinking that put yourself or others at risk, including unprotected sex, drinking that led to legal problems, or drinking that caused problems with family, friends, work, or school.<sup>b</sup> Using drugs that put yourself or others at risk, including unprotected sex or drinking that led to legal problems.<sup>c</sup> Vaginal sex only.\*  $P < .05$ .\*\*  $P < .01$ .\*\*\*  $P < .001$ .

findings related to the association of PI with forgone care and FI with worsening health problems because of no health care suggest there is underutilization of needed health care. The higher use of mental health counseling among individuals with a history of FI likely reflects a greater mental health burden in this population but does not necessarily indicate adequate mental health treatment.<sup>16,31</sup> Additionally, young adults with MI are more likely to use the ED as their usual source of health care. These young adults may seek care after their health problems have worsened, propagating existing health disparities experienced by individuals with exposure to MI.<sup>16</sup> Higher frequencies of ED use is not unexpected given the multiple health conditions that ACE-exposed populations experience in addition

to the numerous social and economic barriers to primary care and may experience unmet health care needs.<sup>14,29,30</sup>

Although we examined young adults in this study, drivers of health care being underused may begin in childhood for individuals with PI. PI often leads to disruptions in the family unit, including possible transitions in the adults who serve as the primary caregiver, as well as the child's residence.<sup>7</sup> Such disruptions may make it more difficult for caregivers to take children to the doctor or dentist for preventive health care, which may normalize forgoing medical care. Additionally, parents and children who have experienced a history of negative interaction with institutions, such as the criminal justice and child welfare systems, may be less likely to interact

with other systems, such as the health care system, because of fear of surveillance and formal record-keeping.<sup>32</sup> Caregivers are also more likely to be financially stressed and may have access to fewer resources that allow them to model good health behavior for children. Additionally, PI has been associated with a truncated transition from adolescence to adulthood,<sup>33</sup> which may result in the failure to acquire knowledge of how to access or use preventive health care. Together, these behaviors may be mirrored in the future as the child ages and begins to independently engage with the health care system.

Individuals with PI histories also reported more unhealthy behaviors compared with their peers without PI. For example, we found that young adults with a history of FI, but not MI, were more likely to engage in obesogenic behaviors, such as excessive television watching. Researchers of previous work have shown that children with PI histories are more likely to eat unhealthy foods, such as fast food and salty, starchy, and sweet snacks, suggesting the health behaviors we observed among young adults may also have their origins in childhood.<sup>34</sup> We found that a history of MI or FI was associated with significantly higher rates of smoking, problem drinking, prescription drug abuse, and ≥10 lifetime sexual partners than peers without a history of PI. The results presented in previous studies have been mixed regarding substance use among children and youth with PI histories.<sup>14,35</sup> However, researchers of previous studies used small sample sizes, whereas we employed a large, nationally representative data set in our study.<sup>36</sup> Our results aligned with studies in which population-based samples were also used.<sup>35,37</sup> Other high-risk behaviors varied by MI or FI history. Individuals with a history of MI had twice the odds of having sex in exchange for money, whereas a history of FI was associated with

IV drug use and problem drug use. These findings add to the broader ACE literature by explicating the differential association between MI or FI and health behaviors.

The differential impact of incarceration by parent has been described in the literature, with a specific focus on the influence of maternal incarceration.<sup>6,30,38</sup> The evidence regarding the effect of MI on child outcomes is mixed, but some scholars have suggested FI may have a greater influence on children's long-term outcomes.<sup>6,38,39</sup> For example, Miller and Barnes<sup>39</sup> found that FI exclusively was associated with physical (ie, asthma, bronchitis, emphysema, and physical injury) and mental health (ie, depression and anxiety) conditions. In our study, we found that FI was more strongly associated with general health behaviors and drug use than MI. The mechanisms for these differential relationships are unclear. The impact of FI may be related to a father's role as the primary wage-earner in the household and the loss of income and economic strain after incarceration. This strain may place children at risk for living in lower socioeconomic families and neighborhoods.<sup>40</sup> In addition, financial challenges during and after FI may impede a family's ability to afford health care, healthy food options, and activities that promote physical fitness. Fewer opportunities for healthy experiences may increase screen time and other unhealthy behaviors.<sup>34</sup> These findings reveal that interventions aimed at improving the health among this population may need to be tailored according to which parent was incarcerated.

Although this study has many strengths, the results of this study must be interpreted in the context of specific limitations. Several of the findings were significantly associated

with FI but not MI. Although this aligns with previous research and could be interpreted as FI being a stronger driver for many health behaviors compared with those with MI,<sup>6,38</sup> the sample of individuals reporting MI was small and may have lacked the power to detect significant associations. Additionally, we did not report the primary caregiver before PI, the type of offenses leading to PI, or measure the length of each episode of PI in our study because these data were not collected in Add Health. Moreover, incarceration can be a sensitive subject and a source of stigma or shame,<sup>41,42</sup> and respondents could have underreported their PI history, which may have led to more conservative estimates.

## CONCLUSIONS

A history of PI is associated with health care use patterns and health behaviors into adulthood. Barriers to health care and health-harming behaviors may contribute to overall poorer health for this population. Research that focuses both on the identification of specific barriers to health care, targeting this population's under-utilization of care, and the development of unhealthy behaviors for PI-exposed individuals is needed. Also, determining if existing interventions that increase preventive health care use and improve unhealthy behaviors for children exposed to PI should be prioritized. For example, partnerships between government organizations, community organizations, and health care organizations that provide services to children with PI could communicate about children that need to establish care within a medical home and help them gain access to care. Also, pediatric providers could consider ACE screening as an initial approach

to identifying patients who may benefit from further assessment and health behavior counseling. Additionally, group medical visits for children impacted by PI may be another strategy to improve health behaviors and decrease ED visits.<sup>43</sup> At those group visits, providers can discuss healthy behaviors and link children with effective interventions to encourage healthy behaviors. These group visits could foster a patient-provider trust, a sense of community, and support among individuals experiencing PI.<sup>44</sup> Finally, policy makers should support policies that (1) reduce incarceration rates by addressing aggressive incarceration policies that lead to mass incarceration, disproportionately affecting minority and poor individuals, and (2) maintain a child's contact with an incarcerated parent, when appropriate. Addressing PI is critical because the long-term consequences may impact future generations to come.

## ACKNOWLEDGMENT

We thank Jessica Haefner, BS, of the University of Michigan, for providing detailed literature reviews during the initial stages of this study.

## ABBREVIATIONS

ACE: adverse childhood experience  
Add Health: National Longitudinal Study of Adolescent Health to Adult Health  
ED: emergency department  
FI: father incarceration  
IV: intravenous  
MI: mother incarceration  
OR: odds ratio  
PI: parental incarceration

revisions to the manuscript, and supervised the study; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

**DOI:** <https://doi.org/10.1542/peds.2017-4314>

Accepted for publication Apr 19, 2018

Address correspondence to Nia Heard-Garris, MD, MSc, Division of Academic General Pediatrics, Department of Pediatrics, Ann and Robert H. Lurie Children's Hospital, 225 E Chicago Ave, Box 162, Chicago, IL 60611. E-mail: [nheardgarris@luriechildrens.org](mailto:nheardgarris@luriechildrens.org)

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2018 by the American Academy of Pediatrics

**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** Drs Heard-Garris, Winkelman, and Kan completed some portions of this study during their tenure as Robert Wood Johnson Clinical Scholars at the University of Michigan and acknowledge funding from the Robert Wood Johnson Foundation during that time. Dr Winkelman also acknowledges funding from the US Department of Veterans Affairs. The funders were not involved in the study design, collection, analysis, interpretation of data, writing of the report, or in the decision to submit the manuscript and they accept no responsibility for the content.

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

## REFERENCES

- Murphey D, Cooper PM; Child Trends. Parents behind bars: what happens to their children? 2015. Available at: <https://www.childtrends.org/wp-content/uploads/2015/10/2015-42ParentsBehindBars.pdf>. Accessed November 2, 2017
- Glaze LE, Maruschak LM; Bureau of Justice Statistics. Parents in prison and their minor children. 2008. Available at: <https://www.bjs.gov/content/pub/pdf/pptmc.pdf>. Accessed November 2, 2017
- Shlafer RJ, Duwe G, Hindt L. Parents in prison and their minor children: comparisons between state and national estimates. *Prison J*. In press.
- Wildeman C. Parental imprisonment, the prison boom, and the concentration of childhood disadvantage. *Demography*. 2009;46(2):265–280
- Schirmer S, Nellis A, Mauer M; The Sentencing Project. Incarcerated parents and their children: trends 1991-2007. 2009. Available at: [www.sentencingproject.org/wp-content/uploads/2016/01/Incarcerated-Parents-and-Their-Children-Trends-1991-2007.pdf](http://www.sentencingproject.org/wp-content/uploads/2016/01/Incarcerated-Parents-and-Their-Children-Trends-1991-2007.pdf). Accessed November 2, 2017
- Turney K, Wildeman C. Detrimental for some? Heterogeneous effects of maternal incarceration on child wellbeing. *Criminol Public Policy*. 2015;14(1):125–156
- Travis J, Waul M, eds. *Prisoners Once Removed: The Impact of Incarceration and Reentry on Children, Families, and Communities*. Washington, DC: The Urban Institute; 2003
- Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) study. *Am J Prev Med*. 1998;14(4):245–258
- Chapman DP, Whitfield CL, Felitti VJ, Dube SR, Edwards VJ, Anda RF. Adverse childhood experiences and the risk of depressive disorders in adulthood. *J Affect Disord*. 2004;82(2):217–225
- Giovanelli A, Reynolds AJ, Mondt CF, Ou SR. Adverse childhood experiences and adult well-being in a low-income, urban cohort. *Pediatrics*. 2016;137(4):e20154016
- Holman DM, Ports KA, Buchanan ND, et al. The association between adverse childhood experiences and risk of cancer in adulthood: a systematic review of the literature. *Pediatrics*. 2016;138(suppl 1):S81–S91
- Turney K. Stress proliferation across generations? Examining the relationship between parental incarceration and childhood health. *J Health Soc Behav*. 2014;55(3):302–319
- Kjellstrand JM, Eddy JM. Parental incarceration during childhood, family context, and youth problem behavior across adolescence. *J Offender Rehabil*. 2011;50(1):18–36
- Murray J, Farrington DP, Sekol I. Children's antisocial behavior, mental health, drug use, and educational performance after parental incarceration: a systematic review and meta-analysis. *Psychol Bull*. 2012;138(2):175–210
- Poehlmann J. Children's family environments and intellectual outcomes during maternal incarceration. *J Marriage Fam*. 2005;67(5):1275–1285
- Lee RD, Fang X, Luo F. The impact of parental incarceration on the physical and mental health of young adults. *Pediatrics*. 2013;131(4). Available at: [www.pediatrics.org/cgi/content/full/131/4/e1188](http://www.pediatrics.org/cgi/content/full/131/4/e1188)
- Parke RD, Clarke-Stewart KA. Effects of parental incarceration on young children. 2015. Available at: <https://aspe.hhs.gov/basic-report/effects-parental-incarceration-young-children>. Accessed November 21, 2017
- Healthy People 2020. Determinants of health. Available at: <https://www.healthypeople.gov/2020/about/foundation-health-measures/Determinants-of-Health#individual-behavior>. Accessed November 23, 2017
- Aaron L, Dallaire DH. Parental incarceration and multiple risk experiences: effects on family dynamics and children's delinquency. *J Youth Adolesc*. 2010;39(12):1471–1484
- Murray J, Farrington DP. Parental imprisonment: effects on boys' antisocial behaviour and delinquency



- through the life-course. *J Child Psychol Psychiatry*. 2005;46(12):1269–1278
21. The National Longitudinal Study of Adolescent Health. Study design. 2009. Available at: [www.cpc.unc.edu/projects/addhealth/design](http://www.cpc.unc.edu/projects/addhealth/design). Accessed November 3, 2017
  22. Bureau of Labor Statistics. Time spent in leisure and sports activities for the civilian population by selected characteristics, averages per day, 2016 annual averages. Available at: <https://www.bls.gov/news.release/atus.t11a.htm>. Accessed February 20, 2018
  23. Salmon J, Bauman A, Crawford D, Timperio A, Owen N. The association between television viewing and overweight among Australian adults participating in varying levels of leisure-time physical activity. *Int J Obes Relat Metab Disord*. 2000;24(5):600–606
  24. Healy GN, Dunstan DW, Salmon J, Shaw JE, Zimmet PZ, Owen N. Television time and continuous metabolic risk in physically active adults. *Med Sci Sports Exerc*. 2008;40(4):639–645
  25. Haderxhanaj LT, Leichliter JS, Aral SO, Chesson HW. Sex in a lifetime: sexual behaviors in the United States by lifetime number of sex partners, 2006-2010. *Sex Transm Dis*. 2014;41(6):345–352
  26. Chandra A, Billioux VG, Copen CE, Sionean C. HIV risk-related behaviors in the United States household population aged 15-44 years: data from the National Survey of Family Growth, 2002 and 2006-2010. *Natl Health Stat Report*. 2012;(46):1–19
  27. Ford CA, Pence BW, Miller WC, et al. Predicting adolescents' longitudinal risk for sexually transmitted infection: results from the National Longitudinal Study of Adolescent Health. *Arch Pediatr Adolesc Med*. 2005;159(7):657–664
  28. Chantala K, Tabor J. Strategies to perform a design-based analysis using the add health data. 1999. Available at: [www.cpc.unc.edu/projects/addhealth/documentation/guides/weight1.pdf](http://www.cpc.unc.edu/projects/addhealth/documentation/guides/weight1.pdf). Accessed January, 2016
  29. Turney K. Unmet health care needs among children exposed to parental incarceration. *Matern Child Health J*. 2017;21(5):1194–1202
  30. Foster H, Hagan J. Maternal imprisonment, economic marginality, and unmet health needs in early adulthood. *Prev Med*. 2017;99:43–48
  31. Tasca M, Turanovic JJ, White C, Rodriguez N. Prisoners' assessments of mental health problems among their children. *Int J Offender Ther Comp Criminol*. 2014;58(2):154–173
  32. Brayne S. Surveillance and system avoidance: criminal justice contact and institutional attachment. *Am Sociol Rev*. 2014;79(3):367–391
  33. Turney K, Lanuza YR. Parental incarceration and the transition to adulthood: parental incarceration and adulthood transitions. *J Marriage Fam*. 2017;79(5):1314–1330
  34. Jackson DB, Vaughn MG. Parental incarceration and child sleep and eating behaviors. *J Pediatr*. 2017;185:211–217
  35. Roettger ME, Swisher RR, Kuhl DC, Chavez J. 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*. 2011;106(1):121–132
  36. Kinner SA, Alati R, Najman JM, Williams GM. Do paternal arrest and imprisonment lead to child behaviour problems and substance use? A longitudinal analysis. *J Child Psychol Psychiatry*. 2007;48(11):1148–1156
  37. Davis L, Shlafer RJ. Substance use among youth with currently and formerly incarcerated parents. *Smith Coll Stud Soc Work*. 2017;87(1):43–58
  38. Wildeman C, Turney K. Positive, negative, or null? The effects of maternal incarceration on children's behavioral problems. *Demography*. 2014;51(3):1041–1068
  39. Miller HV, Barnes JC. The association between parental incarceration and health, education, and economic outcomes in young adulthood. *Am J Crim Justice*. 2015;40(4):765–784
  40. Roettger ME, Swisher RR. Associations of fathers' history of incarceration with sons' delinquency and arrest among black, white, and Hispanic males in the United States\*. *Criminology*. 2011;49(4):1109–1147
  41. Braman D. *Doing Time on the Outside: Incarceration and Family Life in Urban America*. Ann Arbor, MI: University of Michigan Press; 2007
  42. Condry R. *Families Shamed: The Consequences of Crime for Relatives of Serious Offenders*. 1st ed. Hoboken, NJ: Willan; 2007
  43. Jaber R, Braksmajer A, Trilling JS. Group visits: a qualitative review of current research. *J Am Board Fam Med*. 2006;19(3):276–290
  44. Geller JS, Kulla J, Shoemaker A. Group medical visits using an empowerment-based model as treatment for women with chronic pain in an underserved community. *Glob Adv Health Med*. 2015;4(6):27–60