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Correlates of overweight and obesity in a Hispanic sample

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Abstract Theoretically-based correlates of weight and waist circumference in an overweight/obese Hispanic sample were assessed. Two-hundred thirty-one participants completed questionnaires assessing constructs from self-determination theory and the transtheoretical model. Height, weight, and waist circumference were also measured. Hierarchical regression models predicted weight and waist circumference. Lower weight was associated with greater perceived competence for diet and exercise ($\beta = -.176$, $p = .054$; $\beta = -.202$, $p = .040$), environmental reevaluation ($\beta = -.254$, $p = .009$), reduced pros of weight loss ($\beta = .246$, $p = .007$), stimulus control ($\beta = -.200$, $p = .054$), helping relationships ($\beta = .234$, $p = .005$), and social liberation ($\beta = .226$, $p = .019$). Lower waist circumference was associated with the maintenance stage for exercise ($\beta = -.304$, $p = .028$). Exploration of the transtheoretical model and self-determination theory in relation to reductions in overweight/obesity within Hispanic populations is warranted.

Keywords Obesity · Overweight · Hispanic · Theory

In the United States, 71.6% of men and 66.5% of women are overweight or obese (Ogden et al., 2014). Obesity and overweight, which is defined as a body mass index [BMI] of 25 or greater (Centers for Disease Control and Prevention [CDC], 2016) are associated with many diseases, such as heart disease, type 2 diabetes, hypertension, and high cholesterol (United States Department of Health and Human Services [US DHHS], 2013). Clinical guidelines recommend weight loss for individuals who meet the following criteria: a BMI of 25 or greater, a high waist circumference (i.e., greater than 35 inches in women and 40 inches in men), and at least two risk factors such as physical inactivity, smoking, and personal or family history of the aforementioned diseases associated with obesity and overweight (US DHHS, 2013).

The rates of obesity and overweight in Hispanic populations in the U. S. are higher than the national average, with 77.9% of men and 76.2% of women being overweight or obese (Ogden et al., 2014); more recent studies suggest similar rates, and central obesity rates alone in Hispanics are 57% (Forrest et al., 2017). These rates signal a need for attention to weight-related issues in Hispanics. Further, gaps in this literature are noteworthy and include: Hispanic weight-loss interventions for adults seem limited and outdated (Foreyt et al., 1991; Cousins et al., 1992; Domel et al., 1992), many interventions based on theory have not been systematically assessed in Hispanics, issues related to central obesity and/or waist circumference have not been addressed, and attitudes, intentions, and behaviors surrounding diet and exercise may certainly be influenced by cultural nuances (e.g. Hu et al., 2011). Theoretical constructs and their association with weight and waist circumference should be assessed in order to determine which constructs are most salient to this particular population, such that we may further assess their potential utility in interventions prioritizing this population.

One behavioral model to consider is self-determination theory (SDT). SDT is a motivation-based model, which purports that behavior change (in the context of weight-loss, diet and exercise) occurs when one moves from being

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amotivated to being internally motivated. There are three constructs associated with SDT: autonomy (i.e., the belief of control over one's decisions (as opposed to a healthcare provider's)), competence (i.e., the belief in one's ability to make changes), and relatedness (i.e., the belief that one is supported in his or her efforts). SDT posits that interventions which increase the aforementioned constructs may elicit internally motivated behavior change (Ryan & Deci, 2000). Studies have found that SDT-based interventions yielded significant weight loss (Silva et al., 2010; Teixeira et al., 2006). However, these studies did not measure waist circumference, nor did they focus on Hispanics. Thus, SDT-based constructs warrant examination in the current study.

Another behavior model to consider is the Transtheoretical Model (TTM; Prochaska & Velicer, 1997). TTM is also a motivation-based model that seeks to increase readiness to change a behavior (in this context weight, diet, and exercise) using five stages: Precontemplation (i.e., not currently thinking about behavior change), Contemplation (i.e., thinking about behavior change but not yet committed to action), Preparation (i.e., planning behavior change within the next month), Action (i.e., engaged in behavior change), and Maintenance (i.e., continuing behavior change). While TTM has been studied extensively and has been found to be an appropriate model to use to determine readiness to change across multiple health behaviors (Laforge et al., 1999) and even addressed as a weight-loss model in Mexican–American women (Suris et al., 1998), recent theory driven studies which include central obesity, geared toward Hispanic adults of both sexes are lacking.

Aims of the study included observing theoretically-based correlates of weight and waist circumference in an overweight/obese Hispanic sample. Theoretical constructs derived from SDT and TTM were assessed. Hypotheses were that lower weight and waist circumference would be associated with higher scores on SDT constructs and increased readiness to change (TTM).

Method

Participants

Individuals who self-identified as Hispanic (N =231) were recruited from a local health care clinic. Participants were 64.6% female with an average age of 45.07 years (SD = 13.81). The majority self-reported as Mexican National (53.7%), followed by Mexican–American (38.1%), and "Other Hispanic" ethnic group (7.4%). The average BMI was 31.69 for males (SD = 5.59) and 32.26 for females (SD = 6.42). As one of the guidelines for recommending weight loss is a BMI of 25 or greater without regard to overweight or obese status (US DHHS, 2013), researchers also did not categorize participants as such. Average waist circumference was 43.04 inches for males (SD = 6.38) and 41.42 inches for females (SD = 6.64).

Measures

To determine eligibility to participate in the current study, a brief screening form which assessed age, ethnicity, and self-reported height and weight was used. BMI was calculated during the initial screening using an adult body mass index chart (Adult Body Mass Index Chart, n.d.). Participants were eligible if they reported being aged 18 or older, being of Hispanic ethnicity, and reported a height and weight which results in a BMI of 25 or greater.

Demographic information such as age, gender, and ethnicity was included in the survey packet. In addition, information regarding risks associated with obesity and overweight was gathered, such as smoking status, physical activity level, and family or personal history of type 2 diabetes, high blood pressure, heart disease, and high cholesterol.

SDT measures

The *Treatment Self-Regulation Questionnaire for Diet* (TSRQ for Diet; Deci & Ryan, 1985) is a 15-item measure that assesses reasons for maintaining a healthy diet. It has three subscales: autonomous regulatory style, controlled regulatory style, and amotivation. Each item of the scale is averaged to determine a score for each subscale. The *Treatment Self-Regulation Questionnaire for Exercise* (TSRQ for Exercise; Deci & Ryan, 1985) is identical in number of items and scoring to the TSRQ for Diet and assesses reasons for engaging in regular exercise. All subscales demonstrated adequate internal reliability in this study with the exception of the TSRQ amotivation subscale for diet, whose reliability was .63.

The *Perceived Competence Scale for Diet* (PCS for Diet; Deci & Ryan, 1985) is a 4-item measure that assesses confidence in maintaining a healthy diet. Scores are derived by taking an average of the four items. The *Perceived Competence Scale for Exercise* (PCS for Exercise; Deci & Ryan, 1985) is similar in scoring and number of items and assesses confidence in maintaining a regular exercise program. Internal reliabilities for PCS for Diet and Exercise in this study were .96 and .97.

The *Health Care Climate Questionnaires for Diet Short Form* (HCCQ for Diet; Deci & Ryan, 1985) is a 6-item measure that assesses whether one's health care provider is autonomously supportive versus controlling in maintaining a healthy diet. Items are averaged, with higher scores

indicating more autonomous support. The *Health Care Climate Questionnaires for Exercise Short Form* (HCCQ for Exercise; Deci & Ryan, 1985) is similar in item number and scoring and assesses whether one's health care provider is autonomously supportive versus controlling in maintaining a regular exercise program. Internal reliabilities for HCCQ for diet and exercise in the current study were .96 and .95.

TTM measures

The *Exercise Stage of Change Short Form* (ESC; Marcus et al., 1992) is a single item algorithm which assesses if a participant is currently engaged in or plans to engage in regular exercise. The answer a participant chooses determines whether s/he is in the Precontemplation, Contemplation, Preparation, Action, or Maintenance stage of change.

The *Weight Decisional Balance* (WDB; O'Connell & Velicer, 1988) is a 20-item measure that assesses the importance placed on the pros of losing weight versus the cons of losing weight. The cons are contained in the odd-numbered questions, and the pros are contained in the even-numbered questions; responses are summed to create pros and cons scores. Internal reliabilities of the pros and cons scales in this study were .85 and .86.

The *Weight Stage of Change Short Form* (WSC; Prochaska et al., 1992) is a 4-item algorithm that assesses whether a participant is actively trying to lose weight or thinking about losing weight. The way the participant answers each question determines which stage of change s/he is in.

The *Weight Process of Change* (WPC; Prochaska et al., 1992) is a 48-item measure with 12 subscales that assesses the underlying thought processes in deciding to change one's weight. The items of the subscales are summed in order to obtain a score for that subscale. All subscales in the current study demonstrated good internal reliability with the exception of Counterconditioning (.59), and Social Liberation (.48).

All measures were translated and back-translated according to recommendations (Brislin, 2000). In addition to the survey packet, participants' heights, weights, and waist circumferences were measured. Height and weight were taken simultaneously on a medical grade scale after the removal of shoes. Waist circumference was measured by having the participant place a finger on his/her belly button over clothing, which the researcher used as a guide to place a soft tape measure around the waist.

Procedure

University Institutional Review Board approval was obtained prior to study implementation. Potential participants in the waiting areas of a local health care clinic were asked if s/he would like the researcher to determine their eligibility to participate in the study. Eligibility was determined using a brief screening form which asked participants to self-report height, weight, age, and ethnicity so that individuals answered the questions in private. The researcher used a body mass index table to determine individuals' BMIs (Adult Body Mass Index Chart, n.d.). Those who were eligible were invited to participate. Those who were not were assured that the information they provided would not be used as data in the study.

Eligible participants were offered the choice of completing all materials in English or Spanish. After informed consent was provided, participants completed the survey packet, and researchers then measured participants' height, weight, and waist circumference. Afterwards, participants were debriefed and given a $10 gift card. As further incentive, participants also had the opportunity to be chosen randomly to receive one of five $50 gift cards.

Results

All missing data were imputed prior to analyses using the hot deck imputation method (Roth, 1994). In hot deck imputation, missing values are assigned using "donors" from the same dataset that match variables determined by the researcher. Typically, the variables that are chosen should meet the following criteria: (1) They should contain little or no missing data, (2) should be non-continuous variables, and (3) should be related to the variables being imputed but not of proximal interest to the researcher (Myers, 2011). The variables used to match participants for imputation in the current study were sex, education, and annual income. Hot deck imputation is recommended for datasets that contain 20% or less missing data. Missing data analyses for the current dataset found that 1.34% of the values were missing and no data was systematically missing.

Participant characteristics and weight-related risk factors (e.g. familial history of diseases such as diabetes and high blood pressure) were analyzed using descriptive statistics. Over 24% of participants reported a personal history of type 2 diabetes and/or high blood pressure, while over 50% reported a family history of the aforementioned illnesses. In terms of risk factors relating to lifestyle, 17.7% reported smoking at least one cigarette in the past month, and 20.4% reported not exercising regularly (See Table 1).

Table 1 Participant characteristics ($N = 231$)

Characteristic	Mean	SD	Frequency (%)
Survey language			
English			17.8
Spanish			81.7
Age	45.07	13.81	
Sex			
Female			64.6
Male			35.4
Ethnicity			
Mexican national			53.7
Mexican American			38.1
Other Hispanic			7.4
Weight			
Males	206.85	38.87	
Females	183.04	36.23	
BMI			
Males	31.69	5.59	
Females	32.26	6.42	
Waist circumference			
Males	43.04	6.38	
Females	41.42	6.64	
Smoking status			
Daily > 10			4.4
Daily 5 < 10			3.6
Daily < 5			4.4
Weekly			4.0
Monthly			1.3
Experimented with cigarettes			12.4
Never smoked			46.7
Days per week of exercise (at least 30 min)			
1–2 days per week			41.2
3–4 days per week			21.7
5–6 days per week			10.2
Everyday			6.6
No regular exercise			20.4
Type 2 diabetes history			
Personal			27.7
Family			57.6
Heart disease history			
Personal			8.2
Family			24.7
High cholesterol history			
Personal			23.8
Family			43.0
High blood pressure history			
Personal			24.2
Family			50.2
Motivation to change weight (range 1–10)	8.15	2.41	
SDT			
TSRQ D Autonomous motivation (range 1–7)	6.01	1.09	
TSRQ D controlled motivation (range 1–7)	4.10	1.39	
TSRQ D amotivation (range 1–7)	3.56	1.58	
TSRQ E autonomous motivation (range 1–7)	6.09	1.08	
TSRQ E controlled motivation (range 1–7)	3.73	1.53	
TSRQ E amotivation (range 1–7)	3.05	1.72	
PCS D (range 1–7)	5.51	1.44	
PCS E (range 1–7)	5.34	1.66	
HCCQ D (range 1–7)	4.56	1.88	
HCCQ E (range 1–7)	4.59	1.84	
TTM			
WSC			
Precontemplation			10.0
Contemplation			17.8
Action			38.3
Maintenance			33.9
ESC			
Precontemplation			6.5
Contemplation			9.6
Preparation			24.8
Action			26.1
Maintenance			33.0
WDB pros (range 10–50)	37.33	7.79	
WDB cons (range 10–50)	31.07	8.20	
WPC consciousness raising (range 4–20)	11.24	3.67	
WPC counterconditioning (range 4–20)	11.36	3.16	
WPC dramatic relief (range 4–20)	11.59	4.04	
WPC environmental reevaluation (range 4–20)	11.29	4.49	
WPC helping relationships (range 4–20)	12.46	4.21	
WPC interpersonal systems control (range 4–20)	8.44	3.75	
WPC reinforcement management (range 4–20)	9.24	4.03	
WPC self-liberation (range 4–20)	13.65	3.93	
WPC self-reevaluation (range 4–20)	12.05	3.88	
WPC social liberation (range 4–20)	11.69	3.29	
WPC stimulus control (range 4–20)	8.32	3.88	
WPC substance use (range 4–20)	7.63	4.16	

SDT Self-determination theory, *TSRQ* treatment self-regulation questionnaire, *PCS* perceived competence scale, *HCCQ* health care climate questionnaire, *TTM* transtheoretical model, *TTM* transtheoretical model, *ESC* exercise stage of change, *WDB* weight decisional balance, *WPC* weight process of change

Analyses included four hierarchical regression models. The WSC and ESC were dummy coded for inclusion in Models 2 and 4, in which the Precontemplation stage was the reference group (i.e. not thinking of change at all versus thinking of change, contemplating change, actively changing, or maintaining change). The first three models used measured weight as the dependent variable and the variables age, gender, measured height, and survey language were entered into the models first as control variables (he former three because of their clear relationships with weight, the latter to control for any artifacts of survey adaptation).

Model 1 used predictors relevant to SDT (scores for TSRQ for Diet and Exercise, PCS Diet and Exercise, HCCQ Diet and Exercise) in the second step. Steps 1 and 2 of the overall model were significant, accounting for 15% and 24.9% of the variance in weight, respectively. In step 2, Perceived Competence for Exercise ($\beta = -.202$, $p = .040$) was statistically significant and Perceived Competence for Diet was marginally significant ($\beta = -.176$, $p = .054$; See Table 2).

In Model 2 the most proximal components relevant to TTM were entered (scores for WSC, ESC and WDB) in the second step, followed by the remainder of the TTM constructs (WPC) in the third step. Steps 1 and 2 of the overall model were significant, accounting for 14.8% and 25.6% of the variance in weight, respectively. In step 2, statistically significant variables were the Contemplation stage of change for exercise (ESC Contemplation; $\beta = .202$, $p = .004$), and WDB Pros ($\beta = .239$, $p = .004$). In step 3 the overall model was significant, accounting for 34.2% of the variance in weight. Of the predictors entered into the third step ESC Contemplation ($\beta = .138$, $p = .05$), WDB Pros ($\beta = .246$, $p = .007$), WPC Environmental Reevaluation ($\beta = -.254$, $p = .009$), WPC Helping Relationships ($\beta = .234$, $p = .005$), and WPC Social Liberation ($\beta = .226$, $p = .019$) were significant. WPC Stimulus Control was marginally significant ($\beta = -.200$, $p = .054$; See Table 3).

Models 3 and 4 used waist circumference as the dependent variable and entered variables such as age, gender, survey language, and measured height first as control variables. Model 3 then entered components in proceeding steps similar to Model 1. Only the first step of the model was statistically significant (See Table 4).

Model 4 entered components in proceeding steps similar to Model 2. Steps 1 and 2 of the overall model were significant, accounting for 4.3% and 16.1% of the variance in waist circumference, respectively. Of the predictors entered into the second step WSC Contemplation ($\beta = .252$, $p = .018$), WSC Action ($\beta = .273$, $p = .032$), WSC Maintenance ($\beta = .294$, $p = .016$), ESC Contempla-

Table 2 Summary of Model 1: hierarchical regression assessing correlates of weight using components of SDT

Variable	B	SE B	β	
Step 1				
Age	.012	.179	.004	
Sex	− 4.101	7.148	− .050	
Height	4.346	1.116	.347**	
Survey language	− 3.496	5.097	− .043	
R^2				.150**
Step 2				
TSRQ D autonomous motivation	− 1.665	4.349	− .047	
TSRQ D controlled motivation	1.959	3.417	.071	
TSRQ D amotivation	3.905	2.538	.160	
TSRQ E autonomous motivation	7.950	4.476	.224	
TSRQ E controlled motivation	.132	3.239	.005	
TSRQ E amotivation	− .301	2.698	− .013	
PCS D	− 4.705	2.423	− .176	
PCS E	− 4.628	2.245	− .202*	
HCCQ D	− 2.680	2.325	− .131	
HCCQ E	2.024	2.426	.097	
ΔR^2				.100*

Step 1 $R^2 = .150$; Step 2 $R^2 = .249$; only statistically significant steps are expressed in the table

TSRQ Treatment self-regulation questionnaire, *PCS* perceived competence scale, *HCCQ* health care climate questionnaire

*All values significant at the .05 level

**All values significant at the .001 level

Table 3 Summary of Model 2: hierarchical regression assessing correlates of weight using components of TTM

Variable	B	SE B	β	
Step 1				
Age	.016	.179	.006	
Sex	− 3.930	7.162	.048	
Height	4.348	1.117	.347**	
Survey language	− 3.423	5.105	− .042	
R^2				.148**
Step 2				
WSC contemplation	18.445	9.917	.185	
WSC action	11.568	9.475	.145	
WSC maintenance	11.832	9.277	.146	
ESC contemplation	26.084	8.948	.202*	
ESC preparation	− 7.491	10.305	− .084	
ESC action	− 5.735	10.350	− .065	
ESC maintenance	− 12.240	10.081	− .157	
WDB pros	1.184	.403	.239*	
WDB cons	− .374	.357	− .079	
ΔR^2				.107**
Step 3				
WPC consciousness raising	.999	1.066	.095	
WPC counterconditioning	− 1.618	1.165	− .133	
WPC dramatic relief	.954	.940	.098	
WPC environmental reevaluation	− 2.186	.825	− .254*	
WPC helping relationships	2.147	.749	.234*	
WPC interpersonal systems control	1.297	1.042	.125	
WPC reinforcement management	− .047	.912	− .005	
WPC self-liberation	− .559	.995	− .057	
WPC self-reevaluation	− 1.256	1.109	− .126	
WPC social liberation	2.676	1.134	.226*	
WPC stimulus control	− 2.029	1.046	− .200	
WPC substance use	.314	.817	.033	
ΔR^2				.086*

Step 1 R^2 = .148; Step 2 R^2 = .256; Step 3 R^2 = .342; only statistically significant steps are expressed in the table

WSC Weight stage of change, *ESC* exercise stage of change, *WDB* weight decisional balance, *WPC* weight process of change

*All values significant at the .05 level

**All values significant at the .001 level

Reference group for WSC and ESC is precontemplation

tion (β = .242, p = .001), and ESC Maintenance (β = − .304, p = .028) were statistically significant. Step 3 of the model was not significant (see Table 5).

Table 4 Summary of Model 3: Hierarchical regression assessing correlates of waist circumference using components of SDT

Variable	B	SE B	β	
Step 1				
Age	.067	.032	.140*	
Sex	− .021	1.295	− .001	
Height	.368	.202	.172	
Survey language	− .587	.923	− .042	
R^2				.046*

Step 1 R^2 = .046; only statistically significant steps are expressed in the table

*All values significant at the .05 level

Table 5 Summary of Model 4: Hierarchical regression assessing correlates of waist circumference using components of TTM

Variable	B	SE B	β	
Step 1				
Age	.068	.032	.143*	
Sex	.035	1.294	.003	
Height	.369	.202	.173	
Survey language	− .563	.922	− .041	
R^2				.043*
Step 2				
WSC contemplation	4.277	1.794	.252*	
WSC action	3.704	1.714	.273*	
WSC maintenance	4.067	1.679	.294*	
ESC contemplation	5.328	1.619	.242**	
ESC preparation	− 2.572	1.864	− .169	
ESC Action	− 2.772	1.873	− .184	
ESC maintenance	− 4.034	1.824	− .304*	
WDB pros	.103	.073	.122	
WDB cons	− .044	.065	− .055	
ΔR^2				.118**

Step 1 R^2 = .043; Step 2 R^2 = .161; only statistically significant steps are expressed in the table

WSC Weight stage of change, *ESC* exercise stage of change, *WDB* weight decisional balance, *WPC* weight process of change

*All values significant at the .05 level

**All values significant at the .001 level

Reference group for WSC and ESC is precontemplation

Discussion

Basic findings of this study highlight the weight related risks of the sample. Although study inclusion criteria (i.e., BMI of 25 or greater) ensured participants met clinical guidelines for recommending weight loss (US DHHS, 2013), many met additional criteria, particularly with regard to personal and family histories of diseases associ-

ated with overweight/obesity. Most saliently, the rate of type 2 diabetes was higher than the national average reported for Mexican–Americans (27.7% vs. 13.3%; CDC, 2011). Given that the sample was derived from a clinical population, this finding may be expected. Additionally, about one-fifth of the sample reported not exercising regularly, and about 40% of the sample reported exercising for at least 30 min on 1–2 days a week. While it is promising that a large portion of the sample exercises regularly, this falls short of guidelines recommending physical activity at 150 min a week (US DHHS, 2008). It may be that some medical conditions associated with overweight/obesity are also acting as barriers to engaging in exercise more often.

Consistent with hypotheses, the SDT constructs that were associated with lower weight were increased perceived competence for diet and exercise. As increased perceived competence for diet and exercise are associated with change in weight in previous studies, that these constructs appear to be salient in this population is promising (Ryan & Deci, 2000; Teixeira et al., 2006). Also promising is the use of these specific measures in future assessment studies with Hispanic populations, given the reliability of the measures in the current study. Further examination of these constructs within similar populations is warranted.

With regard to the TTM, contrary to hypotheses and previous findings, the Contemplation stage for exercise, relative to the Precontemplation stage, was associated with higher weight (Robinson et al., 2008). It appears that those of higher weight may be aware of the negative impact of weight on health and are considering behavior change. Future longitudinal studies in obese/overweight populations should assess how movement through the stages of change is impacted as weight and health status change.

Higher weight was also associated with greater endorsement of the positive aspects of weight loss. It may be that those of lower weight do not endorse the positive aspects of weight loss because they do not perceive themselves as overweight or feel that weight loss is needed. That heavier individuals already endorse the benefits of weight loss is promising. Lower weight was associated with greater awareness about the effect weight-related behaviors (i.e. diet and exercise) have on one's social environment (Environmental Reevaluation) and greater control over triggers of unhealthy behaviors in one's environment (Stimulus Control). Higher weight was associated with utilizing social support (Helping Relationships) and greater awareness of a potentially less problematic lifestyle (Social Liberation). It is difficult to determine whether this is contrary to current literature as studies that have utilized the WPC have collapsed the items into fewer subscales (Chung et al., 2006) or have removed some scales completely (Suris et al., 1998). However, these findings do make intuitive sense given the reported high level of motivation to lose weight in this sample. Further assessment of these constructs and their salience in similar populations is needed.

Waist circumference was not associated with SDT constructs. As for the TTM, higher waist circumference was associated with being in advanced stages of change for weight loss. Moreover, being in the Contemplation stage for exercise, relative to the Precontemplation stage, was associated with higher waist circumference. Even though this is contrary to hypotheses, findings are similar to the relationship between weight and stage of change for exercise. This suggests that waist circumference and its association with weight-related behaviors and attitudes warrant exploration in future studies, especially those that are longitudinal in design. Interestingly, being in the Maintenance stage for exercise was associated with lower waist circumference, which is consistent with hypotheses. It may be that while those of higher waist circumference in the Contemplation stage have recognized a need for exercise, those of lower waist circumference have already implemented a plan of action and are currently engaged in behavior change. There is a dearth of literature with regard to waist circumference and theory, as previous studies did not assess waist circumference (e.g., Teixeira et al., 2006). Given that a high waist circumference indicates the presence of abdominal fat which increases the risk of developing diseases associated with obesity/overweight (Weight Control Information Network, 2007), its inclusion in future studies, both as a risk assessment tool and an outcome variable, is warranted.

Limitations of the current study are its cross-sectional design, which precludes any causal association, and use of a clinical population, which potentially limits generalizability to other overweight/obese populations. In addition, the lack of inclusion of normal weight individuals limits the ability to compare associations across other weight classes. Strengths of the current study are the assessment within an underserved population and of theoretical constructs which can be examined in other assessment studies and potentially be utilized in future interventions in Hispanic populations.

While the focus of this study was not on weight-loss, rather theoretical constructs associated with weight and waist circumference at a single time assessment, the findings may inform future studies and/or clinic practice in Hispanics associated with weight, central obesity, diet, exercise, and even change in these. For instance, increasing awareness of the impact of weight-related behaviors on one's social environment may be a beneficial component in future interventions, particularly when it comes to assessing potential socially-related facilitators or barriers to weight loss. In addition, interventions that assist in navigating situations that are not conducive to healthy behav-

iors may be efficacious. Also, encouraging the use of social support and implementing goal-setting as weight loss tools may be warranted.

This study provides an examination of theoretical constructs in an overweight/obese Hispanic population. The presence of weight related risk factors was confirmed. Future SDT based studies of weight related challenges in Hispanics should address perceived competence in diet and exercise, while TTM focused studies should assess advances in readiness over time relative to weight, including process elements such as social support, facilitators, and barriers.

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Compliance with ethical standards

Conflict of interest Julie Blow, Ivan N. Torres, and Theodore V. Cooper declare that they have no conflict of interest.

Human and animal rights and Informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study

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