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Relation of Acculturation, Perceived Benefits and Barriers, Self-Efficacy, Social
Support, and Beliefs about Physical Activity to Physical Activity Levels of
College-Aged Hispanic and Non-Hispanic Women

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Support, and Beliefs about Physical Activity to Physical Activity Levels of
College-Aged Hispanic and Non-Hispanic Women

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DEDICATION

To my mother

Beatrice

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Relation of Acculturation, Perceived Benefits and Barriers, Self-Efficacy, Social Support, and Beliefs about Physical Activity to Physical Activity Levels of College-Aged Hispanic and Non-Hispanic Women

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Two overall national health goals are to increase the quality and years of healthy life and to eliminate health disparities. Physical inactivity is a leading cause of disability and death due to its relationship with overweight and chronic disease. Hispanic women are less physically active than Hispanic men and Anglo women in leisure time physical activity and recommended levels of physical activity (PA). From a developmental perspective, understanding prevalence and correlates of PA in emerging adulthood may make a significant contribution to increasing PA as women move into full adulthood. The Health Promotion Model (HPM) advanced by Pender provided the framework for examining beliefs about PA and other correlates of PA. This study also developed and tested a scale measuring beliefs about PA (BPA) that tried to access cultural differences between non-Hispanic and Hispanic women. The study was carried out by electronic solicitation to randomly selected non-Hispanic and Hispanic students from 3 southwestern universities and yielded 237 complete online surveys. Instruments

comprising the survey included the Short-version of the International PA Questionnaire (IPAQ), Exercise Benefits and Barriers Scale (EBBS), Self-Efficacy for Exercise (SEE), Social Support for Exercise Survey for Family and Friends (SSFA, SSFR), BPA, the Acculturation Rating Scale for Mexican Americans (ARSMA II), and questions about SES. Statistical procedures included factor analysis, t-tests, and multi-sample path analysis. Respondents included 80 non-Hispanic and 157 Hispanic women, aged 18-27. Factor analysis of the BPA produced 7 subscales accounting for 68% of the explained variance (spirituality, role enhancement, socialization preferences, personal benefits, cultural beliefs, exercise difficulty, and women's roles). Independent sample t-tests indicated group means for spirituality and cultural beliefs significantly differed, as did total BPA, acculturation, & SES. Path analysis provided evidence for a model with good fit for both groups. Significant path coefficients to vigorous PA included benefits, SE, and SSFA. Total indirect effects for SES to vigorous PA through SE and SSFA were significant. Acculturation, SES, SSFR, and BPA were not significant predictors of vigorous PA.

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CHAPTER 1: INTRODUCTION

The two overall national health goals of *Healthy People 2010* are to increase the quality and years of healthy life and eliminate health disparities (US Department of Health and Human Services [USDHHS], 2001). *Healthy People 2010* also identifies health priorities reflecting the top 10 public health concerns in the United States (USDHHS, 2001). Weight and physical activity are two of these priorities. Two leading preventable causes of death and disability are cardiovascular disease and diabetes. Both of these chronic conditions are strongly correlated with overweight and obesity. The positive association of physical inactivity and these conditions is well-researched and documented (USDHHS, 1996, 2001). In fact, physical inactivity and poor nutrition run a very close second to tobacco as the leading actual cause of death (Mokdad, Marks, Stroup, & Gerberding, 2004).

Health disparities are readily identifiable among Hispanics in the United States in comparison with the majority population. Hispanics are disproportionately and negatively affected by overweight, diabetes, and cardiovascular diseases (Centers for Disease Control [CDC], 2004b, 2004c; Hunt, Resendez, Williams, Haffner, Stern, & Hazuda, 2003; Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006; Perez-Escamilla & Putnik, 2007). The US Surgeon General confirms that Mexican-American men and women are also less

physically active than their Anglo-American counterparts both in leisure time physical activity (LTPA) and recommended levels of physical activity (USDHHS, 1996). In fact in Texas, the Behavioral Risk Factor Surveillance System Data for 2004 indicate 36.7% Hispanic Texans report no LTPA (CDC, 2004a). Hispanics made up 12.5% of the U.S. population in the 2000 census (Grieco & Cassidy, 2001); by 2050 Hispanics are expected to make up 24.4% of the total U.S. population (US Census, 2004). Improving the health of this sub-population is vital, and increasing physical activity is an important strategy to do so.

The examination of prevalence rates and correlates of physical activity provide some basis for studying the process of increasing physical activity. Crespo, Smit, Andersen, Carter-Pokras, and Ainsworth (2000) examined physical activity using the Third National Health and Nutrition Examination Survey. Among the different racial and ethnic groups, rates of leisure time physical *inactivity* were highest for Mexican American men (33%) and women (46%) for almost every variable of social class—income, education, occupation, employment, poverty, and marital status. The researchers concluded that differences in physical activity levels are not entirely explained by these social variables. Indeed, over a range of racial/ethnic health disparities, controlling for socioeconomic status (SES) reduces the disparities but does not fully account for racial health differences (Stewart & Nápoles-Springer, 2003). A number of determinants have a recurrent role in physical activity levels across theories and

populations, including Mexican Americans. Some of these are perceived benefits and barriers, self-efficacy, and social support (Eyler et al., 2002; Sallis & Owen, 1999).

In addition to the common psychosocial variables, acculturation, i.e., the adoption of aspects of the majority population, has also been positively linked to levels of leisure time physical activity (LTPA) in Hispanic populations (Crespo et al, 2000; Crespo, Smit, Carter-Pokras, & Andersen, 2001; Marquez & McAuley, 2006b; Marquez, McAuley, & Overman, 2004; Perez-Escamilla & Putnik, 2007; Sundquist & Winkleby, 2000). Acculturation may account for some of the difference beyond the common correlates and socioeconomic factors. Further research could help discover what facets of culture contribute to differences in activity levels, ultimately leading to more effective interventions for increasing physical activity in Hispanic populations.

Studies have documented a decline in physical activity (PA) in both Hispanic and non-Hispanic White women across the lifespan. However, PA prevalence and decline is greater for Hispanic women. In a study of adolescents using 1993-2003 data from the national survey, Monitoring the Future (Delva, O'Malley, & Johnston, 2006), more males than females at each time interval and in each racial/ethnic group reported getting vigorous exercise. Moreover, PA levels dropped with increasing grade levels for each racial/ethnic group, and this decline was greater for females than for males. Additionally, while little

racial/ethnic differences existed for the males across grade levels, larger differences existed among racial/ethnic groups for females. As an example, in 2001-2003, the rates of getting vigorous exercise in 8th and 12th grades for White females were 53% and 30.1% and for Hispanic females, 38.9% and 20.6%. In a college aged sample, gender and ethnicity patterns are similar (Suminski, Petosa, Utter, & Zhang, 2002). Fewer men (40.3%) than women (53%) reported no vigorous PA in the preceding month, and 11.3% and 22.0% of men and women, respectively, report no PA at all. Again, PA prevalence was not related to ethnicity for men. However, 17.4% of non-Hispanic White women reported no PA compared to 20.3% of Hispanic women.

Similar patterns have been found in other samples. In a study of pregnant women, total energy expenditure was highest in non-Hispanic White women, who were more likely than Hispanic women to engage in greater moderate and vigorous PA (Schmidt, Pekow, Freedson, Markenson, & Chasan-Taber, 2006). Another study examined PA in a diverse population of women aged 20-65 across multiple domains of PA (Sternfeld, Ainsworth, & Quesenberry, 1999). The likelihood of being in the highest quartile of the sports/exercise and active-living indices, was decreased among older, non-White, less well educated, heavier women who had young children at home, lacked motivation to exercise, and perceived external obstacles to exercise behavior. However, the highest quartile of household/caregiving activity was positively associated with increasing age,

Hispanic ethnicity, being married, having young children at home, and greater time constraints as a barrier to exercise and was negatively associated with employment. The authors of this study suggested that psychosocial and demographic correlates of PA vary by domain; a finding which would impact programs to promote physical activity. Clearly, physical activity is lower for women, especially Hispanic women, than for men and declines across the lifespan. Additionally, evidence suggests the constituent domains and correlates of physical activity differ across the lifespan.

Numerous studies have examined the correlates of physical activity in various populations, but many fewer studies have been done with Hispanic college-aged populations, with very few in the Southwest. Few studies examine the prevalence and correlates of physical activity in the emerging adulthood period encompassing 18-25 year olds; studies usually bundle adults with the general adult population. However, physical activity prevalence decreases precipitously in adolescence and early adulthood (Anderssen et al, 1996). This decline is especially worrisome as researchers have found the greatest increase in obesity in the 18-29 age group, with some college education, and with Hispanic ethnicity, compared to other age groups (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999)

Arnett (2000, 2006) and others (Tanner, 2006) provide evidence that emerging adulthood is a distinct developmental period and “a critical turning

point in the human life span.” Arnett describes this extended period before formal adoption of adult roles and identity as the age of instability, identity exploration, possibilities, self-focus, and feeling in-between. More than any other period, emerging adulthood is characterized by demographic variability and individual exploration. This time period offers young adults opportunities to try out different ways of living. During the course of exploring identities and lifestyles, one identity of many is that of a physically active person and the subsequent engagement in physical activity (Koski, 2008). Indeed, according to identity theory, individuals who endorse a given identity are motivated to behave in a manner consistent with this identity (Strachan, Brawley, Spink, & Jung, 2009). In one study participants with high exercise identity strength reported greater frequency of exercise and higher perceived consistency with their identity meaning (Strachan et al., 2009). Maintaining or adopting physical activity in emerging adulthood might also preclude risky behavior. Health risk behavior, such as unprotected sex, reckless driving, crime, violence, alcohol and drug use, cigarette use, and unhealthy eating, increase during adolescence and continue into emerging adulthood (Arnett, 2000; Jasuja, Chou, Riggs, & Pentz, 2008; Larson, Nelson, Neumark-Sztainer, Story, & Hannan, 2009; Marcus, 2009; White, Fleming, Catalano, & Bailey, 2009). In a review of his and other research Arnett (2000) indicates that risk-taking behavior peaks in emerging adulthood. From a developmental perspective, increased understanding of the prevalence and

correlates of physical activity in Hispanic women in emerging adulthood may make a significant contribution to increasing physical activity engagement in adulthood and has the potential for decreasing health risk behavior in this population by replacing it with positive health behavior.

Purpose

The present project was divided in two studies. The first study developed a new instrument to measure beliefs about physical activity. The second study examined the relationships between psychosocial, environmental, and cultural factors and physical activity in college-aged non-Hispanic and Hispanic women in the Southwest. The second study emphasized acculturation and cultural beliefs towards physical activity and exercise. Demographic variables, such as age, income, and education were measured. The study variables included exercise self-efficacy, exercise benefits and barriers, exercise social support, and personal beliefs regarding exercise. These demographic and attitudinal variables are present in several theories of health behavior, such as the Health Belief Model, Social Cognitive Theory, the Theory of Planned Behavior, the Transtheoretical Model, the Health Promotion Model, and others (Ajzen, 1991; Bandura, 1977; Bandura, 2001; Bandura, 2004; Glanz, Rimer, and Lewis, 2002; Janz, Champion, & Strecher, 2002; Pender, Murdaugh, & Parsons, 2001; Prochaska, Redding, & Evers, 2002; Sallis & Owen, 2002). In addition, this study included beliefs regarding exercise and level of acculturation. Pender's Health Promotion Model

(Pender, Murdaugh, & Parsons, 2001) provided the framework for examining these variables. Knowledge of correlates specific to a population assist health promotion professionals in tailoring programs to improve health and eliminate health disparities.

Conceptual Framework

Theoretical Support

Theories of health behavior have important functions in health behavior change research and intervention. These theories identify targets and methods for change, guide the search and selection of modifiable factors, such as knowledge and resources, and inform the evaluation process (Glanz, Rimer, and Lewis, 2002). Furthermore, health behavior theories may focus on or combine multiple levels of influence: intrapersonal or individual factors, interpersonal factors, institutional or organizational factors, community factors, and public policy factors (Glanz et al., 2002; Sallis & Owen, 2002). Theories and models which involve multiple levels of influence are ecological theories or models. Some of the earliest models, e.g., the Health Belief Model, began as health protective theories, i.e., motivated by the goal of actively avoiding illness, detecting it early, or maintaining functioning (Janz et al., 2002). More recent trends include the goals of increasing well-being and actualizing human potential. These goals are essentially about health promotion. The Health Promotion Model (HPM), advanced by Pender et al (2001), is one such model and first appeared in the

nursing literature in the early 1980's. The model was revised in the mid-1990's, and the revised model informs the present study.

According to the authors, the HPM is a “competence- or approach-oriented” model, as opposed to an “avoidance” model, and is appropriate for any health behavior for which fear or threat is not the primary motivation (Pender et al., 2001). Although physical activity plays a preventive and treatment role in many chronic diseases, such as heart disease and diabetes, it is also important in the achievement of optimal health (Galper, Trivedi, Barlow, Dunn, & Kampert, 2006; USDHHS, 1996), and it is not usually exclusively associated with threat. The HPM integrates several aspects of expectancy-value theory and social cognitive theory “within a nursing perspective of holistic human functioning (Pender et al., p. 61).” Expectancy-value theory specifies that a person will engage in a given behavior if the outcome is personally valuable to the person and if the person expects the behavior to result in the expected outcome. Pender maintains the “subjective expectancy of successfully obtaining the change” depends on previous personal or vicarious success and personal confidence of achieving success, which is similar to self-efficacy, a principal concept in Social Cognitive Theory (SCT). While Pender does not identify the HPM as an ecological model, she does write, “The HPM is an attempt to depict the multidimensional nature of persons interacting with their interpersonal and physical environments as they pursue health (p. 61).” This interactive process is

also a feature of SCT Bandura, 1991, 2001, 2004). The HPM includes cognitive, social, and environmental variables that provide an ecological framework for examining physical activity behaviors in women (see Appendix A for a figure of the revised model).

The HPM is based on seven assumptions and fifteen theoretical propositions, which emphasize the “*active role*” of the individual in engaging in and modifying health behaviors as well as modifying the environmental context for health behaviors. Propositions of the HPM that are salient to the present study include the importance of perceived barriers, perceived benefits, self-efficacy, social support, and cognitions and affect in influencing the individual to engage in a health promoting behavior; a central construct of the HPM is self-efficacy. In the present study cognitions and affect include beliefs about physical activity. Additionally, the HPM includes various personal factors—biological, psychological, and sociocultural factors, the inclusion of which depend on their respective saliency for the dependent variable and the population studied. Sociocultural factors may include race, ethnicity, acculturation, education, and socioeconomic status (Pender et al., 2001). In the HPM, personal and prior related behavior have direct and indirect effects, through behavior specific cognitions and affect, commitment, and immediate competing demands, on health promoting behavior outcomes.

Conceptual Model and Study Variables

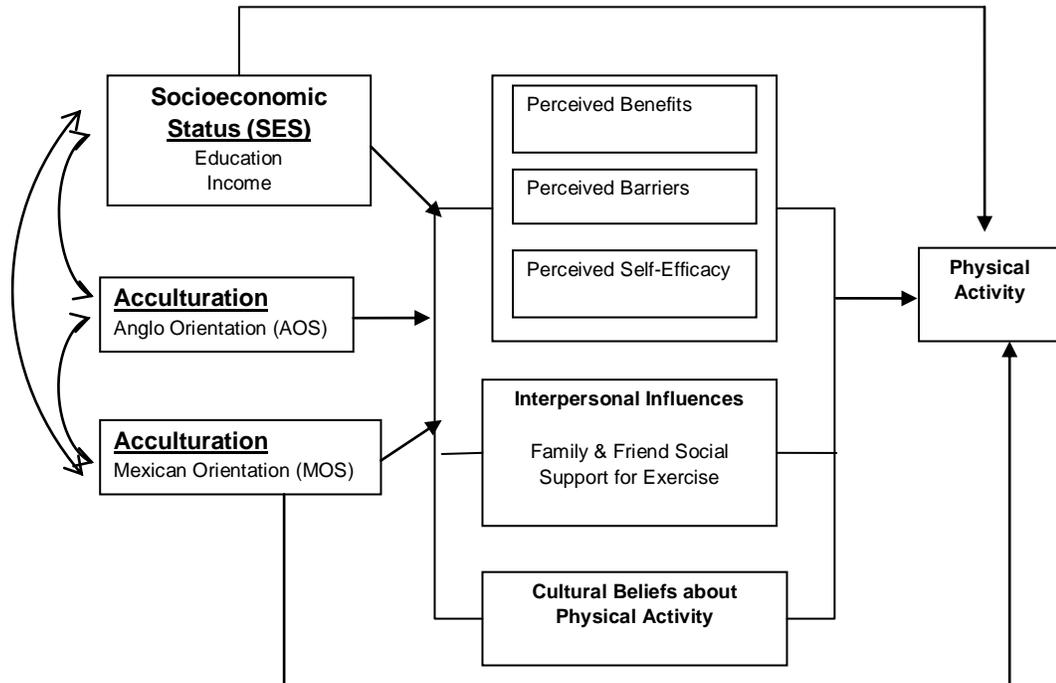
The conceptual model for the present study included selected variables from the HPM (see Figure 1). Personal factors included acculturation and socioeconomic status; behavior-specific cognitions and affect included perceived benefits and barriers, perceived exercise self-efficacy, beliefs about physical activity, and friend and family support for exercise; and the behavioral outcome was physical activity. The model was used to compare relationships among variables for Hispanic and non-Hispanic White college aged women.

Research Questions

The specific questions addressed in this study of correlates of physical activity in Hispanic and non-Hispanic college-aged women were:

1. What is the prevalence of physical activity in college-aged Hispanic and non-Hispanic women?
2. Do selected correlates of physical activity account for differences in physical activity in college-aged Hispanic and non-Hispanic women?
3. Are selected constructs of Pender's Health Promotion theory related to physical activity participation in college-aged women?
4. What is the relationship between acculturation, selected correlates, and prevalence of physical activity in college-aged women?
5. Are there differences in beliefs towards physical activity between college-aged Hispanic and non-Hispanic women?
6. Is acculturation related to beliefs towards physical activity among college-aged Hispanic and non-Hispanic women?

Figure 1. Proposed Path Model of Vigorous Physical Activity Evaluated across Samples of Hispanic and Non-Hispanic College Women College-Aged Women.



CHAPTER 2: REVIEW OF THE LITERATURE

This section presents a review of the literature relevant to the dissertation study. Issues pertinent to this study include health disparities and physical activity, physical activity measurement, physical activity in emerging adulthood, health behavior models, acculturation, cultural beliefs, and other determinants of physical activity in emerging adulthood and in Hispanic women.

Health and Health Disparity

Population inequalities in health, e.g., disease and mortality rates and access to and delivery of healthcare and preventive care, are considered health disparities. The elimination of health disparities in minority populations is one of the overall health goals of the nation (USDHHS, 2001). The Centers for Disease Control and Prevention define health disparities as “preventable differences in the burden of disease, injury, violence, or opportunities to achieve optimal health experienced by socially disadvantaged populations” (CDC, 2009, ¶1). Racial health disparities are reduced but still present when SES is controlled (Stewart & Nápoles-Springer, 2003). Several factors may contribute to these disparities including poverty, environmental conditions, education, access to health care, differences in health care, language barriers, and individual behaviors (CDC, 2009; Stewart & Nápoles-Springer, 2003). In reviewing the research literature Stewart and Nápoles-Springer (2003) also note significant findings of

“suboptimal” medical treatment for minorities compared to Whites. Whatever the contributing factors, preventable health disparities exist.

National data illustrate Hispanic health status and health disparities. The five leading causes of death for Hispanics are heart disease, cancer, accidents, stroke, and diabetes (Heron, 2007). The relative burden of diabetes mortality has increased over time, reaching the top five causes in 1997 and accounting for 5% of Hispanic deaths in 2004—twice the rate for non-Hispanic Whites (CDC, 2004b; Heron, 2007). Moreover, for physician-diagnosed and undiagnosed cases, 2003-2006 diabetes prevalence rates are nearly double for Mexican-American adults (15.7%), aged 20 years and older, compared to White only adults (8.8%) (National Center for Health Statistics [NCHS], 2009). In 2001, after adjusting for age, Hispanics lost more potential life than non-Hispanic Whites for stroke (18%), chronic liver disease and cirrhosis (62%), diabetes (41%), human immunodeficiency virus disease (168%), and homicide (128%) (CDC, 2004b). Therefore, for several conditions Hispanics bear a greater burden in terms of mortality than non-Hispanic Whites.

Hispanics also have higher rates of risk factors for premature mortality and morbidity that impacts quality of life. A special report on health disparities also described higher 1999-2000 rates of overweight and obesity for Mexican-Americans, aged 20-74 years, compared to Whites: 11% and 7% higher for males, and 26% and 32% higher for females (CDC, 2004b). For 2003-2006 the actual

rates of overweight and obesity, were 57.4% and 32% for White females, and 74.4% and 42% for Mexican-American females (NCHS, 2009). Additionally, Mexican-American youth, aged 12-19, reported 112% higher overweight rates for males, and 59% higher for females (CDC, 2004b). Physical inactivity and overweight in adults increase risk for cancer, heart disease, stroke, diabetes, osteoarthritis (particularly in the knee joints), kidney disease, anxiety, depression, and poor pregnancy outcomes (Levi, Vinter, Richardson, St. Laurent, & Segal, 2009). For adolescents, data from two waves of the National Longitudinal Study of Adolescent Health indicate that Hispanics, blacks, and native-born youth were most at risk for increasing obesity during the transition to young adulthood, i.e., 20-25 years of age (Harris, Perreira, & Lee, 2009). In a longitudinal study with a bi-ethnic population, more Mexican Americans at baseline were overweight (43.5%) and obese (34.8%) and had diabetes (23.5%) compared to non-Hispanic Whites (39.2%, 18.3%, and 9.3%, respectively) (Hunt et al., 2003). Additionally, more Mexican Americans required insulin (3.4%) for diabetes than non-Hispanic Whites (0.9%) and were more likely to report cardiovascular disease (CVD) and diabetes.

Not only do Hispanics have higher rates of overweight, they also experience greater behavioral risk factors for overweight and obesity and disease exacerbation: less insurance, lack of access to health care, lower rates of ongoing health care, less prenatal care in the first trimester, and lower rates of physical

activity (CDC, 2004b). Hispanics are also more likely to experience less favorable socioeconomic status, psychosocial stress, environmental exposures, and discrimination (NCHS, 2009), which may lead to poorer health and poor health practices (Abraído-Lanza, Armbrister, Flórez, & Aguirre, 2006; CDC, 2004b). Hispanic adolescents who are overweight or obese complete fewer years of education, experience lower household incomes as adults, and are less likely to marry (Harris et al., 2009). An analysis using the Third NHANES found that while all US-born Hispanic women had high prevalence of abdominal obesity, US-born Spanish-speaking women had greater waist circumferences, had more prevalent abdominal obesity, and were significantly more likely to have one or more CVD risk factors, such as hypertension, hyperlipidemia, non-insulin dependent diabetes, and high serum insulin (Sundquist & Winkleby, 2000). These findings are particularly disconcerting when one considers that overweight and obesity are related to the top three causes of death and diabetes; and diabetes increases risk for, or complicates, existing heart disease.

In the literature, health professionals and researchers discuss the Hispanic paradox: a phenomenon in which Hispanics have lower socioeconomic status and higher rates of obesity and diabetes, but have lower all-cause and cardiovascular mortality rates than non-Hispanic Whites (Hunt et al., 2003). In their review of the literature Lara, Gamboa, Kahramanian, Morales, and Hayes Bautista (2005) found that 2001 age-adjusted mortality rates for Latinos were 22% lower than

non-Latino Whites and 41% lower than those of non-Latino blacks. This paradox would then seem to diminish some claims to health disparities by Hispanics and counteract concern for disparities in mortality risk factors. However, using longitudinal data from the San Antonio Heart Study, researchers refuted the paradox by comparing risk factors and mortality rates between Mexican Americans and non-Hispanic White participants (Hunt et al., 2003). “Mexican Americans have a 50 percent greater risk of all-cause mortality, a 70 percent greater risk of cardiovascular mortality, and a 60 percent greater risk of coronary heart disease mortality than do non-Hispanic Whites” (p. 1056). These findings are particularly strong for Mexican Americans with diabetes not requiring insulin. Mortality rates for Mexican Americans and non-Hispanic Whites without diabetes or with diabetes requiring insulin were similar.

Arguments against allowing the paradox issue to detract from health disparity research and interventions can be summarized as follows: mortality rates do not fully illustrate disparities in quality of life and longevity (as noted in the previous paragraphs); differences in Hispanic sub-populations do not reflect the paradox; and, research indicates that the longer an Hispanic lives in the United States, the more likely s/he is to lose protective behaviors and adopt unhealthy behaviors, especially overweight (Harris et al., 2009; Yeh, Viladrich, Bruning, and Roye, 2009). In fact, Lara and colleagues (2005) found that mortality and prevalence rates varied substantially depending on “Latino origin or cultural

heritage” (pg. 368), and these rates differed by the usual factors of socioeconomic status, educational level, gender, and age, as well as acculturation status. Another artifact in the paradox issue is the age structure of Hispanics. The Hispanic population in the US is heavily weighted toward youth (Heron, 2007), which means as these youth age they will undoubtedly begin to show increased health problems and possible negative changes in mortality rates. Meanwhile only time and further research will illuminate the truth of the Hispanic paradox. The fact remains that health disparities exist in mortality, morbidity, and negative health risk factors, such as overweight and physical inactivity.

Importance of Physical Activity in Relation to Health Disparity

Less than half of women in the United States engage in regular physical activity of sufficient quality and duration to impact risk of chronic diseases, and minority women are among the least active (USDHHS, 1996). In her Report on Physical Activity and Health (USDHS, 1996) the Surgeon General noted evidence in the literature that physical activity that improves cardiorespiratory endurance improves mental health and reduces the risk of developing and dying from CVD, hypertension, non-insulin dependent diabetes (NIDDM), and colon cancer; and may decrease the risk of developing osteoporosis, depression, and obesity. Meta-analyses and current research demonstrate alleviation of depression and improved well-being with physical activity (Bartholomew & Miller, 2002; Bartholomew, Morrison, & Ciccolo, 2005; Crews & Landers, 1987; Galper et al., 2006; Landers

& Arent, 2001; Marquez, McAuley, & Overman, 2004; North, McCullagh, & Tran, 1990). The Surgeon General concluded that because of the dose-response relationship between physical activity and its benefits, increases in physical activity are “likely to substantially improve the health and quality of life of many people” (pg. 149). Thus, physical activity can positively contribute to the elimination of health disparities in the Hispanic population.

Prevalence of Physical Activity among Women and Hispanic Women

The US Surgeon General also confirmed that Mexican-American men and women are also less physically active than their Anglo-American counterparts both in leisure time physical activity (LTPA) and recommended levels of physical activity (USDHHS, 1996). Crespo and colleagues (2000) studied physical activity using the Third National Health and Nutrition Examination Survey. Among the various racial and ethnic groups, rates of leisure time physical *inactivity* were highest for Mexican American men (33%) and women (46%) for almost every variable of social class—income, education, occupation, employment, poverty, and marital status. A separate analysis using the Third NHANES found that while all US-born Hispanic women had high prevalence of abdominal obesity, US-born Spanish-speaking women had greater waist circumferences and more prevalent abdominal obesity, and were significantly more likely to have one or more CVD risk factors, such as hypertension, hyperlipidemia, non-insulin dependent

diabetes, and high serum insulin (Sundquist & Winkleby, 2000). These women also had the lowest prevalence (56.3%) of LTPA (Sundquist & Winkleby, 2000).

Neighbors, Marquez, and Marcus (2008) combined data from the 2000-2003 National Health Interview Survey to examine sociodemographic variables and LTPA in non-Hispanic Whites and Hispanic sub-groups. All Hispanic sub-groups had significantly lower LTPA prevalence, but rates also varied among the six sub-groups. Mexican-Americans had the lowest prevalence (47%) of no LTPA, while Cubans had the highest prevalence (66%). Unlike findings for the men in the study, differences in physical activity for the women persisted after controlling for sociodemographic variables. Numerous other studies have found similar low prevalence of LTPA in Hispanic populations (Gordon-Larsen, Harris, Ward, & Popkin, 2003; Huebert, 2004; Perez-Escamilla & Putnik, 2007; Wilbur, Chandler, Dancy, & Lee, 2003). When other types of physical activity, like household and occupational activity, are included in measures, Hispanic women's levels increase, often to meet recommended levels of physical activity; however, their rates are reportedly still below those of non-Hispanic White women in most studies (López, Bryant, & McDermott, 2008; Sternfeld et al., 1999); however, in at least one study the rate has been greater (Brownson, Eyster, King, Brown, Shyu, & Sallis, 2000).

Measurement of Physical Activity—Issues with Ethnic Women

Differences in physical activity prevalence within and between studies may be artifacts of measures, typically surveys, which do not focus on activities performed by women in general, much less minority women (Masse et al, 1998). A frequent criticism of physical activity research in minority women is the classification of physical activity and limiting of physical activity to LTPA without regard to occupational, household, and child or elder care-giving physical activity. Women have daily routines that often include family and home responsibilities not shared by men. In support of LTPA restrictions, Casperson, Pereira, and Curran (2000) note, “[LTPA is] particularly amenable to individual modification or community intervention. For these reasons, Healthy People 2000 objectives focus on leisure-time physical activity (p. 1607).” Yet, this focus may misrepresent physical activity in minority populations, especially women.

In comparing several measures and protocols in determining the prevalence of meeting physical activity guidelines, researchers using the National Health Interview Survey (NHIS) found that women reported much lower rates of physical activity compared to men (Sarkin, Nichols, Sallis, & Calfas, 2000). The researchers believe these gender differences may have been due to the list of activities used in the NHIS being more representative of men’s activities than women’s activities. Interestingly, the same population sample and different scoring protocols and/or instruments yielded health-related physical activity

prevalence rates ranging from 4% to 70% and participants who met ACSM fitness guidelines ranging from 32% to 59%. These ranges illustrate quite disparate prevalence rates using the same dataset.

Other studies illustrate the importance of how physical activity is defined and measured. Abel, Graf, and Niemann (2001) found that women appeared less active than men when interview questions concerned exercise and sport participation. However, when questioned about habitual activity, levels of physical activity did not differ between genders. In reviewing the literature, Redecker and Musanti (2002) also noted that women tend to describe housework as physical activity and are less likely to participate in LTPA compared to men. They reported that fewer than 25% of women engaged in conditioning and sports activities. Furthermore, when all types of activities were taken into account, studies found 63% to 75% of their samples reporting physical activity at levels to achieve health benefits. In addition to housework, other categories of physical activity have included occupational, childcare, walking, and lawn and garden activities. Bennett (1998) also included shopping. When examining prevalence and correlates of physical activity in women, researchers may want to consider all categories of physical activity to avoid underestimating activity. This practice would be consistent with the Surgeon General recommendations that adults should accumulate at least 30 minutes of moderate physical activity, not restricted to structured exercise, on most days of the week.

A study by Sternfeld, Ainsworth, and Quesenberry (1999) also illustrates the importance of defining and broadening the scope of physical activity. The researchers surveyed members of Kaiser Permanente Medical Care Program in California using a questionnaire adapted from the habitual physical activity survey developed by Baecke, Burema, and Fritjers. The Baecke tool included questions about occupational activity, sports and exercise, and other LTPA (active living). The Kaiser Physical Activity Survey (KPAS) added items regarding household and child or elder care activities, self-efficacy, social support, and perceived barriers, and a time frame of the past year. The researchers found that leaner, younger, White, college-educated women without young children at home were more likely to have the highest level of participation in sports/exercise and active-living behaviors. They also had high self-efficacy and social support for exercise, did not lack motivation, and did not perceive external obstacles, such as lack of facilities or equipment, to be barriers. Conversely, older, Hispanic, unemployed, married women with young children at home perceived little available time to exercise and had the highest level of household/caregiving activity. Sternfeld and colleagues suggest that differing “sociocultural milieus” promote or necessitate occupational and household/caregiving activity. They further suggest, with evidence from the literature, that the strategy of encouraging lifestyle activities may be irrelevant and undervalued by those who are already “on their feet” all day. Verhoef and Love (1994) found that mothers were more

likely to say they got enough activity looking after children and homemaking than women without children. These findings provide evidence for the claim that focusing on one class of physical activity to the exclusion of other types may misrepresent physical activity prevalence in women of varied ages and stages.

Other physical activity measurement issues exist. As part of the Women's Health Initiative, a panel of 53 experts in the area of physical activity measurement in minority women, women in mid-life (aged 40-75), and older women (aged >75) convened and summarized their findings (Masse et al., 1998). While the target populations of the discussions were not specifically women in emerging adulthood, many findings are relevant to that population, and the authors who summarized the findings note that many of the issues can be generalized to children and men. The panel identified five broad areas of concern: *characteristics of the sample population, dimensions of physical activity, measuring moderate and intermittent activities, designing and administering surveys, and assessing the reliability and validity of surveys* (Masse et al., 1998).

Within characteristics of the sample population, experts discussed issues related to sociocultural environment, multiple roles, life events, race and ethnicity, and cognitive functioning. Pertinent issues to this paper and the emerging adulthood population would be culturally relevant activities, role expectations that may differ across culture and gender, life events, and ethnicity. The experts

suggest that race measurements include multidimensional features of ethnicity, such as birthplace, spoken language, and acculturation.

Issues related to dimensions of physical activity include functional independence, health status, life spheres and context, and walking. These issues may be significantly different for women in emerging adulthood, yet they have not been systematically studied. In addition, measuring moderate and intermittent activities may be particularly salient to women because of the activities women perform *simultaneously*, for instance, helping with homework, doing laundry, and cooking all at the same time. Defining intensity of activity is also a challenge in physical activity research. “The physical intensity of a task is often confused with the emotional demand of an activity (Masse et al., 1998, p. 63).”

Another area of concern was the design and administration of surveys, chiefly mode of administration, usefulness of current questions and formats, global vs. descriptive questioning, and survey length. When using existing surveys, the experts suggest researchers may need to substitute more relevant activities for current items. Additionally, the experts suggest “a series of past-week surveys may be better suited for respondents whose physical activities are infrequent or that change regularly [as opposed to 1-month or 1-year recall frames] (Masse et al., 1998, p. 63),” which is probably more descriptive of an emerging adulthood population—especially college students.

Finally, the panel discussed assessment of reliability and validity of surveys. Related issues included seasonal and intraindividual variation, trust, social desirability, interest, and wording and definitions. Sedentary and regular exercisers are much easier to characterize, and patterns are much more stable. Distrust of researchers is more common in studies of minority populations. “In some cultures, social norms dictate that women remain reserved. They may label such behaviors as running, playing sports, or sweating as undesirable and, therefore, may not report the activities even if they perform them. On the other hand, overreporting may be an issue for women who feel they ought to be more active (Masse et al., 1998, pg. 64).” The panelist felt it was important to measure light and moderate activity to “reduce the risk of women losing interest in the survey and refusing to participate” (p. 64). In other words, it is important to validate the role of all activity in women’s lives.

Target Population: Emerging Adulthood

Many population health differences begin in youth. The CDC notes higher rates of asthma, overweight, and Type II Diabetes in Hispanic and African-American youth than in their White counterparts (CDC, 2009). Additionally, Hispanic youth have higher rates of anxiety related behaviors and depression (CDC, 2009). Furthermore, the leading causes of death and illness among minority populations in later life arise from unhealthy behaviors established in childhood; these include physical inactivity, poor nutrition, and use of tobacco

and other drugs (CDC, 2009). Accordingly, early intervention becomes essential in progress towards eliminating health disparities.

Health disparities and physical activity are influenced by many factors across the life span. Progression from childhood to young adulthood to middle and older adulthood give rise to different developmental issues related to health and physical activity. In research, a developmental perspective addresses psychosocial and behavioral changes within and across individuals over time (Weiss & Raedeke, 2004). Research from a developmental perspective must use theories and methods that “capture age-related differences in cognitions, perceptions, and behaviors in physical activity contexts” (p. 3). Age, gender, class, and culture are inextricably involved in biological and social-environmental influences related to physical activity and inactivity (Gill, 2004). Prevalence and correlates of physical activity differ in subpopulations and over time. Physical activity declines begin in adolescence and continue to middle-adulthood, albeit at a slower rate (Sallis, 2000). Adolescents and adults in general (aged 18 and over) have been better-studied than populations of emerging adults. A developmental perspective requires a description and explanation of the decline in physical activity in this subpopulation in order to optimize development through the adoption and/or maintenance of physical activity.

Emerging Adulthood as a Developmental Stage

Arnett (2000, 2006) and others (Tanner, 2006) provide evidence that emerging adulthood—about 18 to 25 years of age, is a distinct developmental period and “a critical turning point in the human life span.” Arnett describes this extended period, before formal adoption of adult roles and adult identity, as the age of identity exploration, instability, possibilities, self-focus, and feeling in-between. More than any other period, emerging adulthood is characterized by demographic variability and individual exploration. Demographic changes in the last several decades have helped illustrate or define this developmental stage (Arnett, 2006). The median age of marriage and the age at first childbirth have both risen steadily and leveled out, and the variance in these two demographics has expanded, with some individuals still marrying and having a first child early in their teens and others waiting until their 30’s, but most marrying and experiencing parenthood somewhere in between. Moreover, marriage is often no longer the *exclusive* context for childbirth. Other demographic changes comprising this “new” stage are participation in higher education, establishment of careers, and increased rates of moving.

Emerging adulthood, as described by Arnett (2000, 2006), has 5 features: identity exploration, instability, self-focus, feeling in-between, and possibilities. Arnett notes that identity exploration had been a task of adolescence, but even Erikson commented on the “prolonged adolescence” typical in industrialized

societies where young people experiment with different roles and explore possibilities in love, work, and ideologies. Emerging adults ask questions about who they are and what their values and beliefs are. These explorations create a stimulating, but unstable, period as demonstrated by high rates of moving and changes in cohabitation and jobs. Emerging adults are not selfish, but they are self-focused because they have fewer social obligations. Consequently, they spend more leisure time alone than most other persons, except the elderly. This self-focus aids self-sufficiency, self-knowledge, and identity formation. In his research, Arnett found that the majority of 18-25 year olds do not feel they have reached adulthood, rather they feel *in between*. In fact, *35 years old* is the age in which nearly everyone has gotten past this ambiguity. And finally, Arnett describes the age of possibilities as a time of *great optimism* and *high hopes for the future*, regardless of the persons' current situation. Additionally, a second possibility is for emerging adults to transform their lives and live differently than they have up to this point. This age is resplendent with opportunities for individuals to change their lives, establish independent identities, and make independent decisions about who they are and what they do. Of course, one identity emerging adults can adopt is someone who is healthy and active. Obviously, these developmental tasks influence patterns and correlates of physical activity.

Before discussing physical activity in emerging adulthood, the role of culture and ethnicity in development for emerging adults should be addressed. Arnett notes that emerging adulthood as a distinct stage is more common in industrialized countries, and in the future will probably become more universal as the trend for globalization of economies and communication spreads (2000). In a study of cultures published in 1991, the researchers explored stages of adolescence, adulthood, and in between (Schlegel & Barry, 1991, cited in Arnett, 2000). While adolescence was universal, only 20% of the studied cultures had a stage between adolescence and adulthood. The existence of or length of an emerging adulthood stage is influenced by cultural, social, and economic pressures (Arnett, 2000). Arnett explains, for example, that when values regarding parental control, premarital intercourse, and gender roles are less conducive to exploration (i.e., early marriage and childbirth, and living at home with less autonomy) the stage is absent or shortened. A teenager who has a child at the age of 16 and must obtain jobs or welfare to financially support self and child does not have time for exploration. Because of less available opportunities for minority cultures, members of minority groups may not experience this extended period of exploration (Arnett, 2000).

In ethnic minority groups, criteria for reaching adulthood may vary for cultural and demographic reasons, and certain experiences may shorten or lengthen the stage of emerging adulthood (Phinney, 2006). Phinney (2006)

examined research and discussed issues involving ethnicity and emerging adulthood. Members of ethnic groups face similar developmental issues as White peers, but also have additional challenges and strengths. Involvement and roles in the family may influence ethnic group members to take on more adult responsibilities earlier. Additionally, the widely varied environments to which ethnic members are exposed can be “critical determinant[s] of the timing, duration, and nature of ethnic identity exploration (Phinney, 2006, p. 129).” Characteristics that seem to contribute more to these factors are where and whether members attend college, and the ethnic and racial make-up and acceptance of that setting. These issues may advance or delay identity resolution. Of course, exploration of ethnic identity may involve embracing, negating, or blending of values and beliefs from minority and majority cultures depending upon that setting and previous experiences.

Physical Activity Patterns in Emerging Adulthood

A number of researchers have examined patterns and correlates of physical activity across the life span or during life transitions. According to Sallis (2000), “The decline in physical activity with age may be the most consistent finding in physical activity epidemiology...well documented ... not well understood” (p. 1598). He claims that not many studies have determined the nature and mechanism of this decline in terms of types and intensities of physical activity and environmental and biological contributions. “Identifying ages of

greatest decline may be useful in targeting interventions to critical periods in life” (Sallis, 2000, p. 1598). The steepest decline appears to be between the ages of 13 and 18, and appears to be due to decreases in nonorganized sport and vigorous activity (Sallis, 2000). While males decrease physical activity the most, they are still more active than females across the board (Sallis, 2000). A few studies attempt to address Sallis’ concern. As of 2000 only one study in the *United States* followed adolescents to adulthood to determine activity patterns and changes in those activity patterns.

The *Amsterdam* Longitudinal Growth and Health Study followed Dutch subjects between the ages of 13 and 27 and is one of the few longitudinal studies describing the natural development of habitual physical activity (HPA; VanMechelen, Twisk, Post, Snel, & Kemper, 2000). This study confirms the decline in HPA over the 15-year period in both male and female subjects. Women in the study showed a decline in time spent on vigorous activities, and they spent significantly more time in moderate activities than male subjects. Interestingly, time women spent in very vigorous activity remained relatively stable. In regards to more specific activity, the Dutch researchers saw that for males and females between 21 and 27, “organized sports activities became relatively more important contributors to both weekly habitual activity time and the weekly energy expenditure (Van Mechelen et al., 2000, pg. 1616).”

Declines are also seen in American populations. In a cross-sectional study using 1992 National Health Interview Survey data, Casperson, Pereira, and Curran (2000) examined differences in physical activity patterns in the United States. They found that physical activity patterns “eroded” the most from ages 15 through 18, with continued erosion until middle adulthood (30-64 yr) when activity patterns were relatively stable. Regular vigorous activity and strengthening activity declined consistently from ages 12 through 21. Levels of inactivity for women were greater than men, and levels of activity, particularly vigorous activity were also less. A longitudinal study, the Coronary Artery Risk Development in Young Adults Study (CARDIA) followed subjects over a 7-year period and found reasonable evidence of physical activity tracking (Anderssen et al., 1996). Still, the CARDIA study demonstrated young adult previous 12 month declines of almost 30% across all groupings examined 4 times between 1985-86 (ages 18-30) and 1992-93 (ages 25-37); researchers attributed approximately 38% of this difference to secular trends rather than to aging factors alone (Anderssen et al., 1996). Both studies illustrate the need for determining the patterns and determinants of physical activity decline in this age group.

In a study of adolescents using 1993-2003 data from the national survey, Monitoring the Future (Delva, O’Malley, & Johnston, 2006), more males than females at each time interval and in each racial/ethnic group reported getting vigorous exercise. Moreover, PA levels dropped with increasing grade levels for

each racial/ethnic group, and this decline was greater for females than for males. Additionally, while little racial/ethnic differences existed for the males across grade levels, larger differences existed among racial/ethnic groups for females. As an example, in 2001-2003, the decline in getting vigorous exercise between 8th and 12th grades for White females was from 53% to 30.1% and for Hispanic females, 38.9% to 20.6%. In a college aged sample, gender and ethnicity patterns are similar (Suminski et al., 2002). Fewer men (40.3%) than women (53%) reported no vigorous PA in the preceding month, and 11.3% and 22.0%, respectively, report no PA at all. Again, PA prevalence was not related to ethnicity for men. However, 17.4% of non-Hispanic White women reported no PA compared to 20.3% of Hispanic women.

Researchers have found conflicting data regarding physical activity determinants, but agree that these correlates change over time. A history of exercise in youth is unrelated to physical activity in adulthood (Sallis & Owen, 1999), yet physical activity across the life span is a predictor of physical activity in old age for women (Redeker & Musanti, 2002). Women who reported participation in sports during childhood and teenage years *and* recreational sports in midlife were more likely to have high levels of physical activity in old age. Women who view themselves as capable of physical activity earlier in life may carry this belief into old age.

Marcus and Forsyth (1998) proposed that a woman's stage of life appears to be a determinant of physical activity and that barriers to physical activity differ with different life stages. Possible barriers for young adults included school and work demands, social pressure, and weight and body image concerns. Indeed, research on emerging adults demonstrates the importance of physical attractiveness to this age group (Brown, 2006). Marcus and Forsyth (1998) recommended identifying developmental stages and milestones in women's lives that impact physical activity in order to develop and implement appropriate strategies for overcoming barriers at each stage of life.

A seven year longitudinal study of 16-25 year olds examined physical activity and psychosocial determinants and how well they tracked over time (DeBourdeaudhuij, Sallis, & Vandelanotte, 2002). "Relatively high perceived benefits and barriers suggest that cognitions related to physical activity are more stable than the behavior itself (p. 376)." This fact makes a case for early interventions to ensure that both cognitions and emotions related to physical activity are positive. Moreover, this association suggests interventions may have long-term effects. Physical activity did not track for males, but total energy expenditure and moderate-intensity activities tracked moderately for females. The authors concluded, "As it was found that a more complex and busy living situation affected physical activity negatively in young adult women, it may already be important for female youngsters to focus on moderate-intensity

activities that can be incorporated in daily routines and child-rearing activities at a later stage in life (p. 384).” Thus, with physical activity rates declining from adolescence through emerging adulthood and physical activity determinants being specific to life-stages, the emerging adult stage is an important time to target for increased physical activity.

Theoretical Model

Ecological and Health Promotion Models

Theories and models of health behavior have important functions in health behavior change research and intervention. These theories identify targets and methods for change, guide the search for and selection of modifiable factors, such as knowledge and resources, and inform the evaluation process (Glanz, Rimer, and Lewis, 2002). Furthermore, these theories may focus on or combine multiple levels of influence: intrapersonal or individual factors, interpersonal factors, institutional or organizational factors, community factors, and public policy factors (Glanz et al., 2002). Theories and models which involve multiple levels of influence are ecological theories or models. Eyster and colleagues (2002) note that ecological models recognize “the many layers of correlates that influence physical activity behavior, including community norms and responsibility for environmental and policy changes (pg. 241),” and that ecological models differ from many other theories because they include factors external to the individual which influence behavior. Cognitive, social, and environmental variables are

believed to influence the engagement in physical activity (Eyler et al., 2002). Given that societal norms have not been based on minority beliefs and culture, an ecological model may be more conducive to understanding the correlates of physical activity in minority women. The Pender Health Promotion Model includes cognitive, social, and environmental variables that provide such an ecological framework for examining physical activity behaviors in minority women.

Tests of the Health Promotion Model

Pender, Murdaugh, and Parsons (2001) summarized thirty-eight studies using the Health Promotion Model; eleven had exercise as the dependent variable. In 61% or greater of the studies testing one or more of the following constructs, researchers found perceived benefits and barriers, prior behavior, and perceived self-efficacy significantly related to health-promoting behavior. Significant variables explained 9-59% of the variance in the studies, with 27 studies reporting greater than 20% of the variance explained. In studies with exercise as the dependent variable the constructs most consistently found significant were perceived self-efficacy, benefits, and barriers. Interpersonal influences were significant in a study of women in structured exercise programs. Only one study used a population of Mexican American industrial workers in order to examine use of hearing protection; the same three constructs, as well as definition of and perceived health, were significantly associated with hearing protection use. Since

only a limited number of studies specifically use the HPM and Hispanics, emerging adults, and/or physical activity, other studies are needed.

Constructs and Variables

Race/Ethnicity

The definition and determination of race/ethnicity is a major issue in health disparities research. In an article summarizing measurement issues in health disparities research, Stewart and Nápoles-Springer (2003) noted that race/ethnicity classifications are “markers of many complex, interrelated factors such as acculturation, SES, health behaviors, literacy, health beliefs, racism, power differentials, skin color, culture, and environment that are confounded with race/ethnicity” (pg. 1208). Any or all of these factors may underlie health disparities.

The current study uses several options for classifying race/ethnicity. However, the primary method of determination in this study is self-identification using the combined format established by the Office of Management and Budget (OMB) Federal Standards for Racial and Ethnic Data (OMB, 1997). This format allows for multiple responses to six minimum categories: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, and White.

Acculturation

Acculturation is the blending or adoption of one culture by individuals of another culture and is measured in a variety of ways. Subpopulations, e.g., immigrant ethnic groups, acquire cultural elements of the dominant, or host, society—values, attitudes, customs, and behaviors, such as language, dress, foods, music, etc. (Cuéllar, Arnold, & Maldonado, 1995; Dergance, Mouton, Lichtenstein, & Hazuda, 2005; Lara et al., 2005). Acculturation allows subpopulations to fit in and become part of the host society; a process often called “structural assimilation” (Gordon, 1975, cited in Dergance et al, 2005; Hazuda, Stern, & Haffner, 1988; Lara et al., 2005). Structural assimilation refers to the degree in which a subpopulation interacts with members of the host society and functions in the larger host society—from making close friends, to forming primary groups, and to entering exclusive clubs and institutions (Gordon, 1975, cited in Dergance et al, 2005; Hazuda et al., 1988). However, structural assimilation can occur without changes in acculturation (Dergance et al, 2005; Hazuda et al., 1988).

In a review of acculturation in health and social science research, Lara, Gamboa, Kahramanian, Morales, and Hayes Bautista (2005) make several observations about the acculturation process. Historically, acculturation was viewed as unidimensional, moving along a linear continuum of *not acculturated* to *fully acculturated*, i.e., total immersion in the dominant culture. However,

contemporary theories and measures of acculturation are multidimensional and often emphasize a biculturalism in which individuals exist comfortably in both cultures. Additionally, they observed that different subgroups vary in their rates of assimilation and the degree of assimilation. Portes and Rumbaut (2001, cited in Lara et al., 2005) attribute this “segmented assimilation” to three factors: human capital (e.g., language ability, education, wealth, and occupational skills), host governmental and institutional policies and members’ attitudes toward the subgroup, and resources and structure of the *new* group and its community. Finally, Lara et al note that the newer models identify basically four outcomes of acculturation: 1) assimilation—adopting the host culture, 2) separation—maintaining the original culture and avoiding or rejecting the new one, 3) integration—“embracing and valuing both cultures” (pg. 371), and 4) marginalization—being or feeling excluded by the origin *and* host cultures. Of course, these acculturation outcomes occur in varying degrees among groups and across time unlike the earlier linear models.

Just as acculturation models have changed over time, so have measures of acculturation. The various measures of acculturation have hindered public health research and interpretation of findings (CDC, 2004b; Lara et al., 2005). Studies have used a mixture of proxy measures for acculturation. The most common proxies appear to be the language spoken or preferred, country of birth, number of years in the host country, generation status, self-identified ethnicity, and summary

scales. Lara and colleagues (2005) identified 15 acculturation scales and summarized the measured constructs in which they differed:

- uni- versus bi-dimensionality
- engagement in culturally specific behaviors, such as music, diet, and media;
- proficiency in, use of, and preference for the Spanish or English language;
- knowledge of culture-specific history and current events;
- sense of cultural identity; and
- adoption of and belief in culture-specific values (pg. 372).

Lara et al noted an overemphasis on language and the difficulty and limitations in measuring values and behaviors. One such limitation would be the availability and accessibility to culture-specific items or practices. Other criticisms of proxy variables include the assumption that acculturation can be measured by length of exposure to the host society, and the failure to address contextual factors and modifiers among individuals, such as the stress experienced, the ability to cope, and the actual acculturation outcome. Many critics claim that differences in measurement contribute to inconsistent relationships between acculturation and health outcomes (Lara, et al, 2005). Despite the dynamic process of acculturation and measurement limitations, most theories and measures capture movement towards the dominant culture.

In spite of these limitations of measurement, researchers have examined the relationship between culture, acculturation, and health and health behaviors. Associations with positive and negative changes in health and health behaviors

suggest a complex relationship (Lara et al, 2004; Stewart & Nápoles-Springer, 1997) in which biculturalism may predict better health (Skinner, 2001, cited in Stewart & Nápoles-Springer, 1997). In their commentary, Abraida-Lanza (2006) discuss the possibility that acculturation measures may actually be proxy measures for prolonged exposure to disadvantaged social status, stressful events, or the process of immigration and acculturation. Additionally, they discuss the assumption that a group acculturates to the White American culture, when some may acculturate to other minority cultures or subcultures.

Generally, higher levels of acculturation positively predict physical activity, and lower levels predict physical inactivity (Crespo et al, 2000; Crespo et al., 2001; Huebert, 2004; Marquez et al, 2004; Pichon, Arredondo, Roesch, Sallis, Ayala, & Elder, 2007), but some studies suggest other possibilities (Coleman, Gonzalez, & Cooley, 2000; Lara et al., 2005; López et al., 2008; Wilbur et al., 2003; Yeh et al., 2009). In a study of Mexicans in Mexico City and San Antonio Mexican Americans, Mexicans were leaner and engaged in more physical activity (Stern, Gonzalez, Mitchell, Villalalpando, Haffner, & Hazuda, 1992).

Additionally, San Antonio Mexican Americans had 36% higher diabetes prevalence than Mexico City Mexicans, despite similar genetic susceptibility. On the other hand, Coleman, Gonzalez, and Cooley (2000) found that US Hispanic women's choice to exercise was independent of acculturation; still Hispanic women with higher SES and lower BMI selected to exercise more than Hispanic

women with lower SES and higher BMI. Substantial differences in definition and measurement of acculturation, as well as selection bias, may have contributed to these unexpected findings. Other studies also found no relationship between acculturation and physical activity (López et al., 2008; Wilbur et al., 2003). Wilbur, Chandler, Dancy, and Lee (2003) suggest the lack of a relationship in their study might be the inclusion of lifestyle physical activity. As noted, in some studies Hispanics and women have met physical activity guidelines through lifestyle or household physical activity, rather than leisure time physical activity, exercise, or sports (Abel et al., 2001; Sternfeld et al., 1999)

For conditions related to Latino behaviors (such as exercise), mental health outcomes, and chronic disease prevalence, such as asthma, diabetes, hypertension, and obesity, Lara et al (2005) determined no clear relationship with acculturation. They based their conclusion on the insufficient quality and/or number of studies or the existence of multiple studies showing no or conflicting effects. One study they examined and determined as showing negative effects of acculturation on physical activity was that of Gordon-Larsen, Harris, Ward, and Popkin (2003). Gordon-Larsen and colleagues used a large sample of Hispanic immigrant adolescents from the National Longitudinal Study of Adolescent Health to explore acculturation, demographic and structural variables, and overweight-related behaviors, such as physical activity, diet, and smoking. Physical activity levels overall decreased between 1st and 2nd generation

Hispanics; however, when broken down by subpopulation, i.e., Mexican-, Puerto Rican-, Cuban-origin, the Mexican immigrants increased both bouts of moderate-vigorous physical activity and lower intensity physical activity; only the difference in lower intensity physical activity was significant. Two of the five models tested included physical activity, one of which controlled for acculturation. Acculturation appeared to have a much stronger effect for foreign-born Hispanics than US-born Hispanics. The difference in predicted probabilities of overweight was two times greater for Mexicans and Cubans, than for Puerto Ricans, between the models and generations. Interestingly, for Mexicans, predicted probabilities for overweight were 10 points less for 2nd generation than for 1st generation in both models, which seems to indicate a positive effect of acculturation on overweight; however, overall, for Hispanics (all three groups together) the effect was negative.

Other studies have not found a relationship between physical activity and acculturation. In their review of the literature Yeh, Viladrich, Bruning, and Roye (2009) found the association between acculturation and obesity to be “consistent and strong,” but that between acculturation and obesity-related behaviors to be unclear and inconsistent. Additionally, studies demonstrate increases in risk the longer an immigrant stays in the U.S., i.e., > 10-15 years (Yeh et al., 2009). In a longitudinal study comparing European-Americans and Mexican-Americans across socioeconomic and acculturation levels, Hazuda and colleagues determined

that cultural factors played a greater role in diabetes and obesity for Mexican-Americans than socioeconomic factors (Hazuda, Haffner, Stern, & Eifler, 1988). Yet, they also found an association between increases in acculturation and socioeconomic factors and decreases in diabetes and obesity. Using the same population of now older participants, Dergance, Mouton, Lichtenstein, and Hazuda (2005) found that above and beyond SES, structural assimilation was significantly associated with LTPA, but not acculturation. Thus, conclusions about acculturation and physical activity are inconsistent, but generally positive. While language, generation, and self-reported ethnic identity are common main measures of acculturation, they do not fully depict the construct, and generally, existing scales do not adequately address nonlanguage domains, such as behaviors, attitudes, and values (Lara et al., 2005).

General Beliefs and Values in Hispanic Cultures

Mental health and social science practitioners and researchers have identified several cultural values within Hispanic populations and individuals; among these values are *personalismo*, *familismo*, *respeto*, *confianza*, *machismo*, *marianismo*, and spiritualism. Despite this generalized discussion of these values, readers are encouraged to recognize the heterogeneity within Hispanic populations. *Personalismo* refers to a preference for relationships with individuals, rather than institutions or impersonal relationships, and a communication style that encourages warm and friendly exchanges (Añez, Silva,

Paris, & Bedregal, 2008; Gloria & Peregoy, 1996). Persons who value personalismo are unlikely to openly disagree or assert themselves; they strive for conflict-free interactions. Gloria and Peregoy (1996) refer to this aspect as *simpatía*.

Familismo alludes to the feelings of loyalty and commitment to the family over individual needs, as well as “the expectation that the family will be the primary source of instrumental and emotional support” (Alvarez, 2007; Gloria & Peregoy, 1996; Halgunseth, Ispa, & Rudy, 2006, p. 1285). *Respeto* refers to “respect and mutual deference. Interactions occur within a hierarchical structure that is clearly mediated by age, gender, and status,” as well as particular roles (Añez et al, 2008, p. 156; Halgunseth et al., 2006). Younger people respect their elders for their experience and wisdom; likewise, educated individuals and professionals also receive respect. *Confianza* refers to trust in interpersonal relationships, but the meaning is stronger than its English translation (Añez et al, 2008).

The values of *marianismo* and *machismo* influence gender role socialization in Mexican families (Alvarez, 2007). While *machismo* has been associated with negative male behaviors—womanizing and household dominance, it also emphasizes responsibility, provision, and protection for the family, combined with respect for others (Alvarez, 2007; Weidel, Provencio-Vasquez, Watson, & Gonzalez-Guarda, 2008). In a study of Mexican American youth and

their parents, Alvarez (2007) found an inverse relationship between acculturation and *familismo* and *machismo*. *Marianismo* requires the female to be self-sacrificing, nurturing, and submissive to the male; however, it also connotes strength and dignity, flexibility and perseverance, and an “ability to survive” (Campesino & Schwartz, 2000; Gloria & Peregoy, 1996, p. 122).

Finally, spiritualism refers to a shared set of beliefs and practices linking individuals to a higher power that is interwoven into the daily lives of Hispanics, serving to guide behavior and help individuals cope with life’s suffering, and varies across Hispanic sub-cultures (Campesino & Schwartz, 2000; Gloria & Peregoy, 1996). For some Hispanics, aspects in life are a consequence of God’s will and other external factors (Gloria & Peregoy, 1996); this belief is often referred to as *fatalismo*. Hispanic women are often seen as having the primary role of the spiritual formation of the family and the keeper of values and religious practices (Campesino & Schwartz, 2000). In keeping with the concept of personalismo and familismo, Hispanics tend to have a close, intimate relationship with their conceptions of a universal power, God, or God’s representatives, and faith experiences are embedded in the family (Campesino & Schwartz, 2000). These cultural values have been examined for some health behaviors, such as intimate partner and community violence, maternal health care, breast cancer treatment decisions, substance abuse, and HIV (Clauss-Ehlers & Lopez Levi, 2002; Gloria & Peregoy, 1996; Gurman & Becker, 2008; Sheppard et al., 2008;

Weidel et al., 2008); however, few studies have *specifically* examined these values in connection to physical activity.

Beliefs Related to Physical Activity

One qualitative study comparing physical activity perspectives among mid-life Mexican American and Anglo American women found a difference in how these women view exercise (Berg, Cromwell, & Arnett, 2002). Anglo American women tended to value individual outcomes and cited personal factors in prevention or promotion of exercise, including the enhancement of health and prevention of illness and injury. In other words, they believed exercise has a role in health promotion. On the other hand, Mexican American women spoke of PA in prescriptive terms and noted family responsibilities and attitudes as factors promoting or preventing exercise. These women did not consider the preventive role of exercise, but rather the curative or disease management role.

Some studies have uncovered cultural issues as correlates which influence physical activity in Hispanic women, mostly while examining populations of mid-life or older women or grouping all women outside of adolescence; almost no studies focus on emerging adult Hispanic women alone. Two qualitative studies illustrate the collective nature of Hispanic values and other cultural values. In one of these studies, involving 75 women over the age of 40 in Houston, TX (Ramirez, Chalela, Gallion, & Velez, 2007), participants identified the top 10 barriers to performing physical activity: safety concerns and fear of going out to

exercise, cost of programs and resources, limited community resources, lack of time and motivation, and cultural issues, such as not wanting to miss *novelas* (soap operas), familismo, modesty (embarrassment about appearance in exercise clothing), and machismo (i.e, spouses not wanting the women to go out and exercise with other men present). Additional barriers included lack of social and family support and lack of information and education about exercise benefits and appropriate exercise for age, fitness level, and health. Participants also reported a preference for physical activity in small groups, so members could support one another, and in churches because of safety, convenience, and familiarity that is more acceptable to family and spouses.

In the other qualitative study comparing physical activity perspectives among mid-life Mexican American and Anglo American women, some of these same issues and others appear (Berg, Cromwell, & Arnett, 2002). As noted previously, Anglo American women tended to value individual outcomes and cited personal factors in prevention or promotion of exercise, including the enhancement of health and prevention of illness and injury. The Mexican American women spoke of PA in prescriptive terms and noted family responsibilities and attitudes as factors promoting or preventing exercise. Some of the time commitments included church, novelas, and duties to others—grandchild care, cooking, etc. Many of these women referred to the family as supporting or interfering with PA engagement—to ‘maintain or enhance my ability to do for my

family' (p. 899). The women felt they would need approval of the family and that the exercise would need to fit into the family's life pattern. In contrast to the Anglos, all the Mexican American women cited cost as a barrier to exercise.

Other Determinants

Using an ecological model, consistent with Eyley (2002), determinants of physical activity fall into one of three categories: intrapersonal factors, interpersonal factors, and environmental factors. Intrapersonal factors can be sociodemographic, biological or health-related, or psychological. Interpersonal factors relate to the social environment, such as social support from family and friends and professionals. Environmental factors include the physical environment, such as neighborhood amenities, and policy related to physical activity or aspects of the environment which impact physical activity, such as funding of recreational facilities and traffic control. In a slightly different structure, the HPM places determinants in two broad categories: individual characteristics and experiences and behavior-specific cognitions and affect. The individual characteristics include prior related behavior and personal factors, which can be biological, psychological, and sociocultural in nature; these characteristics would almost all fall under the category of intrapersonal factors. Behavior-specific cognitions and affect include perceived benefits and barriers, perceived self-efficacy, activity-related affect, interpersonal influences (family, peer, providers; norms, support, and role modeling), and situational influences.

Perceptions of benefits, barriers, self-efficacy, and affect are considered intrapersonal factors, while at the same time some benefits and barriers can be the actual result of interpersonal and environmental factors. Situational influences correspond to environmental factors. The current study adds specific measures of acculturation and cultural beliefs about physical activity and does not examine affect or situational influences, except as related to perceived benefits or barriers. After a general discussion, the discussion of physical activity determinants will address only those being measured in the current study.

Eyler and colleagues (2002) examined research articles published between 1980 and 2000 to determine correlates of physical activity among women from diverse ethnic and racial backgrounds. Sociodemographic variables were the most studied correlates, and environmental and policy correlates were the least studied; non-White race, lower education, and older age were most consistently related to lower levels of PA. Income, employment, and marital status showed inconsistent patterns. Social support was an “overwhelmingly positive” correlate of PA for all groups of women. In their review of the literature regarding psychosocial correlates and physical activity outcomes among Latinos, Marquez, Auley, and Overman (2004) reported self-efficacy and social support as the most commonly reported correlates. In reviewing the literature then and since then, correlates do fall into the defined ecological categories, but few consistent patterns emerge for specific correlates; significance and relative importance of individual correlates

are inconsistent across studies. Some of these inconsistencies may be the result of sub-populations used, measurement, and other issues, such as type of physical activity and definitions. Even so, self-efficacy, social support, and certain barriers have enough support as significant determinants of PA. In the present study the model specifically addresses ethnicity, age, education, socioeconomic status (represented by education and income), acculturation, perceived benefits and barriers, perceived self-efficacy, beliefs about physical activity, and interpersonal influences, i.e., family and friend social support for exercise.

Intrapersonal Factors

Ethnicity, Race, and Age. As noted in earlier sections, Hispanic ethnicity, non-White race, and age are negatively related to PA, particularly LTPA (Eyler et al., 2002). When all or different domains of PA—sport and leisure, occupational, and household, are taken into account this finding is less strong and less consistent (Brownson et al, 2000; Eyler et al., 2002; Sternfeld et al., 1999). In the present study, we control for ethnicity and age by the narrow range of sample selected, i.e., college-aged White non-Hispanic and Hispanic women, and by directly comparing the two groups. However, we expect to see less PA for the Hispanic sample and for all females as they increase in age.

Education. Generally, more education predicts greater involvement in PA, but there are inconsistencies (Eyler et al., 2002), some of which may be related to type of activity measured (Eyler et al., 2002; Sternfeld et al., 1999). Sternfeld et al

(1999) found a positive association between education and sports/exercise and LTPA, yet negative associations for household and caregiving PA. In a sample of 24-59 year old Latinas from Florida, higher educational attainment was associated with lower levels of total PA; these women stated they had to fit PA into leisure time as their jobs were mostly sedentary (Lopez et al., 2008). Additionally, those Latinas with less education and higher total PA generally had labor-intensive jobs and engaged in little to no PA during leisure time. In the current study most subjects will be at the same approximate educational level—some college.

Self-efficacy. Self-efficacy, general and exercise specific, is positively associated with physical activity (Crespo et al., 2000; Laffrey, 2000; Laffrey & Isenberg, 2003; Lewis, Marcus, Pate, & Dunn, 2002; Marquez et al., 2004; Sternfeld et al., 1999) and has been used as an outcome measure in a number of studies (Marquez et al., 2004). Sternfeld (1999) found that self-efficacy was positively related to sport/exercise, but negatively to caregiving and household activities. One study noted that self-efficacy actually decreased after exercising (Marquez et al., 2004). The authors noted these participants had tended to overestimate capability pre-exercise, i.e., their pre-exercise self-efficacy did not match their actual abilities.

Perceived Benefits and Barriers. Perceived barriers for Latinos in general and Hispanic women in particular are abundant and vary over studies. Lack of time (Dergance, Calmbach, Dhanda, Miles, Hazuda, & Mouton, 2003; Eyler,

Brownson, Donatelle, King, Brown, & Sallis, 1999; Wilcox, Castro, King, Housemann, & Brownson, 2000), particularly in relation to other roles of caregiver, homemaker, and worker (Eyler et al., 1999; Eyler et al., 2002; King, Castro, Wilcox, Eyler, Sallis, & Brownson, 2000; Marquez et al., 2004; Sternfeld et al., 1999), health concerns, e.g., fear of injury and presence of illness or disease (Dergance et al., 2003; Eyler et al., 1999; Marquez et al., 2004), and lack of energy or tiredness (Eyler et al., 2002; King et al., 2000; Wilcox et al., 2000) are frequently reported barriers. The authors of a more recent review of the literature, examining studies from 1998 to 2006, noted that “Hispanic women named many sociocultural or acculturation barriers to physical activity including gender roles, language difficulties, and peer pressure (Yeh et al., 2009, pg. 108).” Additionally they noted that acculturation may influence access to exercise facilities and programs, as well as health promotion education (Yeh et al., 2009).

Other studies have found similar results and other barriers. In structured interviews of first generation immigrants aged 20-50, the most frequently cited barriers included not having enough time (38.4%), having low self-motivation or willpower (21.4%), and being too tired or not having enough energy (14.0%) (Evenson, Sarmiento, Tawney, Macon, & Ammerman, 2003). Illinois Latinas reported lack of time and no culturally appropriate childcare (Skowron, Stodolska, & Shiness, 2008). Many of the barriers were related to roles Latinas have in the family as opposed to lack of appropriateness of LTPA for Latinas (Skowron et al.,

2008). Family duty, especially caring for children and elders, is a traditionally important issue and role for Hispanic women, and it is frequently cited as a barrier or negative correlate of physical activity (Eyler et al., 1999; King et al., 2000; Marquez et al, 2004; Sternfeld et al., 1999; Wilcox et al., 2000). This particular role could well be the reason that family discouraged some Hispanic women as their physical activity increased (King et al., 2000). Some Latina women cited, as a barrier to exercise, the belief that full and overweight bodies were signs of health (Crespo et al, 2000). Crespo and colleagues (2000) found higher lack of LTPA among Mexican-Americans living under the poverty line. They noted minorities tend to have larger families than Caucasians and tend to have social and cultural expectations about child and elder-care, free time, social support, and economic resources, that along with low exercise self-efficacy may help explain inactivity in that population. Barriers unique to ethnic women include language barriers and real or perceived peer non-acceptance or being in an exercise group with others from different ethnic background (Eyler et al., 2002). Barriers related to the physical environment include lack of transportation and neighborhood facilities, bad weather, safety, and fear of unattended dogs (King et al., 2000; Skowron et al., 2008).

Two recent studies, one in adolescents, illustrate some of the barriers. In a bi-ethnic adolescent sample examining correlates of PA, Mexican-Americans reported enjoying physical activity less, had less self-efficacy, and found it more

difficult to overcome barriers than did European-Americans (Morgan, McKenzie, Sallis, Broyles, Zive, & Nader, 2003). Mexican-Americans reported having more indoor and outdoor activity rules than European-Americans. They also reported access to fewer facilities and less neighborhood safety, but more support from teachers. Among psychological variables, Mexican-Americans reported lower physical self-perception (especially girls), less enjoyment of physical activity, and more activity barriers.

A qualitative study employing focus groups conducted in Spanish in San Diego and consisting of 97% Mexican-born women (N=25) examined individual barriers and facilitators of physical activity (Martinez, Arredondo, Perez, & Baquero, 2009). Barriers included economic limitations, time constraints and family obligations, lack of motivation, crime and homelessness, fear of immigration, Mexican cultural norms, and environmental factors, such as poor lighting, lack of sidewalks, traffic, vandalism, and dogs. Mexican cultural norms included husband's disapproval and preference for fuller size bodies and negative perceptions regarding weight loss. Facilitators included knowledge about physical activity and nutrition, encouraging social support, child care, safer neighborhoods, playgrounds, and aesthetics.

Attitudes and Beliefs. Comprehensive reviews of the literature suggest attitudes and normative beliefs have mixed or no relationship to overall PA (Sallis & Owen, 1999); however, very few studies had examined these constructs

in relation to ethnic populations. The sample of Illinois Latinas had significant positive attitudes toward LTPA and high levels of perceived support for LTPA, but low PA prevalence (Skowron et al., 2008). Limited research suggests Hispanics have a more negative attitude toward exercise (Marquez et al., 2004; Morgan et al., 2003) and eating behavior than Anglos: weight interventions are difficult, and regular exercise would not be beneficial (Marquez et al., 2004). Seeing people exercise in the neighborhood or knowing people who exercise increased the likelihood of Latinas meeting PA recommendations (Brownson et al., 2001; Evenson et al., 2003; King et al., 2000; Kowal & Fortier, 2007; Velasquez, You, & Holahan, 2009; Voorhees & Rohm Young, 2003; Wilbur et al., 2003; Wilcox et al., 2000). Interestingly, Crespo et al. (2000) found a relationship between physical inactivity and sociocultural conditions that valued overweight as a sign of health. Another salient cultural belief for Hispanic women involves the avoidance of taking time for yourself, when you could be serving your family in some way. Hispanics also reported feeling self-conscious about exercising and fitting in (Dergance et al., 2003; King et al., 2000; Wilcox et al., 2000).

Interpersonal and Environmental Factors

Social Support from Family and Friends. Several studies establish a link between physical activity and social support (Dergance et al., 2003; Eyler et al., 1999; Eyler et al., 2002; King et al., 2000; Marquez et al., 2004; Miller, Trost, &

Brown, 2002; Verhoef & Love, 1994; Wilcox et al., 2000). Social support during exercise increases likelihood of program adoption and adherence, and enhances enjoyment (Eyler et al., 2002). Social support can be instrumental (e.g., providing transport), informational (e.g., providing information about local exercise programs or childcare), motivational (e.g., giving feedback or reinforcing exercise), and modeling (e.g., demonstrating physical activity). Marcus and Forsyth (1998) report that the relationship between social support and physical activity is more consistent for women than men, and the type of support that would be most helpful may depend on non-psychological factors, such as the woman's specific roles and demands for time (e.g., work and parenting). Verhoef and Love (1994) demonstrated that especially for young mothers, lack of an exercise partner, lack of spousal support, and lack of babysitting services created barriers to exercise; no one to exercise with was common across ages. As with self-efficacy, Sternfeld (1999) found a positive relationship between social support and sport/exercise and a negative relationship with caregiving and household PA. Seeing people exercise in the neighborhood or knowing people who exercise increased the likelihood of Latinas meeting PA recommendations (Brownson et al., 2001; Evenson et al., 2003; King et al., 2000; Kowal & Fortier, 2007; Velasquez et al., 2009; Voorhees & Rohm Young, 2003; Wilbur et al., 2003; Wilcox et al., 2000). A few studies regarding social support are worth noting.

In a national telephone survey of minority women, aged 40 and over, subjects with higher physical activity social support (PASS) scores were less likely to be sedentary; Hispanic women were more likely to have high PASS scores than other racial groups (White, Black, American Indian/Alaskan Native), and these groups had higher support scores than White women for all types of PA reported (Eyler et al., 1999). Social support was significantly associated with cumulative (>150 min/wk) and lifestyle (> 300 min/wk) PA, but not regular exercise (30 min/5x/wk). The authors suggest social support may be more important to initiating PA and engaging in shorter periods of PA. Additionally, the associations for social support did not differ whether the support came from family or friends. The researchers suggested interventions to facilitate expanding social networks to provide social support, particularly since there was no difference between family or friend support in Hispanic women (Eyler et al., 1999).

Some studies have not corroborated husband support and marriage as positively related to PA. In the Florida Latinas sample, spouse support and physician support were not significantly associated with total PA (López et al., 2008). This finding was unexpected as in-depth qualitative interviews had indicated the opposite would be true. The researchers suggested they may not have asked specific enough questions. The San Diego study was also qualitative and indicated barriers related to husband's preferences. Yet, in a quantitative

study using a national sample, NHANES III, marriage in Hispanic men was positively correlated with PA; however, no significant relationship existed between marriage and physical activity for Hispanic women (Crespo et al., 2000). However, overall social support is strongly and positively related to PA in general.

Determinants Reported in Emerging Adulthood

A shortage of studies examining determinants of PA in emerging adult Hispanics exists in the research literature; research predominantly has looked at adolescents or adults over 18, mid-life, or older. However, at least two have explored determinants in Hispanic college-aged women. One quasi-experimental study of northeastern Black and Hispanic college students (18% Hispanic), aged 18-35, measured variables derived from the Social Cognitive Theory in relation to attendance in a 16 week PA intervention (D'Alonzo, Stevenson, & Davis, 2004). Students with high attendance in the program exercise class had significantly higher exercise self-efficacy and perceived benefits and lower perceived barriers. The major barriers students gave for missing exercise class were time conflicts related to academic, family, and work responsibilities. In focus groups prior to program design, participants identified incentives or motivators to exercise that included positive feedback from exercise leaders and increased energy and fitness, and they expressed a preference for female exercise leaders, but no preference for ethnicity or age of the leader.

Another study of Black and Hispanic college-aged women used semi-structured interviews, based on selected Social Cognitive Theory constructs, to learn what cultural knowledge influences initiation and adherence to exercise (D'Alonzo & Fischetti, 2008). The researchers described results in seven areas: general impression of exercise, roles models for exercise, social support, benefits, constraints, preferences, and cultural issues. Both Blacks and Hispanics saw exercise as a “means to an end”, most often weight loss or appearance enhancement. Few participants saw exercise as health promotion. Hispanics were less likely to have exercising role models; they saw themselves as the role models for family. Both groups identified social support as someone to exercise with, stating it was easier to exercise when someone goes with you. As for benefits, interviewees focused on the immediate *feel good* effects of exercise, not the health benefits. Both groups identified facility-related constraints, but Hispanics (who were mostly commuters) focused on time constraints—childcare, commuting, part-time jobs. Even those who did not commute traveled home more often due to family responsibilities, such as sibling and grandparent care, which illustrates the concept of *marianismo*. Both groups expressed preferences for different music and for places where the women looked like them in terms of body size and race/ethnicity. Finally, participants spent some time discussing cultural issues. Hispanic participants identified “culturally constructed *rules*” about what activity is appropriate for women; vigorous exercise was seen as

“unfeminine.” These *rules* varied by place of birth and acculturation; US-born and acculturation relaxed the rules. Hispanic women, especially foreign-born, were less likely to have role models and to have participated in competitive sports or vigorous activity. Both groups preferred dancing, especially Hispanic women, and discussed the difference in body size preference between their cultures and the White culture. Hispanic women were more likely to identify family responsibilities as preventing exercise.

Conclusion

Clearly, determinants of PA for Hispanic women may differ from non-Hispanic White women, and these determinants may also differ for emerging Hispanic adult women as they do for most populations across the life span. Unfortunately, research among this population is scarce. However, research that does exist suggests that self-efficacy, perceived benefits and barriers, social support, and cultural beliefs are relevant in the initiation and maintenance of PA in Hispanic women. Physical activity prevalence is lower for Hispanic women than for Hispanic men and White populations. This difference is one of the factors leading to health disparities in the Hispanic population and contributing to mortality and morbidity, especially for diabetes and obesity. Many of these disparities in health and health behavior begin in childhood and continue through adulthood. Physical activity declines are steepest in adolescence and emerging adulthood. Therefore, extending knowledge about determinants of PA in

emerging Hispanic adult women may inform program development to maintain or increase PA in this population at this life stage and, thus, across the life span.

CHAPTER 3: METHOD

As noted in the Introduction, two studies comprised this research. In the first study, the author developed a scale of beliefs about physical activity. In the second study, the newly developed scale and other recognized correlates of physical activity were used to explore a cross-sectional model to predict physical activity. Data from a pilot study and data from the larger dissertation sample were used to analyze the beliefs scale. The following instruments and procedures were approved by the university's human participants review board at all the universities in this study from which respondents were recruited.

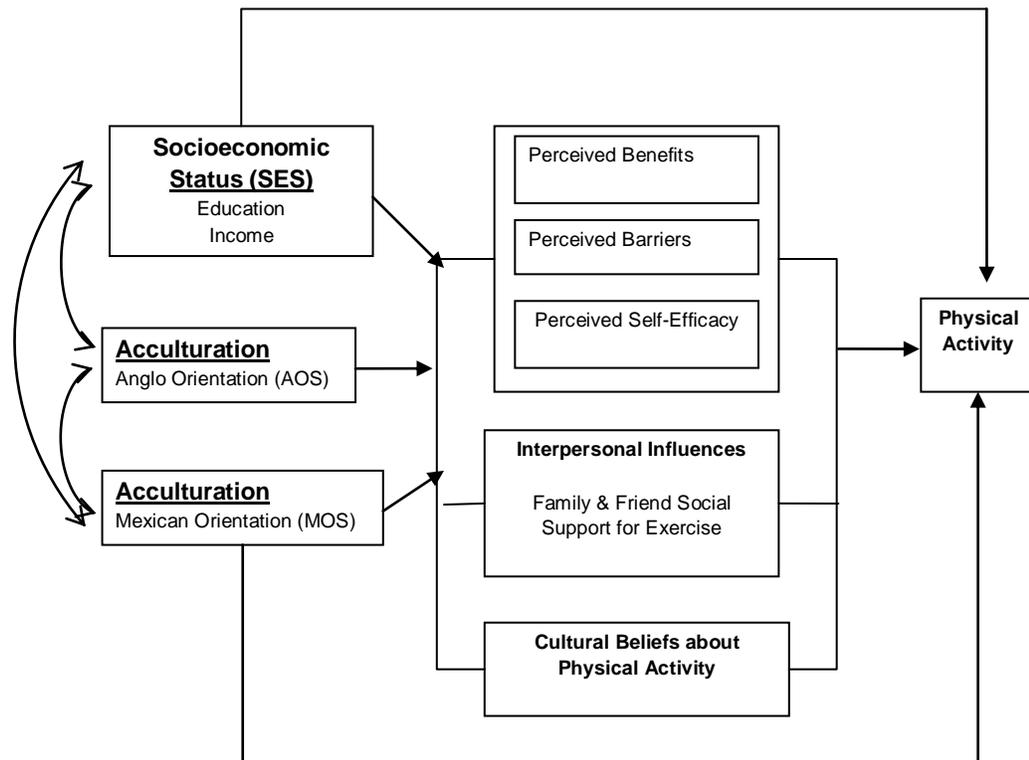
Subjects

With approval from their respective university's research review boards, the researcher recruited participants by electronic solicitation to randomly selected Hispanic and non-Hispanic female students, aged 18-27 years. Participants were asked to complete study instruments online using a link in the electronic message. A lottery incentive of \$50 gift cards to four individuals was offered for completing the survey. For the pilot study, students were recruited from undergraduate classes at The University of Texas using both electronic recruitment for online survey completion and in-person recruitment for paper completion in class. Students received extra-credit points for participation. Copies of the instruments and consent forms are located in Appendices B and C.

Conceptual Model

The conceptual model for this study included selected variables from the Health Promotion Model (see Figure 2). Personal factors included acculturation and socioeconomic status; behavior-specific cognitions and affect included perceived benefits and barriers, perceived exercise self-efficacy, beliefs about physical activity, and friend and family support for exercise; and the behavioral outcome was physical activity.

Figure 2. Proposed Path Model of Vigorous Physical Activity Evaluated across Samples of Hispanic and Non-Hispanic College-Aged Women



Instruments

Sociodemographic Variables

Sociodemographic variables were assessed using standard population survey items. Variables included self-reported age, marital status, personal and family income, parental education, college semesters completed, race/ethnicity, country of birth, living arrangement, and height and weight. Socioeconomic status was calculated using the sum of standardized scores for family income and parental education.

Physical Activity

Physical activity was the dependent variable. Two measures of physical activity were used, MET minutes per week and whether or not participants engaged in leisure time physical activity. Level of physical activity was assessed using the self-administered, short version of the International Physical Activity Questionnaire (IPAQ). Data from the form are used to estimate total weekly physical activity by weighting the reported minutes per week within each activity category by a MET energy expenditure estimate assigned to each category of activity (Craig et al., 2003). Per protocol, sitting counts as 1 MET, slow, moderate, and vigorous walking count as 2.5, 3.3, and 5 METs respectively, and other moderate and vigorous activity count as 4 and 8 METs (Craig et al., 2003). The short version does not account for differences in walking intensity and uses the 3.3 factor for all walking. Weighted MET-minutes per week ($\text{MET}\cdot\text{min}\cdot\text{wk}^{-1}$)

were calculated as duration x frequency per week x MET intensity level, and summed across activity domains. Sitting data were not included in the summed physical activity score. IPAQ guidelines were used for data cleaning and processing (“Guidelines,” 2005). For the short form, self-administered and “usual week,” the test-retest reliability was .79, and for “last 7 days,” the test-retest reliability was .75. Additionally, no “major” difference in the reliability coefficients exist when using “last 7 days” or “usual week,” or between telephone/personal interview and self-administered questionnaires. For the various short forms’ original validation tests, agreement between self-report and CSA accelerometer data were deemed “fair to moderate” at .30. However, when reducing data to categorical estimates of sufficient physical activity, 80% of estimates had coefficients greater than .70, and approximately four-fifths of participants were classified in the same category by both the IPAQ form and accelerometer data. The various long forms included occupational and household activities; however, exclusion of occupational physical activity did not significantly impact results (Craig et al., 2003).

The physical activity variable is a continuous variable. If necessary, the variables can be trichotomized to reflect *no*, *insufficient*, and *sufficient* physical activity, or can be placed in four categories of *inactive*, *low*, *medium*, and *high* physical activity participation according to current recommendations for physical activity and health—150 minutes of moderate-intensity physical activity,

accumulated in bouts of 10 minutes or longer, per week (USDHHS, 2008, p.4), 75 minutes vigorous-intensity physical activity per week or more per week, or an equivalent combination of the two.

In order to explore and compare differences in assessment method, researchers also asked about physical activity prevalence using a question from the 2004 Behavioral Risk Factor Surveillance System (BRFSS) survey (CDC, 2004a). The BRFSS core defines leisure time physical activity (LTPA) as a “yes” response to the question “During the past month, other than your regular job, did you participate in any physical activities or exercise, such as running, calisthenics, golf, gardening, or walking for exercise?”

The use of self-report instruments for physical activity has inherent limitations; however, in large studies of physical activity, self-report instruments are often the only practical method (LaPorte, Montoye, & Caspersen, 1985, cited in Sallis, Hovell, et al., 1992). Social desirability bias can lead to over-reporting of physical activity, and respondents and investigators may not share an understanding of terms, such as “physical activity,” “leisure time,” and “moderate intensity” (Sallis & Saelens, 2000). In their review of physical activity assessment methods, Sallis, Hovell, et al. (1992) report acceptable levels of reliability and validity of the instruments similar to those used in this study and by questionnaire (Washburn & Montoye, 1986, cited in Sallis, Hovell et al., 1992). Additionally, Sallis, Hovell et al report indirect support for validity of mailed surveys using

simple self-reports of physical activity (Kohl, Blair, Paffenberger et al., 1988, cited in Sallis, Hovell et al., 1992).

A panel of experts convened to discuss physical activity measurement in minority women (Masse et al, 1998). They noted that surveys should be short enough to keep the respondent's interest and maintain meaningful responses, yet long enough to address the multi-dimensional aspect of physical activity habits. This panel of experts endorsed the use of MET requirements of exercise intensity defined in the recommendations by the Centers for Disease Control and American College of Sports Medicine (Pate et al., 1995). While the short version of IPAQ does not capture the multiple dimensions of physical activity in women, these dimensions may be less of an issue for younger women than for mid-life and older women (Sternfeld et al., 1999).

Acculturation

Acculturation is often measured using proxy measures, such as language preference, birthplace, and length of residence in the United States (Neighbors et al., 2008). For the purposes of this investigation acculturation was measured in a number of ways to help explore different aspects of acculturation. These methods included language preference, birthplace, length of residence in the United States, ethnic/race self-identification, generation status, and a published and tested tool, the Acculturation Rating Scale for Mexican Americans II (ARSMA II). The main measure will be the ARSMA II developed by Cuéllar, Arnold, and Maldonado

(1995) as a revision of the original, developed by Cuéllar, Harris, and Jasso (1980). ARSMA II consists of two scales—Anglo/Mexican Orientation and Marginality; however, as allowed by the developers, only scale one will be used (Cuéllar et al., 1995). Scale one consists of 30 self-rated items measuring Anglo Orientation (AOS subscale) and Mexican Orientation (MOS subscale). Respondents use a 5-point Likert scale (1=not at all, 5=often/almost always) to indicate how well items describe themselves. Sample items include “I speak Spanish/I speak English” and “I associate with Anglo-Americans/I associate with Mexican Americans.” The mean score of the MOS subscale is subtracted from the AOS subscale to obtain one score representing the participant’s place on a continuum of very Mexican oriented to very Anglo oriented and range from < -1.33 (very Mexican oriented) to > 2.45 (very assimilated; Anglicized) that can be used to determine 5 levels of acculturation (see Table 1). Participants are considered bicultural in the ≥ -1.33 to 1.19 range. Factor analysis revealed three factors measured by Scale 1: language, ethnic identity, and ethnic interaction or distance (Cuéllar et al., 1995). Internal consistency scores were 0.90 for the AOS and 0.87 for the MOS (Cuéllar et al., 1995). Test-retest reliability coefficients were 0.94 for AOS and 0.96 for MOS (Cuéllar et al., 1995).

Table 1. Cutting Scores for Determining Acculturation Level Using ARSMA-II
(Cuéllar et al., 1995, p. 285)

Acculturation Level	Description	ARSMA-II Acculturation Score
1	Very Mexican oriented	< -1.33
2	Mexican oriented to approximately balanced bicultural	≥ -1.33 and $\leq -.07$
3	Slightly Anglo oriented bicultural	$> -.07$ and < 1.19
4	Strongly Anglo oriented	≥ 1.19 and < 2.45
5	Very assimilated; Anglicized	> 2.45

Exercise Self-Efficacy

Exercise self-efficacy was measured using the abbreviated version of the Self-Efficacy for Exercise Survey (Sallis, Pinski, Grossman, Patterson, & Nader, 1988; Sallis, 1996). Items address various situations and behaviors associated with exercise (e.g., confidence that one can exercise despite social obligations, household chores, etc). For each of the 12 items, respondents use a 5-point Likert scale to indicate level of confidence (1=I know I cannot, 5=I know I can). The scale measures two factors: sticking to it (items 2, 3, 5, 6, 8, 9, 10, and 11) and making time for exercise (items 1, 4, 7, and 12). The scale has an internal consistency score of .95 and test-retest reliability of .68 (Sallis et al., 1988).

Social Support for Exercise

Social support for exercise was measured by the Family and Friends Scales of the Social Support For Exercise (SSE) survey developed by Sallis, Grossman, Pinksi, Patterson, and Nader (1987; Sallis, 1996). Thirteen items assess both emotional and information social support using a 5-point Likert scale measuring agreement or disagreement with twelve statements, twice—once for family and once for friends. Internal consistency for the scales ranged from .61 to .91, and reliability ranged from .55 to .79. Sallis et al. noted that social support for exercise was strongly associated with current self-reported exercise behavior, but not with attempts to exercise.

Exercise Benefits and Barriers

Exercise benefits and barriers were measured using the standardized instrument, Exercise Benefits and Barriers Scale (EBBS) (Sechrist, Walker, & Pender, 1987). The EBBS asks respondents to rate their agreement to perceived benefits and barriers on a 4-point Likert scale. Scores are summed for two scores—one for perceived benefits and one for perceived barriers. After reverse coding the barriers, these two scores are summed for a total score; higher sums reflect greater perception of benefits. Twenty-nine of the 43 items assess perceived physical, psychological and social benefits, while the remaining 14 items measure potential barriers. The Cronbach's alpha for the total and benefits subscales were .95, and test-retest reliability over a 2 week period was .89. The

barriers subscale had a Cronbach's alpha of .86, and test-retest reliability of .77. Benefits and barriers differ significantly across the life span (Brown, 2005); therefore, it is expected that the results for this study should contribute to the validation of this scale.

Cultural Beliefs about Physical Activity

Cultural beliefs about physical activity were measured using a scale developed by the researcher and are discussed in detail in the section titled, "Study One." Scale items addressed such issues as spirituality, the appropriateness of exercise for women, how exercise influences roles in the family, and with whom participants prefer to exercise.

Analyses

The specific questions to be addressed in this study of correlates of physical activity in Hispanic and non-Hispanic college-aged women are:

1. What is the prevalence of physical activity in college-aged Hispanic and non-Hispanic women?
2. Do selected correlates of physical activity account for differences in physical activity in college-aged Hispanic and non-Hispanic women?
3. Are selected constructs of Pender's Health Promotion theory related to physical activity participation in college-aged women?
4. What is the relationship between acculturation, selected correlates and prevalence and selected correlates of physical activity in college-aged women?
5. Are there differences in beliefs towards physical activity between college-aged Hispanic and non-Hispanic women?
6. Is acculturation related to beliefs about physical activity among college-aged Hispanic and non-Hispanic women?

Cronbach's alpha and reliability analyses were conducted for each scale and subsample. Additionally, factor analysis utilizing Principal Components Analyses was conducted for the Cultural Beliefs scale. Differences between the two groups in physical activity prevalence and cultural beliefs about physical activity (questions 1 and 5) were tested using Independent Sample T-Tests. For questions 2, 3, and 4, a path analysis of vigorous physical activity across the two samples (see Fig. 3) was undertaken using the MPlus statistical program with the missing data function, [Version 5.0]. Path analysis was selected over regression modeling for several reasons, including its more flexible assumptions (particularly allowing interpretation even in the face of multicollinearity), better model visualization, the ability to test the model overall rather than coefficients individually, the ability to model mediating variables, and the ability to test across multiple groups (Garson, 2011). Fit statistics produced by MPlus include Chi Square significance, Comparative Fit Index, Root Mean Square Error of Approximation, and Standardized Root Mean Square Residual for unconstrained and constrained models. Differences in path coefficients were tested using z-tests for significance. Question 6 was also tested using Mplus multi-group analysis.

Beliefs about Physical Activity Instrument Development

The purpose of the pilot study was to observe factors related to administration of the study instruments and receive feedback regarding instruments, particularly the Beliefs about Physical Activity Survey (BPA).

Additionally, data collected were used to provide preliminary estimates of the validity and reliability of the BPA. Paper surveys were administered twice to estimate test-retest reliability.

Literature Review. The initial item pool was generated based on a review of the literature and existing tools on physical activity in which Hispanic data were specifically examined. The items represented the following areas: general impressions about exercise, exercise role models, social support, exercise benefits and barriers, exercise preferences, cultural issues.

Expert Review. The initial scale consisted of 56 items. Clinical and survey experts were invited to review the scale with regard to item content, clarity, relevance and format. The expert review panel consisted of two clinical psychologists with expertise in multi-cultural counseling; one of these psychologists also has a background in health psychology. Among the experts' suggestions was to add items reflecting spirituality related exercise beliefs. At the end of the process, the wording of several items was modified and the scale consisted of 69 items representing the basic areas and spirituality.

Public Review. Population representatives were invited to provide feedback on content and format of the instrument in one-on-one meetings and as part of pilot testing. Participants were asked to comment on relevancy and meaningfulness, scale instructions, and item format, wording, and response options after completing the instrument. Minor changes in wording were made.

Reliability and Validity Testing. Reliability of the scale was determined by computing internal consistency coefficient alpha. In the pilot test phase participants were also asked to complete the survey a second time 3 weeks later to estimate test-retest reliability. Content validity was determined with the expert and public reviews. Construct validity was estimated through Exploratory Principal Component Factor Analysis with an oblimin rotation and examination of Pearson product moment correlations of the scales subscales and total score with physical activity. Twenty-two items (5, 7-9, 17-18, 22, 24, 32, 37, 39, 41, 44-45, 49, 51-53, 55-58) were reverse scored, so that the scale is scored in the direction favoring exercise.

CHAPTER 4: RESULTS

Study One: Development of the Beliefs about Physical Activity Scale

Subjects

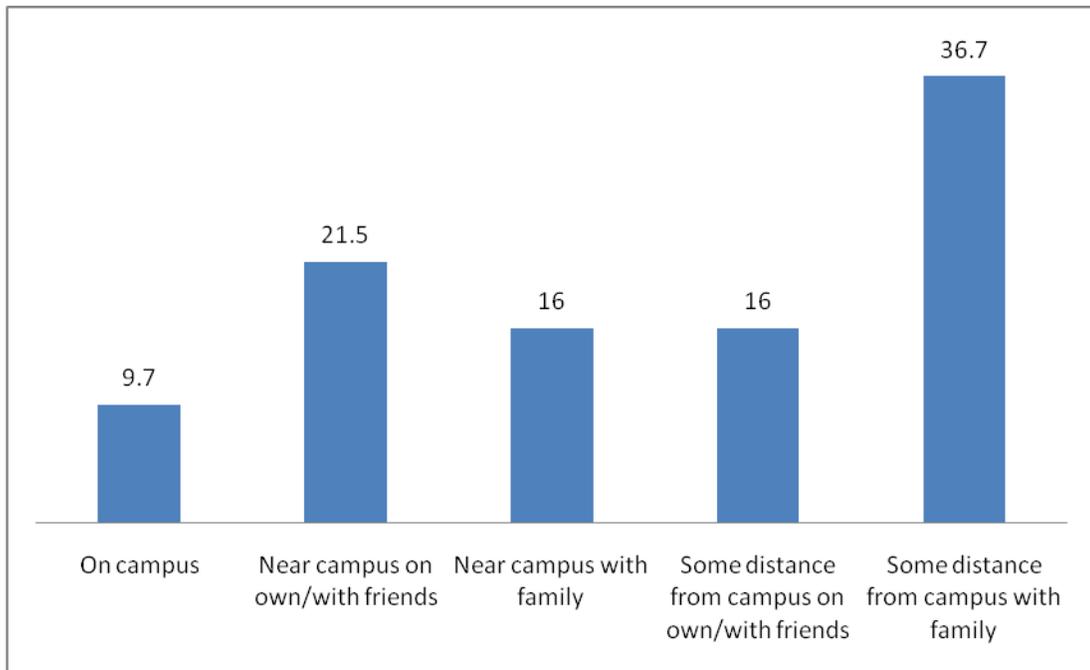
For the pilot study, 91 male and female students were recruited from two undergraduate classes at The University of Texas at Austin. Six cases were deleted as a result of duplication or incomplete surveys. One class of students answered paper surveys (53 of 57 included in the sample), while students in the other class were given a link to the online survey (32 of 34 included in analyses); participants were able to complete the paper or the online survey in 20 minutes or less. The final sample size was 85 with a mean age of 21 years. Females comprised 49.4% of the sample. Approximately 59% of respondents identified themselves as non-Hispanic White, 15% as Hispanic White, 3.5 % as African American, and 10.6% as other. Ten participants did not answer the ethnicity question. The small number of Hispanic students, especially in relation to missing data, prevented any relevant analyses between non-Hispanic and Hispanic respondents, so pilot study analyses combined responses for the entire sample. Only the students completing the paper survey were given the opportunity to participate in the test-retest analysis (n=43), which occurred 3 weeks after the first administration.

A larger sample (the dissertation sample) was recruited for further analyses of the Beliefs about Physical Activity scale. With approval from students' respective university's research review boards, the researcher recruited participants by electronic solicitation to randomly selected Hispanic and non-Hispanic female students, aged 18-27, enrolled at three southwestern universities. Participants were asked to complete study instruments online. A lottery incentive of \$50 gift cards to four individuals was offered for completing the survey. Over 3,000 solicitations were e-mailed; 343 participants began the survey with 237 completing all but one scale; initially, 9 cases were dropped due to age or failure to answer questions about physical activity level, the dependent variable. Another 97 were deleted from the study due to missing more than one scale, leaving a final sample size of 237 (80 non-Hispanic, 157 Hispanic) for the majority of analyses. Sociodemographic data for deleted cases did not differ significantly from retained cases.

All participants were female, aged 18-27, with 33.6% identifying themselves as non-Hispanic. Of the Hispanics 57.7% self-identified as Mexican, 0.9% as Puerto Rican, and 7.7% as other. No significant differences existed between the Hispanic categories on study variables; therefore, all cases identifying as Hispanic were grouped together. However, non-Hispanic and Hispanic groups did differ significantly on measures of parental education and family income where non-Hispanic participants reported higher levels of parental

education and family income [t s ranging from 4.151 to 7.422 df (330-333), p <.001]. The majority of students lived with family (52.7%) (See Figure 3).

Figure 3. Living Arrangements of Respondents by Percentage



Pilot Study Reliability

The original Beliefs about Physical Activity (BPA) survey contained 69 items, 21 of which were reverse scored so that all items are scored in the exercise promoting direction; the items utilize a 6-point Likert scale; thus, total scores could range from 69 to 414. The mean total BPA score for all 85 respondents was 292.7, minimum total was 242, maximum total was 357, and SD was 25.72 (see

Table 2). Forty-three of the respondents completed the survey twice. Tests for reliability (with the reverse scored items) included Cronbach's α (.851) and test-retest reliability. Pearson correlation between time one total scores and time two total scores was $r = .868$, $\rho < .001$. The Split-Half (odd vs. even items) Spearman-Brown Coefficient was .858. All of these coefficients are adequate.

Table 2. Reliability for Pilot BPA Scale

	N	
Cronbach's α	85	.851
Split-Half	85	.858
Test-retest	43	.868***

Factor Analysis and Reliability Using the Dissertation Sample

A Principal Components Factor Analysis using oblimin rotation was conducted on the 69 items of the Beliefs about Physical Activity instrument. The initial factor analysis Eigenvalues > 1 criterion led to extraction of 17-factors, which explained 70.02% of the variance. In determining which items to delete, communalities, factor loadings, cross-loadings, number of items per component, and interpretability were considered (Stevens, 2002). The final factor analysis consisted of 46 items and extracted 9 factors with Eigenvalues > 1 , with an explained variance of 67.40%, as can be seen in Table 3. Table 4 shows that all items loaded at .45 or higher. Three items had cross-loadings greater than .300;

however, the differences between factor loadings and these cross-loadings were

<.2. Reliability data are presented in Table 5.

Table 3. Eigenvalues, Percent Variance Explained, and Cumulative Percent Variance Explained by Nine Factors on the Beliefs about Physical Activity Instrument (N=194)

Factor	Factor Label	Eigenvalue	% Variance Explained	Cumulative %
1	Spirituality	10.742	23.4	23.4
2	Cultural beliefs	5.507	12.0	35.3
3	Role enhancement	4.131	9.0	44.3
4	Socialization needs	2.78	6.0	50.3
5	Class composition	2.174	4.7	55.1
6	Encouragement and modeling by Family/Friends	1.798	3.9	59.0
7	Personal Benefit/Control	1.526	3.3	62.3
8	Women's Roles	1.256	2.7	65.0
9	Exercise Difficulty	1.089	2.4	67.4

Table 4. Factor Loadings of Items of the Beliefs about Physical Activity Instrument (N=194)^a

Item	Factor								
	1	2	3	4	5	6	7	8	9
God gives me the strength to exercise.	0.884								
I depend on God as a source of willpower to exercise.	0.872								
I give thanks to God for my physical ability.	0.868								
I depend on God or a higher power to help me get through a challenging physical experience.	0.845								
I exercise to take care of the body God has given me.	0.839								
My physical ability comes directly from God.	0.807								
God expects us to take care of ourselves.	0.804								
When I am able to accomplish my workout, I give thanks to God.	0.802								
I give thanks to God for my health.	0.799								
I pray before, during, or after physical activity.	0.751								
I exercise to give thanks to God.	0.751								
Exercising brings me closer to God.	0.719								
Exercise is not acceptable for women in my culture.		0.843							
Only certain exercises or sports are acceptable for women.		0.786							
Women tend to do less exercise because men want women to stay at home.		0.778							
Women tend to do less exercise because men do not want women to exercise.		0.762							
Exercise programs are not designed for women of my culture/ethnicity.		0.641							
My engaging in physical activity makes me a better mother or daughter.			0.88						
My engaging in physical activity makes me a better student.			0.881						
My engaging in physical activity makes me a better partner in relationships.			0.857						
My engaging in physical activity improves my role in my family.			0.842						
My engaging in physical activity would/does make me a better employee (improved physical ability & quality of work).			0.775						
My engaging in physical activity is good for my family.			0.703						

^a For ease of interpretation, factor loadings < .300 are not displayed.

Item	Factor								
	1	2	3	4	5	6	7	8	9
I would want to exercise with friends more than others.				0.771					
I prefer to exercise alone.				0.654					
My exercise "buddies" are like family.				0.644					
I would want to exercise with family more than others.				0.505					
I see exercise/sports as a time to socialize with family and friends.				0.479					
I prefer to exercise in classes/programs with people who are like me.					0.82				
I prefer to exercise in classes/programs with people who look like me.					0.678				
Most exercise programs do not have people like me.		-0.315			0.57				
A close family member of mine exercises regularly.						0.781			
My mother encourages me to exercise.						0.694			
My father encourages me to exercise.						0.668			
My close friends exercise regularly.						0.622			
I feel good immediately after exercise.							0.705		
My exercise time is my personal time.							0.694		
Personal control is important for my health.							0.619		
My engaging in physical activity gives me a sense of control.			0.362				0.605		
Marriage and motherhood limit one's ability to exercise.								0.786	
Women's roles/many responsibilities make it difficult to maintain a pattern of regular physical activity.								0.741	
Family responsibilities get in the way of exercising.								0.505	
I wouldn't/don't know how to use exercise machines at the gym.									0.721
When it comes to exercise, I don't know what I'm doing.		0.349							0.643
Exercise classes are too difficult.									0.516

^a For ease of interpretation, factor loadings < .300 are not displayed.

Tables 3 and 4 also list factor labels and item descriptions which load under the respective factors. Factor 1 is a spirituality factor consisting of 12 items and accounts for a third of the variance. Items loading on this factor address an interdependence on God or a higher being and a thankfulness to God for one's ability. Cronbach's α for the Spirituality sub-scale is .959. Factor 2 consists of 5 items and speaks to cultural beliefs about physical activity for women and includes acceptability of exercise for women and cultural fit of exercise programs. Cronbach's α is .857. Factor 3, comprised of 6 items, addresses improvement in various roles as a consequence of exercise and has a Cronbach's α of .931. Factor 4 has 6 items and addresses socialization aspects of physical activity; Cronbach's α is .762. These first four factors accounted for half the variance. The 5th factor, class composition, addresses the self similarity of other persons in exercise programs; Cronbach's α is .641. Factor 6 has a Cronbach's α of .681 and 4 items, which address close family or friends exercise participation or encouragement. Factor 7, with 4 items and Cronbach's α of .792, speaks to personal control and benefits of exercise. The 8th factor has 3 items addressing roles of women which limit or interfere with regular physical activity; Cronbach's α is .634. Finally, the last factor has 3 items and .802 Cronbach's α , and deals with difficulty level or lack of knowledge leading to difficulty of exercise.

After examination of the factors, the class composition and encouragement subscales were eliminated. The class composition subscale created difficulty in

interpreting the whole scale, and the encouragement subscale duplicated items from the Social Support for Exercise scale. The factor structure remained the same and the variance explained increased slightly to 67.9%. With respect to content, four of the remaining subscales focused on beliefs encouraging exercise and three subscales focused on beliefs discouraging exercise. A note in Appendix D addresses the scale composition. The remaining subscale means were summed to compute the total Beliefs about Physical Activity score.

Table 6 contains the subscale, total scale, and physical activity inter-correlations and means by Hispanic and non-Hispanic groups. Vigorous physical activity is included in support of construct validity and to support the use of the beliefs scale in the path model predicting physical activity. The correlation of the total score for Beliefs about Physical Activity scale with vigorous physical activity was .45 for the Hispanic group ($p < .001$) and .29 for the non-Hispanic group ($p < .01$). The subscales and total BPA score had varying levels of correlation and significance with the other variables in Study 2. These are presented in Appendix E.

Independent sample t -tests were conducted for all the Beliefs about Physical Activity subscales. Using Bonferroni correction for multiple procedures, α was set at .01. Significant differences existed between groups for the Spiritual [$t(196) = -3.303, p < .001$] and Cultural Beliefs [$t(191) = 2.748, p < .01$] subscales, as well as BPA Total [$t(195) = -2.849, p < .01$]. The Socialization and Personal

Benefit/Control subscales both had significance levels of $p < .05$ but were not significant with α set at .01. The Hispanic subjects' means were higher for the spiritual, socialization, and personal benefit/control subscales, as well as the BPA total. Hispanics' cultural subscale scores were lower than for non-Hispanics.

Table 5. Descriptive Statistics for BPA Survey

	N	Minimum	Maximum	Mean	SD	Cronbach's α
BPA Total	197	91	210	155.04	25.47	.894
BPA Subscales						
Spirituality	198	12	71	36.87	17.24	.959
Cultural Beliefs	199	5	30	26.15	4.79	.857
PA Role Beliefs	198	6	36	25.17	6.99	.931
Socialization	197	6	36	21.91	5.7	.762
Class Composition	198	3	18	9.77	3.27	.641
Encouragement	200	4	22	13.00	4.63	.681
Personal Benefit/Controls	198	5	24	18.81	3.50	.792
Women's Roles	199	3	18	12.03	3.51	.634
Exercise Difficulty	198	3	18	14.05	3.56	.802

Table 6. Beliefs about Physical Activity Subscale and Scale Correlations and Means by Hispanic and non-Hispanic Group.

Hispanic Subscale	Spir	Roles	Edif	Soc	PB	Wroles	Cult	Vig
N	128	128	128	127	128	128	128	152
Spirituality (Spir)	1							
Role Enhancement (Roles)	.249**	1						
Exercise Difficulty (ExDiff)	-.008	.085	1					
Socialization Preferences (Soc)	.203*	.254**	.016	1				
Personal Benefit/Control (PB)	.293***	.507***	.294***	.000	1			
Women's Roles (Wroles)	.014	.006	.383***	.075	.171†	1		
Cultural Beliefs (Cult)	-.231**	-.006	.537***	-.010	.031	.424***	1	
Vigorous Physical Activity (Vig)	.331***	.170	.269**	.242**	.457***	.152†	-.038	1
Means	39.8***	25.7	14.1	22.5†	19.2†	11.9	25.54**	28.7
SD	16.2	6.9	3.5	5.9	3.6	3.7	5.29	23.3

Hispanic			
Variable	BPA		
	N	Total	Vig
Total BPA		1	
Vigorous Physical Activity (Vig)		.449***	1
Means		158.8**	28.7
SD		24.8	23.3

* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .10$

Table 6. Beliefs about Physical Activity Subscale Correlations and Means by Hispanic and non-Hispanic Group, *Continued*.

Non-Hispanic Subscale	Spir	Roles	Edif	Soc	PB	Wroles	Cult	Vig
N	70	70	70	70	70	71	71	78
Spirituality (Spir)	1							
Role Enhancement (Roles)	.426***	1						
Exercise Difficulty (ExDiff)	.051	-.099	1					
Socialization Preferences (Soc)	.299*	.470***	-.164	1				
Personal Benefit/Control (PB)	.192	.580***	.184	.251*	1			
Women's Roles (Wroles)	-.290*	-.217†	.391***	-.157	-.136	1		
Cultural Beliefs (Cult)	.178	-.038	.301*	-.231	.026	.227	1	
Vigorous Physical Activity (Vig)	.121	.281*	.378***	.160	.245*	.205	-.153	1
Means	31.54	24.17	13.97	20.85	18.18	12.21	27.25	25.4
SD	17.9	7.1	3.7	5.1	3.3	3.2	3.5	23.0

Non-Hispanic		
Variable	BPA	
	Total	Vig
	N	
Total BPA	127	152
Vigorous Physical Activity (Vig)	.285*	1
Means	148.2**	25.4
SD	25.4	23.0

* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .10$

Study Two: Physical Activity and Correlates Using a Two Group Path Analysis

Subjects.

With approval from students respective university's research review boards, the researcher recruited participants by electronic solicitation to randomly selected Hispanic and non-Hispanic female students, aged 18-27 years, enrolled at three southwestern universities. Participants were asked to complete study instruments online. A lottery incentive of a \$50 gift card to each of four participants was offered for completing the survey. Over 3,000 solicitations were e-mailed; 343 participants began the survey with 237 completing all but one scale; initially, 9 cases were dropped due to age or failure to answer questions about physical activity level, the dependent variable. Another 97 were deleted from the study due to missing more than one scale, leaving a final sample size of 237 (80 non-Hispanic, 157 Hispanic) for the majority of analyses. Sociodemographic data for deleted cases did not differ significantly from retained cases.

All participants were female, aged 18-27, with 33.6% identifying themselves as non-Hispanic. Of the Hispanics 57.7% self-identified as Mexican, 0.9% as Puerto Rican, and 7.7% as other. No significant differences existed between the Hispanic categories on study variables; therefore, all cases identifying as Hispanic were grouped together. However, non-Hispanic and Hispanic groups did differ significantly on measures of parental education and family income where non-Hispanic participants reported higher levels of parental

education and family income [t ranging from 4.151 to 7.422 df (330-333), $p < .001$].

Physical Activity

The majority of the respondents (82.3%) reported engaging in leisure time physical activity with no difference between Hispanic and non-Hispanic groups (see Table 7). The majority of respondents (53.2 %) reported high levels of physical activity (see Table 8) when grouped according to IPAQ-suggested protocol, with no difference between groups for all physical activity measures [Total Physical Activity MET-minutes/week: χ^2 (167) = 170.08, $p > .05$]. IPAQ scoring protocol identifies three levels of physical activity: 1=Low, no activity or some, but not enough to meet categories 2 or 3; 2=Moderate, either 3 or more days of vigorous activity of at least 20 minutes per day, or 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day, or 5 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of at least 600 MET-minutes/week; and 3=High, either vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week or 7 or more days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week. The MET-minutes per week varied widely, and its mean was influenced by high vigorous minutes despite instrument protocols to control for extreme reports (see Table 9). Not all respondents participated in each level of

activity; additionally, some students either did not answer the questions for that category or reported “don’t know,” which is coded as missing and deleted per protocol. Independent sample t-tests showed that the means of the two groups were not significantly different.

Table 7. Prevalence of Leisure Time Physical Activity by Hispanic Group (N=334) [χ^2 (1) = 2.053, $p > .05$]

<i>LTPA</i>	<i>Hispanic</i>	<i>Non-Hispanic</i>	<i>Total</i>
Yes	180 (81.1%)	95 (84.8%)	275 (82.3%)
No	42 (18.9%)	17 (15.2%)	59 (17.7%)

Table 8. Frequency of 3 Categories of Physical Activity (IPAQ) [χ^2 (2) = .108, $p > .05$]

Category	Hispanic	Non-Hispanic	Total	Total Cumulative Percent
1-Low	27 (17.1%)	14 (17.7%)	41 (17.3%)	17.3
2-Moderate	47 (29.7%)	23 (29.1%)	70 (29.5%)	46.8
3-High	84 (53.2%)	42 (53.2%)	126 (53.2%)	100.0
Total	158	79	237	

1=Low, no activity or some, but not enough to meet categories 2 or 3; 2=Moderate, either 3 or more days of vigorous activity of at least 20 minutes per day, or 5 or more days of moderate-intensity and/or walking of at least 30 minutes per day, or 5 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of at least 600 MET-minutes/week; and 3=High, either vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week or 7 or more days of any combination of walking, moderate- or vigorous-intensity activities accumulating to at least 3000 MET-minutes/week.

Table 9. Physical Activity Descriptives in MET-Minutes per Week

	N	Minimum	Maximum	Mean	SD
Vigorous MET-min/wk	334	0	10,080	1,060.10	1,617.39
Moderate MET-min/wk	331	0	5,040	668.52	1,074.11
Walking MET-min/wk	258	0	4,158	1,237.09	1,315.51
Total MET-min per week	248	0	16,704	3,430.58	3,005.51
Hours spent sitting per day	233	0	19	6.14	3.57

Intensity MET-minutes/week are the product of respective MET level x minutes of activity/day x days per week (MET levels: vigorous=8.0, moderate=4.0, walking=3.3). Total MET-min/wk is the sum of each individual's intensity MET-minutes/week. Differences in N reflect deleted cases due to missing values or "don't know" responses.

In the path analysis MET minutes per week for vigorous physical activity was used rather than total MET minutes per week because vigorous activity significantly correlated with more of the model variables and had fewer missing values than the other physical activity measures. All physical activity measures were negatively skewed and positively kurtotic due to the number of participants who reported no or very little physical activity; therefore, the vigorous and total physical activity variables were transformed using the square root function, which resulted in acceptable normality. Group means for the untransformed vigorous variable are presented in Table 10.

Table 10. Vigorous MET-Minutes/Week for non-Hispanic and Hispanic Groups

Vigorous MET minutes/week	Mean	SD	N	min	max
non-Hispanic	1160	1731.2	78	0	10,080
Hispanic	1356.32	1574.5	152	0	6,000

Exercise Benefits and Barriers

The EBBS instrument may be scored in its entirety with barrier items reverse-scored, or as two separate scales without reverse scoring. Higher scores on the total instrument indicate greater perceived benefits than barriers; on separate scales, higher scores indicate greater perceptions of benefits or barriers, respectively. All items use a 5-point Likert scale. Scores for the total instrument (43 items) ranged from 97-172 (possible 43-215), with a mean of 138.13; scores on the benefit scales (29 items) ranged from 65-116 (29-145 possible), with a mean of 93.52; and scores on the barrier scale (14 items) scores ranged from 14-51 (14-70 possible), with a mean of 27.78 (See Table 11). Therefore, in this sample, respondents had a relatively positive perception of exercise and reported relatively low perceived barriers. Reliability for the scales were: Total scale .897, Benefits scale .915, and Barriers scale .749, which are all lower than the original instrument development reliabilities (Sechrist et al, 1987), but acceptable. Independent sample t-tests showed that the means between the groups were not significantly different for Exercise Benefits and Barriers [$t(235) = -1.654, p > .05$].

Table 11. Descriptive Data on EBBS Scales

	Benefits Scale	Barrier Scale	Reverse Scored Barrier Scale	TOTAL (Benefits + Reverse Scored Barriers)
N	237	237	237	237
Mean	93.52	27.78	44.6	138.13
Std. Error of Mean	.769	.420	.447	1.08
Median	92	28	44	137
Std. Deviation	11.84	6.46	6.9	16.6
Minimum	65	14	20	97
Maximum	116	51	59	172
Cronbach's α	.946	.845	.843	.944

Self-Efficacy for Exercise

Exercise self-efficacy was measured using the abbreviated version of the Self-Efficacy for Exercise Survey (Sallis, Pinski, Grossman, Patterson, & Nader, 1988), which is comprised of 12 items and uses a 5 point Likert scale. Eight items produce the “Sticking to It” score, and 4 items generate the “Making Time” score. Overall the respondents report high levels of self-efficacy for exercise (see Table 12). Internal consistency for the scale was lower than the original; “Making Time” might be considered marginally acceptable at .611, but the total scale is acceptable at .895. Group means on the scales were not significantly different [$t(235) = -1.137, p > .05$].

Table 12. Exercise Self-Efficacy Statistics

Scale	N	Min.	Max.	Mean	SD	Cronbach's α
Sticking to It	222	8	40	28.24	7.32	.891
Making Time	219	4	20	13.66	3.37	.611
Self-Efficacy Total	209	12	60	42.12	10.0	.895

Social Support for Exercise

Social support for exercise was measured by the Family and Friends Scales of the Social Support for Exercise (SSE) survey (Sallis, Grossman, Pinksi, Patterson, & Nader, 1987). Data are compared for two subscales, which use a 5 point Likert scale: family/family participation (10 items) and rewards and punishment (3 items), and a total score (See Table 13). The rewards and punishment subscale is not used for friends per developer protocol. In this study overall social support from both family and friends tends to be on the lower side and means did not differ between groups.

Table 13. Social Support Statistics

Scale	N	Minimum	Maximum	Mean	SD	Cronbach's α
Family Participation	206	10	50	22.72	10.35	.926
Family Rewards & punishment	215	3	15	4.38	2.12	.614
Family Total	205	13	63	27.10	11.29	.909
Friend Total ^a	212	10	50	23.99	10.78	.944

^a Friend Total only includes items associated with participation. Rewards and punishment subscale not scored according to scale developers.

Socio-economic Status (SES)

SES was calculated using three measurements: self-reported maternal education, paternal education, and family income. The education question involved 8 levels of increasing education, while the family income item involved 7 levels of increasing income (see Appendix C). The standardized mean of each variable was summed to form the SES variable. Independent sample *t*-tests demonstrated higher scores for non-Hispanic respondents [$t(230) = 5.564, < .001$].

Acculturation

The acculturation scale is comprised of two subscales—American Orientation (AOS) and Mexican Orientation (MOS). The acculturation score is determined by totaling each subscale, dividing by the number of items in the subscale to calculate its mean, then subtracting the mean MOS score from the mean AOS; this score is placed on a continuum of very Mexican oriented to very Anglo oriented: < -1.33 (very Mexican oriented) to > 2.45 (very assimilated; Anglicized) that can be used to determine 5 levels of acculturation. Participants are considered bicultural in the ≥ -1.33 to 1.19 range. Means and reliability of each subscale and acculturation were calculated (See Table 14). The majority of participants were strongly Anglo oriented or Anglicized, i.e., very assimilated (see Table 15); however, the categories across Hispanics were normally distributed.

Table 14. Reliability and Statistics for Acculturation Subscales, Means, and Independent Sample *t*-Tests of the Group Means

	N	Min.	Max.	Mean	SD	Cronbach's α	<i>t</i>
Anglo Orientation	225	38	65	54.12	6.09	.748	6.807, (<i>df</i> 223) <i>p</i> < .001
Non-Hispanic	78			57.58	5.57	.793	
Hispanic	147			52.29	5.54	.742	
Mexican Orientation	225	18	85	47.96	18.52	.951	-16.91, (<i>df</i> 213.7) <i>p</i> < .001
Non-Hispanic	78			30.90	6.77	.782	
Hispanic	147			57.01	16.25	.929	
AOS mean	225	2.90	5.0	4.16	.468		6.807, (<i>df</i> 223) <i>p</i> < .001
Non-Hispanic	78			4.43	.429		
Hispanic	147			4.02	.426		
MOS mean	225	1.10	5.0	2.82	1.09		-16.91, (<i>df</i> 213.7) <i>p</i> < .001
Non-Hispanic	78			1.818	.398		
Hispanic	147			3.354	.956		
Acculturation	225	-1.60	3.7	1.34	1.37		16.768, (<i>df</i> 219.4) <i>p</i> < .001
Non-Hispanic	78			2.612	.542		
Hispanic	147			.669	1.181		

Table 15. Frequency of Acculturation Levels by Category and Hispanic Group^a

Acculturation Level	Non-Hispanic N=78	Hispanic N=147	Total Sample N=225
1 Very Mexican oriented	0	3 (2.0%)	3 (1.3%)
2 Mexican oriented to approximately balanced bicultural	0	42 (28.6%)	42 (18.7%)
3 Slightly Anglo oriented bicultural	0	51 (34.7%)	51 (22.7%)
4 Strongly Anglo oriented	34 (43.6%)	46 (31.3%)	80 (35.6%)
5 Very assimilated; Anglicized	44 (56.4%)	5 (3.4%)	49 (21.8%)

^a Acculturation Level by category varied significantly by Hispanic group [$\chi^2 (df 4) = 118.86, p < .001$].

Beliefs about Physical Activity

The results for the Beliefs about Physical Activity instrument were presented in the section for Study 1.

Study Two Model

The second study examines correlates of physical activity in relationship to one another and between non-Hispanic and Hispanic groups. Table 16 presents correlations and means of variables used in the proposed model for non-Hispanic and Hispanic groups (See Figure 4). Independent sample *t*-tests were used to test for differences among the two groups' means (1-tailed, Bonferroni corrected,

$\alpha=.01$). Means significantly differed between groups for Acculturation, SES, Anglo Orientation (AOS), Mexican Orientation (MOS), and the BPA Total, and the mean difference for EBBS approached significance. Higher means were found for non-Hispanics on Acculturation, SES, and AOS, and higher means were found for Hispanics on MOS, and BPA Total, as well as EBBS.

Figure 4. Proposed Path Analysis for Vigorous Physical Activity across Samples of Non-Hispanic and Hispanic College-Aged Women

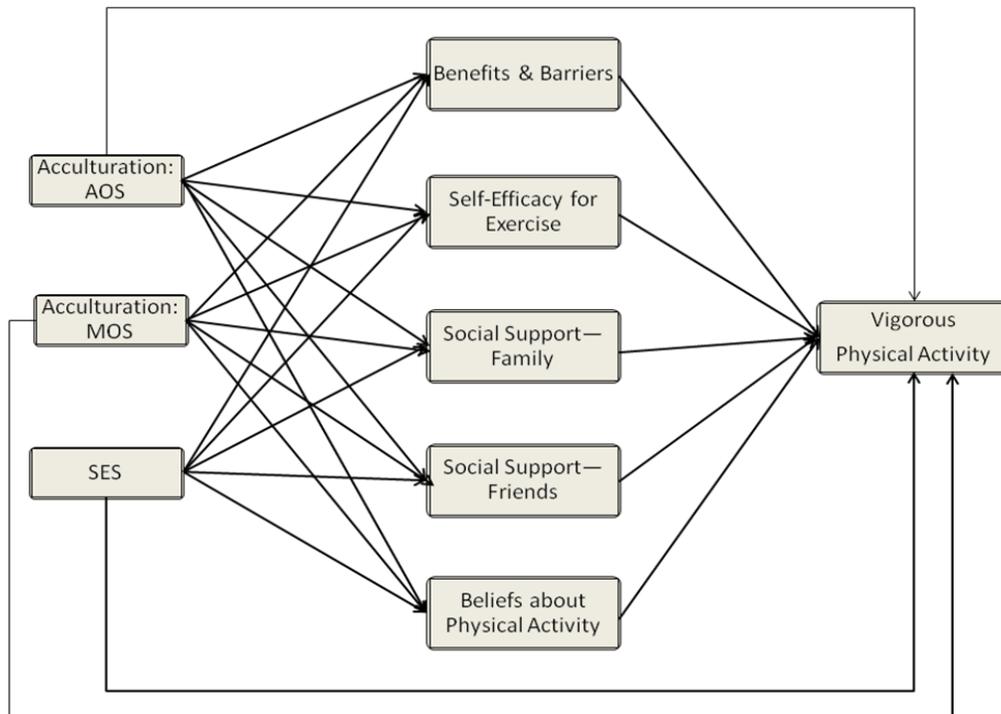


Table 16. Non-Hispanic and Hispanic Correlations and Means for Path Model Variables.

NON-HISPANIC									
Subscale	N	EBBS	SE	SSFA	SSFR	BPA	Vig^a	Accult	SES
Exercise Benefits & Barriers (EBBS)		1							
Self-Efficacy (SE)		.625***	1						
Social Support, Family (SSFA)		.339**	0.256†	1					
Social Support, Friends (SSFR)		.423***	0.179	.519***	1				
Beliefs About Physical Activity (BPA)		.614**	.397**	.326*	.364**	1			
Vigorous Physical Activity (Vig)		.587***	.426***	.350**	.354**	.285*	1		
Acculturation (Accult)		-.072	.036	.108	-0.048	0.054	-0.128	1	
SES		.105	.304*	.219†	0.22†	.264*	0.007	.345**	1
Means		135.6†	41.0	25.9	22.5	148.2**	25.4	2.61***	1.15***
SD		17.0	10.4	11.5	10.3	25.4	23.0	0.5	2.1
HISPANIC									
Subscale	N	EBBS	SE	SSFA	SSFR	BPA	Vig^a	Accult	SES
Exercise Benefits & Barriers (EBBS)		1							
Self-Efficacy (SE)		.529***	1						
Social Support, Family (SSFA)		.165†	.287***	1					
Social Support, Friends (SSFR)		.058	.181*	.345***	1				
Beliefs About Physical Activity (BPA)		.535***	.494***	.209*	.114	1			
Vigorous Physical Activity (Vig)		.454***	.418***	.297***	.117	.449***	1		
Acculturation (Accult)		-.053	-.086	-.197*	-.056	.092	.022	1	
SES		.013	.078	.112	.098	.031	.103	.157†	1
Means		139.4†	42.7	27.7	24.8	158.8**	28.7	0.67***	-.604***
SD		16.3	9.8	11.2	11.0	24.8	23.3	1.2	2.3

^aVigorous reflects a square root transformation

* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .10$

Path Analysis

The path analysis model is based on the Health Promotion Model and answers research questions 2-6 addressing the relationships of correlates of physical activity and ethnic group, particularly those related to acculturation and beliefs. Initially, the researcher examined and prepared data to avoid violating assumptions. The sample size was just over the minimum sample size requirement of 200 (Garson, 2011). Instruments were chosen and scored to maintain interval levels and minimize number of parameter estimates; for example, the BPA instrument was totaled rather than having subscales serve as separate indicators for latent variables. Violations of multivariate abnormality were addressed with transformation of the vigorous PA variable; no obvious outliers existed; the IPAQ protocol also minimized extremes in data. Missing values were imputed and replaced or the cases deleted per instrument protocol (see specific instrument discussion); additionally, analyses took advantage of the missing data function of Mplus.

Proceeding with analyses, the variable correlations and modification indices suggested that the model be tested with all mediating variables co-varying (10 covariances plus those for the acculturation variables and SES); however, all 10 covariances produced a just-identified model. Various combinations of covariance removals produced models without good fit. In order to avoid just identification with the exact proposed model and all covariances, at least one path

had to be removed. Using both MOS and AOS to represent acculturation was no better and often worse than using the acculturation variable (AOSmean – MOSmean difference); therefore, for parsimony, acculturation was used in the various models. Various paths, supported by theory, sample data, and modification indices, were removed, and the models explored. The final model removed only the SES to EBBS path.

Per existing standards of multi-sample path analysis, the model was first tested with parameters unconstrained, then with structural paths constrained (Kline, 2005). Covariances remained unconstrained. SEM experts currently consider constraining of error variances and covariances “excessively stringent” (Bryne, 2001, as cited in Garson, 2011). Both the unconstrained and constrained models fit the data well. Model invariance across samples is supported by a non-significant chi square difference of the fit of the unconstrained and constrained models. The chi square difference was not significant [$\chi^2_D(22) = 31.81, p > .05$]; therefore, the models did not differ significantly across samples of non-Hispanic and Hispanic women, and the constrained model was accepted as more parsimonious. Table 17 presents the fit statistics for the unconstrained and constrained models, and Figures 5 and 6 present the path coefficients for the constrained model. Table 18 presents estimates of the paths. In the constrained model, significant R squares demonstrate that the model variables account for

35.3% of the variability in vigorous PA for the non-Hispanic group ($p < .001$) and for 29.6% of the variability in vigorous PA for the Hispanic group ($p < .001$).

Table 17. Fit Statistics for the Constrained Path Model for Physical Activity

Model	CMIN	df	p	CFI >.95	RMSEA <.05	.90 CI	SRMR <.08
Unconstrained	1.766	2	.414	1	0	0-.175	.023
Constrained	21.474	18	.256	.989	.04	0-.095	.045
χ^2_D	19.7	16	.23				

Good Fit: CMIN > .05, CFI > .95, RMSEA < .05, .90 CI 0-.10, SRMR < .08,

Table 19 presents indirect and total effects of the constrained model shown in Figures 5 and 6. The total indirect effect of SES through endogenous variables to vigorous physical activity (PA) was significant ($p < .01$). The indirect paths to PA through self-efficacy and through SSFA approached significance and were the only indirect paths for which constituent paths were both significant in the final model. Historically, lack of significant correlations between acculturation and PA and SES and PA would preclude testing for mediation according to Baron and Kenny (1986); however, current practice in mediation analysis does not require that the independent variable have a significant relationship with dependent variable (MacKinnon, 2008, pg. 394). According to MacKinnon (2008), this requirement may reduce power to detect mediated effects particularly in complete mediation models.

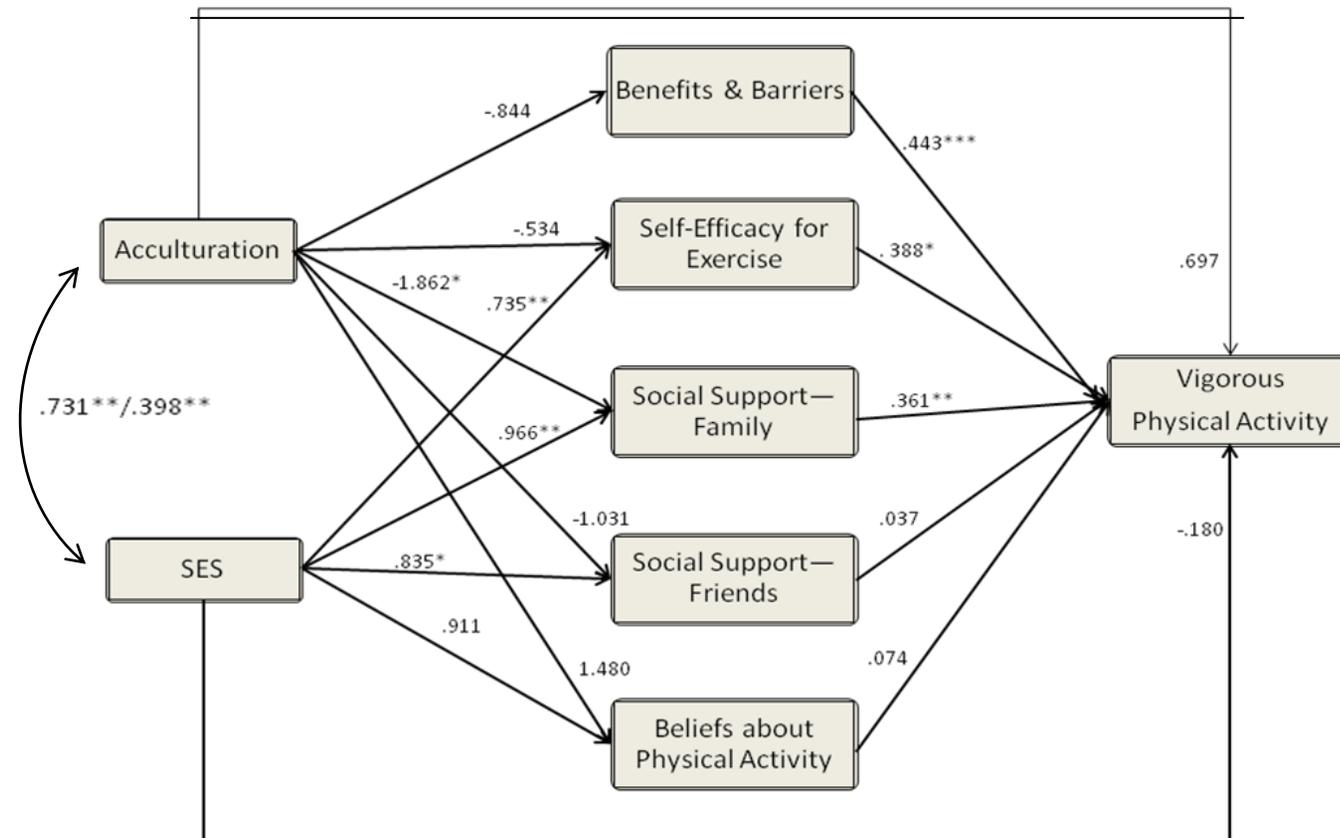
Table 18. Maximum Likelihood Parameter Estimates for Analysis of a Path Model of Vigorous Physical Activity across Samples of Non-Hispanic and Hispanic College-Aged Women

Parameter	Hispanic			Non-Hispanic		
	Unst.	SE	St.	Unst.	SE	St.
<i>Direct Effects</i>						
			Equality Constrained			
Accult → EBBS	-.844	1.093	-.061	-.844	1.093	-.027
Accult → SE	-.534	.702	-.063	-.534	.702	-.028
SES → SE	.735**	.256	.173	.735**	.256	.152
Accult → SSFA	-1.862*	.781	-.197	-1.862*	.781	-.088
SES → SSFA	.966**	.361	.202	.966**	.361	.178
Accult → SSFR	-1.031	.764	-.110	-1.031	.764	-.054
SES → SSFR	.835*	.340	.177	.835*	.340	.171
Accult → BPA	1.480	1.775	.070	1.480	1.775	.032
SES → BPA	.911	.677	.085	.911	.677	.076
Accult → Vigor	.697	1.390	.035	.697	1.390	.017
SES → Vigor	-.180	.613	-.018	-.180	.613	-.017
EBBS → Vigor	.443***	.108	.310	.443***	.108	.330
SE → Vigor	.388*	.167	.166	.388*	.167	.173
SSFA → Vigor	.361**	.138	.173	.361**	.138	.181
SSFR → Vigor	.037	.143	.017	.037	.143	.017
BPA → Vigor	.074	.073	.080	.074	.073	.082

Note: Unst., unstandardized; St., standardized.

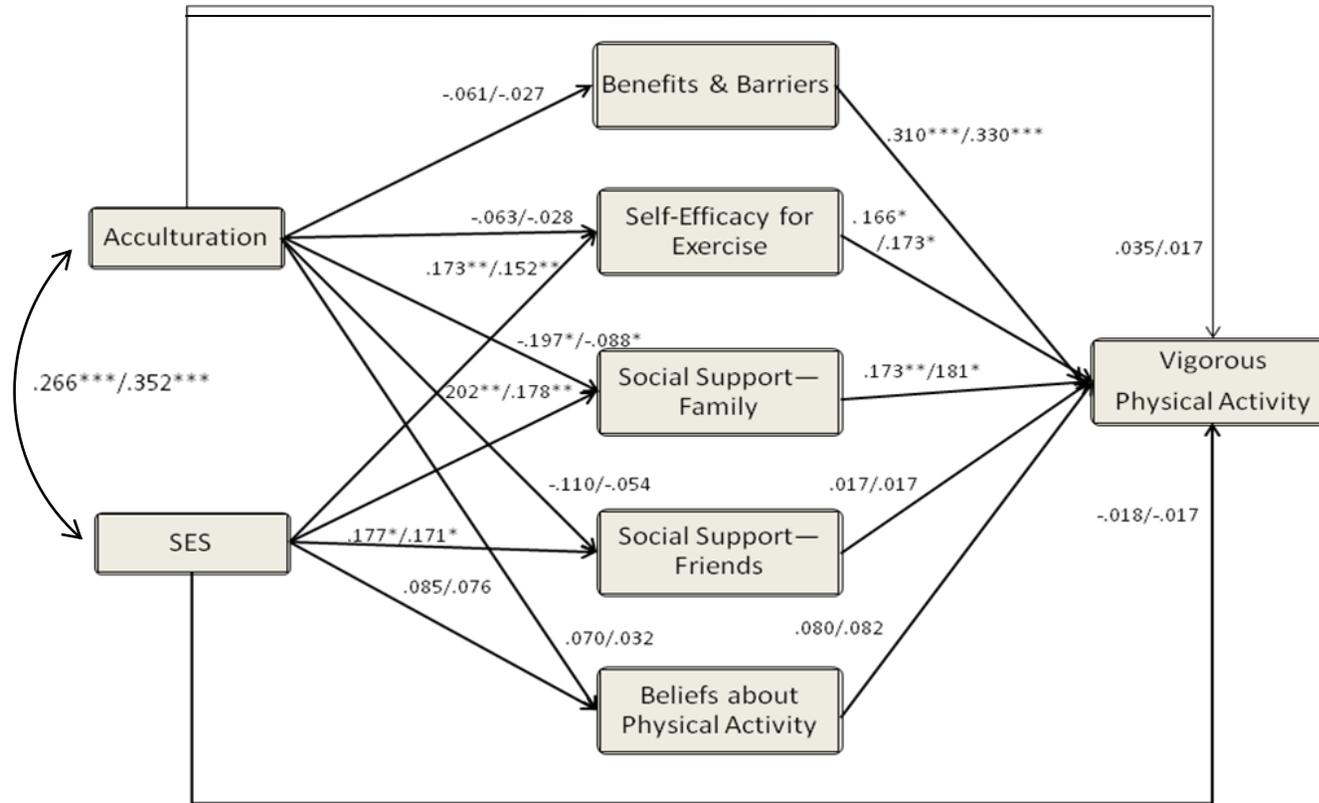
* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .10$

Figure 5. A Path Model of Vigorous Physical Activity Evaluated across Samples of Hispanic and Non-Hispanic College Women.^a (Unstandardized Estimates)



^aCovariances (10) are present for all mediating variables but not illustrated (See Appendix F for an illustration).

Figure 6. A Path Model of Vigorous Physical Activity Evaluated across Samples of Hispanic and Non-Hispanic College Women.^a (Standardized Estimates; Hispanic/non-Hispanic)



^aCovariances (10) are present for all mediating variables, but not illustrated. Coefficients = (Hispanic/non-Hispanic)

Table 19. Indirect and Total Effects for the Constrained Path Model of Vigorous Physical Activity across Non-Hispanic and Hispanic College-Aged Women

Parameter	Unst.	SE	non-Hispanic		Hispanic	
			St.	SE	St.	SE
Effects Accult → Vigor						
Total	-.485	1.591	-.011	.038	-.025	.081
Total Indirect	-1.182	.911	-.028	.022	-.060	.046
Direct Effects						
Accult → Vigor	.697	1.390	.017	.033	.035	.071
Indirect Effects						
Accult→EBBS→Vig	-.374	.493	-.019	.012	-.019	.025
Accult→SE→Vig	-.207	.282	-.010	.007	-.011	.014
Accult→SSFA→Vig	-.672 [†]	.381	-.034	.009	-.034	.019
Accult→SSFR→Vig	-.038	.150	-.002	.004	-.002	.008
Accult→BPA→Vig	.110	.172	.006	.004	.006	.009
Effects SES → Vigor						
Total	.552	.614	.051	.057	.056	.062
Total Indirect	.732**	.258	.068	.024	.074	.026
Direct Effects						
SES → Vigor	-.180	.613	-.017	.057	-.018	.062
Indirect Effects						
SES→SE→Vig	.285	.157	.026	.015	.029	.016
SES→SSFA→Vig	.349	.185	.032	.017	.035	.019
SES→SSFR→Vig	.031	.119	.003	.011	.003	.012
SES→BPA→Vig	.068	.083	.006	.008	.007	.008

Note: Unst., unstandardized; St., standardized.

* $p < .05$, ** $p < .01$, *** $p < .001$

Summary of Results

The current research examined characteristics of a newly developed scale designed to assess beliefs about physical activity and asked 6 questions about correlates of physical activity for non-Hispanic and Hispanic women, with an emphasis on acculturation and beliefs about physical activity.

Study 1—Beliefs about Physical Activity Scale

Factor analysis of a sixty-nine item survey produced a final instrument of 39 items and 7 factors, which formed the subscales. The 7 factors accounted for 67.9% of the explained variance. The content of four of the scales emphasized encouragement of exercise and three emphasized discouragement of exercise. All subscales were scored in the exercise promoting direction with appropriate items reverse coded. The BPA total was the sum of the 7 subscales. Reliability data ranged from .634 to .959 for the subscales, with the highest reliabilities for spirituality, cultural beliefs, and beliefs about impact of exercise on various life roles, i.e., role enhancement; the α for the BPA Total was .894. Significant mean differences existed between groups for the Spiritual [$t(196) = -3.303, p < .001$] and Cultural Beliefs [$t(191) = 2.748, p < .01$] subscales, as well as BPA Total [$t(195) = -2.849, p < .01$]. The Socialization and Personal Benefit/Control subscales both had $p < .05$ and so were not significant with α set at .01. The Hispanic subjects' means were higher for the spiritual, socialization, and personal benefit/control subscales, as well as the BPA total. The Hispanics' mean cultural

subscale score was lower than for non-Hispanics. The spirituality ($r = .331, n = 128, p < .001$), exercise difficulty ($r = .269, n = 128, p < .01$), socialization ($r = .242, n = 127, p < .01$), and personal benefit/control ($r = .457, n = 128, p < .001$) scales were positively correlated with vigorous physical activity for Hispanics, while role enhancement ($r = .281, n = 70, p < .05$), exercise difficulty ($r = .378, n = 70, p < .001$), and personal benefit/control ($r = .245, n = 70, p < .05$) were positively correlated with vigorous physical activity for non-Hispanics.

Study Two

Question 1: What is the prevalence of physical activity in college-aged Hispanic and non-Hispanic women? For this sample, 82% of the women had engaged in leisure time physical activity (LTPA) in the past 30 days. Over half (53.2%) of the women met the criteria for high levels of physical activity. While Hispanics engaged in about 25 more minutes of vigorous activity per week than non-Hispanics, this difference was not statistically significant.

Question 2: Do selected correlates of physical activity account for differences in physical activity in college-aged Hispanic and non-Hispanic women? The correlates of physical activity explored in this study included acculturation, socioeconomic status (SES, parental education and family income), exercise benefits and barriers (EBBS), self-efficacy for exercise (SE), family and friend social support for exercise (SSFA, SSFR), and beliefs about physical activity (BPA). Physical activity prevalence did not differ between the two

groups; however, independent sample t-tests demonstrated significant differences for SES, acculturation (lower for Hispanics), and Beliefs about Physical Activity total (higher for Hispanics).

The path model examined relationships among the variables while controlling for all the other variables in the model. The model was first tested with parameters unconstrained, then with structural paths constrained. Both the unconstrained and constrained models fit the data well without a significant chi square difference [$\chi^2_D(22) = 31.81, p > .05$]; therefore, the models did not differ significantly across samples of non-Hispanic and Hispanic women, and the constrained model was accepted as more parsimonious. The constrained model variables accounted for 35.3% of variation in vigorous PA for non-Hispanics [$p < .001$] and 29.6% of variation in vigorous PA for Hispanics [$p < .001$]. In examination of the direct effects in the path model some variables were significantly and positively related to PA: exercise benefits and barriers, self-efficacy, and family social support for exercise, while others were not significantly related, i.e., acculturation, SES, social support from friends, and beliefs about physical activity. There was a significant negative association between acculturation and family social support, and positive relationships between SES and self-efficacy for exercise and family and friend social support.

Total and indirect effects were also determined. The total indirect effects from SES to vigorousness were significant; however, while the indirect paths from SES to PA through SSFA and SE approached significance, no individual indirect paths were significant.

Question 3. Are selected constructs of Pender's Health Promotion Model related to physical activity participation in college-aged women? Constructs from the final model that are constructs of the HPM include benefits and barriers, self-efficacy, and family and friend social support for exercise. As noted in question 2, all but friend social support for exercise are significantly related in the positive direction in the path model. In this sample, findings support the HPM.

Question 4. What is the relationship between acculturation, selected correlates, and prevalence of physical activity in college-aged women?

Acculturation was determined using the difference between Mexican Orientation from Anglo Orientation; therefore, higher scores indicated greater levels of acculturation. The path from acculturation to family social support was the only significant acculturation path, and it was negative. In this sample, acculturation was not significantly associated with vigorous physical activity.

Question 5. Are there differences in beliefs towards physical activity between college-aged Hispanic and non-Hispanic women? Beliefs were measured by the BPS survey. The means of the BPA Total for the two samples were

significantly different, with the Hispanic mean approximately 10 points greater. There are also differences between the two groups on the subscales as summarized under Study 1.

Question 6. Is acculturation related to beliefs towards physical activity among college-aged Hispanic and non-Hispanic women? Examining the path model, acculturation is not significantly related to beliefs about physical activity.

CHAPTER 5: DISCUSSION

The present research had two major purposes: 1.) to develop a scale measuring beliefs about physical activity that accessed cultural differences between non-Hispanic and Hispanic women and 2.) to test for correlates of physical activity, including this belief scale, using a framework based upon the Health Promotion Model advanced by Pender. The research emphasized acculturation and beliefs about physical activity.

Study 1

Total mean scores on the BPA scale are significantly greater for Hispanic women, and the correlation between the total score and vigorous physical activity is significant for both non-Hispanic and Hispanic groups. At a descriptive level, mean differences and correlation patterns suggest the need for additional research.

The beliefs scale was originally developed around several themes identified from qualitative and quantitative studies of Hispanic and non-Hispanic women (See Ch. 2): general impressions about exercise, exercise role models, social support, exercise benefits and barriers, exercise preferences, and cultural issues. Additionally, commonly recognized cultural values among Hispanic women, i.e., *personalismo*, *familismo*, *respeto*, *confianza*, *machismo*, *marianismo*, and spiritualism (Alvarez, 2007; Añez et al, 2008; Gloria et al, 1996; Halgunseth et al, 2006, Weidel et al, 2008), informed the development of the scale items.

Subscales extracted as a result of factor analysis reflect some of these themes and values. Spirituality, cultural beliefs, role enhancement, and socialization preference subscales accounted for more than half the explained variance of the total scale. Furthermore, means for the spirituality subscale and the cultural beliefs subscale were significantly different between the non-Hispanic and Hispanic groups. The spirituality subscale addresses God as a central figure and source of strength in respondents' lives, while the cultural beliefs subscale expresses beliefs reflective of the two values, *machismo* and *marianismo*, e.g., men do not want their women out exercising and only certain exercise is acceptable for women.

Some beliefs comprising the cultural beliefs subscale are similar to findings in other research. In studies of middle-aged Hispanic women, the reasons cited for not exercising were husbands' attitudes about their wives exercising (*machismo*) and family responsibilities (*marianismo*) (Berg et al, 2002; Ramirez et al, 2007). A qualitative study of college-aged Latinas echoed beliefs around rules for the appropriateness of exercise for women (D'Alonzo et al, 2008).

In a qualitative study of Latino women's spiritual beliefs related to health behaviors, researchers noted an active versus passive relationship with God that influences participation in one's health (Jurkowski, Kurlanska, & Ramos, 2010); in an active relationship, one asks God for help, particularly in coping, while in a passive relationship God is responsible for health. In the present study, items from

the spiritual subscale seem to reflect an active relationship, which may help to explain, in part, the positive relationship of spirituality with physical activity.

These findings may have implications for interventions involving spirituality, such as those in faith-based programs. Physical activity intervention studies in African American faith-based organizations have been successful (Bopp, Fallon, & Marquez, 2009; DeHaven, Hunter, Wilder, Walton, & Berry, 2004); however, few studies or reports of faith-based interventions with Hispanic populations have included the statistics and physical activity data to evaluate effect (DeHaven et al, 2004; Bopp et al, 2011). Further development of the beliefs about physical activity is necessary if the scale is to be used in understanding the relationships of spirituality, other beliefs, and physical activity.

Study 2

Physical Activity

Study 2 used means and a path model to explore the relationships of various correlates of vigorous physical activity. For the group of women studied, 82% had engaged in leisure time physical activity (LTPA) in the past 30 days and, in fact, had met national guidelines for moderate to vigorous physical activity, i.e., 150 minutes of moderate-intensity physical activity, accumulated in bouts of 10 minutes or longer, per week (USDHHS, 2008, p.4), 75 minutes vigorous-intensity physical activity per week or more per week, or an equivalent combination of the two. Over half (53.2%) of the women met the criteria for high

levels of physical activity. Physical activity prevalence did not differ between the non-Hispanic and Hispanic respondents.

These findings are in contrast to the general population. Viewed in terms of inactivity, 18% of the study population had not engaged in LTPA. Data from the Third National Health and Nutrition Examination Survey (NHANES) and the 2000-2003 National Health Interview Survey identified *inactivity* rates across age groups ranging from 44 to 66% for Hispanic women (Crespo et al, 2000; Neighbors et al, 2008; Sundquist et al, 2000). Closer in age to the college sample, 22% of female high school seniors reported no physical activity, and 20.6% reported engaging in vigorous physical activity (Delva et al, 2006).

In a college sample, 53% of women reported no vigorous PA, and 22% of the women reported no PA at all (Suminski et al, 2002). Suminski et al further noted a difference in report of no PA between non-Hispanic women (17.4%) and Hispanic women (20.3%). A more recent study using a predominantly Hispanic (72%) college population also showed generally high exercise participation at 61%; however, unlike the current sample 69% did not meet the CDC recommendations for physical activity (Magoc, Tomaka, & Thompson, 2010). So while the current sample is more aligned with women their own age for no PA, they are certainly more active at a higher volume and/or intensity overall. Differences may exist because of contemporaneous or temporal differences; for example, campuses in the southwest have a tendency to be larger and more spread

out, and the weather stays nicer more of the year. Additionally, selection bias may have contributed to these findings because a strong interest in physical activity may have influenced respondents' choice to participate in the study.

In the path analysis and the remaining discussion, physical activity is confined to vigorous physical activity (PA). Vigorous PA correlated with a greater number of variables than the other PA measures and had fewer missing data. The vigorous PA variable was transformed by square root due to a non-normal distribution. Compared to vigorous PA, participants appeared to have more difficulty knowing the amount of time spent in walking and moderate PA. They reported "don't know" more often for these two activities, which had to be coded as missing data per IPAQ protocol. Apparently, vigorous activity or the perception of vigorous activity may be easier to distinguish from other levels of PA and subsequently better remembered and reported. In this discussion PA without a designation of intensity level should be read as vigorous physical activity.

The particular correlates of physical activity explored in this study included acculturation, socioeconomic status (SES), exercise benefits and barriers (EBBS), self-efficacy for exercise (SE), family and friend social support for exercise (SSFA, SSFR), and beliefs about physical activity (BPA). As noted earlier, physical activity level examined was self-reported total vigorous MET-

minutes per week. Physical activity prevalence did not differ between the two groups, and the structural paths of the model were invariant across groups; the findings are similar for non-Hispanics and Hispanics.

Socio-economic Status

The SES variable combined parental education and family income. Most respondents were at the same approximate educational level, i.e., some college. As expected the SES status between the two groups differed statistically with non-Hispanics 1.15 standard deviations above the mean and Hispanics .604 standard deviations below the mean. Unexpectedly, SES was not directly related to vigorous PA. The total indirect effect of SES on PA through self-efficacy and family social support, however, was significant.

Previous research has consistently demonstrated a positive relationship between education and PA and a less strong, sometimes inconsistent, positive relationship between income and PA (Eyler et al, 2002). Generally, more education predicts greater involvement in PA, but inconsistencies exist (Eyler et al., 2002), some of which may be related to type of activity measured; for example sports, exercise, and LTPA is associated with greater education, and household and caregiving PA is associated with less education (Eyler et al., 2002; Sternfeld et al., 1999). In one study middle-aged Latinas with higher educational attainment had more sedentary jobs compared to Latinas with less education and

more labor-intensive jobs; neither group participated in PA during leisure time (Lopez et al., 2008). The present study did not assess physical activity dimension.

As for income Eyley et al (2002) concluded that there were some inconsistent findings, especially in studies with mixed ethnic samples, but generally income is positively related to PA. The present study used family income to calculate SES; however, students may or may not be living at home or benefiting from the family income. With college students the income factor may not be as great, because students have access to financial aid. Additionally, they may have access to physical activity resources on campus, paid for by student fees.

Acculturation

Higher acculturation scores reflect higher levels of anglo-orientation. As expected group means for acculturation and related measures, AOS and MOS, differed significantly; non-Hispanics had higher acculturation and AOS scores and a lower MOS score. Attempts to separate acculturation into Mexican and Anglo orientation in the model did not produce good fit. In the tested model, path coefficients from acculturation to the other variables were rather small and not significant with the exception of the path to SSFA. Increases in acculturation score are associated with lower family social support scores. In the present study the heterogeneity of acculturation in the college-aged population may not have

been large enough to capture differences that acculturation may have on physical activity across a population with greater age and experiential range.

In reviews of the impact of acculturation, the findings are mixed but generally indicate a positive effect or none (Eyler et al, 2002; Yeh et al., 2009). Lara et al (2005) concluded that the relationship between acculturation and physical activity is unclear. They based their conclusion on the insufficient quality and number of studies and the existence of multiple studies showing no or conflicting effects. Many critics claim that differences in measurement contribute to inconsistent relationships between acculturation and health outcomes and behaviors (Lara, et al, 2005). Some of these differences include the proxy used for acculturation, such as generational status or country of origin, and whether one is measuring the construct of structural assimilation (functional integration into the dominant culture) or acculturation related to beliefs and retention of cultural practices (Dergance et al, 2005; Gordon-Larsen et al, 2003). Gordon-Larsen et al noticed an interaction effect between generation and country of origin. Physical activity levels of Hispanic immigrant adolescents decreased between 1st and 2nd generation Hispanics overall; however, immigrants of Mexican origin increased bouts of moderate-vigorous physical activity and significantly increased lower intensity physical activity. Additionally, acculturation appeared to have a much stronger effect for foreign-born Hispanics than US-born Hispanics. The majority of Hispanic respondents in the current study were 2nd generation or more.

Exercise Benefits and Barriers

As used in the present study, greater scores on the Exercise Benefits and Barriers Survey (EBBS) indicate greater level of positive regard for exercise, i.e., greater perception of benefits over barriers. Both samples had more positive perceptions of physical activity. These findings are similar to those in a study of sedentary elderly Mexican Americans and European Americans (Dergance et al, 2003). Both groups of seniors had accurate and positive attitudes toward barriers and benefits of leisure time physical activity; however, in that study, the Mexican American sample had more prevalent positive beliefs about benefits.

According to Eyler (2002) benefits are consistently associated with engaging in physical activity, but even more so for Whites and Blacks than Hispanic samples. Benefits and barriers were also significantly associated with PA in the present study but were not different across the sample. Analysis of longitudinal data from Project EAT in Minneapolis, which examined eating and physical activity behaviors in teens, demonstrated a similar association (Graham, Sirard, & Neumark-Sztainer, 2011). Researchers determined that adolescents with more favorable attitudes regarding physical activity engaged in approximately 30-40% more MVPA at 5 and 10 year follow-up than adolescents with less-favorable attitudes. However, both groups had still decreased physical activity over the 10

year period (6.0 vs. 4.1 hours/week at 5 years, 4.5 vs. 3.3 hours/week at 10 years).

The mean age at baseline was 14.9 years.

Finally, African-American and Hispanic women who demonstrated higher attendance in a college exercise program designed to increase self-regulation skills and exercise, had higher scores on the EBBS and SEE scales (D'Alonzo et al, 2004). These scores increased significantly over the 8 week program, while the same scores decreased for the control group.

In other studies specifically using the EBBS instrument, 61% reported statistical support for the importance of perceived benefits in influencing health behavior and 79% reported support for perceived barriers role in health behavior (Pender et al, 2001). Twelve of the 18-19 studies examined included physical activity or exercise as the dependent variable. The present study adds supporting empirical evidence that perceived benefits influence health behavior.

Self-Efficacy

In the current study, self-efficacy is positively related to vigorous physical activity. This finding is consistent in literature reviews as well as individual studies for both the general and Hispanic populations (Eyler et al, 2002; Evenson et al, 2003; Sternfeld et al, 1999). Self-efficacy was positively associated with SES as well; however, the research literature does not address this relationship,

except to control for SES. In other studies examining constructs of the HPM, 86% provided support for self-efficacy (Pender et al, 2001).

The relationship of self-efficacy to physical activity is complicated. Despite the importance and frequency of positive relationships of self-efficacy and physical activity in the literature, intervention studies have reported varied and unexpected relationships between self-efficacy and physical activity. An intervention study with ethnic women showed increases in walking and decreases in self-efficacy (Castro, Sallis, Hickman, Lee, & Chen, 1999). Authors suggested the women, in the excitement of joining the study, may have initially overestimated their levels of self-efficacy. Another intervention with multi-ethnic adolescent girls, Trial of Activity in Adolescent Girls (TAAG), had similar findings. Self-efficacy and total and friend social support decreased; however, assessment of difficulty getting to the program and actual physical activity increased compared to control subjects (Lytle, Murray, Evenson, Moody, Pratt, Metcalfe, & Parra-Medina, 2009). Authors believed participation in the study gave participants personal experience that the comparison group didn't get. In another study of Black and White high school girls, self-efficacy *moderated* the relationship between social support and physical activity (Dishman, Saunders, Motl, Dowda, & Pate, 2009). Girls who had higher perceptions of social support throughout high school had less declines in physical activity, but only if self-efficacy for overcoming barriers to physical activity remained high. Girls with

low self-efficacy had lower levels of physical activity regardless of changes in perceived social support. Future research will determine the nuances of the relationship of self-efficacy to women's physical activity.

Social Support

In the present study, social support for family is positively related to vigorous physical activity, while friend social support is not. Previous research has found both types of support associated with physical activity in women across populations (Eyler et al, 2002). In a multi-ethnic sample of middle-aged and older women, Hispanic women had the highest levels of support, and social support regardless of its source (friend or family) was positively associated with physical activity for subjects of all ethnic backgrounds; however, social support was not significantly associated with "regular" exercise (Eyler et al, 1999). The authors concluded that social support may be more important for sedentary or less active women, while "regular exercisers" may no longer be as reliant on social support to maintain physical activity. Since the exercisers in the present study appear to be regular exercisers by meeting national guidelines, social support may not be contributing as much influence as it would in other populations.

The TAAG intervention study with adolescent girls did not demonstrate a significant association with family social support; however, total and friend support was significant and it declined as physical activity increased (Lytle et al,

2009). Girls completing the intervention reported lower levels of support and greater difficulty getting to and from activities compared to girls in the control group. The authors postulated that girls in the intervention group “became more aware of issues related to being active,” and so they became more realistic in their assessments than girls in the control group who were not aware.

Several studies with undergraduate college students examined social support and physical activity, as well as self-efficacy. Among students assessed for stage of exercise behavior change (SOC), self-efficacy and family social support best predicted exercise SOC, while self-efficacy and friend social support best predicted exercise SOC for males (Wallace, Buckworth, Kirby, & Sherman, 2000). Examining friend/peer social support for healthy eating and exercise, Gruber (2008) found gender differences in perceived social support with women receiving more encouragement to exercise and eat well. Two research groups examined health promoting lifestyles or physical activity in college students using the Pender HPM. The first study found that health value and health efficacy significantly predicted engaging in health promoting lifestyle; however, family/friend support, measured by the Multi-Dimensional Support Scale, was not a significant predictor. The researchers suggested college as a time when students spend more time away from home and family. The second study measured physical activity and social support using the same instruments as the present study and a different tool for self-efficacy. They also considered commuter or

residential status in their results. Participants had higher levels of physical activity than expected compared to other studies. The researchers suggested that the short version of IPAQ combines all dimensions of activity, which may contribute to the differences. As in the present study, self-efficacy and family social support were positively associated with physical activity; friend social support was not associated with physical activity. Further analysis demonstrated a stronger relationship with family social support for commuters than for residential students, i.e., those who live on or near campus. The present study did not test this relationship, but the majority of respondents reported living with family.

Beliefs about Physical Activity

In the present study beliefs about physical activity are not uniquely associated with vigorous physical activity in the context of this sample of college women and other commonly researched correlates of physical activity from the Pender model. However, differences in means and the significance of the simple correlation between beliefs and physical activity suggest there are differences between the non-Hispanic and Hispanic sample in beliefs about physical activity. The beliefs measured included beliefs which encourage physical activity and those which discourage physical activity. Appearance of beliefs in the research literature typically refers to benefits, barriers, and social norms (Eyler et al, 2002). However, in the present study the beliefs are not confined to benefits and barriers.

Beliefs particular to a culture have been discussed in qualitative research, but have not been quantitatively measured. The scale retained many of the themes identified in other research as discussed in chapter 2. Further development and exploration of the beliefs scale will quantify some of these beliefs.

Limitations

While the present study does contribute to our knowledge about correlates of physical activity, it does have some limitations related to the administration and construction of the survey and to its interpretation and generalizability. First, all measures were self-report and subject to recall and social desirability bias. Additionally, self-selection and non-response bias are present in that participants had to choose to respond to the electronic solicitation to complete the survey and the overall response rate was low. Women with a greater interest in physical activity might have been overly represented. Differences between those who responded and those who did not were not examined. Furthermore, the survey was long and item scales similar. As the respondents progressed through the survey, they might have changed the way they responded out of fatigue, boredom, or decreased motivation; for example, they might have rushed through responses, spending less time considering answers, or moved to more moderate or extreme positions in order to finish quickly.

In developing and testing the Beliefs about Physical Activity Scale, the limited age range and education level of the subjects limits the generalizability of the findings. While the use of a convenience sample in the initial development of the instrument was appropriate, in reducing the items of the scale to improve the reliability and factor structure, items were removed that were identified and important in other research with other Hispanic and non-Hispanic populations, e.g. less educated or older women in the 20-50 year age range. In addition, the narrow age and education level of this college population, with the relatively larger number of Anglo-oriented subjects may not have allowed a fair test of the relation of acculturation to physical activity. Overall this sample presented a narrow range for several variables—age, education, SES, and acculturation, such that the analyses results were unexpected for some of these PA correlates. Moreover, the relatively small number of respondents in relation to the number of items hindered the testing of the model for measurement invariance across groups, and may have resulted in a lack of statistical power to detect some of the expected relations among variables in the path model.

In testing the path model, vigorous physical activity was selected as the dependent variable for a number of reasons discussed earlier. The correlates of physical activity may differ across the intensities and modes of physical activity, so that combining intensities or modes offers other challenges and limitations. Some of these limitations can be addressed in future research.

Future Research

The proposed model and its constructs confirm the importance of perceived benefits and barriers, and self-efficacy and social support for exercise established in the literature. For the beliefs scale, further psychometric development and evaluation and testing of a measurement model across age and education levels as well as ethnicity are necessary to establish measurement invariance. Women falling in the 20 to 50 year range with greater differences in education and SES level are an especially important population to survey. An interesting study exploring multi-generational dimensions of PA and beliefs could include mother-daughter dyads. Additionally, refinement of the instrument will require further exploration of beliefs that encourage or discourage physical activity, but which do not fall strictly under the categories of benefits or barriers. Larger samples will be required for this work and may make it possible to detect important relations of beliefs about physical activity with attitudinal and behavioral variables.

For the path analyses, alternative models with the same variables should be explored in future studies, possibly with other indirect effects and PA as a potential mediator. In addition, the physical activity variable can be examined strictly in minutes of activity, not MET minutes, to address differences in perception of intensity, and as the sum of moderate and vigorous activity to study

purposeful physical activity. Moreover, the additional utilization of capabilities of statistical software to minimize missing data and possibly eliminate the transformation of the physical activity variable may yield greater statistical power and promote interpretability of findings.

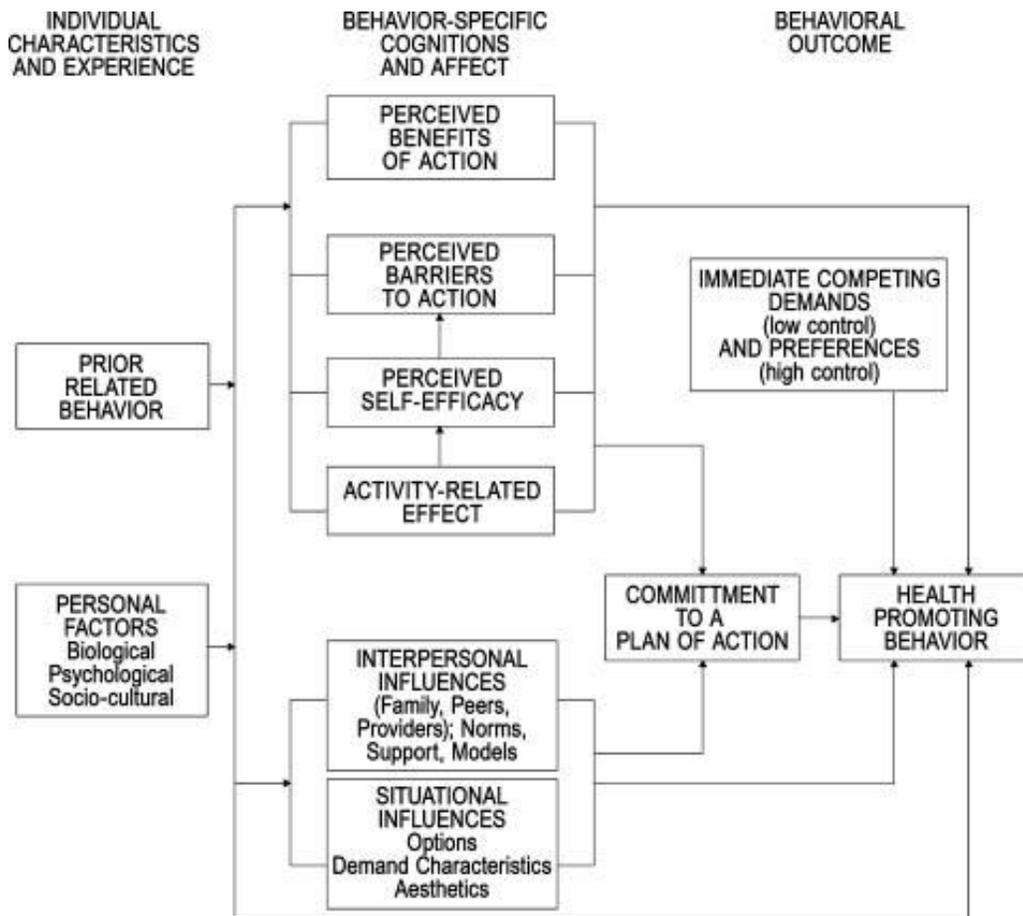
Conclusion

The present project was divided in two studies. The first study developed a new instrument to measure beliefs about physical activity that accessed cultural differences between non-Hispanic and Hispanic women. The beliefs scale was comprised of 7 subscales, which accounted for almost 68% of the variance in beliefs about physical activity. The second study examined the correlates of physical activity in college-aged non-Hispanic and Hispanic women. The final model had good fit across both samples and accounted for approximately a third of the variance in vigorous physical activity. Furthermore, the final model and its constructs confirm the importance of perceived benefits and barriers, and self-efficacy and social support for exercise, already established in the literature. The model did not confirm the significance of acculturation in this population. Findings did demonstrate mediational effects from SES through self-efficacy and family social support. Finally, beliefs about physical activity did not contribute to the prediction of physical activity in the college-aged women in this sample beyond the other variables. Results from the present study confirm the importance

of considering the role of benefits, self-efficacy, and social support in programs targeting college-aged women. Moreover, the findings suggest further exploration of socio-cultural beliefs that may encourage or discourage women's physical activity.

APPENDIX A

Pender's Revised Health Promotion Model (Pender, Murdaugh, & Parsons, 2001)



APPENDIX B

Online Consent Form and Solicitation Letter

IRB APPROVED ON: 03/05/2009

EXPIRES: 03/04/2012

Electronic Solicitation

Research Subjects Needed for Study of College-Aged
Women and Beliefs about Physical Activity

Study Title: Physical Activity in College-Aged Women

This study explores motivation and beliefs about physical activity in Hispanic and non-Hispanic White, college-aged women, 18-25 years of age. This information will be used to design better programs for women.

Participants will answer questions anonymously using an online survey* that should take about 20 minutes or less to complete. Participants will be given an opportunity to register for a drawing for one of ten \$20 gift cards.

If you would like to help us, you may go directly to URL _____ to begin the questionnaire.

For more information contact the Principal Investigator, Katherine Velasquez RN, MA, at velasquezk@juno.com

THE UNIVERSITY OF TEXAS AT AUSTIN

Dept. of Kinesiology & Health Education, 1 University Station D3700, Austin, TX, 78712

512-471-1273

Life-Span Development and Health Research

*URL: _____

IRB PROTOCOL #2009-02-0149

APPENDIX C

Physical Activity Survey

This version has been formatted for publication. The online version had a different appearance and buttons for participants to select, as well as automatic skips on the IPAQ scale; however, the content is the same.

General Information

1. What is your sex? Male Female

2. What is your age? _____

3. Counting Fall and Spring semesters only, how many semesters of college have you attended? _____

4. In which college does your major fall?
 - a. Architecture
 - b. Education and Human Development
 - c. Engineering
 - d. Liberal and Fine Arts
 - e. Public Policy
 - f. Sciences
 - g. Honors
 - h. Other/Prefer not to answer

5. For how many credit hours are you enrolled this semester? _____

6. Where do you currently live?
 - a. On campus
 - b. Near campus on my own or with friends
 - c. Near campus with my family
 - d. Some distance from campus on my own or with friends
 - e. Some distance from campus with my family

7. If you do not live with your family during the semester, how often do you travel back home (to permanent residence/family home)? Answer only one.

_____ per week, OR _____ per month, OR _____ per year, _____NA

8. How many children under age 18 live in your household? _____

9. How many elderly live in your household? _____

10. What is your marital status?

- a. Never Married
- b. Not married, living with significant other or unmarried partner
- c. Married

11. In what country were you born? _____

12. Are you of Hispanic, Latino, or Spanish origin?

- a. No, not of Hispanic, Latino, or Spanish origin
- b. Yes, Mexican, Mexican American, Chicano
- c. Yes, Puerto Rican
- d. Yes, Cuban
- e. Yes, another Hispanic, Latino, or Spanish origin—In box, please enter origin, for example, Argentinean, Colombian, Dominican,
- f. Nicaraguan, Salvadoran, Spaniard, and so on.

NOTE: Please answer BOTH question 12 about Hispanic origin and question 13 about race.

13. Which one of these groups would you say best represents your race?

- a. White alone
- b. Black or African-American alone
- c. American Indian or Alaska Native alone
- d. Asian alone
- e. Native Hawaiian or other Pacific Islander alone
- f. Some other race alone
- g. Mixed
- h. Mixed (please specify)

14. How many years have you lived in the United States? _____
15. What is the highest grade or year of school your mother completed?
- a. Less than 9th grade
 - b. 9th to 12th grade, no diploma
 - c. HS graduate (includes equivalency)
 - d. Some college, no degree
 - e. Associates degree
 - f. Bachelor's degree
 - g. Master's degree
 - h. Professional degree or doctorate degree
 - i. Don't know
16. What is the highest grade or year of school your father completed?
- a. Less than 9th grade
 - b. 9th to 12th grade, no diploma
 - c. HS graduate (includes equivalency)
 - d. Some college, no degree
 - e. Associates degree
 - f. Bachelor's degree
 - g. Master's degree
 - h. Professional degree or doctorate degree
 - i. Don't know
17. What was the combined family household (in which you were raised) income in the past 12 months, before taxes?
- a. < \$19,000
 - b. \$19,000 to < \$36,000
 - c. \$36,000 to < \$58,000
 - d. \$58,000 to < \$90,000
 - e. \$90,000 to < \$125,000
 - f. \$125,000 to < \$175,000
 - g. > \$175,000
18. What was your own personal earnings income in the past 12 months, before taxes?

19. What is your employment status?

- a. Not employed
- b. Employed part-time, <10 hours/week
- c. Employed part-time, 11-20 hours/week
- d. Employed part-time, >20 hours/week
- e. Employed full-time

20. Where did most of your money for college (i.e., books, fees, tuition, housing, etc.) come from? [You may select up to 3 responses.]

- a. Parents
- b. Spouse/relatives
- c. Grants
- d. Scholarships
- e. Subsidized loans
- f. Unsubsidized and other loans
- g. Work study
- h. Job (not work study)/savings

21. What is your height without shoes?

_____ feet _____ inches

22. What is your weight in pounds? _____

23. During the past month, other than your regular job, did you participate in any physical activities or exercise, such as running, calisthenics, golf, gardening, or walking for exercise?

- a. Yes
- b. No

International Physical Activity Questionnaire

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at school, at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

____ days per week

No vigorous physical activities



Skip to question 3

2. How much time did you usually spend doing vigorous physical activities on one of those days?

____ hours per day

____ minutes per day

Don't know/Not sure

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ days per week

No moderate physical activities



Skip to question 5

4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about the time you spent walking in the last 7 days. This includes at work, at school, and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

_____ days per week

No walking



Skip to question 7

6. How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

The next question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at school, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the last 7 days, how much time did you spend sitting on a week day?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Exercise Benefits/Barriers Scale

Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by choosing SA for strongly agree, A for agree, D for disagree or SD for strongly disagree. For item #21, "significant other" may be the person who means the most to you or is most influential in your life, such as your parent, a sibling, a friend, or a romantic partner.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I enjoy exercise.	SD	D	A	SA
2. Exercise decreases feelings of stress and tension for me.	SD	D	A	SA
3. Exercise improves my mental health.	SD	D	A	SA
4. Exercising takes too much of my time.	SD	D	A	SA
5. I will prevent heart attacks by exercising.	SD	D	A	SA
6. Exercise tires me.	SD	D	A	SA

7. Exercise increases my muscle strength.	SD	D	A	SA
8. Exercise gives me a sense of personal accomplishment.	SD	D	A	SA
9. Places for me to exercise are too far away.	SD	D	A	SA
10. Exercising makes me feel relaxed.	SD	D	A	SA
11. Exercising lets me have contact with friends and persons I enjoy.	SD	D	A	SA
12. I am too embarrassed to exercise.	SD	D	A	SA
13. Exercising will keep me from having high blood pressure.	SD	D	A	SA
14. It costs too much money to exercise.	SD	D	A	SA
15. Exercising increases my level of physical fitness.	SD	D	A	SA
16. Exercise facilities do not have convenient schedules for me.	SD	D	A	SA
17. My muscle tone is improved with exercise.	SD	D	A	SA
18. Exercising improves functioning of my cardiovascular system.	SD	D	A	SA
19. I am fatigued by exercise.	SD	D	A	SA
20. I have improved feelings of well being from exercise.	SD	D	A	SA
21. My spouse (or significant other) does not encourage exercising.	SD	D	A	SA
22. Exercise increases my stamina.	SD	D	A	SA
23. Exercise improves my flexibility.	SD	D	A	SA
24. Exercise takes too much time from family relationships.	SD	D	A	SA

25. My disposition is improved by exercise.	SD	D	A	SA
26. Exercising helps me sleep better at night.	SD	D	A	SA
27. I will live longer if I exercise.	SD	D	A	SA
28. I think people in exercise clothes look funny.	SD	D	A	SA
29. Exercise helps me decrease fatigue.	SD	D	A	SA
30. Exercising is a good way for me to meet new people.	SD	D	A	SA
31. My physical endurance is improved by exercising.	SD	D	A	SA
32. Exercising improves my self-concept.	SD	D	A	SA
33. My family members do not encourage me to exercise.	SD	D	A	SA
34. Exercising increases my mental alertness.	SD	D	A	SA
35. Exercise allows me to carry out normal activities without becoming tired.	SD	D	A	SA
36. Exercise improves the quality of my work.	SD	D	A	SA
37. Exercise takes too much time from my family responsibilities.	SD	D	A	SA
38. Exercise is good entertainment for me.	SD	D	A	SA
39. Exercising increases my acceptance by others.	SD	D	A	SA
40. Exercise is hard work for me.	SD	D	A	SA
41. Exercise improves overall body functioning for me.	SD	D	A	SA

42. There are too few places for me to exercise.	SD	D	A	SA
43. Exercise improves the way my body looks.	SD	D	A	SA

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EXERCISE CONFIDENCE SURVEY

Below is a list of things people might do while trying to increase or continue regular exercise. We are interested in exercises like running, swimming, brisk walking, bicycle riding, or aerobics classes.

Whether you exercise or not, please rate how confident you are that you could really motivate yourself to do things like these consistently, for at least six months.

Please select one choice for each item. How sure are you that you can do these things?

	I know I cannot		Maybe I can		I know I can	Does not apply
1. Get up early, even on weekends, to exercise.	1	2	3	4	5	X
2. Stick to your exercise program after a long, tiring day at work.	1	2	3	4	5	X
3. Exercise even though you are feeling depressed.	1	2	3	4	5	X
4. Set aside time for a physical activity program; that is, walking, jogging, swimming, biking, or other continuous activities for at least 30 minutes, 3 times per week.	1	2	3	4	5	X

5. Continue to exercise with others even though they seem too fast or too slow for you.	1	2	3	4	5	X
6. Stick to your exercise program when undergoing a stressful life change (e.g., divorce, death in the family, moving).	1	2	3	4	5	X
7. Attend a party only after exercising.	1	2	3	4	5	X
8. Stick to your exercise program when your family is demanding more time from you.	1	2	3	4	5	X
9. Stick to your exercise program when you have household chores to attend to.	1	2	3	4	5	X
10. Stick to your exercise program even when you have excessive demands at work.	1	2	3	4	5	X
11. Stick to your exercise program when social obligations are very time consuming.	1	2	3	4	5	X
12. Read or study less in order to exercise more.	1	2	3	4	5	X

Social Support and Exercise Survey

Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question *twice*. Under *family*, rate how often anyone living in your household has said or done what is described during the last three months. Under *friends*, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

Please circle *one* number from the following rating scale in each column:

none	rarely	a few times	often	very often	does not apply
1	2	3	4	5	8

During the past three months, my family (or members of my household) or friends:

NOTE: In the online version, first the questions with family came up, then the questions repeated for friends. Here the scale is combined to conserve space.

	Family	Friends
1. Exercised with me.	1 2 3 4 5 8	1 2 3 4 5 8
2. Offered to exercise with me.	1 2 3 4 5 8	1 2 3 4 5 8
3. Gave me helpful reminders to exercise (“Are you going to exercise tonight?”)	1 2 3 4 5 8	1 2 3 4 5 8
4. Gave me encouragement to stick with my exercise program.	1 2 3 4 5 8	1 2 3 4 5 8
5. Changed their schedule so we could exercise together.	1 2 3 4 5 8	1 2 3 4 5 8
6. Discussed exercise with me.	1 2 3 4 5 8	1 2 3 4 5 8
7. Complained about the time I spend exercising.	1 2 3 4 5 8	1 2 3 4 5 8
8. Criticized me or made fun of me for exercising.	1 2 3 4 5 8	1 2 3 4 5 8
9. Gave me rewards for exercising (bought me something or gave me something I like).	1 2 3 4 5 8	1 2 3 4 5 8
10. Planned for exercise on recreational outings.	1 2 3 4 5 8	1 2 3 4 5 8
11. Helped plan activities around my exercise.	1 2 3 4 5 8	1 2 3 4 5 8
12. Asked me for ideas on how <i>they</i> can get more exercise.	1 2 3 4 5 8	1 2 3 4 5 8
13. Talked about how much they like to exercise.	1 2 3 4 5 8	1 2 3 4 5 8

Acculturation

Culture, unrelated to physical activity, has been shown to affect participation in physical activity. We are interested in how culture may affect you regardless of your exercise habits. Again, some of the questions may not seem to relate to you, but answer each question as best you can.

1. *Select the generation that best applies to you.*
 - a. 1st generation = You were born in Mexico or other country
 - b. 2nd generation = You were born in USA, both parents born in Mexico and all grandparents born in Mexico or other country.
 - c. 3rd generation = You were born in USA, both parents born in USA and all grandparents born in Mexico or other country.
 - d. 4th generation = You and your parents born in USA and at least one grandparent born in Mexico or other country with remainder born in the USA.
 - e. 5th generation = You and your parents born in the USA and all grandparents born in the USA.
2. Choose the most accurate answer regarding your parents' surnames
 - a. Both non-Spanish
 - b. Both Spanish
 - c. One non-Spanish, one Spanish
3. What is the birthplace of your mother?
 - a. Don't know
 - b. USA
 - c. Other country: _____
4. What is the birthplace of your father?
 - a. Don't know
 - b. USA
 - c. Other country: _____
5. Please choose the most accurate response.
 - a. 3 or more of my grandparents are non-Hispanic white
 - b. 3 or more of my grandparents have Mexican origin
 - c. None of the above

Acculturation Rating Scale-II (ARSMA-II)--SCALE 1

[Circle a number between 1-5 next to each item that best applies.]

- 1- Not at all
- 2- Very little or not very often
- 3- Moderately
- 4- Much or very often
- 5- Extremely often or almost always

SCALE 1	Not at all	Very little or not very often	Moderately	Much or very often	Extremely often or almost always
1. I speak Spanish	1	2	3	4	5
2. I speak English	1	2	3	4	5
3. I enjoy speaking Spanish	1	2	3	4	5
4. I associate with Anglos	1	2	3	4	5
5. I associate with Mexicans and/or Mexican Americans	1	2	3	4	5
6. I enjoy listening to Spanish language music	1	2	3	4	5
7. I enjoy listening to English language music	1	2	3	4	5
8. I enjoy Spanish language TV	1	2	3	4	5
9. I enjoy English language TV	1	2	3	4	5
10. I enjoy English language movies	1	2	3	4	5
11. I enjoy Spanish language movies	1	2	3	4	5

12. I enjoy reading (e.g., books) in Spanish	1	2	3	4	5
13. I enjoy reading (e.g., books) in English	1	2	3	4	5
14. I write (e.g., letters) in Spanish	1	2	3	4	5
15. I write (e.g., letters) in English	1	2	3	4	5
16. My thinking is done in the English language	1	2	3	4	5
17. My thinking is done in the Spanish language	1	2	3	4	5
18. My contact with Mexico has been	1	2	3	4	5
19. My contact with the USA has been	1	2	3	4	5
20. My father identifies or identified himself as "Mexicano"	1	2	3	4	5
21. My mother identifies or identified herself as "Mexicana"	1	2	3	4	5
22. My friends, while I was growing up, were of Mexican origin	1	2	3	4	5
23. My friends, while I was growing up, were of Anglo origin	1	2	3	4	5
24. My family cooks Mexican foods	1	2	3	4	5
25. My friends now are of Anglo origin	1	2	3	4	5
26. My friends now are of Mexican origin	1	2	3	4	5
27. I like to identify myself as an Anglo American	1	2	3	4	5
28. I like to identify myself as a Mexican American	1	2	3	4	5

29. I like to identify myself as a Mexican	1	2	3	4	5
30. I like to identify myself as an American	1	2	3	4	5

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Beliefs About Physical Activity Survey

Below are more statements that relate to ideas or preferences about physical activity and exercise. You may think some of the statements do not apply to you, but please read and give an answer to every statement. You're almost done—just one more subscale after this one.

Please select the rating corresponding to how much you currently agree or disagree with the statement. 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, and 6 = strongly agree.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1. Exercise is a planned and vigorous physical activity.	1	2	3	4	5	6
2. Exercise prevents disease.	1	2	3	4	5	6
3. Household duties are a form of exercise.	1	2	3	4	5	6
4. Light and moderate exercise is appropriate for women.	1	2	3	4	5	6
5. If a woman already looks good, she doesn't need to exercise.	1	2	3	4	5	6
6. Exercising brings me closer to God.	1	2	3	4	5	6

7. If a woman is healthy, she doesn't need to exercise.	1	2	3	4	5	6
8. Exercise is strenuous and uncomfortable.	1	2	3	4	5	6
9. I prefer to exercise alone.	1	2	3	4	5	6
10. I prefer to exercise with people I know.	1	2	3	4	5	6
11. Exercise is for taking care of disease, that is, keeping it from getting worse or getting rid of diseases.	1	2	3	4	5	6
12. God expects us to take care of ourselves.	1	2	3	4	5	6
13. Vigorous exercise is appropriate for women.	1	2	3	4	5	6
14. I would want to exercise with family more than others.	1	2	3	4	5	6
15. I would want to exercise with friends more than others.	1	2	3	4	5	6
16. God gives me the strength to exercise.	1	2	3	4	5	6
17. I do not want to exercise in classes or programs which include men.	1	2	3	4	5	6
18. I do not want to exercise in classes or programs which include women.	1	2	3	4	5	6

19. I prefer to exercise in classes/programs with people who are like me.	1	2	3	4	5	6
20. My exercise "buddies" are like family.	1	2	3	4	5	6
21. I depend on God as a source of willpower to exercise.	1	2	3	4	5	6
22. Marriage and motherhood limit one's ability to exercise.	1	2	3	4	5	6
23. My physical ability is the result of what I do.	1	2	3	4	5	6
24. Children should only be left with family members while one exercises.	1	2	3	4	5	6
25. A close family member of mine exercises regularly.	1	2	3	4	5	6
26. My close friends exercise regularly.	1	2	3	4	5	6
27. Regular exercise is a part of a normal life plan.	1	2	3	4	5	6
28. I see exercise/sports as a time to socialize with family and friends.	1	2	3	4	5	6
29. I exercise to give thanks to God.	1	2	3	4	5	6

30. Most exercise programs do not have people like me.	1	2	3	4	5	6
31. I feel good immediately after exercise.	1	2	3	4	5	6
32. Exercise programs are not designed for women of my culture/ethnicity.	1	2	3	4	5	6
33. Household duties count as my exercise.	1	2	3	4	5	6
34. My body and weight are about the right shape and size.	1	2	3	4	5	6
35. I depend on God or a higher power to help me get through a challenging physical experience.	1	2	3	4	5	6
36. My exercise time is my personal time.	1	2	3	4	5	6
37. Family responsibilities get in the way of exercising.	1	2	3	4	5	6
38. I exercise to take care of the body God has given me.	1	2	3	4	5	6
39. I do not want to exercise in classes/programs without people I know.	1	2	3	4	5	6
40. I prefer to exercise in classes/programs with people who look	1	2	3	4	5	6

like me.						
41. Women tend to do less exercise because men want women to stay at home.	1	2	3	4	5	6
42. It is important for me to role model exercise for my family and friends.	1	2	3	4	5	6
43. I give thanks to God for my health.	1	2	3	4	5	6
44. Exercise is not acceptable for women in my culture.	1	2	3	4	5	6
45. Exercise takes energy from other things I need to get done.	1	2	3	4	5	6
46. My engaging in physical activity gives me a sense of control.	1	2	3	4	5	6
47. When I am able to accomplish my workout, I give thanks to God.	1	2	3	4	5	6
48. I prefer to exercise in classes/programs with people of my culture/ethnicity.	1	2	3	4	5	6
49. My engaging in physical activity does not contribute to my family.	1	2	3	4	5	6
50. I pray before, during, or after physical activity.	1	2	3	4	5	6

51. Women's roles/many responsibilities make it difficult to maintain a pattern of regular physical activity.	1	2	3	4	5	6
52. I wouldn't/don't know how to use exercise machines at the gym.	1	2	3	4	5	6
53. Exercise classes are too difficult.	1	2	3	4	5	6
54. I give thanks to God for my physical ability.	1	2	3	4	5	6
55. I don't feel comfortable taking time for myself to exercise.	1	2	3	4	5	6
56. Women tend to do less exercise because men do not want their women to exercise.	1	2	3	4	5	6
57. When it comes to exercise, I don't know what I'm doing.	1	2	3	4	5	6
58. Only certain exercises or sports are acceptable for women.	1	2	3	4	5	6
59. Personal control is important for my health.	1	2	3	4	5	6
60. I don't like exercising to meet the expectations of Society.	1	2	3	4	5	6

61. My physical ability comes directly from God.	1	2	3	4	5	6
62. My engaging in physical activity is good for my family.	1	2	3	4	5	6
63. My engaging in physical activity makes me a better student.	1	2	3	4	5	6
64. My engaging in physical activity makes me a better partner in relationships.	1	2	3	4	5	6
65. My engaging in physical activity makes me a better mother or daughter.	1	2	3	4	5	6
66. My engaging in physical activity improves my role in my family.	1	2	3	4	5	6
67. My engaging in physical activity would/does make me a better employee (improved physical ability and quality of work).	1	2	3	4	5	6
68. My father encourages me to exercise.	1	2	3	4	5	6
69. My mother encourages me to exercise.	1	2	3	4	5	6

End Survey

APPENDIX D

Note Concerning Beliefs about Physical Activity Scale Composition

Content analysis, correlational patterns, and an exploratory factor analysis constrained to 2 factors suggested two clusters of items, one of beliefs encouraging exercise and one of beliefs discouraging exercise (with all items scored in the exercising promoting direction). Each summed set of items relates positively to exercise, but more weakly than the combined sets. When the model described in study 2 was run separately to include each set of beliefs, the results were essentially the same as with the combined scale, with nonsignificant paths from beliefs to exercise. For simplicity and following previous research in exercise literature regarding benefits and barriers to exercise (Sechrist et al, 1987), the items were combined into a total beliefs scale. Continued efforts at scale development regarding these two dimensions of beliefs concerning women's exercise would be an important direction for research.

APPENDIX E: Non-Hispanic and Hispanic Correlations with BPA Sub-scales and Means for Path Model Variables.

Non-Hispanic													
Subscale	EBBS	SE	SSFA	SSFR	BPA	Vig^a	Accult	SES	AOS	MOS	Means	SD	
N	80	67	67	71	70	78	78	78	78	78	70	70	
BPA--Spirituality (Spir)	.317**	.194	.228†	.240†	.856***	.121	.056	.246*	.142	.088	31.5***	17.9	
Role Enhancement (Roles)	.557***	.286*	.237†	.198	.717***	.281*	-.070	.074	.055	.168	24.2	7.1	
Exercise Difficulty (ExDiff)	.523***	.393**	.090	.260*	.263*	.378***	.051	.137	-.015	-.092	14.0	3.7	
Socialization Preferences (Soc)	.223†	.185	.243†	.256*	.501***	.160	-.073	.041	-.024	.079	20.9†	5.1	
Personal Benefit/Control (PB)	.637***	.448***	.070	.248*	.492***	.245*	.007	.119	.094	.102	18.2†	3.3	
Women's Roles (Wroles)	.134	.207	.138	.122	-.099	.205	-.008	.077	-.075	-.077	12.2	3.2	
Cultural Beliefs (Cult)	.095	.028	.109	.042	.032	-.153	.302*	.079	.221†	-.179	27.3**	3.5	
Total BPA	.614**	.397**	.326*	.364**	1	.285*	.054	.264*	.141	.091	148.2**	25.4	
Means	135.6†	41.0	25.9	22.5	148.2**	25.4	2.61***	1.15***	57.6***	30.9***			
SD	17.0	10.4	11.5	10.3	25.4	23.0	0.5	2.1	5.6	6.8			

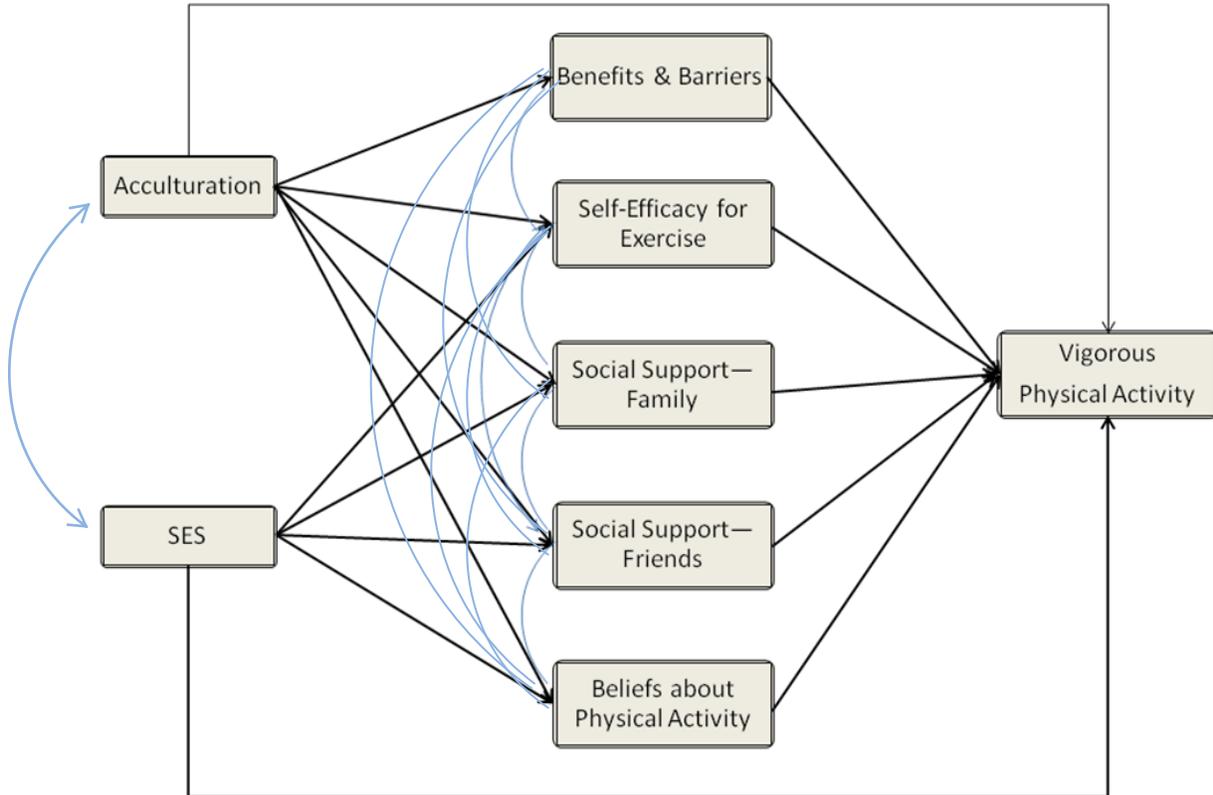
HISPANIC													
Subscale	EBBS	SE	SSFA	SSFR	BPA	Vig^a	Accult	SES	AOS	MOS	Means	SD	
N	157	142	138	141	127	152	147	154	147	147			
BPA--Spirituality (Spir)	.204*	.404***	.247**	.082	.771***	.331***	.035	-.032	.051	-.02	39.8***	16.2	
Role Enhancement (Roles)	.444***	.512***	.262**	.184*	.587***	.170	.013	.141	.080	.02	25.7	6.9	
Exercise Difficulty (ExDiff)	.430***	.088	-.044	-.016	.375**	.269**	.091	.022	.121	-.058	14.1	3.5	
Socialization Preferences (Soc)	.175*	.100	.087	.234*	.454***	.242**	.013	.005	.070	.00	22.5†	5.9	
Personal Benefit/Control (PB)	.587***	.608***	.179†	.091	.550***	.457***	-.018	.061	-.022	.013	19.15†	3.6	
Women's Roles (Wroles)	.358***	.073	-.035	-.072	.344***	.152†	.078	.040	-.023	-.108	11.9	3.7	
Cultural Beliefs (Cult)	.185*	-.204*	-.332***	-.234*	.197*	-.038	.202*	.012	.131	-.191	25.5**	5.3	
Total BPA	.535***	.494***	.209*	.114	1	.449***	.092	.031	.109	-.065	158.8**	24.8	
Means	139.4†	42.7	27.7	24.8	158.8**	28.7	0.67***	-.604***	52.3***	57.0***			
SD	16.3	9.8	11.2	11.0	24.8	23.3	1.2	2.3	5.5	16.3			

^aVigorous reflects a square root transformation

* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .10$

APPENDIX F

A Path Model of Vigorous Physical Activity Evaluated across Samples of Hispanic and Non-Hispanic College Women with covariances illustrated.



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