



Published in final edited form as:

Am J Public Health. 2014 March ; 104(3): 421–427. doi:10.2105/AJPH.2013.301504.

A Heavy Burden: The Cardiovascular Health Consequences of Having a Family Member Incarcerated

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Abstract

Objectives—We examined the association of family member incarceration with cardiovascular risk factors and disease by gender.

Methods—We used a sample of 5470 adults aged 18 years and older in the National Survey of American Life, a 2001–2003 nationally representative cross-sectional survey of Blacks and Whites living in the United States, to examine 5 self-reported health conditions (diabetes, hypertension, heart attack or stroke, obesity, and fair or poor health).

Results—Family member incarceration was associated with increased likelihood of poor health across all 5 conditions for women but not for men. In adjusted models, women with family members who were currently incarcerated had 1.44 (95% confidence interval [CI] = 1.03, 2.00), 2.53 (95% CI = 1.80, 3.55), and 1.93 (95% CI = 1.45, 2.58) times the odds of being obese, having had a heart attack or stroke, and being in fair or poor health, respectively.

Conclusions—Family member incarceration has profound implications for women's cardiovascular health and should be considered a unique risk factor that contributes to racial disparities in health.

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Contributors

H. Lee, C. Wildeman, and J. S. Jackson were involved with study concept, design, and supervision. H. Lee and C. Wildeman drafted the article. H. Lee, C. Wildeman, E. A. Wang, and J. S. Jackson lead the analysis and interpretation of data. N. Matusko performed all statistical analyses. J. S. Jackson acquired the data. All authors were involved in critical revision of the article for important intellectual content.

Human Participant Protection

The University of Michigan institutional review board approved this study.

Over the course of the prison boom, imprisonment has become a common event in the life course for Black men,¹ especially those with low levels of education² who reside in poor neighborhoods,³ and their families.⁴ Although there is no official figure for women who have a family member imprisoned, it has been estimated that as many as 3 million women annually have an incarcerated partner.⁵ This is likely a conservative estimate because it includes neither inmates who have multiple concurrent relationships nor other women affected by male incarceration, such as mothers, sisters, and adult children. Because 60% to 70% of Black men who did not complete high school will experience imprisonment by their early 30s,^{2,4} poor, minority women disproportionately experience family member imprisonment. Yet the only research that has considered the impact of male incarceration on the health of these women has focused on mental rather than physical health.^{6,7} This is a surprising omission because much research examines the physical and mental health consequences of imprisonment for men⁸⁻¹⁵ as well as their communities^{16,17} and children.^{18,19}

This oversight is problematic for 2 reasons. First, because the experience of incarceration is concentrated among men, incarceration's indirect consequences on women's health—transmitted through the incarceration of a family member—are likely more relevant for health among women than are their own experiences of incarceration at the aggregate level. Because the lifetime risks of imprisonment for Black men² and paternal imprisonment for Black children²⁰ hover around 20% to 25%, whereas risks of maternal imprisonment for Black children barely exceed 3%, mass incarceration's indirect effects on health inequalities among women are likely larger than its direct effects. In other words, because women are at least 5 times more likely to have a family member incarcerated than to be incarcerated themselves, the effects of their own incarceration would have to dwarf the effects of having a family member incarcerated to have the same aggregate effect. Likewise, as the cumulative risks of paternal and maternal imprisonment for White children—at 3.3% and 0.6%, respectively—are far lower than are risks for Black children, the consequences are likely much more pronounced for the Black community.²⁰

Second, there is a host of reasons to expect the incarceration of a family member to harm women's physical health beyond increasing their risk of contracting sexually transmitted disease.^{16,17} Indeed, exposure to family member imprisonment may compromise the physical health, particularly cardiovascular disease–related health outcomes, of women via (1) lowered socioeconomic status and family functioning, (2) reduced social support, and (3) higher levels of chronic stress.²¹ The incarceration of a family member brings with it not only increases in household expenses²²⁻²⁴ but also substantial decreases in household income²⁵ and increases in material hardship.²⁶ Furthermore, the incarceration of a family member often dramatically increases the stress and social isolation women feel as they struggle to deal with their family member's absence.^{22,23,27}

The preponderance of research suggests that because of the independent and negative effects of low socioeconomic status, chronic stress, and social isolation on health, the incarceration of a family member may contribute to a novel form of weathering—the early health deterioration of Blacks as a consequence of the accumulation of repeated experience with

social and economic adversity^{28,29}—among disadvantaged Black women (Lee and Wildeman²¹ provide a detailed discussion).

We hypothesized that family member incarceration would be positively associated with cardiovascular disease and related risk factors among women but not men. Women shoulder the burden of childcare and household management and maintain connections to their imprisoned male family members or romantic partners.²¹ In addition, women are more likely to engage in overeating and sedentary behaviors as coping behaviors for stress than are men.^{30,31} Family member incarceration may lead to racial disparities in physical health among women because of the disproportionate experiences of this stressful life event among Black women.

Using data from the National Survey of American Life (NSAL), we tested whether having a family member incarcerated is a distinct stressor that has consequences for cardio-vascular risk factors and disease among women and men.

METHODS

The NSAL is a national household probability sample that was collected throughout the United States between February 2001 and June 2003.³² The goal of the survey was to gather information about the physical, emotional, mental, structural, and economic conditions of Black Americans. The adult (aged ≥ 18 years) sample includes Blacks (n = 3570), Blacks of Caribbean descent (n = 1621), and non-Hispanic Whites (n = 891). The overall response rate was 72.3%, and samples are representative of their respective populations and reflect national distributions on major sociodemographic variables, such as gender, region, urbanicity, education, income, and marital status.³³ National multistage probability methods were used in generating the samples.³⁴ It is important to note that the population of inference for the NSAL White sample is not the entire US White population but those residing in areas where Blacks were at least 10% of the population. A majority of the interviews were conducted face-to-face with race/ethnicity matching of interviewers and respondents and using a computer-assisted instrument (14% were conducted entirely or partially by telephone).

A unique feature of the NSAL is the inclusion of questions to identify members of households missing because of incarceration.³⁵ It is the only broadly representative data set that includes questions about health and incarceration in a large enough sample to generate stable estimates of associations of the incarceration of a family member with physical health. Additional details of the sample are described elsewhere.³³⁻³⁵

Measures

Respondents self-reported all measures used in this analysis. We derived our measure of family member incarceration from questions asking respondents if they currently had any family members (husband or wife, children, mother, father, brother, or sister) who lived away from home for each of the following reasons: school or college, the military, a long-term care facility or nursing home, or jail or prison. We also included an additional control

for family members missing because of the other 3 reasons provided by aggregating responses into 1 dummy variable. These measures were created for use in the NSAL.³⁵

We examined 5 health outcomes. Diabetes (diabetes or sugar), hypertension (hypertension or high blood pressure), and heart attack or stroke (combined from heart trouble or heart attack and stroke) were self-reported measures of ever being diagnosed by a doctor or health professional with the condition. We calculated obesity, defined as having a body mass index (BMI, defined as weight in kilograms divided by the square of height in meters) of 30 or higher, from self-reported height (in feet and inches) and weight (in pounds). Lastly, we created a dummy variable for reports of fair or poor health.

Our demographic controls included age (< 29 years [reference], 30–44 years, 45–59 years, 60 years), race/ethnicity (Black [reference], Caribbean Black, non-Hispanic White), income—needs ratio (household income divided by 2001 census poverty threshold for the appropriate family size), education (< 11 years [reference], 12 years, 13–15 years, 16 years), marital status (married [reference]; partnered [unmarried]; separated, divorced, or widowed; never married), foreign-born, and health insurance status. We also included a series of childhood measures, including being primarily raised in a non-2-parent household (up to age 16 years), family ever received public assistance when growing up, and self-rated health in childhood (up to age 16 years; range = 1 [poor] to 5 [excellent]). Finally, we included controls for own incarceration history (ever spending time in jail or prison), physical activity index (sum of the responses to 3 questions ranging from 0 [never] to 3 [often]: How often do you work in the garden or the yard? How often do you engage in active sports or exercise? How often do you take walks?), and BMI. Further documentation on the sources for demographic variables used can be found online.³²

Our sample included individuals who had no missing information on these covariates, resulting in a sample of 3356 (61%) women and 2114 (39%) men. Compared with women not included, women in the analytic sample had a higher proportion with an education of 11 years or less (0.16 [SE = 0.030] vs 0.20 [SE = 0.020]; $P < .05$) and an education of 16 years or more (0.14 [SE = 0.030] vs 0.23 [SE = 0.030]; $P < .05$); a lower proportion with an education of 12 years (0.34 [SE = 0.040] vs 0.32 [SE = 0.040]; $P < .05$), and an education between 13 and 15 years (0.36 [SE = 0.060] vs 0.24 [SE = 0.020]; $P < .05$); a higher proportion of those who were foreign-born (0.02 [SE = 0.004] vs 0.04 [SE = 0.004]; $P < .001$); and a lower proportion of those reporting fair or poor health (0.34 [SE = 0.060] vs 0.17 [SE = 0.010]; $P < .01$).

There were no statistically significant ($P < .05$) differences on any other controls for women. The only statistically significant differences between men not included in the sample and men in the analytic sample were for age and income—needs ratio. Compared with men not included, men in the analytic sample had a higher proportion of those aged 29 years or younger (0.06 [SE = 0.02] vs 0.22 [SE = 0.01]; $P < .01$) and those aged 45 to 59 years (0.25 [SE = 0.05] vs 0.26 [SE = 0.01]; $P < .01$); a lower proportion of those aged 30 to 44 years (0.50 [SE = 0.06] vs 0.34 [SE = 0.02]; $P < .01$) and aged 60 years or older (0.19 [SE = 0.05] vs 0.18 [SE = 0.02]; $P < .01$); and a higher income—needs ratio (2.98 [SE = 0.16] vs 3.68 [SE = 0.20]; $P < .05$).

Statistical Analyses

We used logistic regression³⁶ to examine the association of family member incarceration with our 5 dichotomous health outcomes in models stratified by gender. Our first model (model 1) adjusted for age and missing family members because of reasons other than jail or prison. We included this control because the loss of a household member owing to other reasons can also be a stressor.³⁷ We then included controls for race/ethnicity, income—needs ratio, education, and self-rated health as a child (model 2) to adjust for confounding because of socioeconomic status or previous health status. In our third model, we adjusted for early life hardship (non—2-parent family and family received financial assistance growing up), marital status, health insurance status, and foreign-born status to adjust for additional social factors related to both health and health care access (model 3). In model 4, we included health and health behavior controls that vary according to each outcome. We adjusted for physical activity for the obesity outcome because it is an important predictor of BMI. We adjusted for BMI for the diabetes, hypertension, and heart attack or stroke outcomes. We also adjusted for diabetes and hypertension for the heart attack or stroke outcome. We did not include health behavior controls for overall self-reported health, as this is a global measure of health. Our final model included a control for own incarceration history (model 5). We weighted all analyses to be nationally representative of the given population and sub-populations in the coterminous 48 US states, and we conducted all analyses using STATA version 11.³⁸

We also ran additional sensitivity analysis (not shown) to examine the robustness of our results. We included interactions between family member incarceration and gender to test for gender differences in the association of family member incarceration with health. In a separate model, we included interactions between family member incarceration and race to test for Black—White differences in the association of family member incarceration with health in samples including and excluding Blacks of Caribbean descent.

RESULTS

Table 1 presents weighted and unweighted descriptive statistics for the sample. We have discussed results for the weighted descriptive statistics. About 8% of the women and 5% of the men reported currently having a family member missing from the household because of jail or prison incarceration. In addition, 5% of the women in the sample had ever spent time in jail or prison compared with 21% of the men. Table 2 provides weighted and un-weighted prevalence and means for the adult health outcomes. Prevalence of diabetes and heart attack or stroke were comparable with national estimates for Blacks near the data collection period.^{39,40} Prevalence of obesity and hypertension were somewhat lower than were national estimates near the data collection period.^{40,41}

Table 3 presents the results of the logistic regression analyses for the association of family member incarceration with health for women. Family member incarceration was associated with increased likelihood of poor health across all 5 health outcomes. In models adjusting for age and family member missing because of other reasons, women with family members who were missing from the household because of incarceration had 1.88 (95% confidence interval [CI] = 1.41, 2.50) times the odds of being obese, 2.68 (95% CI = 1.54, 4.68) times

the odds of reporting diabetes, 2.20 (95% CI = 1.50, 3.22) times the odds of reporting hypertension, 2.44 (95% CI = 1.62, 3.67) times the odds of reporting a heart attack or stroke, and 3.27 (95% CI = 2.47, 4.35) times the odds of reporting fair or poor health compared with women without a family member missing because of incarceration. In the fully adjusted models, which are especially rigorous because they also controlled for own history of incarceration, women with family members who were missing from the household because of incarceration had 1.44 (95% CI = 1.03, 2.00) times the odds of being obese, 2.53 (95% CI = 1.80, 3.55) times the odds of reporting a heart attack or stroke, and 1.93 (95% CI = 1.45, 2.58) times the odds of reporting fair or poor health compared with women without a family member missing because of incarceration. Sociodemographic and childhood measures attenuated the association of family member incarceration with hypertension and diabetes to nonsignificance.

There were no statistically significant associations of family member incarceration with any of the health measures for men in Table 4. Interactions between gender and family member incarceration indicate that these gender differences were statistically significant. In addition, for both men and women there were no significant interactions between race and family member incarceration in samples including and excluding Caribbean Blacks.

DISCUSSION

To our knowledge we are the first to empirically examine the association of family member incarceration with cardiovascular risk factors and disease. We found that family member incarceration was associated with higher odds of obesity, heart attack or stroke, and fair or poor self-reported health for women but not men. A large body of research has identified the loss of a family member because of incarceration as a stressful life event associated with emotional and financial burdens that can have serious implications for women's physical and mental health.^{7,21,23} It should be noted, however, that not all the research on family incarceration suggests negative effects on women's health because some research suggests that the effect may be moderated by whether the partner struggled with drug addiction or engaged in domestic violence.^{22,42,43}

We found consistent associations of family member incarceration with health for women even with the addition of rigorous controls for current and prior socioeconomic status, child health, demographic controls, and own history of incarceration, which have been linked to poor health.^{8–15,44} It remains unclear why there was no association of family member incarceration with health for men. The loss of a family member because of incarceration occurs more frequently for women than men because of men's higher likelihood of incarceration. Previous research has also identified women as facing higher levels of multiple caregiving roles and family demands (in addition to work demands) than do men.⁴⁵ Therefore, the loss of a family member might incur more of a burden for women versus men, particularly women caring for young children.^{46,47} Even for women beyond their reproductive years, the incarceration of a son or a daughter can have profound implications for the demands made on their time by their grandchildren.²³ Previous research also suggests that women, particularly disadvantaged and Black women, are more likely to cope with chronic stress by overeating and engaging in lower levels of physical activity than are

men, who are more likely to engage in higher levels of physical activity and substance abuse, which may have particular implications for women's physical health outcomes.^{30,31} Stress can also have effects on obesity, diabetes, and hyper-tension and other cardiovascular risk factors and disease via direct biological pathways that are independent of these health behaviors.^{48,49} In addition to stress, higher demands on time might also compromise a woman's ability to engage in preventative and self-care behavior to reduce health risks.^{50,51}

These gendered patterns in the consequences of family member incarceration also help to elucidate the mechanisms linking family member incarceration to poor health among women. Similar to other chronic stressors, such as poverty and discrimination, family member incarceration can lead directly to negative physical health outcomes or affect physical health via maladaptive coping behaviors, such as overeating.^{31,48} To be sure, a large proportion of families that experience the incarceration of a family member are likely to be disadvantaged and to have experienced multiple stressors, such as poverty and community violence, before family member incarceration, all of which can also lead to poor health outcomes.^{22,37} Our cross-sectional analysis could not disentangle these co-occurring forms of stress even with multiple controls for disadvantage. However, the preponderance of research on incarceration and family dynamics suggests that the loss of a family member because of incarceration is an additional burden that serves to compound disadvantage and exacerbate preexisting stressors.²³ The loss of a family member is a loss to a woman's social support network and a loss of income. At the same time, it creates a host of new burdens, including greater child care demands and the stigma of having a loved one incarcerated.²¹ Future research should use longitudinal data to isolate the impact of family member incarceration on health from other stressors and confounding variables to provide more confidence in causal associations and to provide stronger tests of the mechanisms through which family member incarceration harms health.

Although incarceration is not a traditional risk factor for cardiovascular disease, our results suggest that current family member incarceration should be understood as part of a woman's risk profile for poor health outcomes.⁵² Physicians working in communities where incarceration is prevalent should consider screening for family history of incarceration because it may provide information about a woman's social support system and her risk of cardiovascular disease. Moreover, waiting rooms in prisons and jails present a prime opportunity to counsel and screen female partners of inmates for cardiovascular risk factors, as has been done with sexually transmitted diseases.⁵³

Along with these clinical implications, our results also relate to our understanding of population health and health disparities. Our findings suggest that family member incarceration has profound implications for women's cardiovascular health across race and should be considered a unique risk factor that contributes to racial disparities in women's health because of the disproportionate burden of this experience among Black women. Indeed, because roughly 3 million women, many of them Black, experience the incarceration of a romantic partner each year, when these yearly risks of incarceration are compounded over a lifetime, it becomes clear how massive these effects may be for Black—White disparities in women's health. In light of this, future research needs to rigorously interrogate the various pathways that link this stressor to poor physical health. Including

current family member incarceration questions in large, nationally representative longitudinal data sets is an important next step.

Our study is not without limitations. Because we used cross-sectional data, we cannot make causal claims. Our measure of family member incarceration, although unique compared with other data, lacks specificity. We could not differentiate family members who are in prison or jail, the length of time they have been institutionalized, when they were institutionalized, or the characteristics of the family member (e.g., husband vs father, man vs woman) that was missing. In addition, we could not identify family members who were currently incarcerated but never lived in the household, which might occur for some romantic partners. Therefore, we may have underreported family members who were currently in prison or jail. This also means we could not capture the experience of parental incarceration before age 18 years, which has been linked to adult physical health outcomes.¹⁸

We also relied on self-reported health measures, which may be underreported or inaccurately reported in the case of height and weight. We also were not able to include smoking as a control because tobacco usage questions were not asked of the White respondents. In addition, our sample represents Blacks and Whites living in geographic areas where Blacks constitute at least 10% of the population, so our results cannot be generalized to populations living in communities with lower percentages of Blacks. However, this can also be considered a strength of our analysis, because most studies lack adequate information on Blacks, who are most affected by incarceration because of the disproportionately high rates of incarceration among Black men.^{2,54-56} Because our sample includes men of many different ages (> 18 years), there is likely a significant proportion of men who will experience imprisonment at some point but had not yet experienced it during data collection. Therefore, it is likely that our estimates are conservative. Lastly, it should be noted that incarceration itself is only 1 aspect of the overall effects of men's imprisonment on women's health. Its effects on women's health represents the longer-term (chronic) presence of the criminal justice system evidenced within these families' lives (e.g., parole, frequent rearrest, and recidivism).⁵⁷ Future research should investigate how other levels of criminal justice contact affect the health of women family members.

To our knowledge, this is the first article to use nationally representative data to examine the association of family incarceration with cardiovascular health. This is an important first step in considering how racial disparities in incarceration could be a new mechanism through which the fundamental causes of disease⁵⁸—such as low socioeconomic status—shape the health and well-being of poor women, exacerbating health disparities in the process.

Acknowledgments

H. L. was supported by the Robert Wood Johnson Foundation, Health & Society Scholars Program. E. A. W. receives support from the National Heart, Lung, and Blood Institute (award 5K23HL103720). J. S. J. is supported by the Robert Wood Johnson Foundation Investigator Award in Health Policy Research and the National Institutes of Health (award 1 P60 MD002249-01).

References

1. Bonczar, TP. Prevalence of imprisonment in the US population, 1974---2001. US Department of Justice, Bureau of Justice Statistics; 2003. Available at <http://www.bjs.gov/content/pub/pdf/piusp01.pdf>. [December 5, 2013]
2. Pettit B, Western B. Mass imprisonment and the life course: race and class inequality in US incarceration. *Am Sociol Rev.* 2004; 69(2):151–169.
3. Sampson RJ, Loeffler C. Punishment's place: the local concentration of mass incarceration. *Daedalus.* 2010; 139(3):20–31. [PubMed: 21032947]
4. Western B, Wildeman C. The Black family and mass incarceration. *Ann Am Acad Pol Soc Sci.* 2009; 621(1):221–242.
5. Comfort M, Grinstead O, McCartney K, Bourgois P, Knight K. “You can’t do nothing in this damn place”: sex and intimacy among couples with an incarcerated male partner. *J Sex Res.* 2005; 42(1): 3–12. [PubMed: 15795799]
6. Green KM, Ensminger ME, Robertson JA, Hee-Soon J. Impact of adult sons’ incarceration on African American mothers’ psychological distress. *J Marriage Fam.* 2006; 68(2):430–441.
7. Wildeman C, Schnittker J, Turney K. Despair by association? The mental health of mothers with children by recently incarcerated fathers. *Am Sociol Rev.* 2012; 77(2):216–243.
8. Massoglia M. Incarceration as exposure: the prison, infectious disease, and other stress-related illnesses. *J Health Soc Behav.* 2008; 49(1):56–71. [PubMed: 18418985]
9. Wang EA, Pletcher M, Lin F, et al. Incarceration, incident hypertension, and access to health care: findings from the Coronary Artery Risk Development in Young Adults (CARDIA) study. *Arch Intern Med.* 2009; 169(7):687–693. [PubMed: 19364998]
10. Massoglia M. Incarceration, health, and racial disparities in health. *Law Soc Rev.* 2008; 42(2): 275–306.
11. Schnittker J, John A. Enduring stigma: the long-term effects of incarceration on health. *J Health Soc Behav.* 2007; 48(2):115–130. [PubMed: 17583269]
12. Binswanger IA, Stern MF, Deyo RA, et al. Release from prison—a high risk of death for former inmates. *N Engl J Med.* 2007; 356(2):157–165. [PubMed: 17215533]
13. Rosen DL, Wohl DA, Schoenbach VJ. All-cause and cause-specific mortality among Black and White North Carolina state prisoners, 1995-2005. *Ann Epidemiol.* 2011; 21(10):719–726. [PubMed: 21737304]
14. Spaulding AC, Seals RM, McCallum VA, et al. Prisoner survival inside and outside of the institution: implications for health-care planning. *Am J Epidemiol.* 2011; 173(5):479–487. [PubMed: 21239522]
15. Fazel S, Baillargeon J. The health of prisoners. *Lancet.* 2011; 377(9769):956–965. [PubMed: 21093904]
16. Johnson RC, Raphael S. The effects of male incarceration dynamics on Acquired Immune Deficiency Syndrome infection rates among African American women and men. *J Law Econ.* 2009; 52(2):251–293.
17. Thomas JC, Torrone E. Incarceration as forced migration: effects on selected community health outcomes. *Am J Public Health.* 2006; 96(10):1762–1765. [PubMed: 17008570]
18. Roettger ME, Boardman JD. Parental incarceration and gender-based risks for increased body mass index: evidence from the National Longitudinal Study of Adolescent Health in the United States. *Am J Epidemiol.* 2012; 175(7):636–644. [PubMed: 22437187]
19. Wildeman C. Imprisonment and infant mortality. *Soc Probl.* 2012; 59(2):228–257.
20. Wildeman C. Parental imprisonment, the prison boom, and the concentration of childhood disadvantage. *Demography.* 2009; 46(2):265–280. [PubMed: 21305393]
21. Lee H, Wildeman C. Things fall apart: health consequences of mass imprisonment for African American women. *Rev Black Polit Econ.* 2013; 40(1):39–52.
22. Comfort, M. *Doing Time Together: Love and Family in the Shadow of the Prison.* University of Chicago Press; Chicago, IL: 2008.

23. Braman, D. *Doing Time on the Outside: Incarceration and Family Life in Urban America*. University of Michigan Press; Ann Arbor, MI: 2004.
24. Grinstead O, Faignes B, Bancroft C, Zack B. The financial cost of maintaining relationships with incarcerated African American men: a survey of women prison visitors. *J Afr Am Men*. 2001; 6(1):59–70.
25. Geller A, Garfinkel I, Western B. Paternal incarceration and support for children in fragile families. *Demography*. 2011; 48(1):25–47. [PubMed: 21318455]
26. Schwartz-Soicher O, Geller A, Garfinkel I. The effect of paternal incarceration on material hardship. *Soc Serv Rev*. 2011; 85(3):447–473. [PubMed: 24839314]
27. Turney K, Schnittker J, Wildeman C. Those they leave behind: paternal incarceration and maternal instrumental support. *J Marriage Fam*. 2012; 74(5):1149–1165.
28. Geronimus AT. The weathering hypothesis and the health of African-American women and infants: evidence and speculations. *Ethn Dis*. 1992; 2(3):207–221. [PubMed: 1467758]
29. Geronimus AT, Hicken M, Keene D, Bound J. “Weathering” and age patterns of allostatic load scores among Blacks and Whites in the United States. *Am J Public Health*. 2006; 96(5):826–833. [PubMed: 16380565]
30. Williams DR. The health of men: structured inequalities and opportunities. *Am J Public Health*. 2003; 93(5):724–731. [PubMed: 12721133]
31. Jackson, JS.; Knight, KM. Race and self-regulatory health behaviors: the role of the stress response and the HPA axis in physical and mental health disparities. In: Schaie, KW.; Carstensen, L., editors. *Social Structure Aging and Self-Regulation in the Elderly*. Springer; New York, NY: 2006. p. 189-239.
32. Jackson, JS.; Caldwell, C.; Williams, DR., et al. [June 5, 2010] National Survey of American Life Self-Administered questionnaire (NSAL-SAQ), 2003. 2010. Available at: [http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/27121?q=NSAL&permit\[0\]=AVAILABLE](http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/27121?q=NSAL&permit[0]=AVAILABLE).
33. Jackson JS, Torres M, Caldwell CH, et al. The National Survey of American Life: a study of racial, ethnic and cultural influences on mental disorders and mental health. *Int J Methods Psychiatr Res*. 2004; 13(4):196–207. [PubMed: 15719528]
34. Heeringa SG, Wagner J, Torres M, et al. Sample designs and sampling methods for the collaborative psychiatric epidemiology studies (CPES). *Int J Methods Psychiatr Res*. 2004; 13(4): 221–240. [PubMed: 15719530]
35. Jackson JS, Neighbors HW, Nesse RM, Trierweiler SJ, Torres M. Methodological innovations in the National Survey of American Life. *Int J Methods Psychiatr Res*. 2004; 13(4):289–298. [PubMed: 15719533]
36. Long, JS. *Regression Models for Categorical and Limited Dependent Variables*. Sage; Thousand Oaks, CA: 1997.
37. Thoits PA. Stress and health: major findings and policy implications. *J Health Soc Behav*. 2010; 51(suppl):S41–S53. [PubMed: 20943582]
38. Stata Statistical Software, Version 11.0. StataCorp LP; College Station, TX: 2009. [computer program]
39. Cowie CC, Rust KF, Byrd-Holt DD, et al. Prevalence of diabetes and impaired fasting glucose in adults in the US population: National Health And Nutrition Examination Survey 1999-2002. *Diabetes Care*. 2006; 29(6):1263–1268. [PubMed: 16732006]
40. Rosamond W, Flegal K, Friday G, et al. Heart disease and stroke statistics—2007 update. *Circulation*. 2007. 115(5):e69–e171.
41. US National Center for Health Statistics. [October 18, 2006] Health, United States, 2006: with chartbook on trends in the health of Americans. 2006. Available at: [http://www.cdc.gov/nchs/data/06.pdf](http://www.cdc.gov/nchs/data/hus/06.pdf).
42. Comfort M. Punishment beyond the legal offender. *Annu Rev Law Soc Sci*. 2007; 3:271–296.
43. Cook BL, Alegría M. Racial-ethnic disparities in substance abuse treatment: the role of criminal history and socioeconomic status. *Psychiatr Serv*. 2011; 62(11):1273–1281. [PubMed: 22211205]
44. Clarke JG, Adashi EY. Perinatal care for incarcerated patients. *JAMA*. 2011; 305(9):923–929. [PubMed: 21304069]

45. Hockschild, A.; Machung, A. *The Second Shift*. Penguin Group; New York: 2003.
46. Pavalko EK, Woodbury S. Social roles as process: caregiving careers and women's health. *J Health Soc Behav*. 2000; 41(1):91–105. [PubMed: 10750324]
47. Terrill AL, Garofalo JP, Soliday E, Craft R. Multiple roles and stress burden in women: a conceptual model of heart disease risk. *J Appl Biobehav Res*. 2012; 17(1):4–22.
48. Kelly S, Hertzman C, Daniels M. Searching for the biological pathways between stress and health. *Annu Rev Public Health*. 1997; 18:437–462. [PubMed: 9143726]
49. Yudkin JS, Kumari M, Humphries SE, Mohamed-Ali V. Inflammation, obesity, stress and coronary heart disease: is interleukin-6 the link? *Atherosclerosis*. 2000; 148(2):209–214. [PubMed: 10657556]
50. Bryant LL, Chin NP, Cottrell LA, et al. Perceptions of cardiovascular health in underserved communities. *Prev Chronic Dis*. 2010; 7(2):A30. [PubMed: 20158958]
51. Samuel-Hodge CD, Headen SW, Skelly AH, et al. Influences on day-to-day self-management of type 2 diabetes among African-American women: spirituality, the multi-caregiver role, and other social context factors. *Diabetes Care*. 2000; 23(7):928–933. [PubMed: 10895842]
52. 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. [PubMed: 9635069]
53. Grinstead O, Comfort M, McCartney K, Koester K, Neilands T. Bringing it home: design and implementation of an HIV/STD intervention for women visiting incarcerated men. *AIDS Educ Prev*. 2008; 20(4):285–300. [PubMed: 18673062]
54. Wang EA, Wildeman C. Studying health disparities by including incarcerated and formerly incarcerated individuals. *JAMA*. 2011; 305(16):1708–1709. [PubMed: 21521854]
55. Pettit, B. *Invisible Men: Mass Incarceration and the Myth of Black Progress*. Russell Sage Foundation; New York, NY: 2012.
56. Western, B. *Punishment and Inequality in America*. Russell Sage Foundation; New York, NY: 2006.
57. Drucker, E. *A Plague of Prisons: The Epidemiology of Mass Incarceration in America*. New Press; New York, NY: 2011.
58. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav*. 1995; 35:80–94. [PubMed: 7560851]

TABLE 1

Characteristics: National Survey of American Life, United States, 2001-2003

Characteristic	Women (n = 3356)		Men (n = 2114)	
	Weighted, ^a No. (%) or Mean ±SE	Unweighted, No. (%) or Mean ±SD	Weighted, ^a No. (%) or Mean ±SE	Unweighted, No. (%) or Mean ±SD
Age, y				
29	780 (24.29)	780 (23.24)	493 (21.69)	493 (23.32)
30-44	1200 (33.63)	1200 (35.76)	730 (34.30)	730 (34.53)
45-59	790 (23.22)	790 (23.54)	520 (26.48)	520 (24.60)
60	586 (18.86)	586 (17.50)	371 (17.53)	371 (17.55)
Race				
Black	2011 (48.49)	2011 (59.92)	1158 (44.86)	1158 (54.78)
Caribbean Black	881 (3.34)	881 (26.25)	609 (3.88)	609 (28.81)
Non-Hispanic White	464 (48.17)	464 (13.83)	347 (51.26)	347 (16.41)
Income-needs ratio	2.94 ±0.14	2.57 ±3.10	3.68 ±0.20	3.42 ±2.96
Education, y				
11	749 (20.20)	749 (22.32)	465 (18.79)	465 (22.00)
12	1115 (32.42)	1115 (34.42)	754 (36.00)	754 (35.67)
13-15	825 (24.37)	825 (24.58)	503 (23.71)	503 (23.79)
16	627 (23.01)	627 (18.68)	392 (22.64)	392 (18.54)
Marital status				
Married	894 (34.19)	894 (26.64)	853 (47.84)	853 (40.35)
Partnered (unmarried)	211 (7.23)	211 (6.29)	177 (7.55)	177 (8.37)
Separated, divorced, or widowed	1168 (31.71)	1168 (34.80)	468 (17.90)	468 (22.14)
Never married	1083 (26.88)	1083 (32.27)	616 (26.71)	616 (29.14)
Foreign-born	687 (4.34)	687 (20.47)	491 (6.29)	491 (23.23)
Has health insurance	2739 (84.75)	2739 (81.62)	1705 (84.44)	1705 (80.65)
Family member in jail or prison	319 (7.56)	319 (9.51)	122 (5.04)	122 (5.77)
Family member away in school, military, or long-term care	648 (21.32)	648 (19.31)	461 (23.56)	461 (21.81)
Ever in jail or prison	187 (5.48)	187 (5.57)	436 (21.17)	436 (20.62)
Self-rated health in childhood	4.09 ±0.03	4.09 ±1.03	4.21 ±0.06	4.40 ±1.00
Non-2-parent household in childhood	1022 (23.19)	1022 (30.45)	566 (18.76)	566 (26.77)
Welfare usage in childhood	644 (19.70)	644 (19.19)	336 (15.69)	336 (15.89)
Physical activity	5.06 ±0.09	4.79 ±2.25	5.71 ±0.11	5.59 ±2.21

^a Percentages, means, and SEs are weighted to be nationally representative of the given population and subpopulations in the coterminous 48 states of the United States. Reported numbers represent the unweighted sample sizes.

TABLE 2

Sample Health Characteristics: National Survey of American Life, United States, 2001-2003

Characteristic	Women (n = 3356)		Men (n = 2114)	
	Weighted, ^a No. (%) or Mean \pm SE	Unweighted, No. (%) or Mean \pm SD	Weighted, ^a No. (%) or Mean \pm SE	Unweighted, No. (%) or Mean \pm SD
BMI	28.27 \pm 0.24	28.87 \pm 6.78	27.42 \pm 0.19	27.45 \pm 5.26
Obesity	1237 (35.14)	1237 (36.86)	530 (25.70)	530 (25.07)
Diabetes	385 (9.67)	385 (11.47)	190 (9.81)	190 (8.99)
Hypertension	1089 (28.86)	1089 (32.45)	585 (30.98)	585 (27.67)
Heart attack or stroke	327 (10.81)	327 (9.74)	199 (12.03)	199 (9.41)
Self-report of fair or poor health	697 (17.09)	697 (20.77)	357 (19.36)	357 (16.89)

Note. BMI = body mass index (defined as weight in kilograms divided by the square of height in meters).

^aPercentages, means, and SEs are weighted to be nationally representative of the given population and subpopulations in the coterminous 48 states of the United States. Reported numbers represent the unweighted sample sizes.

TABLE 3

Association of Family Member Incarceration With Health for Women (n = 3356): National Survey of American Life, United States, 2001-2003

Model	Obese, RR (95% CI)	Diabetes, RR (95% CI)	Hypertension, RR (95% CI)	Heart Attack or Stroke, RR (95% CI)	Fair or Poor Health, RR (95% CI)
1 ^a	1.88 (1.41, 2.50)	2.68 (1.54, 4.68)	2.20 (1.50, 3.22)	2.44 (1.62, 3.67)	3.27 (2.47, 4.35)
2 ^b	1.54 (1.14, 2.09)	1.84 (1.02, 3.31)	1.34 (0.91, 1.95)	2.40 (1.63, 3.54)	2.02 (1.51, 2.70)
3 ^c	1.47 (1.07, 2.02)	1.79 (0.99, 3.23)	1.26 (0.85, 1.87)	2.61 (1.85, 3.68)	2.06 (1.55, 2.73)
4	1.46 ^d (1.04, 2.05)	1.61 ^e (0.96, 2.71)	1.12 ^e (0.75, 1.68)	2.49 ^f (1.74, 3.56)	... ^g
5 ^h	1.44 (1.03, 2.00)	1.62 (0.92, 2.85)	1.11 (0.74, 1.65)	2.53 (1.80, 3.55)	1.93 (1.45, 2.58)

Note. CI = confidence interval; RR = rate ratio. We obtained CIs for design-based variance-covariance matrices to adjust for the stratification, clustering, and weighting of the data.

^a Adjusted for family member missing because of other reasons (school or college, military, or long-term care facility or nursing home) and age.

^b Adjusted for model 1 measures, race, income-needs ratio, education, and self-rated health in childhood.

^c Adjusted for model 2 measures, childhood family structure, childhood public assistance, marital status, health insurance status, and foreign-born status.

^d Adjusted for model 3 measures and physical activity.

^e Adjusted for model 3 measures and body mass index (BMI; defined as weight in kilograms divided by the square of height in meters).

^f Adjusted for model 3 measures, BMI, hypertension, and diabetes.

^g No adjustments made for physical activity, BMI, hypertension or diabetes in model 4 for this outcome.

^h Adjusted for model 4 measures and own incarceration.

TABLE 4

Association of Family Member Incarceration With Men's Health (n = 2114): National Survey of American Life, United States, 2001-2003

Model	Obese, RR (95% CI)	Diabetes, RR (95% CI)	Hypertension, RR (95% CI)	Heart Attack or Stroke, RR (95% CI)	Fair or Poor Health, RR (95% CI)
1 ^a	0.93 (0.51, 1.69)	0.80 (0.30, 2.15)	0.85 (0.49, 1.48)	0.85 (0.31, 2.35)	1.58 (0.73, 3.39)
2 ^b	0.77 (0.44, 1.32)	0.73 (0.28, 1.90)	0.73 (0.43, 1.25)	0.93 (0.41, 2.11)	1.26 (0.69, 2.28)
3 ^c	0.72 (0.41, 1.27)	0.75 (0.25, 2.24)	0.71 (0.40, 1.25)	0.84 (0.35, 2.02)	1.19 (0.60, 2.37)
4	0.72 ^d (0.40, 1.28)	0.74 ^e (0.23, 2.31)	0.72 ^e (0.43, 1.21)	1.10 ^f (0.37, 3.27)	... ^g
5 ^h	0.72 (0.40, 1.28)	0.74 (0.24, 2.31)	0.71 (0.42, 1.21)	0.84 (0.35, 2.02)	1.19 (0.59, 2.38)

Note. CI = confidence interval; RR = rate ratio. We obtained CIs for design-based variance-covariance matrices to adjust for the stratification, clustering, and weighting of the data.

^a Adjusted for family member missing because of other reasons (school or college, military, or long-term care facility or nursing home) and age.

^b Adjusted for model 1 measures, race, income-needs ratio, education, and self-rated health in childhood.

^c Adjusted for model 2 measures, childhood family structure, childhood public assistance, marital status, health insurance status, and foreign-born status.

^d Adjusted for model 3 measures and physical activity.

^e Adjusted for model 3 measures and body mass index (BMI; defined as weight in kilograms divided by the square of height in meters).

^f Adjusted for model 3 measures, BMI, hypertension, and diabetes.

^g No adjustments made for physical activity, BMI, hypertension or diabetes in model 4 for this outcome.

^h Adjusted for model 4 measures and own incarceration.