Relationship of Self-Determination Theory Constructs and Physical Activity and Diet in a Mexican American Population in Nueces County, Texas

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Abstract

Due to disparities in stroke risk among U.S. Hispanics, the need for culturally tailored, theory-based effective health behavior change interventions persists. The purpose of this study was to examine self-determination theory (SDT) constructs related to cardiovascular disease (CVD) risk factors in a predominantly Mexican American population. The Stroke Health and Risk Education (SHARE) project was a cluster-randomized, faith-based behavioral intervention trial that enrolled Mexican Americans (MAs) and non-Hispanic whites (NHWs) from Catholic Churches in Nueces County, Texas. Data regarding SDT constructs and dietary and physical activity behaviors were collected via computer-assisted interviews using standardized instruments at the baseline assessment. Of the 801 subjects who consented, 760 completed baseline interviews. After eliminating cases with missing data, 733 participants (617 MA and 116 NHW) were included in the analyses. Participants were predominantly Mexican American (84%) and female (64%), and had a median age of 53 years. There were no significant ethnic differences in any of the baseline SDT scale scores with the exception of higher autonomous motivation scores for exercise among MAs (7.00 vs. 6.67, $p = 0.01$). Demographic differences in mean SDT scale scores were identified for sex, age, and income. Perceived competence and autonomous motivation were both significant predictors of diet and physical activity behaviors. This study increases our understanding of SDT constructs relative to diet and physical activity in a large, predominantly Mexican American sample. The results indicate that SDT is an appropriate framework to address CVD behavioral risk factors in a predominantly Hispanic population.

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Many chronic diseases have underlying behavioral root causes.[1] As a result, we have decades of research examining relationships between constructs from psychological and health behavioral theories and various health behaviors. This work has informed both basic behavioral and intervention research.

Cardiovascular disease (CVD) and stroke risk are related to physical activity and dietary behaviors. Stroke continues to be a leading cause of death and disability in the United States.[2] Overall, stroke incidence declined over the 10-year period between 2003 and 2013, and is now the 5th leading cause of death in the United States. Whereas stroke incidence has declined for

both Hispanics and non-Hispanic whites (NHWs), the gap between Mexican Americans (MAs) and whites persists, particularly among younger age groups.[3] Furthermore, projections show that by the year 2030, the highest increase in stroke prevalence will be among Hispanic men (29%).[2]

High blood pressure remains a dominant risk factor for stroke and other cardiovascular diseases, particularly among minority populations.[2] Among individuals suffering an initial stroke, 77% have a blood pressure greater than 140/90 mm Hg.[2] Additionally, from 2003 to 2013 the number of deaths attributable to HBP increased 75.5% among Hispanics.[2]

An inverse dose-response relationship between leisure time physical activity and relative risk of CVD and stroke has been demonstrated in both men and women.[4] High rates of leisure time physical activity reduce the overall risk of CVD and stroke by 10 to 30 percent.[4] Hispanic adults in the United States have the lowest proportion of the population meeting physical activity guidelines (41.3% compared to 53.5% for non-Hispanic whites).[2]

A poor quality diet contributes to over half a million annual deaths in the United States from all causes. Dietary behaviors such as fruit and vegetable consumption and sodium intake play a substantial role, with an estimated 58,000 US deaths annually attributable to high sodium intake alone.[2] Current estimates for Mexican Americans show 8% meeting current sodium intake guidelines, 6% meeting guidelines for fruit consumption, and 3% of men and 8% of women meeting guidelines for non-starchy vegetable consumption.[5]

Self-Determination Theory

Self-Determination Theory (SDT) is a psychological theory that has been applied to the understanding and prediction of various health behaviors, including diet[6–9] and exercise.[10,11] SDT is a metatheory of human motivation that proposes a continuum of motivation ranging from autonomous (intrinsic or self-determined) to controlled (extrinsic). Autonomous motivation is seen as more enduring as it is linked to the individual's personal values and goals, whereas controlled motivation is seen as weaker, as it is driven by external others or internal pressure such as shame, guilt, and social comparison. The theory further posits that individuals are driven by three innate psychological needs: perceived autonomy (volition), perceived competence, and relatedness to others.[12] Research has demonstrated that these psychological needs are universally important regardless of culture.[13]

Application of SDT to Health Behaviors

SDT has been widely studied in relation to exercise.[11] Autonomous motivation has consistently been shown to impact behavioral intention and subsequent behavior across multiple health behaviors including exercise and diet.[6,9–11] This relationship for physical activity appears to persist across the life span[10] and over time, as individuals maintain their exercise behaviors.[14] Furthermore, consistent with the theory, controlled motivations have been shown to have little if any association with initial health behavior changes, and are associated with lower persistence of health behaviors.[6,9,11,14] A recent comprehensive review of published SDT research and exercise identified a variety of sample populations including healthy adult and chronic disease groups.[11] However, of the 66 studies examined, only one consisted of a predominantly ethnic minority sample.[15]

SDT in Minority Populations

Although theoretically based health behavior change interventions for Hispanic populations have existed for many years, few have used SDT. A review of randomized control trials (RCTs) of nutrition and exercise interventions aimed at Hispanics determined that 72% of the interventions produced significant results in eating or exercise outcomes and over 70% included a theoretical foundation.[16] However, only one was based on SDT and it was aimed primarily at children.[17]

Motivational interviewing (MI) is a client-centered counseling approach that has been explained using SDT concepts.[18] Several studies have been conducted using MI to encourage healthy behavior change in minority populations.[19] In a pilot study that included predominantly Latina women, Corsino et al. found significant decreases in body weight and systolic blood pressure after MI sessions, but not in dietary outcomes.[20] MI has produced mixed results for physical activity and dietary outcomes in African American populations. Resnicow et al., in a faith-based study of MI for diet and physical activity improvement, identified an increase in fruit and vegetable consumption for African American women receiving a series of MI phone calls, but no significant changes in physical activity.[21] Similarly, a 7-month MI intervention resulted in no significant changes in physical activity among a large sample of African American women.[22] One identified study that used MI and SDT constructs to tailor health messages for diet and physical activity among African American adults showed no overall significant differences between treatment and control groups.[8] However, the SDT construct of autonomy support was shown to be a significant moderator of fruit and vegetable consumption and was also related to the correlations between autonomous and controlled motivation and fruit and vegetable intake.[8] For example, participants who responded more favorably to autonomously supportive messaging had a positive correlation between an autonomous motivation and fruit and vegetable intake. Conversely, participants preferring a more directive style of messaging did not.[8] The ability to tailor messages based on individual participants' scores on SDT construct scales holds enormous potential for increasing the effectiveness of behavioral interventions, but is dependent on understanding how these constructs present in varied populations.

SDT further posits that autonomous motivations leading to self-regulation of behaviors can be encouraged and nurtured through social and environmental supports (relatedness component).[23] This approach could be particularly successful in collectivist cultures such as Mexican American culture.[24]

While SDT has been applied in a multitude of populations targeting a variety of health behaviors, with few exceptions published results have not included actual scores for the SDT construct scales.[8,9] As a result, the ability to quantify the construct scores in any given population or for comparison across populations has been limited. If we are to design effective behavioral interventions to eliminate health disparities, it is imperative that we understand the SDT constructs, particularly motivation and perceived competence, as they relate to the initiation and continued performance of health behaviors in minority populations.

As we continue to address issues of health disparities among high risk, often hard to reach, populations, we must explore the relationships between constructs of health behavior theory and health behaviors so that effective interventions can be developed to reduce the burden of chronic disease among these groups. The purpose of this study was therefore to examine SDT constructs of motivation and perceived competence as they relate to CVD-risk health behaviors in a predominantly Mexican American population in a cross-sectional design.

Methods

SDT provided the framework for the Stroke Health and Risk Education (SHARE) project. This project was a cluster-randomized, faith-based behavioral intervention trial that enrolled Mexican Americans (MAs) and non-Hispanic Whites (NHWs) from Catholic Churches in Nueces County, Texas. Churches were randomly assigned to intervention or control groups. Participants within churches were enrolled in self-selected pairs. Detailed recruitment and enrollment methodologies have been described elsewhere.[25] SDT constructs were assessed at the baseline assessment (before actual trial participation), to explore the relationships between the constructs and dietary and exercise health behaviors related to stroke prevention. The project was approved by the University of Michigan Institutional Review Board and registered on clinicaltrials.gov (NCT01378780).

Measures

Data were collected from 2011 to 2012 by trained research coordinators, through computer-assisted interviews in English or Spanish, during home visits with study participants. SDT measures consisted of a modified version of the Treatment Self-Regulation Questionnaire (TSRQ) (autonomous and controlled motivation) modified to relate to diet (specifically eating more fruits and vegetables and foods low in sodium) and a version modified for exercise. Each TSRQ was a 12-item instrument with a 7-point Likert response scale ranging from "not at all true" to "very true" (the 3 amotivation items were not used for this study). The 6-item autonomous motivation subscale of the TSRQ assesses reasons why participants choose to engage in diet and exercise behaviors, while the 6-item controlled motivation subscale assesses the degree to which the participants' behavior is externally regulated.[26] The responses on the autonomous items were averaged to form the autonomous motivation score (7-point scale) for the target behaviors and the responses on the controlled items were averaged to form the controlled motivation score (7-point scale) for the target behaviors. Higher subscale scores indicate more motivation (autonomous or controlled). Confirmatory factor analysis has validated the subscales of the TSRQ in Caucasian and African American samples. Internal consistency of each of the subscales is acceptable (most alpha values > 0.73).[27]

The Perceived Competence Scale (PCS) (three versions: modified for fruit and vegetable, sodium intake, and exercise) consists of 4 items with a 7-point Likert response scale ranging from "not at all true" to "very true" and was designed to assess the degree to which an individual feels capable of changing his/her diet and exercise level.[26] A higher score on the PCS scale indicates more perceived competence. The alpha reliability values for internal consistency of the PCS were acceptable at 0.89 for diet.[27]

Although previous studies have shown the TSRQ and PCS to be valid and reliable in Caucasian and African-American populations, the model has not been specifically evaluated in a Mexican American population. Therefore, each of the seven measured SDT scales were evaluated for reliability and theoretical structure. The test of reliability, assessed by Cronbach's alpha, was good (> 0.8) for both ethnic groups (see appendix Table S1). Factor structure, based on principal components factor analysis, was similar across both ethnic groups (results not shown), with all scales loading into one factor except for controlled motivation for diet for MAs and controlled motivation for exercise for NHWs, which each loaded into two factors. However, in these two cases, the eigenvalues were only slightly above 1 (1.066 and 1.026, respectively).

Health behaviors related to diet and exercise were assessed with the BLOCK 2005 food frequency questionnaire,[28] from which cups of fruit and vegetables and milligrams of sodium intake per week were calculated and the Stanford 7-day physical activity recall questionnaire, from which total moderate/hard/very hard MET-minutes of physical activity per week were calculated.[29] Additionally, the Marlowe-Crowne Social Desirability Scale (MC), a 10-item instrument, was used to assess social desirability response bias.[30] Standard procedures were employed to exclude dietary records that were deemed invalid.[31] Detailed description of diet and exercise analyses have been described elsewhere. [31]

Analysis

Median and interquartile range (IQR) of all SDT scales were generated for MA, NHW, and all participants. The differences in SDT scales between MA and NHW were initially analyzed using regression models with an ethnicity indicator (MA versus NHW) as the only predictor. The models were fitted within a mixed effects framework with random intercepts for participant pair and church to account for clustering within pairs and within churches. Ethnic differences in SDT were then adjusted for age (categorized in quartiles), sex, education (< high school, high school, some college/trade, college or more) and the MC Social Desirability Scale (quartiles) also using mixed models. Based on regression coefficients from the models, we generated estimates of the mean SDT scale scores, adjusted for demographic characteristics, age, sex, education, income levels, and MC social desirability. Similar methods were followed to assess associations between other demographics and SDT measures.

We again used mixed effects models, as described, to estimate the association between perceived competence for eating more fruits and vegetables, autonomous motivation (TSRQ) for diet, control motivation (TSRQ) for diet, and self-reported daily fruit and vegetable intake. Each construct was assessed in a separate model. Similarly, we assessed the association between perceived competence for eating foods low in sodium, autonomous motivation (TSRQ) for diet, control motivation (TSRQ) for diet, and self-reported daily sodium intake. Finally, perceived competence for exercising regularly, autonomous motivation (TSRQ) for exercise, and control motivation (TSRQ) for exercise were used to predict self-reported physical activity (total MET-minutes) per week. SAS version 9.3 was used to complete all data analyses.

Results

Of the 801 subjects who consented, 760 completed interviews. Five participants were excluded from this analysis due to missing ethnicity data, and 22 were excluded for missing one or more SDT scales, leaving 733 participants (617 MA and 116 NHW) available for analysis. Overall, subjects were predominantly Mexican American (84%) and female (64%), and had a median age of 53 years. Complete participant demographic details have been previously published.[31] Participant SDT scale scores by ethnicity are presented in Table 1. There were no significant ethnic differences in any of the baseline SDT scales (Table 1).

Mean SDT scale scores adjusted for demographic characteristics and MC desirability were calculated and compared across age ranges, sex (Table 2a), and education and income levels (Table 2b). Results indicated significant differences based on demographic characteristics. Women had significantly higher autonomous motivation for diet. Significant differences for perceived competence were identified by age and income for eating foods low in sodium, and for

exercising regularly. Few other patterns were identified with the exception of perceived competence for eating less sodium where perceived competence increased with an increase in age. The lowest income range (< $10,000) showed the highest perceived competence for eating foods low in sodium.

Similarly significant differences were found across age ranges and sex for autonomous motivation for diet (age, sex) and exercise (age). Autonomous motivation for both behaviors was highest among participants in the 43-52 year age range and among females for diet. Interestingly, education was only shown to be indicative of differences in controlled motivation for both diet and exercise, with participants indicating less than a high school education having the highest controlled motivation scores. Additionally, those reporting an annual income of $10,000 - $19,999 had higher levels of controlled motivation for diet.

Table 1

Adjusted Mean (SE) of SDT Scales by Ethnicity, Ethnic Difference (SE), and p-value for the Differences*

	Ethnicity		Adjusted difference	
Scale	NHW	MA		*p*
Perceived competence for eating more fruits and vegetables	5.84 (0.11)	5.80 (0.09)	0.03 (0.15)	0.82
Perceived competence for eating foods low in sodium	5.51 (0.21)	5.60 (0.06)	-0.09 (0.24)	0.70
Perceived competence for exercising regularly	5.46 (0.14)	5.36 (0.10)	0.10 (0.15)	0.52
Autonomous motivation (TSRQ) for diet	6.44 (0.06)	6.45 (0.06)	-0.01 (0.07)	0.84
Controlled motivation (TSRQ) for diet	3.90 (0.17)	3.96 (0.13)	-0.06 (0.22)	0.77
Autonomous motivation (TSRQ) for exercise	6.28 (0.06)	6.43 (0.07)	-0.15 (0.08)	0.06
Controlled motivation (TSRQ) for exercise	3.52 (0.18)	3.37 (0.10)	0.15 (0.21)	0.49

*Adjusted for age, sex, education, income and Marlowe-Crowne Social Desirability Scale

Table 2a

Adjusted Mean (SE) of SDT Scales by Age and Sex

	Age					Sex		
Scale	18-42	43-52	53-63	> 63	*p*	Male	Female	*p*
Perceived competence for eating more fruits and vegetables	5.86 (0.07)	5.92 (0.10)	5.68 (0.08)	5.81 (0.11)	.04	5.71 (0.10)	5.93 (0.06)	.01
Perceived competence for eating foods low in sodium	5.29 (0.11)	5.49 (0.16)	5.51 (0.13)	5.92 (0.11)	< .001*	5.48 (0.08)	5.62 (0.13)	.16
Perceived competence for exercising regularly	5.62 (0.10)	5.50 (0.14)	5.18 (0.15)	5.34 (0.14)	.007*	5.41 (0.12)	5.41 (0.09)	.99
Autonomous motivation (TSRQ) for diet	6.37 (0.08)	6.54 (0.07)	6.47 (0.08)	6.39 (0.08)	< .001*	6.30 (0.08)	6.59 (0.03)	< .001*
Controlled motivation (TSRQ) for diet	3.80 (0.15)	3.84 (0.08)	3.94 (0.16)	4.14 (0.17)	.23	3.99 (0.14)	3.87 (0.09)	.19
Autonomous motivation (TSRQ) for exercise	6.35 (0.06)	6.49 (0.06)	6.30 (0.08)	6.30 (0.12)	.001*	6.26 (0.08)	6.46 (0.05)	.03
Controlled motivation (TSRQ) for exercise	3.47 (0.15)	3.42 (0.09)	3.34 (0.16)	3.56 (0.15)	.53	3.52 (0.13)	3.37 (0.08)	.13

Note. Adjusted for demographic characteristics and Marlowe-Crowne Social Desirability Scale; * if p-value < 0.05/7 = 0.0071

Table 2b

Adjusted mean (SE) of SDT scales by Education and Income

	Education					Annual Income					
Scale	< HS	HS	Some College	College or more	*p*	< $10,000	$10,000-19,999	$20,000-$29,999	$30,000-$49,999	> $50,000	*p*
Perceived competence for eating more fruits and vegetables	5.55 (0.16)	5.93 (0.06)	5.89 (0.10)	5.90 (0.05)	.07	5.92 (0.14)	5.62 (0.14)	5.78 (0.13)	6.00 (0.12)	5.78 (0.11)	.23
Perceived competence for eating foods low in sodium	5.29 (0.18)	5.59 (0.09)	5.58 (0.14)	5.75 (0.11)	.07	5.77 (0.11)	5.49 (0.11)	5.48 (0.12)	5.53 (0.14)	5.49 (0.16)	.006*
Perceived competence for exercising regularly	5.36 (0.21)	5.33 (0.12)	5.51 (0.14)	5.45 (0.10)	.18	5.34 (0.14)	5.22 (0.08)	5.51 (0.14)	5.59 (0.13)	5.39 (0.13)	< .001*
Autonomous motivation (TSRQ) for Diet	6.34 (0.13)	6.46 (0.05)	6.46 (0.07)	6.52 (0.04)	.07	6.42 (0.06)	6.43 (0.10)	6.47 (0.06)	6.44 (0.09)	6.45 (0.05)	.92
Controlled motivation (TSRQ) for Diet	4.46 (0.19)	4.01 (0.11)	3.83 (0.12)	3.42 (0.17)	< .001*	3.90 (0.16)	4.27 (0.18)	3.95 (0.20)	3.83 (0.19)	3.70 (0.13)	.007*
Autonomous motivation (TSRQ) for Exercise	6.22 (0.12)	6.39 (0.05)	6.38 (0.06)	6.45 (0.07)	.13	6.36 (0.08)	6.34 (0.08)	6.40 (0.11)	6.36 (0.09)	6.34 (0.07)	.84
Controlled motivation (TSRQ) for Exercise	4.15 (0.23)	3.49 (0.12)	3.26 (0.11)	2.89 (0.17)	< .001*	3.49 (0.14)	3.78 (0.19)	3.36 (0.21)	3.34 (0.17)	3.27 (0.11)	.02

Note. Adjusted for demographic characteristics and Marlowe-Crowne Social desirability scale; * if *p*-value < 0.05/7 = 0.0071

Table 3

Regression Coefficients Estimating the Association between SDT Constructs and Behaviors (One Point Higher per SDT Construct)*

	Self-reported Behavior		
Predictor	Sodium, mg/week (*SE*)	Fruit and vegetable, cups/week (*SE*)	Exercise, mod/hard/very hard MET-min/week (*SE*)
Perceived competence for eating foods low in sodium	-62.93 (31.40)**		
Perceived competence for eating more fruits and vegetables		0.16 (0.05)**	
Perceived competence for exercising regularly			153.08 (40.07)**
Autonomous motivation for diet	-50.51 (63.69)	0.22 (0.03)**	
Autonomous motivation for exercise			175.22 (161.52)**
Controlled motivation for diet	15.60 (34.09)	0.01 (0.02)	
Controlled motivation for exercise			-112.79 (79.01)

Note. *Adjusted for ethnicity, age, sex, education, income, and Marlowe-Crowne Social Desirability Scale. ***p*-value < 0.05/3

For the most part, associations between SDT constructs and self-reported diet and exercise behaviors were as expected (Table 3). One point higher on the perceived competence scale related to eating lower sodium foods was associated with 62.93mg (*SE* = 31.40) lower dietary sodium intake per week. Similarly, one point higher in the scale measuring perceived competence to eat fruits and vegetables was associated with 0.16 (*SE* = 0.05) more fruit and vegetable cups consumed per week. One point on the PCS for engaging in physical activity was also associated with 153.08 (*SE* = 40.07) higher moderate/hard/very hard MET-minutes per week of physical activity. Autonomous motivation toward a particular behavior was also associated with the respective realized diet and exercise behaviors (see row 2 of Table 3). However, controlled motivation was not associated with any of the health behaviors.

Discussion

This cross-sectional analysis of baseline data from a large intervention study of a predominantly Mexican American population demonstrates relationships between SDT constructs and CVD risk factors that have been found in non-Hispanic populations. This is particularly important in the quest for effective behavioral interventions to reduce CVD and stroke in this high-risk group.

As possibly the first study to report specific SDT constructs in an Hispanic population, these results provide a foundation for the ability to comparatively evaluate the presentation of SDT in an Hispanic sample with previous research in mostly NHW and African American samples. While previous research has evaluated SDT in predominantly African American samples, and to a lesser extent ethnically mixed samples, ethnic comparisons have not been reported.[8,15] Results of this study however, showed no significant differences between MAs and NHWs on any of the SDT constructs. The absence of ethnic differences in SDT constructs provides preliminary evidence that SDT behavioral interventions may be similarly appropriate across ethnic groups and is therefore an important finding.

Demographic characteristics of sex, age, income, and education were evaluated relative to the SDT constructs. Whereas women were found to have higher levels of autonomous motivation for diet, age and income were significantly associated with perceived competence for lowering sodium intake and for exercising regularly. Age was also shown to be related to differences in autonomous motivation for both diet and exercise and women had significantly higher autonomous motivation for diet than men. Brunet et al. also showed a significant association between age and intrinsic motivation and exercise. While the association between intrinsic motivation and exercise was significant in all age groups, younger adults (18-24 years) reported higher levels of intrinsic motivation and of exercise than middle-aged adults (45-64 years).[10] Understanding the patterns of SDT constructs based on demographic characteristics is relevant to intervention design. Identification of heterogeneity in SDT constructs across demographic groups provides justification for the need to measure SDT constructs in individuals and subsequently provide tailored interventions accordingly. Additionally, knowledge of an SDT construct profile of a potential target population can help inform the choice of the type of intervention that would be most appropriate for that population.

Consistent with SDT perceived competence, type of motivation was related to diet and physical activity behaviors in the Mexican American participants in this sample. Perceived competence and autonomous motivation were significantly associated with positive dietary and physical activity behaviors, whereas controlled motivation was not. Previous studies have shown

similar relationships. For example, a systematic review of 66 empirical studies of SDT and physical activity found a positive association between intrinsic (autonomous) motivation and exercise related outcomes 92% of the time, and a null or negative association with controlled motivation and exercise outcomes in 100% of the studies sampled, while perceived competence was positively associated with exercise outcomes in 92% of the reviewed studies.[11]

Limitations

The study was limited to enrollees in a cluster randomized, church-based trial of a behavioral intervention to reduce CVD risk. Additionally, all measures, including diet and physical activity, were self-reported and therefore subject to response bias and measurement error. Given that this was a cross-sectional analysis of baseline data, no causal determinations can be made. Response bias was mitigated by adjustment for the Marlowe-Crowne Social Desirability Scale. Participants were recruited from a single Texas county and overrepresented by women and older adults, potentially limiting their generalizability to the greater Hispanic community. Furthermore, NHWs in the Corpus Christi community may be influenced by MA culture more so than in other communities in the United States, given the high representation of MAs. The NHW results therefore may not be generalizable to less cross-cultural communities. Although valuable information was obtained in this baseline study, additional factor analysis should be conducted for outcome variables to further validate the use of SDT in a Mexican American population.

Implications for Health Behavior Research

This study addresses a noticeable gap in the research and lays the foundation for our understanding of SDT constructs relative to diet and physical activity in a large, predominantly Mexican American sample. Many studies have evaluated the effectiveness of MI and SDT framed interventions aimed at diet and physical activity in white and African American populations, but to our knowledge this is the first study of the relationship between SDT constructs and diet and physical activity in a Mexican American sample.

The results of this study indicate that Self-Determination Theory is an appropriate framework to address CVD behavioral risk factors in an Hispanic population. Given that Hispanics are the largest and fastest growing minority group in the United States[32] and have a disproportionately high risk of CVD and stroke, it is imperative that we develop and implement effective behavioral interventions to reduce these risks. In order to do this, it is essential that research continues to examine the relationships among health behavior theories, behavioral outcomes, and socio-demographic factors in this population.

Appendix

Table S1. Cronbach's Alpha Coefficients by Ethnicity

Scale	MA	NHW
Perceived competence for exercising regularly	0.94	0.95
Perceived competence for eating more fruits and vegetables	0.88	0.88
Perceived competence for eating foods low in sodium	0.92	0.91
Autonomous motivation (TSRQ) for diet	0.86	0.85
Controlled motivation (TSRQ) for diet	0.81	0.82
Autonomous motivation (TSRQ) for exercise	0.87	0.84
Controlled motivation (TSRQ) for exercise	0.84	0.85

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