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Weight Patterns of Youth Entering an Urban Juvenile Justice Facility

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Abstract

Adolescents with a history of incarceration face a disproportionate number of health issues compared with their peers in virtually all areas, including perceived well-being; self-esteem; acute, chronic, and psychosocial disorders; and physical activity. Some studies have shown correlates of weight status and incarceration; however, the literature is conflicting. The current study sought to assess weight patterns of primarily minority urban youth ($N = 548$) entering a juvenile justice facility as well as associations between medications and weight status. Results indicate incarcerated adolescents have higher rates of overweight and obesity (40%) in comparison with nonincarcerated adolescents in the state (20 to 30%) or surrounding community (30 to 34%). Of interest, incarcerated adolescents taking asthma medications have significantly higher rates of overweight and obesity when compared with those not taking asthma medications. The clinical implications of these findings are discussed and implications for future research explored.

Keywords

asthma, BMI, juvenile justice, obesity, adolescence

Introduction

Obesity is a burgeoning health problem now affecting almost 17% of adolescents in the United States (Ogden, Carroll, Kit, & Flegal, 2012). Obesity is well known for its association with cardiac disease including high blood pressure and elevated cholesterol (Freedman, Mei, Srinivasan, Berenson, & Deitz, 2007) and associated increased risk for type 2 diabetes (Whitlock, Williams, Gold, Smith, & Shipman, 2005), as well as certain respiratory, musculoskeletal, and gastrointestinal disorders (Han, Lawlor, & Kimm, 2010). Factors contributing to obesity are multifactorial,

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complicated, and often poorly understood. What is clear, however, is that significant disparities in obesity prevalence rates exist in subgroups of the U.S. population. For instance, there is an inverse association between socioeconomic status and obesity prevalence among some gender and ethnic groups (Freedman, 2011; Kumanyika et al., 2008; O'Dea & Wilson, 2006). There are also well-documented racial/ethnic disparities in obesity prevalence rates, with the highest among youth aged 12 to 19 years being among Black females (31%) and Mexican American males (26%; Freedman, 2011).

Of the approximately 130,000 adolescents detained in juvenile justice facilities across the United States, 55% to 65% are minority (Feinstein, Gomez, Gordon, Curise, & DePrato, 2007). Being of minority status places youth at high risk for poor health outcomes and may predispose them to racial health disparities. For example, Blacks, who are overrepresented in correctional populations (Sickmund, 2004), and Latinos are especially vulnerable to cardiovascular disease and type 2 diabetes (Goodman, McEwen, Huang, Dolan, & Adler, 2005). Incarcerated youth have higher rates of physical and mental health problems, and higher mortality rates, than the general adolescent population (Forrest, Tambor, Riley, Ensminger, & Starfield, 2000). Incarcerated youth also have disproportionately high rates of sexually transmitted infections, chronic health conditions including diabetes and asthma, and psychiatric disorders (Griel & Loeb, 2009). What is unclear is whether youth who are incarcerated are at a higher risk for obesity. A study conducted in Louisiana found that only 8% of the teenage male subjects were overweight and 17% at risk for being overweight (Feinstein et al., 2007). However, an Australian study found a higher rate of obesity than the general population for incarcerated male adolescents (Allerton & Champion, 2003), as did a small study in the United States (Robinson et al., 2006).

Understanding the health status of youth as they enter into a facility is important. In addition to excess weight being a major contributor to physical health problems, studies suggest that those who are overweight and obese often suffer from low self-esteem, depression, and poor quality of life (Lowry, Sallinen, & Janicke, 2007) and are more likely to be discriminated against (Kumanyika et al., 2008). These factors are especially problematic for incarcerated youth who are likely to be experiencing some, if not all, of these variables (Forrest et al., 2000). This presents a unique opportunity to implement educational and behavioral interventions on a population level to assist in decreasing health-related disparities and help youth to better care for themselves. Therefore, the objective of this study was to assess the health and weight patterns of youth entering juvenile justice facilities in a large metropolitan area in the northeast United States, using a retrospective chart review. The research questions and variables under investigation are as follows:

Research Question 1: What is the general distribution of body mass index (BMI; underweight, normal weight, overweight, and obese) in the metro Boston juvenile justice system general population? Variables: Age/Height/Weight/BMI

Research Question 2: Are there ethnic differences in BMI across different racial and ethnic groups and genders? Variables: Age/Height/Weight/BMI, Gender, and Race/Ethnicity

Research Question 3: What are the BMI patterns of youth who take medications? Variables: BMI/Medication

Research Question 4: What are the BMI patterns of youth who have a diagnosed medical condition? Variables: BMI/medical conditions

Method

Participants

Study participants comprised 549 adolescents entering a juvenile justice facility over an 18-month period. All participants were receiving standard medical care as part of their admission to the

facility. The investigator collected height, weight, BMI data, and a medication list as part of the standard intake process.

Human Subjects

Approval to conduct the study was granted by the institutional review boards of the University of Massachusetts and Boston Children's Hospital and the state's Department of Youth Services. To protect study participants and minimize risks, the investigators coded the data after collection and de-identified and aggregated the data, making it impossible to link personal identifiers with data observations.

Data Collection

The researchers collected the data via retrospective chart review. Inclusion criteria included any youth aged 19 or younger who had entered the facility for detention, assessment, or revocation from April 1, 2010, to August 1, 2011. The exclusion criteria included pregnancy and refusal to have height and weight measured upon entry. Also excluded were those youth ($n = 20$) who were in the custody of the state's Department of Children and Families at the time of entry because the researchers were unable to obtain study approval from this agency. Because some youth had multiple admissions to the facility, data were collected only from the most recent intake. To ensure data reliability, a random sample of 10% was verified by a research staff member who did not enter the original data.

Demographic variables included gender, date of birth, date of weight measurement, and self-reported race and ethnicity. Height and weight data were measured on the same calibrated scale within 24 hours of youth entering the facility. BMI was calculated using published data from the Centers for Disease Control and Prevention (CDC). Similarly, the investigators calculated BMI *Z*-scores with reference to sex- and age-specific mean BMI values and distributions using the CDC growth chart data and calculating in SPSS. To determine weight status, the researchers followed the parameters from national standards (National Commission on Correctional Health Care, 2004) and the most recent (2007) recommendations of the American Academy of Pediatrics; these are underweight ($\leq$5th percentile), normal weight (5th to 84th percentile), overweight (85th to 94th percentile), and obese ($\geq$95th percentile). They also recorded medical and certain psychiatric diagnoses (e.g., depression, mood disorders, attention deficit/hyperactivity disorder, asthma, diabetes, and "other") within the past year and current medications at the time of the intake, noting the medications that corresponded to these diagnoses.

Data Analysis

The researchers analyzed the data analyzed using SPSS 19. They calculated descriptive statistics (range, mean, and standard deviations) for mean BMI, *Z*-score, and weight status. To model relative weight for the population and allow for subsequent longitudinal analysis, the investigators chose BMI *Z*-scores to compare between groups. They categorized weight status as underweight, normal, overweight, and obese and used a three-level variable that combined overweight and obese. They examined BMI stratified by four demographic variables: age, gender, ethnicity, and race. Since there were only two underweight observations, they included these with the normal weight category. Coding for racial categories included three groups: Black, White, and other. Similarly, ethnicity categories included Hispanic and non-Hispanic. Youth self-identified race and ethnicity at the time of initial intake to the facility.

The investigators reviewed normal values of distributions of the BMI variable for each racial group and found them to be approximately symmetric. They compared the outcome variable

Table 1. Descriptive Statistics for Sample.

	Mean (*SD*)				Range		
Age (years and months)	16.4 (1.47)				13.6 to 19.9		
BMI *Z*-score	.83 (.93)				−2.5 to 2.8		
	n	(%)	*n*	(%)	*n*	(%)	
Race	African American		White		Other		Total
Male	218	(55)	63	(16)	113	(29)	394
Female	51	(33)	57	(37)	46	(30)	154
Total	269	(49)	120	(22)	159	(29)	548
Ethnicity	Hispanic		Non-Hispanic		Other		Total
Male	103	(26)	76	(45)	115	(29)	394
Female	49	(32)	71	(46)	34	(22)	154
Total	152	(28)	247	(45)	149	(27)	548

Note. $N = 548$.

distribution within each racial and ethnic group and for medications and medical diagnoses. Using independent sample *t*-tests or analyses of variance (ANOVA), they tested the significance of between-group differences across, respectively, two groups (e.g., males vs. females or medication use yes vs. no) or more than two groups (e.g., White vs. black vs. other). They used the χ^2 test to determine whether there were significant relationships between weight status and race, ethnicity, medical diagnosis, or prescription medications.

A one-way analysis of covariance (ANCOVA) model was calculated to determine the main effects of a medical diagnosis or use of a prescription medication as a dependent variable on weight status as measured by mean BMI and weight status. An independent samples t-test was used to evaluate whether there were mean differences in BMI in those with a medical diagnosis and those without. This was done to determine which had significant differences when main effects were found.

Results

Table 1 presents descriptive statistics for the overall sample. The average age was 16.4 ($SD = 1.47$), with a greater proportion of male participants (71.8%). Roughly half of the sample was African American (49%), 42% identified themselves as other, and 14.3% self-identified as White. Participants were most likely to be identified as non-Hispanic (45%); 28% identified as Hispanic. The majority of the sample fell into the normal weight category (58.8%); however, as shown in Table 2, approximately 40% of the total sample was classified as overweight (20.2%) and obese (20.6%).

Racial, Ethnic, and Gender Differences

The ANOVA model showed that an overall difference in weight status across racial and ethnic groups was not statistically significant. Similarly, there was no interaction between gender and race in terms of BMI *Z*-scores or weight status. Although 22% ($n = 86$) of males were obese compared with 18% of females ($n = 27$), no statistically significant gender differences were found. BMI *Z*-scores were almost identical between gender groups, with means at 0.838 for males and 0.819 for females.

Table 2. Weight Status Percentiles Across Racial and Ethnic Groups.

	Normal	Overweight	Obese	Mean BMI Z-Score (*SD*)
Race				
African American ($n = 269$)	56% ($n = 151$)	22% ($n = 60$)	22% ($n = 58$)	.87 (.94)
White ($n = 118$)	64% ($n = 75$)	20% ($n = 24$)	16% ($n = 19$)	.79 (.86)
Other ($n = 158$)	60% ($n = 95$)	17% ($n = 27$)	23% ($n = 36$)	.81 (.98)
Ethnicity				
Hispanic ($n = 151$)	57% ($n = 86$)	19% ($n = 29$)	24% ($n = 36$)	.90 (.93)
Non-Hispanic ($n = 245$)	58% ($n = 142$)	20% ($n = 50$)	22% ($n = 53$)	.85 (.96)
Other ($n = 149$)	62% ($n = 93$)	21% ($n = 32$)	16% ($n = 24$)	.75 (.88)

Table 3. *Z*-Scores Across Youth Who Are on/Not on Asthma Medication.

	On Asthma Medication?			
	Yes	No	*t*	*p*
N	138	411		
Adjusted mean BMI-*Z* (*SD*)	1.01 (0.97)	0.76 (0.91)	2.751	.006

Note. BMI = body mass index.

Table 4. Cross Tabulation of Weight Status by Youth Who Are on Asthma Medication (Yes/No).

	Under/Normal	Overweight	Obese	*p*
Any asthma medication	65 (47.1%)	35 (25.4%)	38 (27.5%)	
No asthma medication	260 (63.3%)	76 (18.5%)	75 (18.2%)	< .001

Note. $\chi^2 = 11.30$.

Medical Diagnosis and Prescription Medications

The ANCOVA model, after controlling the covariates, found differences between weight status of those with a medical diagnosis and taking medications and those who were not. To determine which medications influenced weight, each was introduced into the model and run separately. Chi-square analysis (Tables 3 and 4) showed that those with an asthma diagnosis were significantly, $\chi^2(2) = 8.90$, $p = .03$, more likely to be obese than those who did not have an asthma diagnosis. Further, as shown in Table 3, those taking asthma medications had a significantly higher BMI *Z*-score (mean = 1.01; $SD = .097$) than those not taking asthma medication (mean = 0.77; $SD = 0.91$). No statistically significant findings were seen for other medication categories.

Discussion

The prevalence of overweight and obesity in the study population was high, even when compared with the rates in the surrounding community. In Massachusetts, 25% to 30% of adolescents are overweight or obese (Massachusetts Public Health Association, 2011). The percentage is higher in the city of Boston, 30% to 34% (Boston Indicators Project, 2008; Stark, Potenza, Lin, & Grant, 2011). In this population, the percentage is higher still, 40%, suggesting there may be increased risk for overweight and obesity associated with incarceration, although the direction of the association is not clear.

This study found a highly significant association between asthma and obesity. Fully 25% of the subjects in this study were prescribed asthma medication, whereas in Massachusetts the asthma prevalence rate in youth is 9.8% (Centers for Disease Control and Prevention [CDC], 2008). In addition, of those youth with asthma in the study, 27.5% were in the obese category. Although comparable data are not available for youth in Massachusetts, numerous studies support the link between body weight and asthma, and there is a complex, and not entirely understood, interrelation between obesity and asthma (Ford & Mannino, 2005). Also, obesity seems to increase susceptibility to and the severity of asthma (Ciprandi, Pistorio, Tosca, Ferraro, & Cirillo, 2009; Schaub & von Mutius, 2005). Both asthma and obesity can result in a decrease in physical activity and subsequent worsening of both conditions (Lucas & Platts-Mills, 2005). This is particularly problematic in juvenile justice facilities since opportunities for exercise may already be limited secondary to the nature of safety issues, security, and residing in a facility.

Asthma and obesity both confer risk for poor health outcomes, and both disproportionally affect minority and low-income communities (Akinbami, LaFleur, & Schoendorf, 2002; Baskin, Ard, Franklin, & Allison, 2005; Goodman et al., 2005), which are overrepresented in juvenile justice facilities. This presents an opportunity for those engaged in the care of these youth to screen incarcerated youth for overweight and obesity and for asthma, to provide treatment, and to educate patients about the risks. Clinicians should be aware that when youth are obese and have asthma, each can exacerbate the other. This may be of particular importance for incarcerated youth who are likely to have other morbidities and may be deeply affected by the social and emotional implications of overweight and obesity as obesity is associated with poor psychosocial health, particularly among African American adolescents (Witherspoon, Latta, Wang, & Black, 2013). The authors postulate that weight loss could help increase psychosocial outcomes and improve mediators such as self-esteem among incarcerated youth, thus contributing to better overall outcomes including a potential for decreased recidivism.

Limitations

The data were gathered through a retrospective chart review and are cross-sectional and descriptive. The investigators used a convenience sample of youth entering a juvenile justice facility in one urban area in the Northeast that may not reflect incarcerated youth nationally. This study included a relatively small number of subjects who were taking each category of medication, and no information was gathered about length of time receiving medications, compliance, or outcomes associated with conditions. This adds to the importance of statistically significant findings, given the limited power of the sample.

Future Research

Future studies should further investigate the association between weight and incarceration and aggregate national data to determine whether geographical differences are present. A more complete

understanding of the relationship between incarceration and weight change would require following youth over time, and a study is being planned to better evaluate the effect of incarceration and medications on weight patterns in this population. An attempt to delineate effects of the juvenile justice policies and culture on eating and exercise during incarceration with BMI assessments pre- and postincarceration would be useful, as well. Further, intervention research aimed at healthy lifestyle behaviors in this population and the correlates of self-esteem is important. Researchers must further investigate the interplay of asthma and obesity as well as effective strategies for treating patients with both conditions.

Conclusions

The findings add to the limited knowledge about the health of incarcerated youth. The high prevalence of overweight and obesity in this population is concerning and has important clinical implications, as does the significant association between asthma and obesity, both of which must inform practice in the juvenile justice setting.

Authors' Note

The content is solely the responsibility of the authors and does not necessarily represent the official views of the Health Resources and Services Administration.

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