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Physical Factors, Personal Characteristics, and Substance Use: Associations with Obesity

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Abstract

Background—Since obesity has become a major public health problem, attention to a range of its predictors is needed. This study examined the association of physical factors, personal characteristics, and substance use with obesity in a sample (N=815) of African American and Puerto Rican young adults with a mean age of 32.

Methods—Body mass index (BMI) was calculated to assess obesity. Bivariate and multivariate logistic regression analyses were conducted.

Results—Bivariate analyses showed that protective factors such as physical activity (AOR=.82, 95% CI=.74–.91), healthy diet (AOR=.96, 95% CI=.93–.99), self control (AOR=.93, 95% CI=.87–.98), and life satisfaction (AOR=.97, 95% CI=.95–.99) were associated with a reduced probability of being obese. Marijuana use was also associated with a decreased probability of obesity (AOR=.89, 95% CI=.80–.99), but was not considered a protective factor. Risk factors such as short sleep duration (AOR=1.70, 95% CI=1.24–2.33), and depressive mood (AOR=1.05, 95% CI=1.01–1.09) were associated with an increased probability of being obese.

Conclusions—For African Americans and Puerto Ricans, programs to treat obesity should focus on increasing sleep, physical activity, and life satisfaction.

Keywords

Obesity; body mass index; protective factors; risk factors

INTRODUCTION

Obesity, defined as abnormal or excessive fat accumulation that presents a health risk, has become a major public health problem (1). Obesity is associated with a number of serious illnesses such as diabetes, cardiovascular disease, and some cancers (1). Physical factors, personal factors, and substance use have been found by most, but not all, investigators to be related to obesity (2, 3–5, 6, 7–16). Alcohol use is inversely related to obesity in some research, but not all (17–20). Cannabis users are also less likely to be obese (3).

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The present study is innovative in two aspects. First, this research focuses on an understudied population of urban African American and Puerto Rican young adults. According to Agyemang et al. (21), ethnic minority groups such as African Americans and Puerto Ricans, but not Asians, have higher rates of being overweight or obese than do Whites. To date, the study of obesity predictors in minority groups has been relatively uncommon. Second, the study includes numerous factors involved in obesity that might be considered in obesity treatment programs.

This study examines the association of obesity with protective factors (e.g., physical activity and life satisfaction), risk factors (e.g., short sleep duration), and substance use (e.g., marijuana use). Unlike the other studies that investigated either physical factors (22), personal factors (11, 23), or the use of substances (24), a major advantage of this study is that all of these risk and protective factors for obesity are examined at the same time in African Americans and Puerto Ricans.

Based on the literature, the hypotheses are: 1) protective factors (e.g., physical activity, healthy diet, self control, and life satisfaction) are associated with lower Body Mass Index (BMI); and 2) risk factors (e.g., short sleep duration, depressive mood, and anxiety) are associated with a higher BMI. Since the findings regarding the relationship of both alcohol use and marijuana use to obesity have been contradictory, these associations are explored, but their direction is not hypothesized.

METHOD

Participants

We examined our research questions using data from the Harlem Longitudinal Development Study (25). This study's sample is representative of African Americans and Puerto Ricans who in 1990 attended schools serving East Harlem, NYC. Participants were 815 young adults who completed the fifth wave (T5) questionnaire between 2007 and 2010. The one pregnant participant was excluded. Of the 815 participants, 52% (n = 424) were African American and 48% (n = 391) were Puerto Rican. Forty percent (n = 324) were male. The T5 mean age was 32.6 years (SD = 1.5). The New York University School of Medicine's Institutional Review Board approved the study. A Certificate of Confidentiality was obtained from the National Institutes of Health. We obtained informed consent from all of the participants.

Measures

All variables were measured at T5. BMI, the dependent variable, was calculated using each participant's self reported height and weight from the formula $\mathrm{BMI}=\frac{weight(lb)\times 703}{height^2(inches)}$. The index of obesity was set at 1 when BMI≥30 and 0 otherwise (26). $height^2$ (*inches*) The independent variables are listed in Table 1. Ninety-nine percent of the participants provided complete data on each of the 13 variables in the study. We used the Full Information Maximum Likelihood method to deal with the small amount of missing data (32).

RESULTS

The results of the *t*-tests and χ^2 tests indicated that the obese group differed from the non-obese group on all of the factors ($p<.05$) except for anxiety ($p>.05$) and alcohol use ($p>.05$). The participants in the obese group had shorter sleep durations ($\chi^2=10.22^{**}$), less physical activity ($t=-3.74^{***}$), unhealthier diets ($t=-2.38^{*}$), more depressive mood ($t=2.23^{*}$), less satisfaction with their lives ($t=-3.34^{***}$), less self control ($t=-2.49^{*}$), and less frequent

marijuana use (t=−2.44*) than those who were not obese. The only significant differences between African Americans and Puerto Ricans were on the healthy diet, life satisfaction, and alcohol measures. African Americans had healthier diets (t=2.6, p<.01), reported less satisfaction with their lives (t=−3.1, p<.01), and used more alcohol (t=2.2, p<.05).

Table 2 presents the results of the bivariate logistic regression analysis, controlling for gender and ethnicity, comparing the obese and non-obese participants. Individuals with short sleep duration were more likely to be obese (AOR=1.70, p<.01). More physical activity (AOR=0.82, p<.001), eating healthier food (AOR=0.96, p<.01), less depressive mood (AOR=1.05, p<.05), more self control (AOR=0.93, p<.05), greater life satisfaction (AOR=0.97, p<.001), and more frequent marijuana use (AOR=0.89, p<.05) were associated with a lower likelihood of obesity. With two exceptions, the findings of the multivariate logistic regression analysis, controlling also for the other variables in the same domain, were similar to the results of the controlled bivariate logistic regression analysis.

DISCUSSION

The variables most significantly associated with obesity were short sleep duration, physical activity, and life satisfaction. Previous research has also found that short sleep duration is associated with obesity (4). Short sleep duration may alter thermoregulatory functions, leading to reduced energy expenditure (33). African Americans, in particular, report shorter sleep duration compared to Whites (34).

The obese participants engaged in less physical activity and had more unhealthy diets compared to the non-obese. These findings are consistent with those of several investigators (6, 35, 36). However, while an unhealthy diet had a controlled bivariate association with greater obesity, it lost significance when other physical factors were controlled. As noted by Madan et al. (35), successfully managing obesity may require physical activity.

Contrary to the results of other investigators (11,23), our findings showed that depressive mood was not related to obesity after controlling for the other personal factors, and anxiety was not related to obesity with or without these controls. This inconsistency may be due to ethnic differences between the samples (11, 23).

More life satisfaction was related to a decreased likelihood of obesity. This is consistent with findings that obese women are less likely to be satisfied with their partner relationships than non-obese women (16). Our findings extend this literature by identifying these associations in understudied groups while controlling for other personal predictors.

Other studies have found positive (20, 37) and negative (17) associations between alcohol use and obesity. Our finding of no association is partially consistent with Dallongeville's report (18) of no association between alcohol intake and BMI in men, and an inverse correlation of alcohol consumption with BMI in women.

Although marijuana use stimulates appetite in clinical samples, usage was negatively associated with obesity, without and with alcohol use controlled. Warren et al.'s (24) results were comparable; the brain may not differentiate between food and marijuana in the activation of the dopamine reward system. From a clinical perspective, developing other reward mechanisms (i.e., physical activity) is important. The relationship between marijuana and obesity could be reciprocal. Obese persons may be less social and consequently less exposed to substance-using peers (24). Thus, greater BMI might predict less drug use.

Limitations

This study has some limitations. First is the use of self-reports for measurements of sleep duration, physical activity, diet, substance use, height, and weight. Second, our substance use measure was somewhat limited. Longitudinal studies with controls for earlier obesity and confounding variables are needed to overcome this cross-sectional study's limits.

CONCLUSION

Despite these limitations, this study has several strengths. First, our findings are based on an understudied population (African American and Puerto Rican adults). Second, we examine the association of multiple physical factors (i.e., short sleep duration, physical activity, healthy diet), personal characteristics (i.e., depressive mood, anxiety, self control, life satisfaction), and substance use (i.e., alcohol and marijuana use) as they relate to obesity. From a clinical perspective, obesity prevention and treatment programs should focus on increasing sleep and physical activity while improving life satisfaction.

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References

1. World Health Organization, Media Centre. Obesity and overweight. Fact sheet N°311. Mar. 2011 Available at: www.who.int/mediacentre/factsheets/fs311/en/
2. Kushner RF, Choi SW. Prevalence of unhealthy lifestyle patterns among overweight and obese adults. Obesity. 2010; 18:1160–1167. [PubMed: 19875995]
3. Le Strat Y, Le Foll B. Obesity and cannabis use: results from 2 representative national surveys. Am J Epidemiol. 2011; 174:929–933. [PubMed: 21868374]
4. Patel SR, Malhotra A, White DP, Gottlieb DJ, Hu FB. Association between reduced sleep and weight gain in women. Am J Epidemiol. 2006; 164:947–954. [PubMed: 16914506]
5. Hairston KG, Bryer-Ash M, Norris JM, Haffner S, Bowden DW, Wagenknecht LE. Sleep duration and five-year abdominal fat accumulation in a minority cohort: the IRAS family study. Sleep. 2010; 33:289–295. [PubMed: 20337186]
6. National Conference of State Legislatures. Nutrition, physical activity, & obesity overview. 2006. Available at: www.ncsl.org/default.aspx?tabid=14338
7. Swinburn BA, Caterson I, Seidell JC, James WPT. Diet, nutrition and the prevention of excess weight gain and obesity. Public Health Nutr. 2004; 7:123–146. [PubMed: 14972057]
8. Bray GA, Popkin BM. Dietary fat intake does affect obesity! Am J Clin Nutr. 1998; 68:1157–1173. [PubMed: 9846842]
9. Heitmann BL, Lissner L, Sorensen TI, Bengtsson C. Dietary fat intake and weight gain in women genetically predisposed for obesity. J Clin Nutr. 1995; 61:1213–1217.
10. Pan A, Sun Q, Czernichow S, et al. Bidirectional association between depression and obesity in middle-aged and older women. Int J Obes. 2012; 36:595–602.
11. Zhao G, Ford ES, Dhingra S, et al. Depression and anxiety among US adults: association with body mass index. Int J Obes. 2009; 33:257–266.
12. Pesa JA, Syre TR, Jones E. Psychosocial differences associated with body weight among female adolescents: the importance of body image. J Adolesc Health. 2000; 26:330–337. [PubMed: 10775825]
13. Daniels J. Weight and weight concerns: are they associated with reported depressive symptoms in adolescents? J Pediatr Health Care. 2005; 19:33–41. [PubMed: 15662360]
14. Stutzer, A. Limited self-control, obesity and the loss of happiness. (Discussion Paper Series, IZA DP No. 2925). Bonn, Germany: Institute for the Study of Labor; 2007.

15. Lachman ME. Perceived control over aging-related declines adaptive beliefs and behaviors. Curr Dir Psychol Sci. 2006; 15:282–286.
16. Strine TW, Chapman DP, Balluz LS, Moriarty DG, Mokdad AH. The associations between life satisfaction and health-related quality of life, chronic illness, and health behaviors among U.S. community-dwelling adults. J Community Health. 2008; 33:40–50. [PubMed: 18080207]
17. Wang L, Lee IM, Manson JE, Buring JE, Sesso HD. Alcohol consumption, weight gain, and risk of becoming overweight in middle-aged and older women. Arch Intern Med. 2010; 170:453–461. [PubMed: 20212182]
18. Dallongeville J, Marecaux N, Ducimetiere P, et al. Influence of alcohol consumption and various beverages on waist girth and waist-to-hip ration in a sample of French men and women. Int J Obes Relat Metab Disord. 1998; 22:1179–1183.
19. Breslow RA, Smothers BA. Drinking patterns and body mass index in never smokers: National Health Interview Survey, 1997–2001. Am J Epidemiol. 2005; 161:368–376. [PubMed: 15692081]
20. Tolstrup JS, Heitmann BL, Tjonneland AM, Overvad OK, Sorensen TIA, Gronbaek MN. The relation between drinking pattern and body mass index and waist and hip circumference. Int J Obes. 2005; 29:490–497.
21. Agyemang C, Kunst A, Bhopal R, et al. Dutch versus English advantage in the epidemic of central and generalized obesity is not shared by ethnic minority groups: comparative secondary analysis of cross-sectional data. Int J Obes Relat Metab Disord. 2011; 35:1334–1346.
22. Fox KR, Hillsdon M. Physical activity and obesity. Obes Rev. 2007; 8:115–121. [PubMed: 17316313]
23. Gaysina D, Hotopf M, Richards M, Colman I, Kuh D, Hardy R. Symptoms of depression and anxiety, and change in body mass index from adolescence to adulthood: results from a British birth cohort. Psychol Med. 2011; 41:175–184. [PubMed: 20236569]
24. Warren M, Frost-Pineda K, Gold M. Body mass index and marijuana use. J Addict Dis. 2005; 24:95–100. [PubMed: 16186086]
25. Brook JS, Saar NS, Zhang C, Brook DW. Psychosocial antecedents and adverse health consequences related to substance use. Am J Public Health. 2009; 99:563–568. [PubMed: 18633083]
26. Brook, A. The Golden Gate diet: lose weight and maintain your health. Midsummer Press; 2005. p. 47-49.
27. Gangwisch JE, Heymsfield SB, Boden-Albala B, et al. Short sleep duration as a risk factor for hypertension: analyses of the first National Health and Nutrition Examination Survey. Hypertension. 2006; 47:833–839. [PubMed: 16585410]
28. Bachman, JG.; Johnston, LD.; O'Malley, PM. Monitoring the future 2002. Ann Arbor: Institute for Social Research; 2005. Form 40, Part I
29. Derogatis, LR. Symptom checklist 90-R administration, scoring procedures manual. 3. Minneapolis: National Computer Systems; 1994.
30. Pearlin LI, Schooler C. The structure of coping. J Health Soc Behav. 1978; 19:2–21. [PubMed: 649936]
31. Gerstorf, D.; Ram, N.; Fauth, E.; Schupp, J.; Wagner, GG. 2009 Between-person disparities in the progression of late-life well-being. In: Antonucci, TC.; Jackson, JS., editors. Annual Review of Gerontology & Geriatrics. Vol. 29. New York, NY: Springer; 2011. p. 205-232.Life course perspectives on late-life health inequalities
32. Myrtveit I, Stensrud E, Olsson UH. Analyzing data sets with missing data: an empirical evaluation of imputation methods and likelihood-based methods. IEEE transactions on software engineering. 2001; 27:999–1013.
33. Spiegel K, Tasali E, Penev P, Cauter EV. Brief communication: sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite. Ann Intern Med. 2004; 141:846–850. [PubMed: 15583226]
34. Hale L, Do DP. Racial differences in self-reports of sleep duration in a population- based study. Sleep. 2007; 30:1096–1103. [PubMed: 17910381]

35. Madan A, Archambeau OG, Milsom VA, et al. More than black and white: differences in predictors of obesity among Native Hawaiian/Pacific Islanders and European Americans. Obesity. 2012; 20:1325–1328. [PubMed: 22286530]

36. Hardman, AE.; Stensel, DJ. Physical activity and health: the evidence explained. 2. London: Routledge Taylor & Francis; 2009. p. 119-147.

37. Kleiner KD, Gold MS, Frost-Pineda K, Lenz-Brunsman B, Perri MG, Jacobs WS. Body mass index and alcohol use. J Addict Dis. 2004; 23:105–118. [PubMed: 15256347]

Table 1

Measures for the independent variables at T5

	T5	Alphas (no. of items)	Sample question	Answer options
Demographics	Gender	NA	Are you female or male?	1=female, 2=male
	Ethnicity	NA	Are you Hispanic?	1=African American, 2=Puerto Rican
Physical factors	Short sleep duration [27]	NA	On average, how many hours of sleep do you get per night?	1=5 hours or less, 0=otherwise
	Physical activity [28]	NA	How often do you engage in moderate physical activity (i.e. using a vacuum, bowling, washing your car, walking your dog)?	0= never, 1=seldom, 2=sometimes, 3=most days, 4=nearly every day, 5= every day
	Healthy diet [28]	.74 (4)	How often do you avoid high-fat foods (e.g., fried foods)?	Same as for physical activity
Personal factors	Depressive mood [29]	.76 (6)	You sometimes feel hopeless about the future.	1=completely false, 2=mostly false, 3= mostly true, and 4=completely true
	Anxiety [29]	.77 (3)	Over the last few years, how much were you bothered by feeling fearful?	0=not at all, 1= a little, 2= somewhat, 3=quite a bit, and 4= extremely
	Self control [30]	.65 (4)	You feel like losing your temper at people.	Same as for depressive mood
	Life satisfaction [31]	.82 (13)	During the past few years how satisfied have you been with your work?	1= completely dissatisfied, 2= somewhat dissatisfied, 3= neither satisfied nor dissatisfied, 4=somewhat satisfied, and 5=completely satisfied
Substance use	Alcohol	NA	On average, how many drinks (beer, wine, or hard liquor) did you have in the past 5 years?	0 = none, 1 = less than once a week, 2 = once a week to several times a week, 3 = 1 or 2 drinks a day, 4 = 3 or 4 drinks a day, and 5 = 5 or more drinks every day
	Marijuana	NA	On average in the past 5 years, how often have you used marijuana?	0 = never, 1 = a few times a year or less, 2 = about once a month, 3 = several times a month, and 4 = once a week or more

Table 2

Comparisons between Obese and Non-Obese Participants Associated with Physical, Personal, and Substance Use Factors at the Mean Age of 32 (T5).

		Obesity vs. Non-obesity	
		AOR (95% CI) Controlled bivariate	**AOR (95% CI) Multivariate**
Physical factors	Short sleep duration	1.70 ** (1.24, 2.33)	1.67 ** (1.21, 2.30)
	Physical activity	0.82 *** (0.74, 0.91)	0.83 *** (0.75, 0.93)
	Healthy diet	0.96 * (0.93, 0.99)	0.98 (0.95, 1.02)
Personal factors	Depressive mood	1.05 * (1.01, 1.09)	1.00 (0.93, 1.08)
	Anxiety	1.02 (0.96, 1.08)	0.95 (0.87, 1.05)
	Self control	0.93 * (0.87, 0.98)	0.96 (0.88, 1.06)
	Life satisfaction	0.97 *** (0.95, 0.99)	0.97 ** (0.95, 0.99)
Substance use	Alcohol	1.03 (0.88, 1.20)	1.08 (0.92, 1.27)
	Marijuana	0.89 * (0.80, 0.99)	0.88 * (0.79, 0.98)

* $p<.05$,

** $p<.01$,

*** $p<.001$

Gender and ethnicity were statistically controlled in the controlled bivariate analyses.

The variables in the same domain as well as gender and ethnicity were statistically controlled in the multivariate analyses.

AOR= Adjusted Odds Ratio, CI=Confidence Interval