HHS Public Access

Author manuscript

Obesity (Silver Spring). Author manuscript; available in PMC 2012 December 01.

Published in final edited form as:

Obesity (Silver Spring). 2012 June ; 20(6): 1325–1328. doi:10.1038/oby.2012.15.

More than Black and White: Differences in Predictors of Obesity among Native Hawaiian/Pacific Islanders and European Americans

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Abstract

Although Native Hawaiians and Pacific Islanders exhibit the highest rates of obesity and associated chronic diseases of any racial/ethnic group, they remain vastly underrepresented in health research. In a cross-sectional survey of college students (N = 402) we examined body mass index (BMI) and health outcomes in an ethnoracially diverse rural sample of Native Hawaiian/ Pacific Islanders (25.1%), Asian-Americans (39.8%) and European Americans (35.1%). Measures assessed BMI, health status, health behaviors, frequency of exercise, and symptoms of psychiatric disorders (i.e., depression, anxiety, posttraumatic stress, and substance abuse and dependence). Regression analyses revealed that an overall model of five predictors (gender, race, regular exercise, difficulty sleeping, and anxiety) was significantly associated with obesity ($p<0.001$) and correctly classified 84.2% of cases. 30.7% of Native Hawaiians/Pacific Islanders were obese as compared to 9.2% of European Americans and 10.6% of Asian Americans. These findings suggest that Native Hawaiian/ Pacific Islanders are at high risk for obesity and associated medical comorbidities, but that regular physical activity may ameliorate this risk. Further, these results support the consideration of Native Hawaiians/Pacific Islanders as a distinct racial/ethnic subgroup separate from other Asian populations.

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Conflict of Interest

The authors have no conflicts of interest to declare.

Keywords

Obesity; Ethnic Differences; Exercise; Cultural Issues; Psychosocial Variables

Introduction

Significant research has examined obesity and its correlates among European-Americans and African-Americans. Few investigations have studied obesity among other racial/ethnic groups, especially Native Hawaiian/Other Pacific Islander (NHOPIs) and Asians. Though NHOPIs represent less than 1% of the US population (1), they exhibit the highest prevalence rates of obesity of any racial/ethnic group. Nationwide 2009 Behavior Risk Factor Surveillance Survey (BRFSS) estimates suggest that 26.1% of European Americans, 38.7% of African-Americans, and 29.2% of Hispanics are obese (2). In contrast, State of Hawaii BRFSS data from 2009 indicate that 49.3% of Native Hawaiians are obese, as compared to 21.4% of European Americans, 18.5% of Filipinos, and 12.8% of Japanese (3). Additionally, NHOPIs exhibit higher rates of chronic diseases associated with obesity compared to European-Americans (4).

Young adults represent another high-risk subgroup that has traditionally been ignored in obesity research. Many young adults are focused on work or schooling and at higher risk for sedentary behavior. Adults between the ages of 18 and 25 gain 1-2 pounds annually and being overweight/obese during this time is associated with the development of later health problems (5). Among adults between the ages of 18 and 24 residing in Hawaii, 45.7% are classified as either overweight or obese (3). However, young adults are rarely targeted in obesity research and have proven difficult to engage in traditional weight loss programs (6).

Although they exhibit the highest prevalence rates of obesity of any racial/ethnic group, to date little research attention has been paid to young adults of NHOPI descent. One limitation to this area of research is that NHOPIs are typically included as part of Asian-American racial/ethnic groups. Further, to our knowledge no studies have examined the correlates of obesity in this population, including the potential impact of psychiatric symptoms (e.g., depression, anxiety). Therefore, the aims of the current study were 1) to describe the prevalence of obesity among NHOPIs separate from Asian-Americans and European-Americans, and 2) to examine the association of health status, health behaviors, psychiatric symptoms, as well as substance misuse and obesity among an ethno-racially diverse, rural population of young adults in Hawaii.

Method

Participants

Participants were 614 undergraduate students enrolled in introductory psychology classes. For a detailed description of the total sample, see Archambeau et al. (7). For the purpose of this study, only participants in the “obese” and “normal” body mass index (BMI) categories were included. Participants who were underweight (6.0%) or overweight (19.5%) were excluded. Due to the small number of participants who endorsed the racial/ethnic categories

of African American (2%), American Indian (0.2%), Hispanic (2.6%), and "Other" (2%), these individuals were excluded. The final sample consisted of 402 participants. The majority were freshmen (64.5%). With respect to racial/ethnic identity, 35.1% of participants endorsed their primary racial identity as European American, 39.8% as Asian American, and 25% as NHOPI. Participants' age ranged from 18 to 53 years (M=19.7; SD=4.1); however, 95.5% of the sample was between 18-24 years old, consistent with World Health Organization's (WHO) definition of "young people" (8) The majority of participants were single (89.7%), and there was a wide range of socioeconomic status, with 26.4%, 39.2%, and 22.1% of individuals reporting household incomes of $20,000-39,000, $40,000-74,999, and >$75,000, respectively. A large proportion of participants (43%) reported having lived on the Big Island of Hawaii most or all of their lives.

Procedure

Participants were recruited through the human subjects' pool in the Psychology Department of the University of Hawaii at Hilo for course credit and asked to fill out a questionnaire packet that took approximately 15-30 minutes to complete. The University of Hawaii Institutional Review Board approved all study procedures.

Measures

Obesity—Based on self-reported weight and height, BMI (pounds/height in inches^2 X 703) was calculated for each participant. Obesity (yes = 1, no = 0) was defined as BMI ≥ 30.

Health status questions—Participants were asked about their medical history and presence of chronic health conditions. Dichotomous responses (yes or no) were asked of participants regarding if they 1) exercised on a regular basis, 2) frequently had difficulty sleeping at night, 3) used any tobacco product on a regular basis, 4) visited a doctor in the past 12 months.

Posttraumatic stress disorder (PTSD)—PTSD was assessed by a the 10-item Trauma Screening Questionnaire (TSQ), a screening instrument with a yes/no response format based on DSM-IV diagnostic criteria of PTSD symptoms experienced at least twice in the past week (9). The presence of PTSD was defined as an affirmative answer to any 6 of 10 questions. Cronbach's alpha for this sample was 0.85.

Anxiety—Anxiety symptoms were assessed using three stem questions from the MINI International Neuropsychiatric Interview (10) corresponding to generalized anxiety disorder (GAD), panic or social anxiety, respectively. Participants who endorsed symptoms consistent with any of the three anxiety disorders were classified as having a probable anxiety disorder.

Depression—Depression was assessed by the Center of Epidemiological Studies Depression Scale (11). Participants with a score 16 or higher were classified as having probable depression. Cronbach's alpha for this sample was 0.88.

Substance abuse and dependence (SA/D)—Substance abuse was assessed using five questions based on the DSM-IV-TR criteria for alcohol/substance abuse. Probable alcohol/substance abuse was defined as an affirmative response to any one of the five questions (12).

Data Analysis

Summary statistics were calculated in terms of means and standard deviations for continuous variables and in terms of frequencies and proportions for categorical variables. Summary statistics were presented to describe the study sample's weight/BMI/obesity status, health status, and psychiatric status. Stepwise logistic regression was performed to determine which variables were significantly associated with obesity and to determine odds ratios. Potential predictors included demographics (age, gender, race/ethnicity, family income), health status, and probable mental health diagnoses (depression, PTSD, anxiety, and substance abuse). To control for the potential confounding influence of having lived in a rural area, whether or not participants had lived on the Big Island of Hawaii for most of their lives (0=no, 1=yes) was included as a covariate in the full model, Because of the known independent associations between race/ethnicity as well as psychiatric comorbidity and obesity, interactions between race/ethnicity and psychiatric comorbidity were also examined. Statistical significance was set at $p = .05$.

Results

Overall, 30.7% of NHOPIs were obese as compared to 10.6% of Asian-Americans and 9.2% of European Americans; see Table 1 for details. Forward logistic regression results indicate the overall model of five predictors (gender, race/ethnicity, regular exercise, difficulty sleeping, and anxiety) was significantly associated with obesity (-2 Log Likelihood=246.159 χ^2 (6)=90.91, p<0.001). Having lived on the Big Island of Hawaii for most of one's life was not a significant covariate; none of the race/ethnicity and psychiatric comorbidity interaction terms was significant (p>0.05). An examination of the covariance structure of all predictors in the final model revealed acceptable levels of correlation (-0.13 < r < 0.22). Additionally, there were no violations of multicollinearity diagnostic statistics: all had tolerances greater than 0.40 (0.81-1.0) and variance inflation factors below 2.5 (1.0-1.1). Consequently, shared variance among predictors was unlikely to have artificially biased subsequent model findings.

The model correctly classified 84.2% of cases. Male gender (OR=2.7 vs. female) and NHOPI (OR=5.88 vs. European American) was associated with higher likelihood of being obese. Anxiety (OR=2.03 vs. none, p=0.052) was marginally associated with being obese. Participants who reported having difficulty sleeping at night were more likely to be obese (OR=3.52 vs. no sleep problems) while those who reported exercising on a regular basis were significantly less likely to be obese (OR=0.34 vs. no exercise).

Discussion

To our knowledge, this study is among the first to investigate the prevalence and correlates of obesity among an ethno-racially diverse sample of young adults in rural Hawaii, who represent a medically underserved and understudied group. Overall, 30.7% of NHOPIs were

obese as compared to 10.6% of Asian-Americans and 9.2% of European Americans. Results revealed that males, individuals of NHOPI descent, and sleep difficulties were associated with increased risk of obesity. However, exercise emerged as a protective factor: participants who reported engaging in regular exercise were at decreased risk.

One of this study's most significant findings is that although NHOPIs exhibited higher rates of obesity compared to European Americans, obesity was not associated with psychiatric comorbidity (i.e., depression, anxiety, PTSD, and substance use/dependence) either independently for the sample as a whole or uniquely by race/ethnicity. In contrast, research using predominantly European American samples has demonstrated a link between depressive symptoms and being overweight/obese (13). Cultural influences may help to explain this apparent disparity. Pacific Islanders report greater acceptance and idealization of larger body types (which are associated with strength, attractiveness, and fitness) and lower levels of body image dissatisfaction (14,15). For example, among obese Samoan men, a significant number actually report wanting to be *larger* (14). Research also suggests that the strong cultural emphasis on food and social relationships in NHOPI communities may prevail over weight concerns (14).

Although a multitude of factors likely contribute to the higher rates of obesity observed among NHOPIs, it is important to consider the Hawaiian culture and environment. The traditional Hawaiian diet is calorically dense, placing high emphasis on starchy vegetables (e.g., yam, taro, banana), and many NHOPIs have embraced the American mainland diet of processed foods and meals high in refined grains. NHOPIs residing in rural areas also face unique challenges. Rural communities have fewer economic resources and may lack access to preventive health care programs and safe spaces for recreation and physical activity. Genetic predisposition may place NHOPIs at further increased risk for obesity and central adiposity (16).

The observed relationship between sleep and obesity in this ethno-racially diverse, young adult sample is consistent with longitudinal, epidemiologic studies of the general population that have found sleep duration of less than 7 hours to be associated with obesity (17). Additionally, results from State of Hawaii BRFSS data (18) are also consistent with the general US population in noting that poor sleep increases the odds of experiencing myriad chronic medical conditions and poor health behaviors (e.g.heart attack, stroke, asthma, arthritis, cancer, hypertension, high cholesterol, and smoking. Though causality cannot be determined, future efforts directed at identifying and treating sleep disturbance may help to reduce the risk of obesity and other chronic medical conditions.

The current study's major limitation is its cross-sectional design, which does not allow for examination of causal relationships. A second limitation is the self-report nature of the questionnaires and consequent susceptibility to recall bias. Additionally, the predominantly female, relatively young, college-enrolled study sample may not generalize to the larger Hawaiian population as a whole. However, identifying the characteristics of this unique subsample of an at-risk population could inform primary and secondary prevention efforts, e.g., college-based weight management resources, health screening fairs, and culturally-informed/gender-specific interventions. The study's considerable strengths include use of a

large sample and examination of NHOPIs as a unique subgroup within an ethno-racially diverse sample.

Reducing health disparities among racial/ethnic minority populations remains an important treatment priority. To this end, future studies might investigate the impact of acculturation on dietary and physical activity patterns among young adults of NHOPI descent.

Acknowledgements

This work was partially supported by grant MH074468 from the National Institute of Mental Health (NIMH), and from the McNair Foundation. Elements of the current work were included in Ms. Archambeau's master's thesis.

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Table 1

Descriptive findings by Race/Ethnicity (M±SD)

	Asian American (n=160)			European American (n=141)			Native Hawaiian/Pacific Islander (n=101)		
	Men	**Women**	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**
Weight (kg)	69.34(12.09)	56.19(11.00)	60.88(13.00)	76.50 (12.73)	61.33 (10.41)	66.81 (13.43)	80.68 (19.16)	68.30 (21.28)	71.39 (21.36)
BMI	23.45(3.94)	22.65(3.85)	22.94 (3.89)	23.64 (3.78)	22.38 (3.63)	22.84 (3.72)	26.94 (5.51)	26.15 (7.79)	26.31 (7.24)
Obese (%)	10.5	10.7	10.6	13.7	6.7	9.2	44.0	26.7	30.7
Exercising Regularly (%)	70.2	44.7	53.8	51.0	70.0	63.1	60.0	44.0	48.0
Difficulty Sleeping (%)	21.1	34.3	29.6	27.5	42.2	36.9	36.0	44.0	42.0
Anxiety Concerns (%)	48.2	58.0	54.5	57.1	66.7	63.3	56.5	62.2	60.8