

Psychosocial Correlates of Body Mass Index in the United States: Intersection of Race, Gender and Age

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Received 2015 January 13; Revised 2015 April 11; Accepted 2016 April 28.

Abstract

Background: Studies on the association between psychosocial factors and obesity have provided mixed findings.

Objectives: Current study used a nationally representative sample of U.S. adults to investigate how intersection of race, gender and age alters the psychosocial correlates of body mass index (BMI).

Materials and Methods: Data came from the national health measurement study (NHMS), a cross-sectional study with nationally representative sample of Black and White (n = 3,648) adults ages 35 - 89. We tested bivariate correlations between BMI and physical and mental quality of life, purpose in life, number of chronic medical conditions, and discrimination across race × gender × age groups.

Results: Higher purpose in life was associated with lower BMI among middle aged and older White women, middle aged Black men, middle aged Black women, and older Black women but not middle aged or older White men and older Black men. There was a positive association between multi-morbidity and BMI in all groups other than older White men. High BMI was associated with poor mental quality of life among older White women, older Black men and women, but not any of middle aged groups, and older White men. High BMI was associated with poor physical quality of life among all groups. Everyday discrimination was positively associated with BMI among older White women but not any other group. Lifetime discrimination was not associated with BMI among any of the groups.

Conclusions: Race, gender, and age shape psychosocial and health related correlates of BMI. There is a need for further research on group differences in psychosocial correlates of obesity.

Keywords: Age, Body Mass Index, Gender, Race

1. Background

Studies on the association between psychosocial factors and obesity have provided mixed findings (1). As a result, there has been an increasing interest in understanding factors that may moderate the above link. For instance, the link between mental health and obesity may vary across populations (2). Some of the inconsistent findings of this literature may be due to race (3), ethnicity (3, 4), and gender (3, 5) that modify factors that are associated with obesity.

There is not enough knowledge on race, ethnic and gender differences in psychological factors that predict obesity (3, 6). Gavin et al. analyzed the Comprehensive psychiatric epidemiology surveys (CPES) data, and showed that Blacks and Whites may differ in the association between 12-month major depressive disorder (MDD) and obesity (3). Using the national survey of American life, Assari showed that magnitude and direction of the associations

between MDD and body mass index among Blacks varies based on gender and ethnicity (6).

2. Objectives

In line with the empirical evidence and theories suggesting race, ethnicity, gender, and place may have contextual effects on shaping causes and consequences of health and well-being (6-31), current study was conducted to investigate if groups based on the intersection of race, gender, and age differ in the association between purpose in life, physical and mental health, multi-morbidity, and discrimination with BMI. In this study we compared six race × gender × age groups; middle age (age between 35 and 65 years) and older (age between 66 and 89 years) Black and White men and women. As the sample was representative of the US, our results are believed to be generalizable to US adults.

3. Materials and Methods

3.1. Design and Setting

With a cross-sectional design, we used data of the national health measurement study (NHMS), 2005 - 2006. The NHMS enrolled a nationally representative sample of adults who aged between 35 and 89 years. The study sample is believed to represent the older half of the U.S. population in 2005 - 06.

3.2. Participants and Sampling

The study used a random digit dialed (RDD) surveys use random telephone numbers from non-cellular exchanges to sample households. The study over-sampled Black Americans and persons aged 65 to 89, using standard survey sampling methods. Over sampling of Blacks was done by using a factor of 2 for probability of calling in geographically scattered phone exchanges in areas with high proportions of Black population. Older individuals were also over-sampled, by a factor of 3 in sampling. Based on the above proportions, and using above described pre-determined probabilities, sampling weights were calculated for each respondent. This weight was then used to estimate results representative of the U.S. population aged 35 - 89, using standard survey methods.

3.3. Ethics

For about 40% of households, street addresses were available from reverse directories. For these households, advance letters with a full explanation of the study purpose were sent. Respondent were contacted via telephone and asked to participate in the survey. At the first step, all respondents were provided full explanations about the purpose of the study. Then participants also provided informed consent. All respondents were offered financial incentive for completion of the survey. All data was collected anonymously. Consent form was mailed as data was collected via telephone interview. The study protocol was approved by the institute review board of the University of Wisconsin.

3.4. Process and Interviews

All data was collected through computer assisted telephone interview (CATI) conducted by trained interviewers at the University of Wisconsin Survey Center. Data collection started June 2005 and lasted up to August 2006.

At the beginning of the telephone interviews, the interviewer determined the number of adults in the householder with age 35 to 89. CATI software assigned persons to three age ranges, 35 - 44, 45 - 64, and 65 - 89, and sampled among the age groups using pre-determined probabilities

favoring the oldest age group. Troldahl-Carter-Bryant technique was used to select eligible respondents if more than one adult were living in the householder in the selected age group (32).

3.5. Measures

Outcome: BMI was calculated based on self-reported data on height and weight. Based on this information, BMI was classified as underweight (BMI < 18.5), normal weight (18.5 - 24.9 kg/m²), overweight (25 - 29.9 kg/m²), obese (30 - 50 kg/m²), and server obese (BMI > 50.0) (33).

A 15-item version of Ryff's Psychological Well-being scale was used. The scale had the following seven items on purpose of life: 1) living one day at a time, 2) sense of direction, 3) no sense of what trying to accomplish, 4) activities seem trivial and unimportant, 5) enjoy making future plans, 6) active in carrying out plans, 7) do not wander aimlessly through life, and 7) done all there is to do in life. Five item scale likert was used for response options, ranging from 'strongly disagree' to 'strongly agree'. As our scale comprised both positive and negative item content. Prior to analysis, items with negative content were reverse coded. We computed a score in which higher score reflected higher purpose in life (34-43) ($\alpha = 0.89$).

Questionnaires were administered in an order randomized across respondents by the CATI software. Later sections of the interview elicited a wide range of other information including socio-economic characteristics. For 734 individuals, interview could not be completed for collection of all data. In all these cases, a call-back was arranged for completion of data collection. In most cases, call-backs were within a few days after first call.

3.6. Statistical Analysis

We used Stata 13.0 for data analysis to account for the complex sampling design of the study. Taylor series approximation technique was used for calculating the standard errors. We recalculated standard errors based on the study's complex design. P less than 0.05 were considered statistically significant. Adjusted odds ratio (OR) and a 95% confidence interval (CI) were reported. Pearson test was used to calculate correlations

4. Results

4.1. Middle Aged or Older White Men

Among middle aged and older aged White men, purpose in life was not associated with BMI. Among both groups, BMI was associated with physical but not mental quality of life. Among middle aged White men, BMI was also associated with comorbidities. BMI was not associated with discrimination in neither of groups (Table 1).

Table 1. Correlation Matrix Among Middle Age (Age Between 35 and 65 Years) and Older (Age Between 66 and 89 Years) White Men^a

		1	2	3	4	5	6	7
1	Body mass index	1	-0.067	0.023	0.022	-0.282 ^b	0.055	0.203 ^b
2	Purpose in life	-0.035	1	-0.197 ^b	-0.218 ^b	0.250 ^b	0.510 ^b	-0.216 ^b
3	Everyday discrimination	0.083	-0.079	1	0.380 ^b	-0.118 ^b	-0.281 ^b	0.063
4	Lifetime discrimination	0.058	0.009	0.180 ^b	1	-0.225 ^b	-0.291 ^b	0.176 ^b
5	Physical quality of life	-0.101 ^c	0.244 ^b	0.026	-0.028	1	0.141 ^b	-0.595 ^b
6	Mental quality of life	-0.032	0.335 ^b	-0.083	-0.043	0.104 ^c	1	-0.167 ^b
7	Comorbidity	0.052	-0.126 ^b	0.040	0.020	-0.506 ^b	-0.127 ^b	1

^aIndividuals younger than 65; up diagonal. Individuals older than 65 years; low diagonal.

^bCorrelation is significant at the 0.01 level (2-tailed).

^cCorrelation is significant at the 0.05 level (2-tailed).

4.2. Middle Aged or Older White Women

Among middle aged and older White women, higher purpose in life was associated with lower BMI. Among both groups, BMI was associated with physical quality of life, and comorbidities. BMI was not associated with lifetime discrimination in neither of groups. Among older White women, BMI was associated with mental quality of life and everyday discrimination (Table 2).

4.3. Middle Aged or Older Black Men

Among middle aged Black men, higher purpose in life was associated with lower BMI. Among older Black men, purpose in life was not associated with lower BMI. Among both groups, BMI was associated with physical quality of life, and comorbidities. BMI was not associated with discrimination in neither of groups (Table 3).

4.4. Middle Aged or Older Black Women

As Table 4 depicts, among both middle aged and older Black women, higher purpose in life was associated with lower BMI. Among both groups, BMI was associated with physical quality of life, and comorbidities. BMI was not associated with discrimination in neither of groups. Among older Black women, BMI was associated with mental quality of life.

5. Discussion

In the current study we aimed to explore how middle aged and older White and Black men and women are different in psychosocial correlates of BMI. Findings of our study suggest that groups based on race × gender × age are very different in how their BMI is linked to purpose in life, mental health, multi-morbidity, and discrimination. This finding is in line with the empirical evidence suggesting that

race, ethnicity, gender, and place shape causes and consequences of health and well-being including BMI (6-31).

Higher purpose in life was associated with lower BMI among middle aged and older White women, middle aged and older Black women, and middle aged Black men, but not middle aged or older White men and older Black men. Although the association between BMI and low physical quality of life was consistent among all groups, the association between BMI and mental quality of life was only present among older White women, older Black men, and older Black women, but not any of middle aged groups, and older White men. Association between multi-morbidity and BMI was consistent, with an exception of older White men. While lifetime discrimination was not associated with BMI among any of the groups, everyday discrimination was only positively associated with BMI among older White women.

Purpose in life has been defined as “having goals in life and a sense of directedness, a feeling that there is meaning to present and past life, harbouring a belief that gives life purpose, and having aims and objectives for living” (44). Purpose in life is being interchangeably used by the concept *meaning in life* defined as, “the cognizance of order, coherence, and purpose in one’s existence, the pursuit and attainment of worthwhile goals, and an accompanying sense of fulfilment” (44, 45). Based on a multidimensional model developed by Ryff in 1995, purpose in life is a major dimension of the psychological well-being of humans (42) and changes over aging (38, 46, 47). Purpose in life is a personal characteristic that varies among populations (38, 39). However, it is not known how purpose in life is linked to obesity.

Purpose in life may be one of many possible mechanisms by which quality of life (48, 49), hopelessness (50), depression and other mental health conditions (3) are linked to obesity. Although several review studies have con-

Table 2. Correlation Matrix Among Middle Age (Age Between 35 and 65 Years) and Older (Age Between 66 and 89 Years) White Women^a

		1	2	3	4	5	6	7
1	Body mass index	1	-0.21 ^b	0.056	0.058	-0.393 ^b	-0.041	0.286 ^b
2	Purpose in life	-0.178 ^b	1	-0.324 ^b	-0.177 ^b	0.333 ^b	0.565 ^b	-0.301 ^b
3	Everyday discrimination	0.100 ^c	-0.166 ^b	1	0.345 ^b	-0.170 ^b	-0.340 ^b	0.164 ^b
4	Lifetime discrimination	0.060	0.028	0.322 ^b	1	-0.190 ^b	-0.143 ^b	0.281 ^b
5	Physical quality of life	-0.307 ^b	0.359 ^b	-0.060	0.040	1	0.171 ^b	-0.599 ^b
6	Mental quality of life	-0.115 ^b	0.443 ^b	-0.164 ^b	-0.080 ^c	0.183 ^b	1	-0.302 ^b
7	Comorbidity	0.237 ^b	-0.213 ^b	0.055	0.049	-0.558 ^b	-0.200 ^b	1

^aIndividuals younger than 65; up diagonal. Individuals older than 65 years; low diagonal.

^bCorrelation is significant at the 0.01 level (2-tailed).

^cCorrelation is significant at the 0.05 level (2-tailed).

Table 3. Correlation Matrix Among Middle Age (Age Between 35 and 65 Years) and Older (Age Between 66 and 89 Years) Black Men^a

		1	2	3	4	5	6	7
1	Body mass index	1	-0.132 ^b	0.056	-0.002	-0.181 ^c	-0.029	0.286 ^c
2	Purpose in life	0.034	1	-0.226 ^c	-0.126	0.346 ^c	0.619 ^c	-0.293 ^c
3	Everyday discrimination	0.128	-0.081	1	0.436 ^c	-0.196 ^c	-0.346 ^c	0.174 ^c
4	Lifetime discrimination	0.064	0.063	0.416 ^c	1	-0.158 ^b	-0.241 ^c	0.143 ^b
5	Physical quality of life	-0.316 ^c	0.278 ^c	-0.105	-0.083	1	0.311 ^c	-0.664 ^c
6	Mental quality of life	-0.178 ^b	0.381 ^c	-0.183 ^b	-0.039	0.423 ^c	1	-0.321 ^c
7	Comorbidity	0.343 ^c	-0.089	0.288 ^c	0.223 ^c	-0.460 ^c	-0.322 ^c	1

^aIndividuals younger than 65; up diagonal. Individuals older than 65 years; low diagonal.

^bCorrelation is significant at the 0.05 level (2-tailed).

^cCorrelation is significant at the 0.01 level (2-tailed).

Table 4. Correlation Matrix Among Middle Age (Age Between 35 and 65 Years) and Older (Age Between 66 and 89 Years) Black Women^a

		1	2	3	4	5	6	7
1	Body mass index	1	-0.178 ^b	0.083	-0.084	-0.326 ^b	-0.084	0.308 ^b
2	Purpose in life	-0.119 ^c	1	-0.338 ^b	-0.039	0.375 ^b	0.536 ^b	-0.389 ^b
3	Everyday discrimination	0.035	-0.123 ^c	1	0.386 ^b	-0.118 ^c	-0.342 ^b	0.122 ^c
4	Lifetime discrimination	-0.034	-0.012	0.324 ^b	1	-0.017	-0.182 ^b	0.024
5	Physical quality of life	-0.217 ^b	0.191 ^b	-0.042	0.075	1	0.323 ^b	-0.650 ^b
6	Mental quality of life	-0.128 ^c	0.385 ^b	-0.328 ^b	-0.003	0.148 ^c	1	-0.334 ^b
7	Comorbidity	0.124 ^c	-0.202 ^b	0.085	0.033	-0.562 ^b	-0.296 ^b	1

^aIndividuals younger than 65; up diagonal. Individuals older than 65 years; low diagonal.

^bCorrelation is significant at the 0.01 level (2-tailed).

^cCorrelation is significant at the 0.05 level (2-tailed).

firmed the association between mental health and obesity (51, 52), the existing knowledge is very limited about group differences in role of purpose in life, physical and mental health, and discrimination on obesity.

The literature is limited about the moderating effect

of race/ethnicity on the link between psychological well-being and obesity (53). Bentley et al. used data of the national health measurement study (NHMS) to compare the link between various measures of quality of life and BMI levels. The study showed that quality of life decreases as

BMI increases, however, this may depend on domain of quality of life, gender, and race. The study suggested that mental health summary score of the SF36 may be an exception in direction of association with BMI. Obese individuals had lower score on physical quality of life than those with normal weight, however, for mental health summary score, scores were lower for obese than normal-weight only among women but not men. Overweight Blacks had better quality of life than Blacks in other BMI categories. The study suggested that in general, obesity and overweight are associated with lower quality of life than those with normal BMI, however, in both genders, the association may be driven primarily by physical health, although mental health seems to be an important factor only among women. Blacks may have best quality of life when overweight (33).

There are only very few available studies that have tested the effects of race, gender and age on mental health correlates of obesity. Gavin et al. suggested that among women with obesity, prevalence of 12-month MDD is considerably lower among Blacks than Whites. That said, the study showed a stronger association between obesity and MDD among Whites than Blacks (3). In 2013, Assari showed that direction of association between MDD and BMI among Blacks were reversed among men and women. Among Black men and women, there were positive and negative associations between BMI and MDD, respectively. The gradient effect of BMI on MDD was significant among African American men (6). Sachs-Ericsson et al. reported a larger influence of BMI on depressive symptoms among Blacks than Whites (52). Analysis of the national comorbidity survey replication (NCS-R) reported a stronger association between obesity and MDD for Whites than non-Whites (54). Garipey et al. showed that baseline obesity predicts subsequent major depression episode among men but not women (55).

Considerable gender differences have been also shown in the associations between anxiety, depression and obesity. Among men, BMI was linked to depression symptoms and negative affect, however, the difference among men was only between the underweight and normal weight groups. Depression and negative affect were higher among underweight men. Unexpectedly, obese and overweight men had less depressive symptoms and negative affect. Among women, BMI was associated with anxiety, depression and negative affect. Among women, those underweight had more depression and negative affect than those normal weight. Obese women, however, had better mental health, both for anxiety and negative affect. Among women, compared to those with normal weight, those who were overweight had lower anxiety, depression and negative affect (56).

Our findings may have implications for prevention of race, gender and age disparities in depression-related obesity in the U.S. Our finding about the pattern of the links between well-being, life purpose, and obesity is essential for explaining gender and racial differences in the link between depression and obesity. Results may also help with the design of interventions which address depression-related obesity in the community (3). Clinicians may benefit from considering differential role of purpose in life, physical and mental quality of life, and multi-morbidity on obesity across populations.

Current study had a few limitations. Although the association between BMI and psychological outcomes is not limited to linear associations (57, 58), current analysis is limited to modeling linear association between BMI and our factors. Compared to the simplistic linear (gradient) effects, threshold effects may better explain these complex links. Finally, BMI was calculated based on self-reported weight and height, which is prone to measurement error. In addition, psychiatric comorbidities were not included in the analysis.

5.1. Conclusions

Race, gender and age groups differ in the pattern of associations between purpose in life, mental quality of life, physical quality of life, multimorbidity, and BMI.

Acknowledgments

Shervin Assari is supported by the Heinz C. Prechter Bipolar Research Fund and the Richard Tam Foundation at the University of Michigan Comprehensive Depression Center.

Footnotes

Conflict of Interests Author declares that there is no any financial support or relationship that may pose conflict of interest.

Funding/Support The National Health Measurement Study (NHMS) was funded by National Institute on Aging (P01-AG020679; PI = Dennis Fryback). Public data were downloaded from the Interuniversity Consortium for Political and Social Research (ICPSR), University of Michigan (58).

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