

HIGHER MOTIVATION FOR WEIGHT LOSS IN AFRICAN AMERICAN THAN CAUCASIAN RURAL PATIENTS WITH HYPERTENSION AND/OR DIABETES

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Objective: To examine the relationship between race/ethnicity and motivation for weight loss and motivation for exercise among patients with chronic disease.

Design: Cross-sectional.

Setting: Our study took place within a network of federally qualified health centers (FQHCs) in the rural southern United States.

Patients or Participants: 463 active FQHC patients with diabetes and/or hypertension identifying as African American, White Hispanic, or non-Hispanic White participated in our study.

Main Outcome Measures: Primary outcomes were assessed using standardized measures of motivation for a) weight loss; and b) hypertension per the Transtheoretical Model.

Results: Multivariate logistic regression revealed that, when controlling for age, sex, education status, employment status, poverty, comorbidity, and weight status, there were no significant differences in motivation for exercise among the different racial/ethnic groups ($P = .361$). However, when controlling for the same factors, there was a significant difference in motivation for weight loss, with African American participants more than twice as likely as non-Hispanic White participants to be motivated to lose weight (ORADJ = 2.430, $P = .002$).

Conclusions: Our study suggests that, among rural patients with obesity-related chronic disease, there is a significant variation in motivation to lose weight between racial/ethnic groups. This underscores the importance of culturally tailoring interventions and in considering motivation for change when promoting weight loss

INTRODUCTION

Rural-urban disparities related to obesity-related diseases (ie, diabetes and hypertension) are well-documented, with rural low-income and/or racial/ethnic minority individuals disproportionately burdened by these conditions.¹⁻⁴ This is coupled with the fact that, due to a multitude of cultural and structural barriers, healthy weight management among rural chronic disease patients has proven to be particularly challenging,⁵⁻⁶ further exacerbating the morbidity, disability, and mortality disparities faced by this population. Therefore, given that effective nutrition, physical activity, and healthy weight management are crucial components to both preventing and managing diabetes and hypertension,⁷ there is a dire need for evidence-based healthy weight promotion interventions and programming in rural areas.

behaviors. Additional implications for intervention development and delivery are discussed. *Ethn Dis.* 2016;26(1):77-84; doi:10.18865/ed.26.1.77

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Most notably, despite the established racial/ethnic differences in obesity, diabetes, and hypertension both in the general population and within rural areas,^{1-2,7-9} there is a dearth of research that examines racial/ethnic differences beyond prevalence rates and basic risk factors among rural populations. Therefore, rural-focused research that explicitly examines the influence of racial/ethnic background on specific factors known to improve weight-loss success is crucial to informing and promoting culturally tailored interventions targeting this population.

One particular factor that has been found to be a fundamental aspect of any weight loss intervention or program is an individual's underlying motivation for change.¹⁰⁻¹³ More specifically, according to the Transtheoretical Model (also known as the Stages-of-Change Model), motivation for modifying a set of unhealthy behaviors

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(ie, changes in diet and exercise) is a gradual process, with individuals progressing across five sequential stages of change as they prepare for, begin, and eventually sustain a new, healthier pattern of behavior.¹⁴ The five stages of the Transtheoretical Model are: 1) precontemplation (ie, no intention of behavioral change); 2) contemplation (ie, consideration of behavioral change in the next six months); 3) preparation (ie, intention to change one's behavior in the next month with some small, beginning steps being taken); 4) action (ie, actively engaging in behavioral change for fewer than six months); and 5) maintenance (ie, behavioral change has been sustained for more than six months). The Stages-of-Change Model has been applied extensively to weight loss research and interventions, with a specific focus on assessing for an individual's stage of change for diet, exercise, and/or overall weight loss and subsequently tailoring interventions to match their current stage of change; with the ultimate goal being to help move individuals into an active, and eventual maintenance, stage of change.¹⁵⁻¹⁸

Although previous research has highlighted the substantial impact that racial/ethnic background can have on weight loss attitudes, behaviors, and experiences,¹⁹⁻²⁰ few studies have specifically examined potential racial/ethnic differences in motivation for weight loss and/or physical activity—two factors that are imperative for long-term weight loss success.^{10,11} In terms of motivation for weight loss, despite the lack of research that specifically examines racial/ethnic differences in motivation for weight loss, previous research highlights a variety

of social and cultural factors that are suggestive of potential racial/ethnic differences in weight loss motivation. For example, African American and Hispanic cultures place less emphasis on thinness and weight loss and have more favorable attitudes toward overweight bodies, especially among women.²⁰⁻²² In addition, racial/ethnic minorities have been found to report less social pressure to lose weight, while also having lower rates of engagement in formalized weight loss programs and ultimate weight-loss success.²²⁻²⁶

The literature exploring racial/ethnic differences in motivation for physical activity has proven to be relatively more fruitful, which is likely related to the fact that racial/ethnic minorities have consistently been found to have lower rates of physical activity.²⁷⁻²⁸ For example, Egli and colleagues²⁹ explored racial differences across 14 different exercise motivation subscales (including intrinsic and extrinsic motivators) among a sample of college students and found significant racial differences for eight of the exercise motivators, suggesting that specific motivators for physical activity vary substantially across races. Furthermore, and more specific to our study, two previous non-rural studies involving both college student³⁰ and population-based³¹ samples have demonstrated racial differences in stages of change for exercise, with both African Americans and Hispanic Americans having a greater likelihood of being in an inactive stage of change (ie, precontemplation/contemplation) when compared with their non-Hispanic, White counterparts.

While these previous studies provide some preliminary insight into

potential racial/ethnic differences in motivation for weight loss and physical activity, they are substantially limited in their generalizability to rural populations. There is currently only one known study that has specifically examined racial/ethnic differences in motivation for change using a rural sample. As part of a larger, community-based participatory research project aimed at reducing obesity among low-income women in eastern North Carolina,³² 472 participants were asked to indicate their stage of change (Precontemplation, Contemplation, or Action) for “having a healthier diet,” “increasing physical activ-

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ity,” and “working toward a healthier weight” prior to engaging in any type of intervention programming. An examination of baseline racial/ethnic variations in stages of change revealed no significant differences, with the majority of participants being in a contemplation or action stage of change. While interesting, these find-

ings provide little information about the actual racial/ethnic differences in motivation for weight loss and/or physical activity for rural residents who are not actively associated with any type of weight loss intervention programming. In other words, the lack of racial/ethnic differences in this study may be more of a function of the overall greater motivation for change that is inherent in volunteering to participate in a weight loss research project and not necessarily indicative of a general consistency in motivation for change. Therefore, these findings are considerably limited in their applicability as well.

Rural chronic disease patients represent a vulnerable population with a great need for evidence-based, culturally tailored weight loss programming. However, there is currently a critical shortage of research that examines the underlying factors associated with successful weight loss among this population, while also taking into consideration the potential impact of racial/ethnic background. Therefore, the purpose of our study was to examine the relationship between race/ethnicity and motivation for weight loss and motivation for exercise among rural FQHC patients with chronic disease.

METHODS

Participants

As part of a parent study, a total of 497 participants were recruited from the patient population at a network of federally qualified healthcare centers (FQHCs) serving a multi-county region in the rural South. As described below, 463 of these patients

were included in the analytic sample for our study. Participants were active patients at one of six of the FQHC's adult-serving locations, and were recruited to be approximately proportionate to the relative patient volume at each location. Inclusion criteria were: 1) aged >18 years; 2) diagnosed with diabetes, hypertension, or both; and 3) able to understand spoken or written English.

Procedure

Participants were recruited from the patient population through flyers posted within the clinics, through referral by clinic front-desk staff, and through direct approach by study staff. Following an initial description of the study, eligibility screening, and informed consent, participants completed a series of questionnaires using audio computer assisted self-interviewing (ACASI). Following completion of the survey, participants were compensated \$15 for their time and effort through a gift card to a retail supermarket. Data were collected in an anonymous fashion. All procedures were reviewed and approved by the institutional review boards of Mercer University and Georgia Southern University.

Measures

In addition to other measures not relevant to our study, participants completed a background assessment of demographic characteristics and health history, as well as motivation for change assessments. Age, education level, employment status, household income, insurance status, current diagnoses (ie, diabetes and/or hypertension), and height and weight (ie, to

calculate BMI) were all measured by participant self-report on the survey. Motivation for change was assessed using measures developed by the Cancer Prevention Center at the University of Rhode Island, led by James Prochaska (one of the originators of the Transtheoretical Model, [TTM]). Separate questionnaires developed by Prochaska's team were used for exercise³³ and weight control³⁴ to independently determine stage of change for both exercise and weight loss. Participants are asked to respond to a series of questions regarding thoughts and activities centering on the target behavior (exercise or weight loss), after which standardized scoring procedures are followed to determine at what stage of the TTM they fall (i.e., precontemplation, contemplation, preparation, action, or maintenance).

Analysis

Only participants with known race/ethnicity who had complete data for motivation for exercise and motivation for weight were included in the analytic sample (n = 463 of an original n = 497). Data were first examined descriptively to examine demographic characteristics. Chi-square analysis was then conducted to examine the bivariate relationships between race/ethnicity and motivation for change for both exercise and weight loss. Two multivariate logistic regressions were then conducted to examine the relationship between race/ethnicity and motivation for 1) exercise and 2) weight loss while controlling for the following covariates: age, sex, employment status, educational level, weight status, poverty, and comorbidity (diabetes and/or hypertension).

Table 1. Participant characteristics

Characteristic	Total Sample, n = 463	African American, n = 236	White Hispanic, n = 26	Non-Hispanic White, n = 201	P ^a
Demographics					
Age, yrs, (SD)	52.6 (12.3)	51.9 (12.4)	52.5 (15.1)	53.5 (11.7)	.411
	%	%	%	%	
Sex					.080
Female	72.4	74.6	53.8	72.1	
Male	27.6	25.4	46.2	27.9	
Education level ^b					.010
<High school	29.8	28.6	62.5	28.1	
High school	35.2	38.0	8.3	36.2	
Some college/vocational school	20.1	17.9	16.7	23.6	
College/vocational degree	13.6	15.4	12.5	12.1	
Employment status					.171
Full time	21.8	24.4	36.4	22.0	
Part time	11.9	13.1	18.2	12.4	
Unemployed, looking for work	12.1	13.6	22.7	11.8	
Unemployed, not looking for work	7.8	7.5	13.6	9.1	
On disability	25.1	30.0	0.0	28.0	
Retired	12.3	11.3	9.1	16.7	
Poverty, <\$20,000 per year ^b	64.8	75.2	42.1	69.3	.007
Health status					
Uninsured	43.8	44.1	50.0	42.8	.780
Diabetic ^c	48.2	42.4	57.7	53.7	.037
Hypertensive	84.0	86.0	73.1	83.1	.207
Comorbid diabetic/hypertensive	41.7	38.6	46.2	44.8	.377
Weight status					.058
Normal, BMI < 25	12.7	11.1	28.0	13.4	
Overweight, 25 < BMI < 30	18.1	15.6	16.0	22.4	
Obese, 30 < BMI < 40	38.4	40.4	44.0	37.8	
Morbidly obese, BMI > 40	28.1	32.9	12.0	26.4	
Motivation					
Motivated for exercise	24.8	24.2	26.9	25.4	.927
Motivated for weight loss ^d	71.3	78.8	65.4	63.2	<.001

a. Age was compared using ANOVA; other variables tested with chi-square tests.

b. P < .01

c. P < .05

d. P < .001

RESULTS

The average age of the sample was 52.6 years, with 72.4% of the sample being female, 51.0% African American, 5.6% White Hispanic, and 43.4% non-Hispanic White. Overall, the sample had relatively low levels of education and income, with nearly 2/3 (65.0%) of the sample having a <high school education and

nearly 2/3 (64.8%) having an annual income of <\$20,000 per year. In total, 87.3% of participants were overweight (18.1%), obese (38.4%), or morbidly obese (28.1%). Overall, motivation for weight loss was high (71.3%); however, motivation for exercise was low (24.8%). Participant characteristics varied by race/ethnicity for education level, poverty, and diagnosis of diabetes. In addition, at

the univariate level there were demonstrated differences by race/ethnicity in motivation for weight loss, but not motivation for exercise.(Table 1)

Tables 2 and 3 present the results of the multivariate logistic regressions. Results indicate that when controlling for age, sex, education status, employment status, poverty, comorbidity, and weight status, there were no significant differences in motivation for

exercise among the different racial/ethnic groups ($P=.361$). However, when controlling for the same factors, there was a significant difference in motivation for weight loss, with African American participants more than twice as likely as non-Hispanic White participants to be motivated to lose weight (ORADJ = 2.430, $P=.002$).

DISCUSSION

Our findings suggest that, among rural patients with obesity-related chronic disease, there is a significant variation in motivation to lose weight between racial/ethnic groups. Namely, African American patients were the most motivated to lose weight, and Hispanic patients were also numerically (although not significantly) more motivated to lose weight than non-Hispanic White patients. This finding is somewhat unexpected, as research has consistently demonstrated higher rates of obesity in minority populations.^{7-8,35} Likewise, our results are somewhat contradictory to previous research suggesting that minority cultures place less emphasis on weight loss and have heavier body ideals in comparison to their White counterparts.^{20-22,36-38}

When considering the factors underlying this demonstrated difference, it is important to note that our analyses dually controlled for racial/ethnic differences in obesity, allowing for a clearer picture of actual motivation. The first method of control was our use of a uniformly impacted patient population, all of whom had a diagnosis of diabetes and/or hypertension. As a result, we did not have significant differences in actual weight status be-

Table 2. Predictors of motivation for exercise

Variable	Odds Ratio adj	95 CI	P
Age	1.020	.991,1.049	.182
Sex, men referent ^a	.424	.239,.753	.003
Education status	--	--	.671
Employment status	--	--	.353
Poverty	.858	.450,1.636	.641
Comorbidity	--	--	.685
Weight status ^b			.034
Normal weight	referent		
Overweight	.833	.349,1.986	.680
Obese	.427	.192,.951	.037
Morbidly obese	.350	.144,.848	.020
Race/Ethnicity			.361
African American	1.900	.534,6.753	.321
White Hispanic	.795	.466,1.359	.403
Non-Hispanic White	referent		

a. $P < .01$
 b. $P < .05$

tween the racial and ethnic groups in our sample. We implemented a second analytic control, however, by still including weight status in the final analytic model to control for any potential lingering confounding effects (particularly given the univariate difference was a strong trend; $P < .06$). Thus, our findings strip away differences in underlying weight status and allow for a clearer

examination of motivation. By focusing exclusively on the population at most health risk (ie, patients who have already manifested an obesity-related medical complication), we are better able to investigate motivation among the population most at need of behavioral intervention. In fact, by doing so, we were able to demonstrate that minority patients appear to be even

Table 3. Predictors of motivation for weight loss

Variable	Odds Ratio adj	95 CI	P
Age	1.014	.985,1.043	.360
Sex, men referent ^a	2.450	1.344,4.464	.003
Education status	--	--	.440
Employment status	--	--	.977
Poverty	.713	.380,1.336	.291
Comorbidity	--	--	.875
Weight status			<.001
Normal weight	referent		
Overweight	4.572	1.836,11.385	<.001
Obese	7.540	3.213,17.694	<.001
Morbidly Obese	9.024	3.572,22.798	<.001
Race/Ethnicity ^a			.008
African American	2.430	1.386,4.260	.002
White Hispanic	1.486	.417,5.295	.541
Non-Hispanic White	referent		

a. $P < .01$

more ready to be engaged in weight loss promotion health interventions than their non-minority counterparts.

The reasons behind this higher degree of motivation for change are unclear. We are not aware of any prior studies that specifically examined racial/ethnic differences in motivation to lose weight while accounting for weight status and socioeconomic factors in a general/urban patient popu-

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lation for comparison's sake, but our findings may reflect the rural nature of our study. Rural minority patients, in particular African American, may recognize the long-term impacts of obesity on chronic disease outcomes better than non-minority patients due to the higher demonstrated prevalence⁷⁻⁹ of those diseases. That is, minority patients may be more likely to have seen and/or experienced the long-term sequelae of diabetes and hypertension within themselves or their broader families (eg, amputations, stroke). Future research should more specifically

examine what particular factors are increasing African American patients' degree of motivation for weight loss to see if there are intervention targets that may be generalizable to other minority (and even majority) groups. Furthermore, given that previous research involving predominantly urban samples has highlighted unique racial differences in both the attitudes, beliefs, and behaviors related to physical exercise and dieting and weight loss intervention preferences (especially among overweight/obese African American women³⁸⁻³⁹) future studies should examine whether similar differences are present within rural populations prior to developing and generalizing culturally tailored interventions aimed at increasing motivation for weight loss.

Overall, our findings support the growing body of literature regarding the importance of culturally tailoring interventions^{1,6,18-19,26,32,40,41} and for specifically considering stage of change when implementing behavioral interventions.^{14-17,32} For instance, based upon population-level data showing higher rates of obesity among racial and ethnic minorities, it is easy to assume that this would translate to lower levels of motivation for change within patient populations, and thus support implementation of motivational enhancement interventions for weight loss among minority patients. However, our results show that once you look specifically within patient populations, rural minority patients appear to already have a higher degree of motivation for change, and thus interventions should focus more specifically on bridging that underlying motivation into specific action. In addition, interventions should explore

cultural themes to determine to what extent they can appropriately be built into interventions. For example, it could be that familial arguments (eg, the need to "be there" for children and parents) may resonate particularly well with rural minority patients, as the importance of family has previously been demonstrated both within rural^{1,3} and minority^{18,42-43} populations.

It is interesting to note that while significant differences did emerge with respect to weight loss motivation, there were no significant differences with respect to motivation for exercise (and no appreciable trend: $P=.361$). This suggests that, unfortunately, the factors that are motivating rural patients to lose weight are not correspondingly motivating individuals to engage in the actual activities necessary to lose weight. This may be particularly true for rural African American women with chronic disease who, despite having a high appreciation for the benefits of physical activity and a readiness for exercise, may experience greater environmental and cultural barriers to exercise motivation and actual engagement in physical activity.⁴⁴⁻⁴⁵ Given that the combination of dietary and exercise behavior change has been recognized as crucial to long-term weight loss success,¹⁰⁻¹¹ it will be important to elucidate the disconnect between weight loss and exercise. Future research should explore this discrepancy in further detail, and examine ways in which motivation for exercise may be "piggybacked" onto already-existing motivation for weight loss.

Our findings should be viewed within the context of the study's limitations. While our study does illustrate differences in motivation

for weight loss across racial/ethnic groups, it is not able to determine if this motivation translates into action, and thus translates into differences in weight loss success. However, motivation has been well-recognized as a critical component to health behavior change,^{10-17,46} and it stands to reason that baseline differences in motivation will at minimum impact the types of interventions needed to bridge motivation to long-term behavior change. In addition, while our sample was multi-site, it was drawn entirely from a single rural region in southern Georgia. This may limit generalizability, but it is likely that our findings can be readily translated at least to similar patient populations throughout the Deep South (the area of the country most impacted by obesity, diabetes, and hypertension^{1,7,26,47}) at minimum, if not beyond. Finally, by nature of the variables under investigation, all data are self-report and may be subject to social desirability. However, use of electronic assessment methods (such as in this study) have been shown to reduce social desirability effects.⁴⁸

CONCLUSIONS

Our study demonstrated that, once controlling for the effects of underlying differences in weight status and various sociodemographic characteristics, among rural patients with an obesity-linked chronic disease African American patients are significantly more motivated for weight loss than their non-Hispanic White peers. This has important implications for future intervention development research investigating the specific factors increas-

ing motivation for change within this population and how those factors can both be connected with motivation for actual weight loss behaviors and also generalized out to other groups.

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CONFLICT OF INTEREST

No conflicts of interest to report.

AUTHOR CONTRIBUTIONS

Research concept and design: Warren, Smalley. Acquisition of data: Warren, Smalley. Data analysis and interpretation: Warren, Smalley, Barefoot. Manuscript draft: Warren, Smalley, Barefoot. Statistical expertise: Warren, Smalley, Barefoot. Acquisition of funding: Warren, Smalley. Administrative: Warren, Smalley, Barefoot. Supervision: Warren, Smalley.

REFERENCES

1. Warren JC, Smalley KB, eds. *Rural Public Health: Best Practices and Preventive Models*. New York, NY: Springer Publishing Company; 2014.
2. Gamm, KD, Hutchinson LL, Dabney BJ, Dorsey, AM, eds. *Rural Healthy People: 2010: A Companion Document to Healthy People 2010. Volume 1*. College Station, Texas: The Texas A&M University System Health Science Center, School of Rural Public Health, Southwest Rural Health Research Center; 2003.
3. Hartley D. Rural health disparities, population health, and rural culture. *Am J Public Health*. 2004;94(10):1675-1678. <http://dx.doi.org/10.2105/AJPH.94.10.1675>. PMID:15451729.
4. O'Connor A, Wellenius G. Rural-urban disparities in the prevalence of diabetes and coronary heart disease. *Public Health*. 2012;126(10):813-820. <http://dx.doi.org/10.1016/j.puhe.2012.05.029>. PMID:22922043.
5. Greder K, Ihmels M, Burney J, Doudna K. Obesity in rural America. In: Warren JC, Smalley KB, eds. *Rural Public Health:*

Best Practices and Prevention Models. New York, NY: Springer Publishing Company; 2014:139-154.

6. Peterson JA, Cheng AL. Physical activity counseling intervention to promote weight loss in overweight rural women. *J Am Assoc Nurse Pract*. 2013;25(7):385-394. PMID:24170622.
7. Remington PL, Brownson RC, Wegner MV, eds. *Chronic Disease Epidemiology and Control*. 3rd ed. Washington, DC: American Public Health Association. 2010. <http://dx.doi.org/10.2105/9780875531922>.
8. Cossrow N, Falkner B. Race/ethnic issues in obesity and obesity-related comorbidities. *J Clin Endocrin & Metabol*. 2004;89(6):2590-2594. PMID:1518102
9. Kurian AK, Cardarelli KM. Racial and ethnic differences in cardiovascular disease risk factors: a systematic review. *Ethn Dis*. 2007;17(1):143-152. PMID:17274224.
10. Jeffery RW, Epstein LH, Wilson GT, Drewnowski A, Stunkard AJ, Wing RR. Long-term maintenance of weight loss: Current status. *Health Psych*. 2000;19(1S):5-16. PMID:10709944.
11. Wadden TA, Stunkard AJ, eds. *Handbook of Obesity Treatment*. New York, NY: Guilford Press; 2002.
12. West DS, Gorin AA, Subak LL, et al; Program to Reduce Incontinence by Diet and Exercise (PRIDE) Research Group. A motivation-focused weight loss maintenance program is an effective alternative to a skill-based approach. *Int J Obes*. 2011;35(2):259-269. <http://dx.doi.org/10.1038/ijo.2010.138>. PMID:20680012.
13. Prochaska JO, Redding CA, Evers KE. The transtheoretical model and stages of change. In: Glanz K, Rimer BK, Viswanath K, eds. *Health Behavior and Health Education*. 4th ed. San Francisco, CA: John Wiley & Sons; 2008:97-121.
14. Sutton K, Logue E, Jarjoura D, Baughman K, Smucker W, Capers C. Assessing dietary and exercise stage of change to optimize weight loss interventions. *Obes Res*. 2003;11(5):641-652. <http://dx.doi.org/10.1038/oby.2003.92>. PMID:12740454.
15. Bawadi HA, Banks AD, Ammari F, Tayyem RF, Jebreen S. Stage of change of 6 health-related behaviors among patients with type 2 diabetes. *Prim Care Diabetes*. 2012;6(4):319-327. <http://dx.doi.org/10.1016/j.pcd.2012.07.003>. PMID:22889585.
16. Jeffery RW, French SA, Rothman AJ. Stage of change as a predictor of success in weight control in adult women. *Health Psychol*. 1999;18(5):543-546. <http://dx.doi.org/10.1037/0278-6133.18.5.543>. PMID:10519471.
17. Hardcastle SJ, Taylor AH, Bailey MP, Harley RA, Hagger MS. Effectiveness of a motivational interviewing intervention on weight

- loss, physical activity and cardiovascular disease risk factors: a randomised controlled trial with a 12-month post-intervention follow-up. *Int J Behav Nutr Phys Act.* 2013;10(40):40. <http://dx.doi.org/10.1186/1479-5868-10-40>. PMID:23537492.
18. Davis EM, Clark JM, Carrese JA, Gary TL, Cooper LA. Racial and socioeconomic differences in the weight-loss experiences of obese women. *Am J Public Health.* 2005;95(9):1539-1543. <http://dx.doi.org/10.2105/AJPH.2004.047050>. PMID:16118365.
 19. Orzech KM, Vivian J, Huebner Torres C, Armin J, Shaw SJ. Diet and exercise adherence and practices among medically underserved patients with chronic disease: variation across four ethnic groups. *Health Educ Behav.* 2013;40(1):56-66. <http://dx.doi.org/10.1177/1090198112436970>. PMID:22505574.
 20. Flynn KJ, Fitzgibbon M. Body images and obesity risk among black females: a review of the literature. *Ann Behav Med.* 1998;20(1):13-24. <http://dx.doi.org/10.1007/BF02893804>. PMID:9755347.
 21. Rubin LR, Fitts ML, Becker AE. "Whatever feels good in my soul": body ethics and aesthetics among African American and Latina women. *Cult Med Psychiatry.* 2003;27(1):49-75. <http://dx.doi.org/10.1023/A:1023679821086>. PMID:12825784.
 22. Befort CA, Thomas JL, Daley CM, Rhode PC, Ahluwalia JS. Perceptions and beliefs about body size, weight, and weight loss among obese African American women: a qualitative inquiry. *Health Educ Behav.* 2008;35(3):410-426. <http://dx.doi.org/10.1177/1090198106290398>. PMID:17142244.
 23. Wingo BC, Carson TL, Ard J. Differences in weight loss and health outcomes among African Americans and whites in multicentre trials. *Obes Rev.* 2014;15(suppl 4):46-61. <http://dx.doi.org/10.1111/obr.12212>. PMID:25196406.
 24. Keith NR, Hemmerlein KA, Clark DO. Weight loss attitudes and social forces in urban poor Black and White women. *Am J Health Behav.* 2015;39(1):34-42. <http://dx.doi.org/10.5993/AJHB.39.1.4>. PMID:25290595.
 25. Clark JM, Bone LR, Stallings R, et al. Obesity and approaches to weight in an urban African-American community. *Ethn Dis.* 2001;11(4):676-686. PMID:11763292.
 26. Akabas S, Lederman SA, Moore BJ. *Textbook of Obesity: Biological, Psychological and Cultural Influences.* San Francisco, CA: John Wiley & Sons; 2012.
 27. Wilson-Frederick SM, Thorpe RJ Jr, Bell CN, Bleich SN, Ford JG, LaVeist TA. Examination of race disparities in physical inactivity among adults of similar social context. *Ethn Dis.* 2014;24(3):363-369. PMID:25065080.
 28. Vázquez E, Shaw BA, Gensburg L, Okorodu D, Corsino L. Racial and ethnic differences in physical activity and bone density: National Health and Nutrition Examination Survey, 2007-2008. *Prev Chronic Dis.* 2013;10:E216. <http://dx.doi.org/10.5888/pcd10.130183>. PMID:24370111.
 29. Egli T, Bland HW, Melton BF, Czech DR. Influence of age, sex, and race on college students' exercise motivation of physical activity. *J Am Coll Health.* 2011;59(5):399-406. <http://dx.doi.org/10.1080/07448481.2010.513074>. PMID:21500059.
 30. Suminski RR, Petosa R. Stages of change among ethnically diverse college students. *J Am Coll Health.* 2002;51(1):26-31. <http://dx.doi.org/10.1080/07448480209596324>. PMID:12222844.
 31. Garber CE, Allsworth JE, Marcus BH, Hesser J, Lapane KL. Correlates of the stages of change for physical activity in a population survey. *Am J Public Health.* 2008;98(5):897-904. <http://dx.doi.org/10.2105/AJPH.2007.123075>. PMID:18381988.
 32. Ries AV, Blackman LT, Page RA, et al. Goal setting for health behavior change: evidence from an obesity intervention for rural low-income women. *Rural Remote Health.* 2014;14:2682. PMID:24785265.
 33. Marcus BH, Selby VC, Niaura RS, Rossi JS. Self-efficacy and the stages of exercise behavior change. *Res Q Exerc Sport.* 1992;63(1):60-66. <http://dx.doi.org/10.1080/02701367.1992.10607557>. PMID:1574662.
 34. Norcross JC, Prochaska JO, DiClemente CC. Stages and processes of weight control: two replications. In: Simopoulos AP, VanItallie TB, eds. *Obesity: New Directions in Assessment and Management.* Philadelphia: Charles Press; 1995:172-184.
 35. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA.* 2010;303(3):235-241. <http://dx.doi.org/10.1001/jama.2009.2014>. PMID:20071471.
 36. Kronenfeld LW, Reba-Harrelson L, Von Holle A, Reyes ML, Bulik CM. Ethnic and racial differences in body size perception and satisfaction. *Body Image.* 2010;7(2):131-136. <http://dx.doi.org/10.1016/j.bodyim.2009.11.002>. PMID:20096656.
 37. Grogan S. *Body Image: Understanding Body Dissatisfaction in Men, Women, and Children.* New York, NY: Routledge; 2008.
 38. Sutherland M. Overweight and obesity among African American women: an examination of predictive and risk factors and weight-reduction recommendations. *J Black Stud.* 2013;44(8):846-869. <http://dx.doi.org/10.1177/0021934713511639>.
 39. Blixen CE, Singh A, Xu M, Thacker H, Mascha E. What women want: understanding obesity and preferences for primary care weight reduction interventions among African-American and Caucasian women. *J Natl Med Assoc.* 2006;98(7):1160-1170. PMID:16895288.
 40. Fitzgibbon ML, Stolley MR, Ganschow P, et al. Results of a faith-based weight loss intervention for black women. *J Natl Med Assoc.* 2005;97(10):1393-1402. PMID:16355489.
 41. Rosal MC, Ockene IS, Restrepo A, et al. Randomized trial of a literacy-sensitive, culturally tailored diabetes self-management intervention for low-income latinos: latinos en control. *Diabetes Care.* 2011;34(4):838-844. <http://dx.doi.org/10.2337/dc10-1981>. PMID:21378213.
 42. Im EO, Ko Y, Hwang H, et al. Racial/ethnic differences in midlife women's attitudes toward physical activity. *J Midwifery Womens Health.* 2013;58(4):440-450. <http://dx.doi.org/10.1111/j.1542-2011.2012.00259.x>. PMID:23931661.
 43. Taylor RJ, Chatters LM, Woodward AT, Brown E. Racial and ethnic differences in extended family, friendship, fictive kin, and congregational informal support networks. *Fam Relat.* 2013;62(4):609-624. <http://dx.doi.org/10.1111/fare.12030>. PMID:25089067.
 44. Miller ST, Marolen KN, Beech BM. Perceptions of physical activity and motivational interviewing among rural African-American women with type 2 diabetes. *Women's Health Issues.* 2010;20(1):43-49. <http://dx.doi.org/10.1016/j.whi.2009.09.004>. PMID:19944621.
 45. Wanko NS, Brazier CW, Young-Rogers D, et al. Exercise preferences and barriers in urban African Americans with type 2 diabetes. *Diabetes Educ.* 2004;30(3):502-513. <http://dx.doi.org/10.1177/014572170403000322>. PMID:15208848.
 46. Rollnick S, Miller WR, Butler CC, Aloia MS. Motivational interviewing in health care: helping patients change behavior. *COPD.* 2008;5(3):203. <http://dx.doi.org/10.1080/15412550802093108>. PMID:15208848.
 47. Barker LE, Kirtland KA, Gregg EW, Geiss LS, Thompson TJ. Geographic distribution of diagnosed diabetes in the U.S.: a diabetes belt. *Am J Prev Med.* 2011;40(4):434-439. <http://dx.doi.org/10.1016/j.amepre.2010.12.019>. PMID:21406277.
 48. Booth-Kewley S, Larson GE, Miyoshi DK. Social desirability effects on computerized and paper-and-pencil questionnaires. *Comput Human Behav.* 2007;23(1):463-477. <http://dx.doi.org/10.1016/j.chb.2004.10.020>.