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Incarceration and adult weight gain in the National Survey of American Life (NSAL)

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Abstract

The United States has the unenviable distinction of having both the highest obesity rate among Organisation for Economic Co-operation and Development (OECD) member countries and the highest incarceration rate in the world. Further, both are socially patterned by race/ethnicity and socioeconomic position. Incarceration involves various health behaviors that could influence adult weight trajectory. We evaluated the associations between history and duration of adult incarceration and weight gain using the National Survey of American Life (N=6,082 adults residing in the 48 contiguous states between February 2001 and March 2003). We propensity score-matched individuals to control for the probability of having a history of incarceration. To examine the relation between prior incarceration and adult weight gain, we fit gender-stratified generalized estimating equations controlling for propensity of incarceration history, age, education, income, race/ethnicity, and marital status. For males (N=563), incarceration was associated with about a 1.77 kg/m² lower gain in body mass index (BMI) during adulthood, after adjusting for age, education, income, race/ethnicity, and marital status in addition to the propensity of having a history of incarceration (95% CI: -2.63, -0.92). For females (N=286), no significant overall relationship was found between a history of incarceration and adult weight gain. In subgroup analyses among those with an incarceration history, we found no overall association between duration of incarceration and adult weight gain in men or women. In sensitivity analyses, neither tobacco smoking nor parity changed the results. The results of this study indicate that incarceration is associated with a lower transition of weight gain in males, but not females.

Keywords

incarceration; body weight

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Conflict of Interest

The authors declare there is no conflict of interest.

INTRODUCTION

The United States incarcerates 716 out of every 100,000 Americans, giving it the unenviable distinction of having the highest incarceration rate in the world and accounting for 22% of the world's prisoners despite having only 4.4% of the world's population.¹ This high risk of incarceration is concentrated among racial minorities and individuals with low socioeconomic standing.² One in 21 African American men and one in 279 African American women are currently incarcerated and almost one in three of African American men will be incarcerated at least once in their lifetime.³ Key drivers of the 400% increased incarceration rate since 1980 include the federal government's "War on Drugs" and insufficient funding of deinstitutionalized community mental health centers.³⁻⁵ With the advent of this era of "mass incarceration," incarceration is likely to affect individual and population health in a variety of ways. Although under-researched, incarceration has been linked to various negative health outcomes, including various infectious diseases,⁶⁻¹⁰ hypertension,^{6,10,11} asthma,^{6,10} cardiovascular disease,^{6,10} cancer,⁶ and psychopathology.¹⁰ In recent analyses, researchers have found that Black men have lower mortality while incarcerated; however, this protective effect was attributed to protection from motor vehicle accidents and similar injuries as well as increased mortality associated with compassionate release, as opposed to a "healthy prisoner" selection effect.^{12,13}

There is a relatively large body of literature highlighting the prevalence of obesity among prisoners, namely male prisoners.^{6,14} A systematic meta-analysis of 31 cross-sectional surveys published worldwide on the relationship between incarceration and body weight found that, overall, incarcerated men were less likely to be overweight or obese compared to their counterparts in the general population, while the opposite was true among women.¹⁴ Among higher income countries, both incarcerated men and women were more likely to be overweight or obese compared to the general population. Few studies have evaluated the relation between incarceration and weight changes over time, but they seem consistent with these data.^{15,16} In the most recent analysis of weight transitions after incarceration, both men and women gained weight in prison, although women gained more weight than men.¹⁵ Individuals with shorter sentences (shorter duration of incarceration) gained 2.2 times more than those with longer sentences; however, there was no relationship between being classified as overweight or obese and duration of incarceration.¹⁵

However, there are no studies that track the weight of former inmates when they return to their communities. With the vast majority of inmates returning within four years — the average felony sentence in state courts is about 38 months,¹⁷ it may be important to think about incarceration history when thinking about adult weight gain, especially among racial/ethnic minorities. Incarceration could conceivably play a role in patterning adult weight over time. While there is little information regarding the dietary quality/quantity and physical activity patterns in American prisons, data from prison systems in Australia, the United Kingdom, and other developed countries indicate that female prisoners' energy intake exceeded recommended daily allowances (RDAs), while there was a large range among men.¹⁴ While gym equipment and recreational opportunities in American prisons used to be more extensive, a series of amendments (including Zimmer's 1996 "No Frills Prison Act") have limited the provision of and access to fitness equipment and/or instruction in federal

prisons.¹⁸ Various state prison systems followed suit, leading to several lawsuits questioning whether denial of recreational time constitutes “cruel and unusual punishment” or infringes on prisoner rights.¹⁹ Exposure to dietary restrictions in jail or prison could either lead to greater behavioral disinhibition or maintenance of prison eating patterns post-release, whereas increased physical activity patterns could continue post-release.

Outside of prisons, individuals face broader obesogenic environments with fewer restriction on behavior/activity. Americans have become increasingly overweight over the last 50 years, with about 75% of the U.S. adult population classified as overweight or obese.²⁰ National statistics reveal that weight gain during adulthood has increased by more than 50% in the past 40 years, contributing to increasing trends in obese and extremely obese categories.^{20,21} While adult weight gain is often accepted in the United States as a normative part of life, even among normal weight individuals, adult weight gain may have harmful health effects, increasing the risk of colon cancer,²² diabetes,²³ coronary heart disease,²⁴ and breast cancer in post-menopausal women.²⁵ Better characterizing the dynamic factors driving adult weight gain is an important public health endeavor. This is especially true among racial/ethnic minorities who are more likely to be overweight or obese.²⁶ Moreover, in the age of mass incarceration among disadvantaged Black and Latino communities, incarceration history may be another driver of health disparities in weight transitions over the lifecourse.

The existing studies do not investigate weight changes among formerly incarcerated individuals in non-institutional settings. Using a propensity score-matched, cross-sectional national sample of non-institutionalized U.S. adults, this study evaluated the relationship between incarceration history and weight gain since age 18, using gender-stratified generalized linear regression models.

METHODS

Sample Population

This study used data from the National Survey of American Life (NSAL), a multi-stage, cross-sectional, household probability study that is part of the Collaborative Psychiatric Epidemiology Surveys. The sample included non-institutionalized, English-speaking U.S. adults aged 18 and older residing in the 48 contiguous states between February 2001 and March 2003. The study targeted three racial/ethnic groups living in urban and rural centers where Black Americans were residentially concentrated: African Americans, Blacks of Caribbean ancestry, and non-Hispanic Whites. African Americans were individuals who identified as Black but did not report Caribbean ancestry. Caribbean Blacks were persons who identified as Black and also indicated that they were of West Indian or Caribbean descent, or were from a Caribbean-area country, or had parents or grandparents who were born in a Caribbean-area country. The Black samples were nationally representative. While the White sample was only representative of Whites who lived in census tracts with 10% or greater Black population, each of the racial/ethnic groups are comparable to other nationally representative samples based on education, income, gender, region, urbanicity, marital status, and various other characteristics.²⁷ Household screening yielded 6,082 total adult responses (891 non-Hispanic Whites, 1,621 Caribbean Blacks, 3,570 African Americans).²⁸ The response rate for the national sample of non-Hispanic Whites and African Americans

was 69.7% and 70.7%, respectively, while the response rate for the Caribbean supplement was 77.7%.²⁷ About 86% of the interviews were conducted face-to-face using computer-assisted instrument (CAPI) software, while the rest were conducted by telephone.²⁷ Respondents were compensated \$50 for their time. More details about the design, sampling, methodology, and other characteristics associated with the NSAL have been described at length elsewhere.²⁷⁻³¹

Measures

History of Incarceration—The primary exposure of interest for this study was an individual's history of incarceration. Participants were asked a series of questions regarding their history of detention, including whether they spent time in a reform school, detention center, jail or prison; how many times the respondent served time in jail or prison; how long s/he spent there altogether; and the year and month s/he first went to jail or prison for a month or more. We operationalized incarceration in two ways: history of any incarceration and the total duration of incarceration.

Adult Weight Gain—The primary outcome for this study was adult weight gain, measured as an increase in body mass index (BMI; kg/m²) after age 18. The NSAL contains two self-reported weight measures: respondents' recall of their weight at age 18 and their current weight at the time of survey administration. Each respondent also reported his/her current height. A BMI for each time point was calculated using the respondent's reported weight at each time point and his/her current height, assuming that height does not change considerably after age 18. Adult BMI gain was calculated by subtracting each respondent's body mass index at age 18 from his/her current BMI with a positive value indicating weight gain during adulthood and a negative value indicating weight loss.

Propensity for History of Incarceration—A number of background characteristics contribute to an individual's propensity to have a history of incarceration, and they could make finding an exchangeable comparison group difficult. Furthermore, with their divergent probability of incarceration, men and women are likely to experience different propensities for criminality and incarceration. Gender-specific propensity scores were calculated based on a logistic regression model that included predictors of incarceration documented in the literature: age (6 indicators: 18-24, 25-34, 35-44, 45-54, 55-64, 65+ years),³²⁻³⁴ race/ethnicity (African American, Caribbean-Black, White),^{32,35} ever history of selected mental illnesses before age 18 (4 separate indicator variables),^{36,37} family history of selected mental illnesses that could contribute to family instability (7 separate indicator variables),³⁵ US nativity,³² highest parental education level (<12 years of education, 12 years, 13-15 years, 16+ years of education),^{32,38} self-reported welfare status during childhood,^{34,38,39} presence of biological father during childhood,³⁸ and urbanicity of childhood home.³² To account for the complex survey design in the propensity score models, we included the variables for survey weight, stratum and cluster as covariates, as indicated in previous methodological literature.⁴⁰

Other Socio-demographic Covariates—Additional covariates potentially occurring after incarceration were included in the regression models: education, income and marital

status. Education was considered on four levels: <12 years of education, 12 years, 13-15 years, and 16+ years of education. Personal income was also categorized into four levels: < \$25,000, \$25,000-44,999, \$45,000-69,999, and \$70,000. Due to small sample size, the divorced, separated, and widowed marital status categories were collapsed into one category that was used along with married and never married. In order to account for residual confounding by key demographic characteristics, we included continuous age and race/ethnicity in the models.

Statistical Analyses

To assess the distributions of the variables, univariate analyses were conducted for all variables used in the modeling process. Bivariate analyses were conducted between each of the independent variables and adult weight gain to assess the strength and functional forms of those relationships. Chi-square tests were conducted to evaluate whether the distribution of key sociodemographic variables was different between those with a history of incarceration and those without. We also evaluated the functional form of the relationship between continuous age and BMI gain; the most appropriate functional form was a quadratic transformation of age, resulting in the highest R^2 value.

Propensity scores were calculated using the predicted output results from the gender-specific logistic regression models. We used a GREEDY macro using the nearest neighbor matching within a 0.01 caliper distance in propensity score to one-to-one match individuals with prior incarceration to individuals without prior incarceration in gender-specific models. To examine the association between prior incarceration and adult weight gain, gender-stratified generalized linear models were fit using generalized estimating equations using the SUBPOPN option in SUDAAN sequentially adding sociodemographic characteristics. Measures of association (included in the Results) were linear regression coefficients, representing the average change in body mass index (BMI; kg/m^2) after age 18 associated with having an incarceration history compared to not having an incarceration history. A positive number indicates adult weight gain, while a negative number, adult weight loss. Model 1 was unadjusted linear regression model. Model 2 included the incarceration history variable from Model 1, controlling for age and race/ethnicity. Model 3 included the variables in Model 2 as well as education, income, and marital status. Subsequent analyses tested for effect modification by marital status, parity, education, race/ethnicity, and preincarceration depression. We also conducted sensitivity analyses with parity and tobacco smoking. To evaluate the association of duration of incarceration with adult BMI change, sub-group analyses were conducted among the respondents with incarceration history. Analyses were performed using the SURVEY procedures in SAS version 9.3 (SAS Institute, Inc., Cary, North Carolina) and SAS-callable SUDAAN release 11.0 (Research Triangle Institute, Research Triangle Park, North Carolina) to account for the NSAL complex survey design. Ethical approval for these data analyses included in this study was given by the Institutional Review Board.

RESULTS

Of the 6,082 total respondents, approximately 12% had an incarceration history (Table 1). They were more likely to be African American, male, between 45 and 54 years of age, had low socioeconomic status (as measured by income and education), had a family history of drug abuse, and a history of mental illness. In this non-institutionalized sample, those with a history of incarceration did not differ significantly from those who had never been incarcerated with regard to (a) marital status (p -value=0.2417) and (b) current overweight status (p -value=0.4245). Results from unadjusted bivariate analyses (by gender) showed that incarceration history was associated with lower adult weight gain among men (incarceration history: 3.86 kg/m² adult weight gain [95% CI: 3.29, 4.44] vs. no incarceration history: 5.08 kg/m² [95% CI: 4.45, 5.70]). Among women with and without incarceration history, the weight gain patterns were similar (incarceration history: 7.46 kg/m² adult weight gain [95% CI: 6.24, 8.68] vs. no incarceration history: 7.41 kg/m² [95% CI: 6.85, 7.98]).

In the propensity score models (Table 2), the only variables significant in both male and female propensity score models was an indicator variable for having an absent biological father during childhood. Using the GREEDY matching algorithm, 564 males and 286 females were matched, excluding 5232 respondents from the analysis.

For males, in the unadjusted propensity score-matched model (Table 3 – Model 1), history of incarceration was associated with a 1.51 kg/m² lower gain in BMI since age 18 (p -value=0.0002). After including several control variables in Models 2 and 3, a history of incarceration remained associated with lower BMI gain during adulthood (Model 2: β =-1.56 [95% CI: -2.31, -0.81]; Model 3: β =-1.77 [95% CI: -2.63, -0.92]). For females, we found no significant relationship between a history of incarceration and adult weight gain in unadjusted and adjusted models (Models 1-3). In sensitivity analyses controlling separately for parity and tobacco smoking, the results were almost identical (not shown).

We examined models evaluating whether marital status, number of children, education, race/ethnicity or pre-incarceration depression history (for the formerly incarcerated) modified the relationships, but the results indicated no significant effect modification by marital status, parity, education, or race/ethnicity (results not shown).

In subgroup analyses among those with any incarceration history, there was no indication of an association between weight gain and duration of incarceration (Table 4).

DISCUSSION

We found that history of incarceration was independently associated with lower adult weight gain in men, while there was no relationship present among women. Given the absence of significant associations between duration of incarceration and adult weight gain, incarceration may be more of a marker of social disadvantage as opposed to an indicator of certain dietary, physical activity or other habits acquired during and/or after incarceration.

Until recently, it has been broadly claimed that “prior incarceration appears uniformly to worsen prisoners’ health.”⁴¹ This may be partly because, the last five years aside, body

weight and body weight transitions have been understudied in relation to incarceration history. The lower adult weight gain experienced among men with an incarceration history in the present study is consistent with the limited literature indicating lower levels of weight gain during prison stays and lower prevalence of overweight and obesity among men.^{14,15} The null association among women was not completely expected, given the higher levels of weight gain among women during prison stays, noted in the literature.^{15,16,42} One such study estimated that incarcerated women with short sentences gain an average of 1.1 pound per week incarcerated.¹⁶ The gendered patterns in the literature can be partially attributed to the general tendency of female prisoners having mean energy intakes exceeding recommended levels as well as the higher physical activity patterns for men while incarcerated.¹⁴ The present study did not include data regarding respondents' dietary or physical activity practices while incarcerated, making comparability to these focused studies impossible. Non-institutionalized women with any incarceration history, like those in the present study, may have been able to rebound from incarceration-related weight gain in the absence of that dictated food environment.

Recent studies exploring prisoner mortality have identified some protective effects of incarceration for Black men's health, largely attributable to the socially disparate environments in which Black men live rather than an indication that prison is an ideal institution for health intervention.^{13,43,44} However, at odds with expected disparities by race/ethnicity, there was little indication of effect modification by race/ethnicity in regression models nor substantial racial/ethnic differences in incarceration in the propensity score models. While our interaction analyses were likely underpowered, it is more important to emphasize that the Whites in this study population were living in similar neighborhoods to Blacks in this study, unlike most of the U.S. White population who live in segregated neighborhoods. Shared neighborhoods may mean that the Whites in this study were more likely than whites nationally to share many of the social ills that pervade racially segregated neighborhoods, such as concentrated poverty, limited access to sources of healthy nutrition, violence, and increased criminalization. At the same time, they were better off on a broad range of socioeconomic and demographic characteristics to blacks.

In the simplest case, lower levels of weight gain likely experienced by formerly incarcerated men, specifically, over the course of their incarceration directly contributes to overall lower levels of adult weight gain compared to men without incarceration histories. The specific exposure to a restricted dietary environment and regulated physical activity schedules could also change eating and exercise habits on the long-term. However, if the cross-sectional relationship is reflective of a causal relationship, incarceration could also affect adult weight gain through various indirect mechanisms, including changes in socioeconomic position and marital status over the life course.⁴⁵ With disinvestment in rehabilitative correctional systems since the 1990s, individuals tend to lose skills and experience while incarcerated (i.e., human capital), at the same time that they lose or weaken social ties to their communities (i.e., social capital).⁴¹ Upon return to their communities, both of these factors may reduce later earnings, particularly by limiting employment opportunities. This may reduce food budgets, especially among those whose prior incarceration disqualifies them from public assistance.⁴⁶ This reduced budget could prompt men to either lower their caloric intake accordingly and/or more heavily rely on of cheaper, unhealthier foods; formerly

incarcerated men would gain weight over their adulthood, but perhaps at a slower rate than men without an incarceration history. Stigma associated with prior incarceration further reduces chances of employment — a factor closely related to earning potential — and may also play a role in reduced weight gain. However, in the present study, the non-significant relationships between our measures of socioeconomic status and BMI change in men did not support these mechanisms.

There are various limitations for this study, which used current and retrospective data collected at one time-point to examine the relationship between incarceration history and weight gain since age 18 among individuals in non-institutional settings. The cross-sectional data in our study did not allow for precise establishment of temporality of exposure variables and covariates. Because of the cross-sectional nature of the data collection, self-reported values for both current weight and weight at age 18 are collected at the same time; therefore, the outcome measure is likely subject to misclassification due to recall bias. We were limited to self-reported weight data as opposed to more reliable anthropomorphic measurements taken at the desired time point. Those who have a history of incarceration are more likely to suffer (or have suffered) from mental illness,⁵ which could affect recall. However, it is not clear whether there would be a systematic misclassification in one way or another in either of any of these measurements. Consequently, while there may be more uncertainty around accurate weight reporting and recall with regard to incarceration and psychiatric history, the bias is likely non-differential, in which case the results from the study are likely underestimates. In addition, since data was collected primarily via face-to-face, interviewer-administered questionnaires, there may be social desirability bias introduced, yet with the large volume of data collected from each participant, other data collection methods were more problematic. Efforts were also made to match interviewers and likely interviewees by key social factors that may put respondents more at ease.²⁷ Furthermore, this bias is likely small in magnitude when comparing weight and incarceration questions to the sheer volume of detailed personal, psychological, and medical questions that were also asked and the rapport that was encouraged by highly trained interviewers using CAPI software. Research evaluating the effect of CAPI technology indicate that respondents are more likely to feel positive about their data privacy and answering sensitive questions compared to an unassisted personal interview.⁴⁷

While the propensity score models were adequate in terms of discrimination and goodness-of-fit, better specified propensity score models would increase precision and more effectively account for confounding/selection into having any incarceration history. Since incarceration policies are federal-, state- and municipality-specific, geocoded data of location of arrest would likely add predictive power to the propensity score models. We cannot rule out that the interaction and subgroup analyses were underpowered. Furthermore, the population with incarceration history in this sample may be a distinctive subset of the overall population of formerly incarcerated, having a lower duration of incarceration than those sentenced annually⁴⁷ and, perhaps, less risky behaviors compared to those formerly incarcerated individuals that die within two weeks of release.⁴² In addition, because the White sample is not representative of Whites nationally, systematic exclusion of perhaps leaner individuals may be possible, which would likely attenuate the results presented in this study. However, the Whites in this sample do resemble the broader White population

regarding a number of social-demographic factors that usually correlate with BMI and overweight status, including education, income, gender, urbanicity, and marital status. A longitudinal study following individuals over several years would better disentangle the contemporaneous trajectories of incarceration, adult weight change and covariates over the life course, especially if the study followed a large cohort of 18 year olds through their adulthood to control for age-period-cohort effects.

To our knowledge, this is the only study to have investigated the relation between incarceration history and adult weight gain in a non-institutionalized population. Propensity score matching analyses add greater credibility to the potential causal relationships at hand. Despite having cross-sectional data, as one of the most comprehensive studies of minority mental health, the NSAL has rich data regarding psychological symptomology and its timing, which allowed for the creation of time-specific covariates. Considering the deinstitutionalization of mental health services with the Community Mental Health Centers Act of 1963 and limited resources for community mental health centers in the most disadvantaged neighborhoods, pre-incarceration mental health history is extremely important to addressing selection into incarceration in propensity score models. For the most disadvantaged, jails and prisons may be healthcare providers of last resort.⁴ These analyses were also able to distinguish between any history of incarceration and the total duration of incarceration hinting at possible mechanisms.

CONCLUSION

The results of this study indicate that incarceration is likely to have a complex relationship with health that may be mediated or modified by various life trajectories. While incarceration has an ostensibly positive relationship with health in this study (i.e., lower adult weight gain), it is likely to have broader, long-lasting influences on health across the life course, indirectly through dynamic social relationships and roles. Given the associations noted in these analyses, further study in a longitudinal data set is warranted for the establishment of clearer conclusions regarding the role of incarceration in adult weight gain. In addition, a larger sample would increase the power to capture the temporal relationship between incarceration and adult weight change, especially (a) across race/ethnicity and (b) in women, who are incarcerated at lower rates than men (5% vs. 21% in this dataset). Incarceration may not play the same role in women's social and economic trajectories as it seems to in those of men, but as the incarceration of women becomes more prevalent, it is essential to explore these differences further.

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Highlights

- We matched individuals on propensity for incarceration history.
- We model the relation between prior incarceration and adult weight gain.
- For males, incarceration was associated with lower adult weight gain.
- For females, incarceration was not associated with adult weight gain.

Table 1

Demographic characteristics of weighted sample, by history of incarceration

	Full Sample			Rao-Scott χ^2 P-value
	Overall % (N)	Ever Incarcerated % (N)	Never Incarcerated % (N)	
Sample Size	100 (6082)	12.47 (669)	87.53 (5413)	
Gender				
Female	54.13 (3796)	23.75 (211)	58.46 (3585)	<0.0001
Male	45.87 (2286)	76.25 (458)	41.54 (1828)	
Race/Ethnicity				
African American	46.82 (3570)	53.07 (464)	45.93 (3106)	0.0328
Caribbean Black	3.51 (1620)	2.32 (115)	3.68 (1506)	
White	49.67 (891)	44.61 (90)	50.39 (801)	
Age (years)				
18-24	14.73 (819)	12.51 (85)	15.05 (734)	0.0353
25-44	42.27 (2719)	46.60 (334)	41.65 (2385)	
45-64	29.75 (1774)	34.48 (203)	29.08 (1571)	
65	13.25 (770)	6.41 (47)	14.23 (723)	
Annual Income(\$)				
<25,000	36.01 (2672)	43.49 (339)	34.94 (2333)	0.0382
25,000-44,999	28.24 (1715)	28.80 (196)	28.16 (1519)	
45,000-69,999	18.73 (979)	13.35 (80)	19.50 (899)	
70,000	17.01 (716)	14.36 (54)	17.39 (662)	
Education				
<=High School	19.60 (1375)	34.86 (237)	17.43 (1138)	<0.0001
High School	34.24 (2136)	35.38 (235)	34.08 (1901)	
Some College	24.40 (1468)	20.07 (141)	25.02 (1327)	
Bachelors Degree+	21.76 (1103)	9.69 (56)	23.48 (1047)	
Marital Status				
Married	40.25 (1902)	33.07 (171)	41.28 (1731)	0.2417
Partner	7.81 (435)	10.80 (83)	7.38 (352)	
Separated	5.08 (451)	6.82 (71)	4.84 (380)	
Divorced	12.31 (849)	15.33 (97)	11.88 (752)	
Widowed	7.74 (534)	6.74 (37)	7.88 (497)	
Never Married	26.81 (1885)	27.24 (209)	26.75 (1676)	
Family History of Drug Use				
Any Drug Use Hx	17.49 (924)	23.20 (164)	15.50 (760)	0.0007
No Drug Use Hx	82.51 (4738)	76.80 (505)	84.50 (4653)	
History of Mental Illness				
Any Mental Illness	44.35 (2336)	53.37 (331)	43.08 (2005)	0.0075
No Mental Illness	55.65 (3746)	46.63 (338)	56.92 (3408)	
Overweight Status				
Normal or Underweight	34.99 (1862)	36.90 (216)	34.72 (1646)	0.4245

	Full Sample			Rao-Scott χ^2 P-value
	Overall % (N)	Ever Incarcerated % (N)	Never Incarcerated % (N)	
Overweight or Obese	65.01 (4007)	63.10 (441)	65.28 (3566)	

Notes: Percentages in the "Overall" column are for the full sample. All percentages in other columns are specific to the stratified sample in each column. Percentages are weighted to account for unequal probabilities of selection, nonresponse, and post-stratification, while frequencies are unweighted. (National Survey of American Life participants were sampled from adults residing in the 48 contiguous states between February 2001 and March 2003.)

Table 2

Propensity Model Variables, by Gender

	Males N=1,849	Females N=3,022
	OR (95% CI)	OR (95% CI)
Socio-demographics		
Age		
18-24 years	1.06 (0.59, 1.90) [†]	1.49 (0.57, 3.89)
25-34 years	1.68 (0.98, 2.86) [†]	1.71 (0.69, 4.24)
35-44 years	1.73 (1.04, 2.89) ^{†*}	2.04 (0.83, 5.00)
45-54 years	1.96 (1.17, 3.27) ^{†*}	1.68 (0.67, 4.20)
55-64 years	1.60 (0.90, 2.83) [†]	0.63 (0.19, 2.10)
65 years	REF	REF
Race/Ethnicity		
African American	1.23 (0.76, 1.98)	2.21 (0.95, 5.14)
Caribbean Black	1.26 (0.65, 2.43)	1.14 (0.36, 3.60)
White	REF	REF
U.S. Nativity	2.44 (1.50, 3.96) [*]	2.39 (0.94, 6.07)
Childhood Environment		
Highest Parental Education		
<High School	1.20 (0.80, 1.78)	0.58 (0.33, 1.03)
High School	1.20 (0.84, 1.72)	1.01 (0.61, 1.68)
Some College	1.15 (0.74, 1.79)	0.98 (0.53, 1.78)
Bachelor's Degree+	REF	REF
Welfare Status during Childhood	1.36 (1.00, 1.85)	1.54 (1.06, 2.23) [*]
Absent Biological Father	1.37 (1.06, 1.77) [*]	1.57 (1.11, 2.21) [*]
Urban	1.07 (0.82, 1.39)	1.15 (0.79, 1.68)
Childhood Mental Health History		
Depressive symptoms	0.66 (0.34, 1.31)	0.75 (0.37, 1.52)
Manic symptoms	1.77 (0.79, 3.96)	2.55 (1.11, 5.87) [*]
Panic disorder symptoms	1.69 (1.14, 2.51) [*]	1.52 (0.95, 2.42)
Anxious symptoms	0.94 (0.47, 1.88)	2.16 (1.15, 4.05) [*]
Family History of Mental Health Issues		
Depression	1.37 (1.01, 1.86) [*]	1.20 (0.81, 1.78)
Mania	1.22 (0.82, 1.81)	0.86 (0.50, 1.48)
Anxiety	1.07 (0.72, 1.60)	1.05 (0.63, 1.74)
Alcohol Abuse	1.20 (0.90, 1.61)	1.23 (0.82, 1.85)
Drug Abuse	1.73 (1.24, 2.41) [*]	1.19 (0.77, 1.83)

	Males N=1,849	Females N=3,022
	OR (95% CI)	OR (95% CI)
Psychosis	1.11 (0.62, 1.99)	1.52 (0.84, 2.74)
Suicide	0.48 (0.26, 0.89) *	1.35 (0.84, 2.74)
C-statistic	0.7	0.8
Hosmer-Lemeshow GOF Test		
chi-squared (p-value)	6.15 (0.6301)	6.63 (0.5768)

Reported estimates are odds ratios (95% confidence interval).

Note: Propensity score models control for survey weight, stratum and cluster as covariates. (National Survey of American Life participants were sampled from adults residing in the 48 contiguous states between February 2001 and March 2003.)

*
<0.05

[†]
<0.05 for chunk test.

Table 3
Propensity Score-Matched Linear Regression Model Results – Adult Weight Gain in BMI Points, by Gender

Characteristic	Male			Female		
	Model 1 β (SE) N=563	Model 2 β (SE) N=563	Model 3 β (SE) N=563	Model 1 β (SE) N=286	Model 2 β (SE) N=286	Model 3 β (SE) N=286
Incarceration						
(any vs none)	-1.51 (0.38)**	-1.56 (0.38)**	-1.77 (0.43)**	0.97 (1.23)	0.64 (1.17)	0.32 (1.26)
Age						
Years		0.41 (0.09)**	0.44 (0.09)**		0.64 (0.20)**	0.63 (0.22)**
Years ²		-0.00 (0.00)**	-0.00 (0.00)**		-0.01 (0.00)**	-0.01 (0.00)*
Race/Ethnicity						
African American		1.06 (0.60)	1.02 (0.61)		2.39 (1.31)	2.77 (1.45)
Caribbean Black		1.02 (0.87)	0.68 (0.69)		5.57 (3.32)	5.72 (3.44)
White			REF		REF	REF
Education						
<High School			2.06 (0.69)*			0.13 (1.31)
High School			REF			REF
Some College			0.94 (0.58)			0.16 (1.35)
Bachelors+			0.72 (0.82)			-1.42 (1.91)
Income						
<\$25,000			0.42 (0.95)			-3.07 (2.16)
\$25,000-44,999			1.21 (0.73)			-3.08 (2.28)
\$45,000-69,999			0.43 (0.62)			-4.40 (2.38)
\$70,000			REF			REF
Marital Status						
Married/Partner			REF			REF
Divorced/Separated/Widowed			-1.61 (0.77)*			-0.11 (1.41)
Never married			0.36 (0.61)			0.45 (1.52)

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Propensity score models included age, sex, race/ethnicity, history of certain mental illnesses (depression, mania, panic disorder, anxiety) before age 18, family history of depression, family history of mania, family history of anxiety, family history of psychosis, family history of suicide, US nativity, highest parental education level, self-reported welfare status during childhood, absence of biological father during childhood, and urbanicity of childhood home.

* p-value<0.05

** p-value<0.01 (National Survey of American Life participants were sampled from adults residing in the 48 contiguous states between February 2001 and March 2003.)

Table 4

Linear Regression Model Results – Adult Weight Gain in BMI Points, by Gender among Previously Incarcerated

Characteristic	Male		Female	
	Model 1 β (SE) N=422	Model 2 β (SE) N=422	Model 1 β (SE) N=194	Model 2 β (SE) N=194
Duration of Incarceration				
<1 year	REF	REF	REF	REF
1 x <3 years	-0.37 (0.78)	-0.60 (0.79)	0.60 (1.63)	0.25 (1.88)
3 or more years	-1.32 (0.98)	-1.46 (1.02)	-1.86 (2.70)	-1.37 (2.59)
Age				
Years	0.51 (0.15) **	0.53 (0.15) **	0.64 (0.25) *	0.52 (0.26) *
Years ²	-0.01 (0.00) **	-0.00 (0.00) **	-0.01 (0.00) *	-0.00 (0.00)
Pre-Incarceration Mental Health				
Depressive Symptoms	-----	-3.14 (1.05) **	-----	1.54 (2.51)
Manic Symptoms		2.41 (1.47)		-1.38 (2.83)
Post-Incarceration Mental Health				
Depressive Symptoms	-----	-1.44 (0.79)	-----	1.99 (1.47)
Manic Symptoms		2.30 (1.21)		-1.86 (1.95)

*
p-value<0.05

**
p-value<0.01 (National Survey of American Life participants were sampled from adults residing in the 48 contiguous states between February 2001 and March 2003.)