ORIGINAL ARTICLES

Accuracy of weight status perception related to weight loss stage of change among medically underserved adults

Amir Alakaam[1], Davis Townsend[2], Jennifer Lemacks*[2]

[1]*Department of Nutrition and Dietetics, University of North Dakota, Grand Forks, North Dakota, USA*
[2]*Department of Nutrition and Food Systems, The University of Southern Mississippi, Hattiesburg, Mississippi, USA*

ABSTRACT

Objective: The aim of this study was to examine the relationship between the individuals' perception of their weight status and the stage of change they are currently in among an overweight and obese, medically underserved population in south Mississippi.

Methods: One hundred eighty-two adults were surveyed at healthcare facilities in south Mississippi using a tablet application. Inclusion criteria were: BMI of 25 or greater, over 21 years of age, and not pre or postpartum. About 62% (n = 114) met the inclusion criteria. Participants completed a survey pertaining to: weight perception, stage of change for weight loss, and other variables. Statistical analysis were used to analyze participant responses. Weight perception accuracy was determined by comparing participant responses about weight status to their BMI classification.

Results: Weight perception accuracy was a significant predictor of stage of change for weight loss, after controlling for confounding factors. A Lin's concordance correlation coefficient analysis revealed that participants do not portray themselves as their BMI classifies them (Pearson $p = .46$). Ordinal regression analysis displayed that those with a mismatched were likely to be at an advanced stage of change compared to those with matched weight perception accuracy and BMI.

Conclusions and implication: This study exemplifies that overweight and obese individuals who view themselves as overweight are more apt to be in active stage of change for weight loss. Weight management interventions should address weight perceptions in overweight and obese individuals who are at a lower stage of change for weight loss.

Key Words: Transtheoretical model, Weight management, Diet, Physical activity, Medically underserved, Mississippi

1. INTRODUCTION

More than two-thirds of U.S. adults were identified as overweight and obese in 2014. The Midwest and the South have the highest prevalence of obesity in the U.S. (30.7%, 30.6% respectively), with Arkansas, Mississippi, and West Virginia having the highest prevalence of obesity of about 35%. The greatest prevalence of obesity being in Mississippi (MS) in 2014 (35.5%).[1] As the prevalence of obesity grows so do the health care costs related to the growing prevalence of obesity-related comorbidities, especially type 2 diabetes and cardiovascular diseases.[1,2]

According to U.S. Department of Health and Human Services (2016), populations and areas that have few healthcare centers and primary care providers, and face economic and

*Correspondence: Jennifer Lemacks; Email: jennifer.lemacks@usm.edu; Address: Department of Nutrition and Food Systems, The University of Southern Mississippi, Hattiesburg, MS, USA.

geographical barriers to health care service are identified as Medically Underserved Populations.[3] There are several areas in MS considered as medically underserved and Health Professional Shortage Areas.[3] Those populations are of importance because they have a high poverty, increase incidence of chronic diseases and obesity, and high rates mortality rate among infant and elderly.[1, 3] Understanding health and nutrition behaviors among medically underserved individuals could be useful in improving the weight and chronic disease management, as well as helping healthcare providers to better serve the population in MS.

Weight management prevents chronic diseases, improves disease status, decreases utilization of health care services, and reduces costs associated with health care. Studies showed that both permanent and temporary weight loss decreased lifetime medical expenditures with long-term benefits significantly outweighing short-term benefits.[4, 5]

Education, threats of resulting illness, surgeries, and medications have shown little success in obesity treatment and prevention. While costly, individualized weight loss counseling has shown some success, but only in those who opt to change behavior to lose weight.[2, 4] It is well known that obesity is associated with several health risks, including heart disease, type 2 diabetes, stroke as well as some forms of cancer, yet the mere perception of the need to lose weight may impact a person's intention to do so.[4, 6]

Studies have found that individuals move through a series of stages called the Stages of Changes (SOC) when trying to modify their health behavior.[7, 8] The Transtheoretical Model posits five or six stages to describe the process of change in health behaviors, these stages include: Precontemplation, Contemplation, Preparation, Action, and Maintenance; each characterized by distinctive practices and motives that reflect variances in individuals willingness and readiness to make a behavior change (in our case, weight loss via dietary and physical activity behaviors).[7, 8] Individuals in early SOC are not interested in behavior that might improve their health, while individuals in advanced SOC have started or adapted a new behavior such as switching to low fat milk instead of whole milk to improve their health. Understanding SOC of individuals is important because it can be used to inform nutrition and health intervention strategies that specifically target the SOC of those individuals.[7, 9]

It is important to understand how weight perception accuracy mediates intention for health behavior change.[10] The aim of this study was to determine whether an individual's accurate perception of their weight status is related to the SOC for weight loss via modifying diet and physical activity behaviors among an overweight and obese, medically underserved

population in south MS. The phenomenon we might expect to find is that individuals who do not perceive themselves as overweight or obese to be at an advanced SOC.

2. METHODS

In 2013, we commenced a Community Based Participatory project aimed to develop effective strategies for weight management in a primary care setting serving predominantly rural, medically underserved populations in Southern MS.[11] As a part of this project, we assessed a convenience sample of 182 medically underserved adults over a three-month period; the participants were recruited from five federally funded healthcare centers located in the rural areas. The centers provide general practice with a purpose to serve mainly medically underserved and rural individuals in south MS. The researches were approached individuals who were present in the center's lobby at the time of the study and asked them to participate in the study using a self-administered survey. The survey was managed through droid SURVEY tablet application, version 2.10.7 (an electronic application intended to use for data gathering and reporting on mobile and tablet devices).[12] The time for completion of the survey by the participant ranged from seven to ten minutes. Full disclosure was provided to participants and a research assistant was available to aid participants at all times. Informed consent was obtained from the participants.

For this sample, inclusion criteria for the participants were: over 21 years of age, overweight and obese defined as having a Body Mass Index (BMI) of 25 or greater based on standards from the National Institutes of Health,[13] and not pregnant or 6 months postpartum. Initial data included age, gender, height, weight, and gestation status. Participants not meeting the inclusion criteria were forwarded to the end of the survey and no additional data were collected from these individuals. The full survey assessed: BMI, weight perception, SOC for weight loss, and demographic data.

The first variable, BMI, was measured through self-reported height and weight, participants not meeting BMI requirements were removed from the data sample for this analysis. The second variable, weight perception, was measured by asking: How would you describe your body image/weight? answered as under-, normal-, over-, or very overweight. The item for this variable was adapted from the work of Wang, Liang, and Chen (2009).[14] The third variable, SOC for weight loss via diet and physical activity behaviors, was measured by several items matching the five SOC (Precontemplation, Contemplation, Preparation, Action, and Maintenance stages) answered by Yes/No to address the readiness to change among the participants based on an adapted algorithm from the work of Andres, Saldana, and Gomez-Benito

(2009).[9] For example, the first question of the algorithm asked participants, "Have you been making an effort to lose weight within the past 6 months by improving your eating and/or physical activity habits?" Those in Action or Maintenance stages were further asked if they had engaged in diet/physical activity behaviors.

To examine whether participant's weight perception matched their BMI, a body perception accuracy variable was coded and analyzed by whether participant's weight perception accuracy matched the clinical interpretation of their BMI. For example, a participant with an overweight BMI classification and normal weight perception was coded as an inaccurate perception. A participant with an overweight or obese BMI classification and an overweight or obese weight perception accuracy was coded as an accurate perception. Instrument validity is reported in previous studies.[9, 14] Socio-demographic information for each participant was also collected using questions based on the U.S. Department of Health and Human Services.[15]

Our study design also assessed physical activity participation, fruits and vegetable intake, and other variables. The analysis and findings of these variables are presented in another article.[11] The project was approved by the University of Southern Mississippi Institutional Review Board, an approval statement has been also obtained from the healthcare centers administration.

Data analysis was carried out using SPSS (22.0) software. Lin's Concordance correlation coefficient (MedCalc) analysis was used to determine accuracy of respondent's weight perception to calculated BMI. The Lin's concordance correlation coefficient value represents the strength of agreement between two variables, which if it is lower than 0.90 is considered to be less agreement.

Ordinal logistic regression analysis was used to assess the relationship between SOC and weight perception accuracy with adjustment for possible covariates, including: self-reported BMI (as a continuous variable), age (21-34 years of age to 55 and over), gender (0 = male, 1 = female), race (white, nonwhite), income ($0-19,999 to more than $40,000), and educational (less than high school degree through a college degree or higher). Missing variables were excluded case wise. Statistically significant values were those with p-values < .05.

3. RESULTS

One hundred eighty-two individuals participated in this study, 114 participants met eligibility criteria, while 68 participants were omitted due to being normal or underweight, pre- or post-partum status, or under 21 years of age. The sample

population was relatively homogenous, with the majority being female (78.1%), Non-Hispanic White (50.9%), African American (45.6%), and less than 50 years of age (61.4%). Demographic characteristics of the participants are shown in Table 1. Mean BMI was 34.8 (SD 9.73). For statistical analyses, 40.4% of the participants were in the Maintenance stage, 31.6% of the participants were in the Action stage, 12.3% of the participants were in the Preparation stage, 11.4% of the participants were in the Precontemplation stage, and 4.4% of the participants were in the Contemplation stage. There were 110 valid participants for models examining SOC and weight status perception and 96 valid participants when covariates were included.

Table 1. Demographic characteristics of the participants (n = 114)

Characteristic		n	(%)
Age	21-34	30	27.3
	35-44	27	24.5
	45-54	25	22.7
	55 or over	28	25.5
Gender	Male	25	21.9
	Female	89	78.1
Race	White	58	50.9
	Black	52	45.6
	Hispanic or Latino	1	0.9
	I refuse to answer	3	2.6
Marital Status	Married	57	50.0
	Cohabitating	4	3.5
	Divorced	17	14.9
	Separated	5	4.4
	Single	27	23.7
	I refuse to answer	4	3.5
Education Level	Less than high school degree	10	8.8
	A high school degree	42	36.8
	Some college, but not a college degree	24	21.1
	A 2-year or vocational degree	11	9.6
	A 4-year college degree or higher	26	22.8
	I refuse to answer	1	0.9
Income Level	$0 to $19,999	42	36.8
	$20,000 to $29,999	30	26.3
	$30,000 to $39,999	10	8.8
	$40,000 to above	14	12.3
	Currently unemployed	5	4.4
	I refuse to answer	13	11.4

The Lin's concordance correlation coefficient revealed that overall participants did not perceive their weight status as their BMI classifies them (Pearson p = .46). A match between the weight perception accuracy and the self-reported BMI of the overweight/obese individuals occurred in 79.8% (n = 91), whereas a mismatch occurred in 20.2% (n = 23) of the individuals. To examine the relationship between weight status perception and SOC, ordinal regression analysis displayed that those with a mismatched weight perception accuracy and BMI were approximately one third as likely to be at an

advanced stage of change compared to those with matched weight perception accuracy and BMI, as shown in Table 2, and about one tenth as likely after including for covariates in the model. There were no interactions observed among variables. Model 1 explained approximately 5.5% of the variance in SOC for weight loss, whereas Model 2 improved to 36.8% of the variance.

Table 2. Weight perception accuracy as a determinants of stage of change for weight loss via ordinal logistic regression (n = 96)

Model	Independent Variables		Estimate	CI		P value
				Lower	Upper	
1[a]	Weight Perception	Inaccurate	-1.17	-2.05	-0.30	.01
		Accurate	1.00			
		χ^2	40.49			
2[b]	Model 1 with Covariates					
	BMI	Continuous	-0.02	-0.06	0.03	.03
	Gender	Male	-0.14	-1.362	1.079	.82
		Female	1.00			
	Age	21-34 years	-0.76	-1.96	0.45	.22
		35-44 years	-0.97	-2.27	0.33	.14
		45-54 years	-1.82	-3.07	-0.57	.00
		> 55 years	1.00			
	Race	Nonwhite	-0.55	-1.62	0.52	.31
		White	1.00			
	Income	$0-19,999	-0.07	-1.45	1.31	.92
		$20-29,999	-0.88	-2.30	0.53	.22
		$30-39,999	1.06	0.30	-0.95	3.07
		> $40,000	1.00			
	Educational	< High school	-2.45	-4.31	-0.59	.01
		High school	-3.19	-4.75	-1.62	.00
		Some college	-2.56	-4.07	-1.05	.00
		2-year/vocational	-2.28	-3.92	-0.64	.01
		/> 4-year degree	1.00			
	Weight Perception	Innacurate	-2.34	-3.67	-1.01	.00
		Accurate	1.00			
		χ^2	5.83			

Note. BMI: Body Mass Index; CI: Confidence Interval; Dependent variable: Stage of change; Pseudo R^2=0.055[a], 0.368[b]; Statistical significance ($p < .05$).

4. DISCUSSION

This study contributes to the advancement of knowledge in the area of obesity management. According to our study, adults who were overweight or obese and viewed themselves as overweight were more likely to be in active SOC for weight loss. An accurate perception of body weight may mediate behavior changes associated with obesity, including behaviors such as diet and physical activity. This result is parallel to other studies conducted.[4, 10, 14] Weight management interventions should address weight perceptions in overweight and obese individuals especially those who are at a lower stage of change for weight loss.

Our model considered various demographic variables and all were statistically insignificant except for one. Educational level was significant in model two analysis, which would suggest that higher educational level has a greater likelihood for being at an advanced SOC for weight loss. This finding is similar to a study that also found education was a significant predictor of SOC for weight loss intention among rural African American women.[16]

The study sample is small and mostly women, this may affect the generalizability and the accuracy of the data. However, the sample is an even representation of both African American and white participants, which is important for studies of U.S. Southern populations. This study as it stands is not generalizable to larger populations but does provide information regarding rural, underserved populations in the south U.S. Additionally, weight classification of overweight and obesity based on BMI could cause limitation as BMI does not consider body composition. The study did rely on self-

reported data to obtain height and weight information. This could have greatly skewed the results of the study given that individuals, especially females, tend to underreport weight status.[17] However, a larger study (n = 18,639 women) has indicated that self-reported height and weight are reliable and weight is seldom underreported by more than 10%, even among obese women.[18]

The current study serves as evidence for the need to consider weight perceptions of patients in rural and medically underserved populations. Accurate perception of weight status was associated with being more likely to be at an advanced SOC for weight loss. Weight management interventions should address weight perceptions in overweight/obese individuals who are at a lower SOC for weight loss and identify ways to address these perceptions as well as other methods to motivate patients for behavior change to promote weight loss intentions. Understanding weight perception is specifically useful in addressing lifestyle modification for weight management and can improve patient satisfaction during the change process. Researchers emphasize the need for effective and community based strategies for combating obesity due to the poor success of existing programs.[2, 4] A better understanding of the motivating factors may inform the development of successful obesity management and prevention programs on both the individual and population-based levels.

CONFLICTS OF INTEREST DISCLOSURE

Authors declare that they have no competing interests.

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