
Obesity and Weight-Related Medical Problems of Incarcerated Persons With and Without Mental Disorders

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Abstract

This study examined weight and weight-related medical conditions of soon-to-be released inmates with and without a mental disorder. The sample included 4,204 males and females aged 18 or older residing in 11 state prisons. Three quarters or more of the inmates were overweight or obese. Mental health status was not found to be a significant factor in the presence or absence of overweight or obesity. Male inmates with mental disorders had higher rates of breathing, walking, and intense pain problems compared to those without mental disorders. Obese male inmates with schizophrenia or bipolar were more likely than those without a mental disorder to report medication treatment for diabetes, cardiovascular problems, arthritis, and intense pain. Evidence-based interventions are needed to monitor weight and obesity during incarceration and to teach weight management skills as part of an integrated psychiatric and medical program.

Keywords

obesity, overweight, mental disorder, prison, correctional health care

Introduction

People with serious mental illnesses often have lifestyles and living conditions that put them at elevated risk of poor health and obesity (Daumit, Pratt, Crum, Powe, & Ford, 2002; Holmberg & Kane, 1999); victimization (Teplin McClelland, Abram, & Weiner, 2005); homelessness, unemployment, and social isolation (Draine, Salzer, Culhane, & Hadley, 2002); drug abuse (Kessler

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et al., 1996; Regier et al., 1990); arrest (Teplin, 1989); and incarceration (Wolff, 2008). Incarceration puts them at further risk.

Prison environments are hazardous to health and wellness (Human Rights Watch, 2003; Toch, 1977). The social conditions inside prison are often predatory, with the stronger preying on the weaker or more vulnerable. Indeed, rates of physical and sexual abuse of prison inmates are higher for those with mental illnesses than without (Kupers, 1999; Wolff, Blitz, Shi, 2007; Wolff, Blitz, Shi, Siegel, & Bachman, 2007). The living conditions are also hazardous to physical health. Prisons house hundreds of people in close and often crowded quarters; routinely feed them diets high in fat, salt, and complex carbohydrates; and restrict their movement to small enclosed areas that limit exposure to fresh air, sunlight, and opportunities to exercise (Leddy, Schulkin, & Power, 2009). Sedentary lifestyles with low energy expenditures combined with increased food intake result in energy imbalances that contribute to weight gain. And excessive weight gain often leads to obesity, a risk factor for diabetes, cardiovascular disease, disability, and osteoarthritis (Wilborn et al., 2005).

Obesity is a significant problem for many people with mental illnesses (Citrome & Vreeland, 2009). Strong associations have been found between obesity and mood and anxiety disorders (Petry, Barry, Pietrzak, & Wagner, 2008; Scott, McGee, Wells, & Oakley Browne, 2008; Simon et al., 2006), as well as schizophrenia and bipolar disorder (Dickerson, Brown, Daumit, et al., 2006; Homel, Casey, & Allison, 2002; McEvoy et al., 2005). Research also suggests that the prevalence of obesity is higher among people with mental illnesses than their community-based counterparts without mental illness (Dickerson, Brown, Kreyenbuhl, et al., 2006; Homel et al., 2002; McEvoy et al., 2005). Women with mental illnesses, compared to their male counterparts, have been found to have more significant weight problems and a higher prevalence of obesity (Dickerson, Brown, Kreyenbuhl, et al., 2006).

Very little research has examined weight distribution and change among incarcerated adult populations. Studies to date have focused on female incarcerated populations in the United States and New Zealand and did not examine differences associated with mental disorder. Taken together, the U.S.-based studies indicate that obesity rates of women entering prison mirror obesity rates of the regional population (Will, Farris, Sanders, Stockmeyer, & Fickelstein, 2004), and that women generally gain weight during incarceration (Massie, 2000; Shaw, Rutherford, & Kenny, 1985), increasing the prevalence of overweight but not obesity among incarcerated females (Massie, 2000). The New Zealand study comparing incarcerated women to women in the general population found that incarcerated women were equally likely to be overweight or obese (Young, Waters, Falconer, & O'Rourke, 2005).

The prevalence of chronic medical conditions typically associated with obesity, such as diabetes, hypertension, cardiovascular problems, and osteoarthritis, are generally higher for persons with mental illnesses compared to the general population (Dickey, Norman, Weiss, Drake, & Azeni, 2002; Sokal et al., 2004) and for incarcerated populations compared to the general population (Binswanger, Krueger, & Steiner, 2009; Wilper et al., 2009). However, a recent study of the Texas prison system found no significant differences in the prevalence of hypertension, ischemic heart disease, and diabetes among state inmates and the general population (Harzke et al., 2010).

There is a dearth of information about weight and co-occurring medical problems among incarcerated persons with and without mental disorders. The aim of this study is to inform the literature about the weight status and weight-related medical problems of soon-to-be-released incarcerated persons with mental disorders and to highlight the importance of developing best practices for the management of obesity, psychiatric disorders, and medical conditions in correctional and community settings. In this article, we describe results from a health-related survey administered to a sample of soon-to-be-released male and female inmates residing in a single state correctional system.

Method

Setting

The study population was all inmates housed at 10 adult male prisons and one female prison, who were within 24 months of their parole eligibility or maximum sentence date. Excluded from the eligible population were inmates housed in the hospital, administrative segregation, halfway houses, or residential treatment units. Also excluded were individuals off-site on the day of the survey due to court, medical appointments, or work assignments. Individuals were excluded if they were being deported, had detainers for new charges, or otherwise had release eligibility dates that were outside the 24-month window based on recent parole hearings. Roughly 25% of the soon-to-be-released population was ineligible for these reasons.

In all, 7,622 inmates met the eligibility criteria and were invited to participate in a survey about readiness for reentry. The principal investigator provided a 10-minute study orientation to groups of approximately 30 eligible inmates. At the conclusion of the orientation, those interested in participating were consented. Written consent was required to participate in the survey. Participants were not compensated. Response rates across all facilities ranged from 46% to 64.9%, with a mean response rate of 58.2% ($SD = 6.9$). The consent procedures were approved by the appropriate Institutional Review Board and the Research Committee of the Department of Corrections.

Instrument

The survey was divided into six parts: reentry readiness, personal well-being, prison time, prison programs, employment experience, and background information. Health questions included self-rated health, height, weight, weight change since incarceration, frequency of body pain and difficulty breathing and walking, and health conditions managed by medication. Respondents were also asked if they had ever been treated for depression, schizophrenia, posttraumatic stress disorder (PTSD), bipolar disorder, or an anxiety disorder while incarcerated. Positive responses were used to classify respondents as having a mental disorder. It was not feasible to administer diagnostic tests in this survey. Although the reliability of self-reported diagnosis is usually suspect, previous research showed that participants' self-reported clinical diagnoses were fully consistent with information in their clinical and criminal records maintained by the prison system (Wolff, Maschi, & Bjerklie, 2004).

Procedures

The survey was administered using audio computer-assisted self-interviews (A-CASI) and was available in English and Spanish. Participants responded to a computer-administered questionnaire by using a mouse and followed instructions shown on the screen or delivered audibly via headphones. Thirty-three computer stations were available and research assistants were on-site to assist participants as needed. On average, respondents completed the survey within 60 minutes. Data were collected from June 2009 through August 2009.

Participants

A total of 3,986 males (mean age = 33.3, $SD = 10.3$) and 218 females (mean age = 36.5, $SD = 10.0$) aged 18 or older participated in the study. Among the 3,986 male respondents, 2,004 (50.3%) were African American, 596 (15.0%) non-Hispanic White, 986 (24.7%) Hispanic, 312 (7.8%) other race or ethnicity, and 88 (2.2%) did not report their race and ethnicity. Of the female respondents,

83 (38.1%) were African American, 64 (29.4%) non-Hispanic White, 46 (21.1%) Hispanic, 24 (11.0%) other race or ethnicity, and one inmate did not report race or ethnicity characteristics. A total of 29 respondents (28 males, 1 female) were excluded from the analysis because they did not report mental disorder status. For all variables used in this analysis, missing data is less than 2%. Missing data are treated as missing completely at random and all percentages are based on valid numbers.

Analysis

Weights were constructed to adjust the sampled population to the full population for different probabilities of selection due to different response rates among facilities and nonresponse bias. Final weights were rescaled to reflect the actual sample size. Weighted and unweighted analyses were conducted and because the results were similar, only weighted results are presented. The significance level used to assess the validity of the null hypotheses is $p < .05$. Means and percentages were estimated based on weighted valid numbers. The 95% confidence intervals (CIs) presented in each table are equivalent to two-sided t tests for differences in means or proportions based on Taylor expansion. Respondents were classified into groups according to gender, mental disorder, and body mass index (BMI). The BMI was calculated by multiplying weight in pounds by 703 and dividing by height in inches squared. A BMI of 25 to 29.9 indicates overweight and of 30 or higher, obese. SAS 9.2 software was used for all the analysis and Proc SurveyMeans was used to construct all statistics and confidence intervals.

Results

Respondents' Characteristics

Male respondents ($N = 3,958$) were mostly African American (51.5%) with a mean age of 33.8 ($SD = 10.3$). The race and ethnicity characteristics of female respondents were more evenly distributed among African American (38.2%), White (29.5%), and Hispanic (21.2%), with a mean age of 36.5 ($SD = 10.0$). More than 60% of female (61.3%) and male (61.5%) respondents completed high school or had a GED. A serious mental disorder (defined as schizophrenia or bipolar disorder) was reported by 6.6% of male respondents and 19.4% of females. Nearly one fifth of males and one half of females reported one of the following mental disorders (classified as "any mental disorder"): schizophrenia, bipolar, depression, PTSD, or anxiety disorder.

Weight Status of Inmate Sample

On average, male inmates weighed 197 ($SD = 36$) pounds and were 70 ($SD = 3$) inches tall (BMI = 28.4, $SD = 4.6$), while females weighed nearly 174 ($SD = 41$) pounds and measured 64 ($SD = 3$) inches (BMI = 29.6, $SD = 6.3$). The vast majority of soon-to-be-released inmates independent of gender and mental disorder were overweight or obese, with percentages ranging from 75.2 (females with no mental disorder) to 78.4 (males with no mental disorder). Although there are no significant differences in obesity rates by mental disorder, females with no reported mental disorder were more likely to be obese than their male counterparts (42.7% vs. 29.8% respectively, significant). Half or more of males and females reported gaining weight since incarcerated. (See Table 1.)

Health Status of Inmate Sample

In general, male inmates reporting any mental disorder compared to their counterparts without a mental disorder were significantly less likely to self-report their health status as excellent or very good independent of their BMI. Inmates reporting any mental disorder were significantly more

Table 1. Comparison of Weight Reported by Soon-to-Be-Released Inmates by Gender and Mental Disorder

Weight Characteristic	Men (N = 3,958)			Women (N = 217)		
	No Mental Disorder (N = 3,176)	Any Mental Disorder (N = 782)	Serious Mental Disorder (N = 261)	No Mental Disorder (N = 117)	Any Mental Disorder (N = 100)	Serious Mental Disorder (N = 42)
Weight, mean	197	196	198	175	173	177
Height, mean	5 ft 10 in	5 ft 10 in	5 ft 10 in	5 ft 4 in	5 ft 4 in	5 ft 5 in
Overweight ^a , %	48.6 (46.8–50.3)	46.5 (42.9–50.0)	43.2 (37.0–49.4)	32.5 (23.9–41.0)	34.7 (25.1–44.4)	37.5 (22.4–52.6)
Obese ^b , %	29.8 (28.2–31.5)	30.7 (27.4–34.0)	34.2 (28.3–40.2)	42.7 (33.7–51.8)	41.1 (31.1–51.0)	42.5 (27.1–57.9)
Gained weight, %	60.1 (58.4–61.8)	58.4 (54.9–61.8)	59.2 (53.2–65.2)	49.6 (40.4–58.7)	56.0 (46.2–65.8)	59.5 (44.6–74.5)
Lost weight, %	22.4 (20.9–23.9)	26.1 (23.0–29.2)	27.6 (22.1–33.0)	33.3 (24.7–41.9)	36.0 (26.5–45.5)	33.3 (19.0–47.7)
Same weight, %	17.5 (16.2–18.8)	15.6 (13.0–18.1)	13.3 (9.1–17.4)	17.1 (10.2–24.0)	8.0 (2.6–13.4)	7.1 (0–15.0)

Note. ^a Overweight is defined as a body mass index equal to 25 to 29.9.

^b Obese is defined as a body mass index equal to 30 or higher.

likely to report their health as good or fair compared to their counterparts without a mental disorder (no respondent reported his health as poor). Similarly, male respondents reporting any mental disorder were significantly more likely than their counterparts without a mental disorder to report difficulty breathing and walking, as well as experiencing intense pain. (See Table 2.) While the percentage of inmates reporting these health problems generally increased with higher BMI levels independent of mental disorder, the largest increases were between male inmates with healthy weights compared to those who were obese.

Similar patterns were found for female inmates with BMIs of 25 or greater compared to those with females with healthy weights, although differences between disorder groups are not significant, given the small sample size. (See Table 3.)

Treatment Status of Inmate Sample

Overall, rates of medication management for diabetes, cardiovascular disease, and arthritis increased with BMI levels from healthy, overweight, to obese, independent of mental disorder. Compared to male respondents without a mental disorder, male inmates with any mental disorder were significantly more likely to report medication management for cardiovascular disease and intense pain if they were overweight, and those conditions plus arthritis if obese. Obese male respondents with schizophrenia or bipolar (serious mental disorder) were more likely than their counterparts without a mental disorder to report medication treatment for cardiovascular problems and intense pain. Obese male inmates with a mental disorder were also more likely than their counterparts without a mental disorder to be treated for hepatitis. It is important to note that treatment rates for diabetes, cardiovascular disorder, and arthritis significantly increased between healthy weight and obese groups with and without a mental disorder, although level increases were greatest for the disordered groups with schizophrenia or bipolar. Similar patterns were again found for female inmates. Differences did not reach levels of statistical significance due to the small sample size. (See Tables 4 and 5.)

Discussion

Our findings are consistent with the general literature on obesity and its associations with mental and physical disorders. First, the vast majority (70% or more) of incarcerated persons in the soon-to-be-released sample were overweight or obese. However, we did not find the prevalence of overweight or obesity among incarcerated persons, either male or female, to differ by mental disorder. Relatively equal proportions of the disordered and nondisordered samples had BMIs in the overweight and obese ranges.

Second, consistent with the extensive literature describing the association between obesity and chronic medical conditions, our findings show that incarcerated persons with BMIs in the obese range, particularly those with mental disorders, were more likely than those with healthy weight to receive medication treatment for diabetes, cardiovascular disease, and arthritis. These conditions were most prevalent in the sample of obese male inmates with serious mental illnesses. This group also had the highest proportions of breathing and walking problems. While our results are consistent with the general literature on obesity, mental illness, and chronic medical conditions, there are limitations to our study. Our data on weight, height, mental illness, and medical conditions under treatment are based on self-report. Self-reporting of this information may over- or understate the prevalence of these conditions within the sample.

Although neither the direction nor the magnitude of error is known, it is unlikely to be systematic in ways that would compromise the general findings reported herein. Regarding weight and height information, it is common for studies of BMI to use survey data based on self-reported weight and height (e.g., NHANES (National Health and Nutrition Examination Survey)) and these data have

Table 2. Comparison of Health Status Reported by Soon-to-Be-Released Male Inmates by Body Mass Index and Mental Disorder

Health Status Characteristic	Healthy Weight (BMI < 25)			Overweight (BMI = 25–29.9)			Obese (BMI = 30+)		
	No Mental Disorder (N = 694)	Any Mental Disorder (N = 174)	Serious Mental Disorder (N = 56)	No Mental Disorder (N = 1,532)	Any Mental Disorder (N = 363)	Serious Mental Disorder (N = 110)	No Mental Disorder (N = 924)	Any Mental Disorder (N = 232)	Serious Mental Disorder (N = 85)
Self-rated health status									
Excellent, very good, %	66.0 (62.4–69.6)	50.9 ^a (43.2–58.6)	49.2 (35.5–62.9)	65.1 (62.7–67.5)	47.8 ^a (42.5–53.1)	46.2 ^a (36.6–55.9)	54.8 (51.5–58.1)	37.6 ^a (31.2–44.1)	36.3 ^a (25.7–46.9)
Good, fair, %	34.0 (30.4–37.6)	49.1 ^a (41.4–56.8)	50.8 (37.1–64.5)	34.9 (32.5–37.3)	52.2 ^a (46.9–57.5)	53.8 ^a (44.1–63.4)	45.2 (41.9–48.5)	62.4 ^a (55.9–68.8)	63.7 ^a (53.1–74.3)
Difficulty breathing, %	27.1 (23.8–30.5)	43.6 ^a (36.1–51.0)	44.2 ^a (31.1–57.3)	23.9 (21.8–26.1)	43.4 ^a (38.3–48.6)	52.6 ^a (43.2–62.0)	30.6 (27.6–33.6)	51.9 ^a (45.5–58.4)	51.7 ^a (41.0–62.4)
Difficulty walking, %	17.4 (14.6–20.3)	32.3 ^a (25.3–39.4)	33.8 ^a (21.3–46.2)	20.0 (18.0–22.0)	34.2 ^a (29.3–39.2)	35.5 ^a (26.5–44.5)	27.4 (24.5–30.3)	41.9 ^a (35.5–48.3)	44.8 ^a (34.1–55.4)
Intense pain, %	70.6 (67.2–74.1)	79.7 (73.7–85.7)	82.4 (72.4–92.4)	71.1 (68.8–73.4)	83.5 ^a (79.7–87.4)	84.7 ^a (77.9–91.4)	72.1 (69.2–75.0)	84.7 ^a (80.0–89.3)	82.5 (74.3–90.6)

^a Statistically significant results comparing serious mental disorder and any mental disorder inmates to their counterparts who have no mental disorder, $p < .05$.

Table 3. Comparison of Health Status Reported by Soon-to-Be-Released Female Inmates by Body Mass Index and Mental Disorder

Health Status Characteristic	Healthy Weight (BMI < 25)			Overweight or Obese (BMI = 25+)		
	No Mental Disorder (N = 29)	Any Mental Disorder (N = 23)	Serious Mental Disorder (N = 8)	No Mental Disorder (N = 88)	Any Mental Disorder (N = 72)	Serious Mental Disorder (N = 32)
Self-rated health status						
Excellent, very good, %	58.6 (40.1–77.1)	68.2 (48.0–88.3)	62.5 (27.8–97.2)	45.9 (35.2–56.6)	33.8 (22.2–45.5)	37.9 (20.1–55.8)
Good, fair, %	41.4 (22.9–59.9)	31.8 (11.7–52.0)	37.5 (2.8–72.2)	54.1 (43.4–64.8)	66.2 (54.5–77.8)	62.1 (44.2–79.9)
Difficulty breathing, %	27.6 (10.8–44.4)	43.5 (22.5–64.4)	37.5 (2.8–72.2)	33.0 (23.0–42.9)	55.6 ^a (44.0–67.2)	59.4 (42.2–76.6)
Difficulty walking, %	24.1 (8.1–40.2)	26.1 (7.5–44.6)	12.5 (0–36.2)	37.5 (27.3–47.7)	55.6 (44.0–67.2)	50.0 (32.5–67.5)
Intense pain, %	82.8 (68.6–97.0)	87.0 (72.7–100)	87.5 (63.8–100)	85.2 (77.7–92.7)	91.7 (85.2–98.1)	90.6 (80.4–100)

^a Statistically significant results comparing serious mental disorder and any mental disorder inmates to their counterparts who have no mental disorder, $p < .05$.

Table 4. Comparison of Chronic Medical Conditions Under Medication Treatment Reported by Soon-to-Be-Released Male Inmates by Body Mass Index and Mental Disorder

Chronic Medical Condition	Healthy Weight BMI < 25			Overweight BMI = 25–29.9			Obese BMI = 30+		
	No Mental Disorder (N = 694)	Any Mental Disorder (N = 174)	Serious Mental Disorder (N = 56)	No Mental Disorder (N = 1,532)	Any Mental Disorder (N = 363)	Serious Mental Disorder (N = 110)	No Mental Disorder (N = 924)	Any Mental Disorder (N = 232)	Serious Mental Disorder (N = 85)
Percent taking medications for:									
Diabetes	1.2 (0.4–2.0)	0.6 (0–1.8)	1.9 (0–5.6)	2.7 (1.9–3.5)	2.3 (0.7–3.9)	2.8 (0–5.9)	6.1 (4.5–7.6)	11.4 (7.2–15.5)	13.4 (6.0–20.8)
Heart disease, hypertension, or high cholesterol	4.9 (3.2–6.6)	7.7 (3.7–11.8)	6.0 (0–12.6)	7.9 (6.5–9.3)	14.3 ^a (10.7–18.0)	22.8 ^a (14.8–30.8)	13.6 (11.3–15.8)	30.0 ^a (24.1–36.0)	32.0 ^a (21.9–42.1)
Arthritis	0.9 (0.2–1.7)	1.3 (0–3.1)	0	1.1 (0.6–1.7)	3.4 (1.5–5.4)	4.7 (0.7–8.7)	3.2 (2.1–4.4)	8.9 ^a (5.2–12.6)	11.2 (4.3–18.1)
Intense pain	2.1 (1.0–3.2)	10.1 ^a (5.5–14.6)	16.7 ^a (6.7–26.7)	2.7 (1.9–3.5)	9.3 ^a (6.3–12.4)	6.5 (1.8–11.2)	5.1 (3.6–6.5)	17.1 ^a (12.2–22.0)	19.6 ^a (11.0–28.3)
Asthma	5.3 (3.6–7.0)	3.9 (1.0–6.8)	5.4 (0–11.4)	4.5 (3.5–5.6)	7.7 (4.9–10.4)	6.9 (2.3–11.6)	5.8 (4.3–7.3)	10.4 (6.4–14.4)	11.9 (5.0–18.9)
HIV/AIDS	0.9 (0.2–1.7)	1.7 (0–3.5)	1.6 (0–4.8)	1.1 (0.6–1.7)	1.7 (0.3–3.1)	1.9 (0–4.6)	0.9 (0.3–1.5)	1.6 (0–3.2)	1.1 (0–3.4)
Hepatitis	0.9 (0.2–1.7)	3.5 (0.7–6.3)	3.7 (0–8.6)	1.2 (0.7–1.8)	2.0 (0.5–3.5)	1.9 (0–4.5)	1.4 (0.6–2.2)	6.0 ^a (3.0–9.1)	9.4 ^a (3.2–15.7)

^a Statistically significant results comparing serious mental disorder and any mental disorder inmates to their counterparts who have no mental disorder, $p < .05$.

Table 5. Comparison of Chronic Medical Conditions Under Medication Treatment Reported By Soon-to-Be-Released Female Inmates by Body Mass Index and Mental Disorder

Chronic Medical Condition	Healthy Weight (BMI < 25)			Overweight or Obese (BMI = 25+)		
	No Mental Disorder (N = 29)	Any Mental Disorder (N = 23)	Serious Mental Disorder (N = 8)	No Mental Disorder (N = 88)	Any Mental Disorder (N = 72)	Serious Mental Disorder (N = 32)
Percent taking medications for:						
Diabetes	0	0	0	6.8 (1.5–12.1)	12.5 (4.8–20.2)	0
Heart disease, hypertension, or high cholesterol	6.9 (0–16.4)	13.0 (0–27.3)	12.5 (0–36.2)	14.8 (7.3–22.3)	26.4 (16.1–36.7)	21.9 (7.4–36.4)
Arthritis	3.4 (0–10.3)	0	0	6.8 (1.5–12.1)	9.7 (2.8–16.6)	15.6 (2.9–28.3)
Intense pain	0	4.3 (0–13.0)	0	5.7 (0.8–10.6)	15.3 (6.9–23.7)	15.6 (2.9–28.3)
Asthma	13.8 (0.8–26.7)	21.7 (4.3–39.2)	25.0 (0–56.0)	11.4 (4.7–18.1)	18.1 (9.1–27.0)	18.8 (5.1–32.4)
HIV/AIDS	0	0	0	1.1 (0–3.4)	2.8 (0–6.6)	3.1 (0–9.2)
Hepatitis	0	0	0	2.3 (0–5.4)	6.9 (1.0–12.9)	6.3 (0–14.7)

been found reliable for general population samples (Heymsfield, Allison, Heshka, & Pierson, 1995). Also, many of the most prominent BMI studies based on samples of persons with mental illnesses have relied on self-reported weight and height (Allison, Mackell, & McDonnell, 2003; Dickerson, Brown, Kreyenbuhl, et al., 2006; Homel et al., 2002; McElroy et al., 2002). Self-reported treatment for psychiatric and medical problems during incarceration was used to measure types of disorders for which treatment would likely be required by the soon-to-be-released sample in the community. Our goal here was not to measure the prevalence of disorders among the population but the prevalence of chronic psychiatric and medical conditions under treatment during incarceration. In previous investigations, self-reported responses to treatment questions have been compared to clinical records and no systematic reporting biases were found (Wolff et al., 2004). Finally, our data are cross-sectional and as such we cannot draw causal associations among obesity, mental illness, or chronic medical conditions.

A number of countervailing strengths warrant mentioning. Methodologically, this study is based on a large sample of soon-to-be-released persons drawn from a single state prison system. The response rate for the sample was relatively high and the individual responses were elicited by A-CASI (Tourangeau & Smith, 1998), with very little missing data. To our knowledge, this is the largest corrections sample available to investigate issues of obesity, mental disorder, and co-occurring chronic medical problems among incarcerated persons. The findings based on these survey data contribute significantly to the literature on the health risks associated with obesity in incarcerated populations. They also represent settings where people experience living conditions for long periods of time that are conducive to weight gain due to high energy intake and low energy expenditures.

It is not surprising that 34% to 43% of incarcerated males and females, respectively, with serious mental illnesses were obese and that they have higher rates of health risks related to obesity, including diabetes, cardiovascular problems, and arthritis. Our findings simply add one more piece to the growing evidence base documenting medical comorbidities and treatment issues for persons with mental illnesses—issues that warrant policy and practice attention both in correctional and community settings.

In 1999, the Surgeon General's Report on Mental Illness stated that mental health and physical health were "inextricably intertwined" (Surgeon General, 1999). Since then, an extensive body of literature has developed on the linkage between antipsychotic medications and obesity, further intertwining the relationship between mental and physical health through obesity (Allison, Loebel, Lombardo, Romano, & Siu, 2009; Holt & Preveler, 2009). What has not evolved along with the evidence is an integrated mental/medical treatment response, particularly in correctional settings where physical and mental health treatments are typically provided by separate private vendors (Wolff, 2008) and where menu plans and exercise routines are institutionalized.

Gaining weight as a consequence of incarceration not only drives up correctional health care costs but also creates public health issues in the community. Most incarcerated people return to the community and their health problems and needs follow them. Our data suggest that a sizable proportion of released individuals will require continuous, community-based treatment and medications for mental illnesses and chronic medical problems, many of which may be a result of or related to obesity. Unmonitored weight gain during incarceration drives up public health costs to the extent that obesity increases the onset of chronic medical problems, such as diabetes, cardiovascular problems, and arthritis. At a minimum, weight gain and obesity should be monitored among inmates and managed in ways to prevent or lower the health risks associated with unhealthy weight gain. Our research suggests the need to develop best practices in correctional settings for the management of obesity and mental and medical problems.

Conclusion

Correctional populations have lifestyles and living conditions that are conducive to weight gain. Our findings highlight the associations among obesity, mental illnesses, and chronic medical conditions

among soon-to-be-released male and female inmates. Inmates' mental health status was not found to be a significant factor in the presence or absence of overweight or obesity. Obesity is a manageable health risk that requires responsible management in correctional settings. Interventions are needed to monitor weight gain and obesity during incarceration and to teach weight management skills as part of an integrated psychiatric and medical program. It is in the best interest of the individual, the correctional system, and society to proactively respond to environmental and clinical factors that contribute to obesity. Preventing obesity and related chronic medical conditions saves money and improves quality of life.

Declaration of Conflicting Interests

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