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Suzanne M. Keep
University of Detroit Mercy

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Physical Activity: Like Mother, Like Daughter?

Suzanne M. Keep, PhD, RN
Assistant Professor

Corresponding Author:

Suzanne M. Keep, PhD, RN
College of Health Professions, McAuley School of Nursing
University of Detroit Mercy, Grand Rapids, MI 49503
keepsm@udmercy.edu

Abstract

Physical inactivity is a leading cause of death in the United States (U.S.), and is a public health priority. The majority of individuals do not engage in regular physical activity (PA). Hispanics have the highest inactivity rates (51.3%) in the U.S. (HealthyPeople.gov, 2012). This paper reports a gap in knowledge concerning factors that affect PA. Data was collected in Kent and Ottawa counties in Michigan, with Hispanic mothers (N=79) and their daughters (N=79). This study supports the relationship among societal norms, exercise self-efficacy and activity related affect, on commitment to a plan of PA. Theorized relationships appear to be more significant among Hispanic daughters than their mothers. Limitations of this study included a language barrier, limited access to Actigraphs® and winter months that may have reduced PA. Further research is needed with the Hispanic population, with key predictor variables of being physically active and exercise self-efficacy. Implication for nurses include education for why and how to be physically active, and to provide PA programs that are culturally specific for this population that would provide enjoyment and therefore a commitment to PA.

Introduction

Obesity and physical inactivity are two of the top ten major public health issues facing adults and children today in the United States (U.S.) (U.S. DHHS, 2008). Obesity and physical activity (PA) are also listed in the top twelve topics of leading health indicators in Healthy People 2020 (www.healthypeople.gov/2020/LHI/2020indicators.aspx retrieved July 1, 2012). Physical inactivity is a major risk factor for several causes of death from non-communicable diseases (Kohl, et al., 2012), such as coronary heart disease, stroke, diabetes and several cancers (Gulsvik, et al., 2012; Hahn, Marks, Teutsch, & Rothenberg, 1990; Hallal, et al., 2012), and is the fourth leading cause of global mortality (Kohl, et al., 2012). This significant statistic demonstrates that physical inactivity is a major risk factor for health issues, and should be considered to have the same level of health concern as smoking, blood cholesterol, and obesity (Hallal et al., 2012; Sallis et al., 1999). A major health-promoting factor across all age groups is physical activity (PA), which is inversely associated with mortality in the general population (Gulsvik, et al., 2012). Although it is clear that being physically active reduces the risk of all causes of mortality, it is unclear how much PA is needed to have the most significant benefit in reducing mortality. In a systematic review of PA and all-cause mortality, risk reduction of mortality was greatest among those with vigorous PA, and to a lesser extent, mortality was reduced among those who were engaged in moderate intensity PA (Samitz, Effer & Zwahlen, 2011). However, contradicting the Samitz et al., (2011) study, a systematic review and meta-analysis of cohort studies related to PA and lower mortality (Woodcock, Franco, Orsini & Roberts, 2011), it was found that being physically active reduces the risk of mortality, with the greatest benefit being increasing activity from no activity to low activity.

The specific guidelines for habitual PA for young people between the ages of 6-17 years are 60 minutes per day of (1) moderate-intensity or vigorous-intensity aerobic activity, seven days of the week, (2) muscle strengthening such as gymnastics or push-ups at least three days a week, and (3) bone strengthening activities such as jumping rope or running at least three days per week as part of the 60 or more minutes (CDC, 2011). Moderate intensity is defined as the heart will beat faster than normal and breathing will be harder than normal, and with vigorous-intensity, the heart will beat much faster than normal and breathing will be much harder than normal (CDC, 2012).

Physical inactivity (defined as not having participated in at least 60 minutes of physical activity on any day) was highest among Black (19.6%) and Hispanic (15.9%) students, and particularly high among Black females (26.7%) and Hispanic females (21.3%). As female students progressed in high school, the prevalence of inactivity for 60 minutes on any day increased: among 9th graders (13.9%), 10th graders (17.9%), 11th graders (19.0%) and 12th graders (20.6%) (MMWR, 2012). Nationwide, only 28.7% of all students surveyed in the 2011 YRBSS (MMWR) reported having been physically active, (defined as raising their heart rate and breathing hard for at least 60 minutes on all 7 days). The activity rates in the survey were higher among males (38.3%) than females (18.5%) and in particular, PA rates were higher than among Hispanic females (16.9%). Among females, physical activity prevalence was higher in 9th grade (22.2%), similar in 10th and 11th grade (18.1%, 18.0% respectively), and decreased to 14.9% in 12th grade.

These statistics are troublesome, given the fact that children are generally the most physically active subgroup of the population (fitness.gov/betterhealth/ppar.pdf). It is unclear how PA patterns are established in early childhood (Crossman, Sullivan, and Benin, 2006): the

determinants of PA among children into adolescence vary in significance with developmental changes, are not well understood and are difficult to measure (Sallis & Owen, 1999). There is a notable decline in PA participation among girls beginning as early as the age of 10 years (Kimm, et al, 2002; Craggs, C. Corder, K., vanSluijs, E. & Griffin, S., 2011). The study of the decrease in PA among the youth is hindered due to limited external validity, and the lack of valid measures of PA (Hearst, M., Patnode, C., Sirard, J., Farbakhsh, K., and Lytle, L., 2012).

Physical inactivity of Hispanic females is of particular concern. Only 33% of Hispanic high school girls reported they were physically active at least 60 minutes per day on five or more days (CDC, 2011). Both first and second generation Hispanic immigrant children are less likely to be physically active and engage in regular PA compared to U.S. born Non-Hispanic children (Singh, G., Yu, S., Siahpush, M., & Kogan, M., 2008). Hispanic women have historically not been encouraged to be physically active or self-motivated to be physically active (Im, Lee, Hwang, Yoo, Chee, Stuifbergen, Walker et al., 2010).

A majority of parents do not engage in sufficient amounts of PA themselves. The basic PA recommendations for adults from the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) are lower than the requirement for children: (1) activity that increases the heart rate for at least 30 minutes a day five days a week (at least 150 minutes per week); or (2) vigorous intense aerobic exercise 20 minutes a day three days a week and 3) eight to 10 strength training exercises, eight to twelve repetitions of each exercise two times a week (Haskell et al., 2007).

Recent 2010 Census Bureau data demonstrated a 43% increase in the size of the Hispanic/Latino population since 2000 indicating that Hispanics now comprise the largest minority group in the United States (US) (2010 Census Data, 2011). With regard to PA,

Hispanic/Latino adults have the highest inactivity rates (51.3%) among all ethnic and racial groups ([http://minority health.hhs.gov](http://minorityhealth.hhs.gov), 2011, HealthyPeople.gov, 2012). Hispanic women also have higher obesity rates compared to the general population; 78% are overweight or obese ([minorityhealth.hhs](http://minorityhealth.hhs.gov), 2012), and have a disproportionate health risk for diseases linked with physical inactivity such as diabetes and cardiovascular disease (Vorhees & Young, 2003).

Problem

Physical inactivity is a leading cause of death in the US, yet the majority of individuals do not engage in regular PA. Notably, Hispanics have the highest inactivity rates (51.3%) among all ethnic and racial groups in the US (HealthyPeople.gov, 2012, [http://minority health.hhs.gov](http://minorityhealth.hhs.gov), 2011). This study addressed a gap in the knowledge concerning factors that affect PA among Hispanic women and their young daughters. PA is a complex behavior involving multiple factors. Lack of PA contributes to leading causes of morbidity and mortality (MMWR, 2012). Since sedentary behavior among immigrants increases with the number of years living in the US, with acculturation, Hispanic immigrants will lose the comparative health advantages that have collectively been referred to as the “Hispanic Paradox” (Markides & Coreil, 1986; Taningco, 2007). PA patterns appear to begin during the pre-adolescent years and extend into adulthood. It is important to study PA behaviors as children since children’s attitudes and behaviors are more adaptable than adults and subsequently health-related behaviors in early life may have significant long-term results (Stucky-Ropp & DiLorenzo 1993). This study identified factors that will encourage Hispanic girls to make PA a part of their health promotion activities as they enter into adulthood.

Previous research has identified exercise self-efficacy, activity related affect and commitment among women and children (Robbins, Pis, Pender & Kazanis, 2004) as strong

predictors of participation in PA. However little research has been conducted among minority populations. Specific cultural factors including societal norms have been underexplored. This study examined societal norms including an understanding of how Hispanic societal norms affect PA, and how societal norms are similar or different among the mothers and daughters.

Information generated from this study will address the gap in knowledge of the factors that foster sedentary behaviors among Hispanic mothers and their daughters who do not exercise. In addition, measurement of PA in most studies has been limited to self-reporting. This study incorporated a valid physiological measure of PA through the use of an accelerometer.

Purpose

The purpose of this paper is to report the survey results obtained from Hispanic mothers and daughters who participated in a study to examine the relationship among societal norms, exercise self-efficacy and activity related affect on commitment to a plan of PA among the Hispanic women and their young daughters. Pender's Health Promotion Model concepts of societal norms, self-efficacy, activity-related affect, and commitment to PA was used in this study.

Knowledge from this study can assist nurses in promoting PA among Hispanic women and girls, which will lead to healthier lifestyles. The impact of Hispanic identity formation and cultural transformation on health risks, health behaviors (specifically PA), and coping strategies represents an emerging area of study that requires further conceptual and empirical development (Amaro et al., 2002). Nursing is poised as a key discipline in healthcare to promote a physically active lifestyle for Hispanic mothers and their daughters.

This study contributes to increasing knowledge of factors associated with PA in the vulnerable Hispanic population, and specifically generated knowledge related to improving the measurement of PA determinants in the Hispanic population. Results of this study will improve clinical practice by an increased understanding of culturally specific factors and provide data that can be used to test interventions to increase PA that will improve health outcomes among the Hispanic population. Findings from this study can expand nursing knowledge to understand the complex issues of factors related to a commitment to exercise to promote healthy behaviors in a minority population that is at high risk for a host of illnesses associated with sedentary lifestyles.

Study Population, Setting and Sample

Following approval by the Rutgers Institutional Review Board (IRB), the study took place in three Catholic churches in communities in Western Michigan, an area with a substantial population of immigrant Hispanic families. All three churches are located in low-income Hispanic neighborhoods. Two of the churches are located in the same city in Kent county, Michigan, which has a significantly higher percentage of Hispanics (19.45% versus 4.4%) and a higher poverty rate (16.3% versus 14.8%) than does the state of Michigan as a whole (U.S. Census, 2012). These two churches each report a total 700 Hispanic people who attend each Mass on Saturday and Sunday. The third church is located in Ottawa county with a Hispanic or Latino rate of 22.7% compared to 4.4% in Michigan, and a poverty rate of 15.4% compared to 14.8% in Michigan (U.S. Census, 2012). The Hispanic mothers and their daughters were invited to sign up for the study, after Mass on specific Sundays. Data collection took place in designated areas in the churches and in a school that was related to one of the churches.

Design and Sampling Methods.

This research was a community-based participatory research (CBPR) methodology design (Kneipp, Lutz, Levonian, Cook, et al., 2013) in which partnerships occurred to implement the study. CBPR is a collaborative approach to research that involves partners with unique strengths and assets that each brings to the research. The aim of combining expert knowledge and skill provide action for social change to improve the quality of the community's health and to eliminate health disparities (Israel, Engl, Schulz, & Parker, 2005). Although the original intent of the design of this study was not a community-based approach design, there were many facets of utilizing community resources to implement this study: partnering with two different universities related to using Actigraphs®, having translators from the churches and a local Loop, after school program, gifts cards donated by the local superstore, a grant from Sigma-Theta Tau, and local churches supplying space and flyers.

An announcement concerning the research study was given to the parish office to be placed in the church bulletin for one week prior to the actual research date and for three days at the one school that was related to one of the churches. The priest announced the study at the end of Mass, inviting mothers and their daughters between the ages of 8-12 years to come to learn more about the study. The sampling method was a convenience sample. The inclusion criteria consisted of: (1) Self-identified Hispanic mothers and their daughters, ages 8-12 years; (2) the mothers and daughters must live in western Michigan; (3) the mothers and daughters must speak and write either English or Spanish. The exclusion criterion is that the mothers and daughters must be healthy enough to participate in a 60-90 minute survey.

A snack of Clementine, muffins and water was offered to the participants of the study, and to other family members. Childcare was offered for mothers with small children. A solar

dancing flower was given to the daughters and siblings of the daughters. Once the study was explained to the mother and daughters in both English and Spanish, consent forms were signed. Participants were informed that they may withdraw from the study at any time. They were also informed about their rights to confidentiality and anonymity will be protected. In order to avoid a response bias, the women and their daughters completed the surveys in separate parts of the room. Bilingual research assistants were available to subjects who needed assistance with completing the forms. Following the consent process, the participants' height, and weight were measured, and recorded for Body Mass Index (BMI) to be calculated.

The Principal Investigator (PI) gave an accelerometer to each of the participants, along with instructions that they must wear the accelerometer on the right hip, attached to a belt. The instructions were available in Spanish or English, and provided instruction on the use of the Actigraph® and the importance of caring for the Actigraph®. The mothers and daughters were asked to wear the accelerometer all the time except while bathing, swimming or sleeping and after three days the participants will return the accelerometer to the church in order to receive the \$20.00 Meijer gift card for each mother and daughter. The software for the Actigraph® was the Lite version and therefore when the participant returned the monitor at the church, it could not be determined immediately if there was sufficient activity data on the accelerometer. The accelerometer data was downloaded and analyzed by another software program at the university.

Scores for the Actigraph® data calculated daily sedentary minutes, total sedentary minutes, and for physical activity: light, life, moderate, vigorous, very vigorous, and converted to percentages. The mothers and daughters wore the Actigraphs® for an average of 50 hours of total time. Participants were asked to wear the monitor for three days during waking hours. They were

asked to wear it first thing in the morning and take it off right before going to bed at night. The device is not waterproof, so they were instructed to not wear it in the shower or get it wet.

Instruments and Analysis of the Data

The purpose of this study was to determine factors that affect a commitment to a plan of physical activity among low-income Hispanic mothers and their daughters. Lower socioeconomic status minority women are reported to have the highest rates of physical activity in the U.S. (Pruitt, Castro, Gonzalez, Woo, & King, A. 2005). Data were collected from a sample of 79 Hispanic mothers and their daughters from Hispanic Catholic churches and a Hispanic Catholic school. The sample size was determined by using the power analysis program, R software package (<http://cran.us.r-project.org>). To achieve a power = 0.85, 78 mothers + 78 daughters will be recruited for this study. The correlation level was currently 0.3. All of the instruments were available in English and Spanish in a paper and pencil format. The instruments that have not been previously validated in Spanish were translated from English to Spanish then back-translated (Brislin, 1970). The Spanish tools were piloted with Hispanic mothers and their daughters after mass at one of the churches.

The following instruments were used in this study: a) a demographic questionnaire, developed by the investigator, was used to collect information on age, marital status, number of children, length of stay in the U.S., highest level of education, employment, annual income, level of education, hours of sleep per night for the mothers, and age, birthdates, grade in school, length of stay in the U.S., hours of sleep per night for the daughters; b) The Short Acculturation Scale for Hispanics (SASH) was used to collect acculturation data (Marin & Sabogal, 1987) with the mothers; c) Anthropometric measures including height, body weight, body mass index calculated from height and body weight for both mothers and daughters; d) Actigraph GT3X-plus physical

activity intensity and duration of physical activity for both mothers and daughters; d) Physical Activity Record (PA-R) measured self-report of physical activity (Jackson et al., 1990) for both mothers and daughters; e) Lifestyle Profile II (LP) (adult version) (Walker et al., 1996) and Adolescent Lifestyle Questionnaire (ALQ) were used to measure a self report of physical activity habits; f) Exercise Norms Scale (NORMS) were used to measure exercise norms in adults and children (Pender, 2011); g) Exercise Self-Efficacy (ESE) was used to measure personal capacity to exercise at a specific level on a regular basis for mothers and daughters (Garcia et al., 1995; Sallis et al., 1988); h) The Physical Activity Enjoyment Scale (PACES) was used to measure activity related affect in the mothers and daughters (Kendzierski & DeCarlo, 1991; Motl et al., 2001); i) Planning Commitment for Exercise (COMM) for mothers and daughters was used to measure various strategies individuals use to increase PA (Pender et al., 2011).

Results

A total of 79 mothers and their daughters participated in the study. Mothers and daughters were analyzed separately. The data did not suggest any strong associations between commitment to physical activity and the various demographic variables. Table A and Table B displays the distribution of demographics of the mothers and their daughters.

Table A. Mother and Daughter Characteristics as Mean and Standard Deviation of the Sample

Variable	Mother		Daughter	
	<i>(n=79)</i>		<i>(n=79)</i>	
	<u>M</u>	<u>(SD)</u>	<u>M</u>	<u>(SD)</u>
Age	36.53	(5.43)	9.89	(1.21)
Education	9.70	(3.39)	4.55	(1.20)
Hours of Sleep	7.17	(0.98)	9.25	(1.13)
Years in U.S.	17.66	(8.14)	9.60	(1.79)
BMI	29.876	(6.13)	21.10	(4.44)

Table B. Mother Characteristics as Frequency and Percentage of Sample

Variable	Mother (<i>n</i> =79) <u><i>n</i> Percentage</u>
Race	
Hispanic	79 (100)
Employment	
Employed by someone or a company	44 (55.7)
Self-employed	3 (3.8)
Out of work and looking for work	10 (12.7)
Out of work but not currently looking for work	2 (2.5)
Homemaker	16(20.3)
Student	1 (1.3)
Retired	1 (1.3)
Unable to work	2 (2.5)
Income	
less than 10,000	9 (11.4)
11,000-20,000	21 (26.6)
21,000-30,000	25 (31.6)
31,000-51,000	11 (13.9)
51,000 +	11 (13.9)
Unknown	2 (2.6)
Number of Children	
One	5 (6.3)
Two	18 (22.8)
Three	26 (32.9)
Four	18 (22.8)
Five	5 (6.3)

Societal Norms

To determine whether there was a significant association between the mean score on the Social Norms Scale and the mean score on the Commitment to a Plan of Physical Activity Scale, Kendall's T_b was used. The Kendall's T_b statistic was computed comparing the scores for the mothers and daughters separately. It was found that correlational Kendall's T_b analysis did not reveal a significant relationship between social norms and commitment of mothers, $T_b = .087, p = .290$, however, correlational Kendall's T_b analysis did reveal a significant relationship between social norms and commitment of daughters, $T_b = .274, p = .001$.

Exercise Self-Efficacy

To determine whether there was a significant association between the mean score on the Exercise Self-Efficacy Scale and the mean score on the Commitment to a Plan of Physical Activity Scale, Kendall's T_b was used. The Kendall's T_b statistic was computed comparing the scores for the mothers and daughters separately. It was found that correlational Kendall's T_b analysis did not reveal a relationship between the exercise self-efficacy and a commitment to a plan of physical activity among mothers, $T_b = .086, p = .285$, however, correlational Kendall's T_b analysis did reveal a significant relationship between the daughters, exercise self-efficacy and commitment among daughters, $T_b = .27, p = .001$.

Activity related-affect

To determine whether there was a significant association between the mean score on the Physical Activity Related Affect Scale and the mean score on the Commitment to a Plan of Physical Activity Scale, Kendall's T_b was used. The Kendall's T_b statistic was computed comparing the scores for the mothers and daughters separately. It was found that correlational Kendall's T_b

analysis did not reveal a significant relationship between physically active related affect and commitment of mothers, $T_b = .146, p = .068$, nor did the correlational Kendall's T_b analysis reveal a significant relationship between physically active related affect and commitment of daughters, $T_b = .099, p = .218$.

Tables C and D describe the Kendall's T_b analysis for the mothers and daughters respectively for commitment to physical activity, societal norms, exercise self-efficacy and physically active related affect.

Table C. Mothers: Correlation Kendall's tau-b commitment, societal norms, exercise self-efficacy, and physically active related affect

Variable	Commitment to PA $t_b,$ (p)	Societal Norms $t_b,$ (p)	Exercise self-efficacy $t_b,$ (p)	Physically active related affect $t_b,$ (p)
Commitment to PA	1	.087 (.290)	.086 (.285)	.146 (.068)
Societal Norms	.087 (.290)	1	.067 (.418)	.078 (.340)
Exercise self-efficacy	.086 (.285)	.067 (.418)	1	-.027 (.736)
Physically active related affect	.146 (.068)	.078 (.340)	-.027 (.736)	1

** Correlation is significant at the 0.01 level (2-tailed)

Table D. Daughters: Correlation Kendall's tau-b commitment, societal norms, exercise self-efficacy, and physically active related affect

Variable	Commitment to PA $t_b,$ (p)	Societal Norms $t_b,$ (p)	Exercise self-efficacy $t_b,$ (p)	Physically active related affect $t_b,$ (p)
Commitment to PA	1	.274** (.001)	.27** (.001)	.099 (.218)
Societal Norms	.274** (.001)	1	.215** (.008)	.105 (.202)
Exercise self-efficacy	.27** (.001)	.215** (.008)	1	.130 (.104)
Physically active related affect	.099 (.218)	.105 (.202)	.130 (.104)	1

** Correlation is significant at the 0.01 level (2-tailed)

Self-Report Physical Activity and Actigraph®

To determine whether there was a significant association between the mean score on the self-reported physically activity scores: Lifestyle Health Promotion Questionnaire (LPM) for mothers, the Adolescent Lifestyle Questionnaire (ALQ) for the daughters, the Physical Activity Recall (PAR) and the mean score on the Commitment to a Plan of Physical Activity Scale, Kendall's T_b was used. The Kendall's T_b statistic was computed comparing the scores for the mothers and daughters separately.

It was found that correlational Kendall's T_b analysis revealed a significant relationship between LPM and PAR among mothers, $T_b = .334, p = .001$, and between the ALQ Means and

PAR $T_b = .261, p = .002$ for the daughters.

Of the total Actigraph® wear time, 71.12% of the time the mothers wore the Actigraph® monitor, the mothers were sedentary, compared to 71.18% of the time the daughters wore the Actigraph® monitor, the daughters were sedentary. Of the active time, most engaged in light activity (17% for moms, 15% for daughters), and very little engaged in vigorous (.3% for mothers and .5% for daughters) or very vigorous activity (.04% for mothers and .09% for daughters). Refer to Table E. This outcome is well below the recommended physical activity guidelines.

Table E. Actigraph® Measures of Mothers and Daughters

	Mothers (n=64)	Daughters (n=64)
	<u>Percentage</u>	<u>Percentage</u>
Light active	17.00%	15.00%
Lifestyle: walking, yard work, recreational such as golf, bowling or bicycling, housework	7.00%	7.00%
Moderate activity	4.00%	5.00%
Vigorous activity	0.33%	0.56%
Very vigorous activity	0.04%	0.09%
Sedentary	71.00%	71.00%

Discussion and Evaluation

The main findings of this study support, as theorized, the relationship among societal norms, exercise self-efficacy and activity related affect, on commitment to a plan of physical activity. Theorized relationships between societal norms, exercise self-efficacy and PA related affected appear to be significant more among the Hispanic daughters but not the mothers.

Mothers and daughters with a sedentary lifestyle deprive themselves of the health benefits of physical activity and increase their risk for serious chronic diseases that may lead to an early death (Berg and Cromwell, 2002). Self-report perceptions of physical activity were rated higher among the mothers and daughters. Scores for total percentage of physical activity scores did not meet the recommended physical activity levels for moms or daughters. In fact, physical activity levels as measured by the Actigraph® were even lower in this study than National Health and Nutrition Examination Survey (NHANES, 2010) study. Actigraph® data in this study demonstrated that both mothers and daughters had high percentages of sedentary time.

Daughters had significant relationships for both social norms and self-efficacy scores for commitment to physical activity whereas mothers did not have significant relationships for social norms and self-efficacy for commitment to physical activity. It is unclear why these results occurred, however, research on unmeasured factors such as social support, specific barriers such as lack of transportation or lack of safety should be considered as additional factors that could affect physical activity (Allison, Dwyer and Makin, 1999).

Prediction for commitment for physical activity revealed societal norms, self-efficacy, and activity related affect was positively correlated for daughters and not mothers. This finding may be related to the daughters' involvement with organized sporting activities such as soccer, basketball

and dance. One mother stated she goes to Zumba® classes and looks forward to this activity, but most mothers stated they did not have any organized method of physical activity. Ancillary findings of age and BMI were not significant factors of commitment for physical activity for mothers and daughters. Further research is needed to understand the complexities of physical activity and the unique issues related to the Hispanic population.

This study generated new knowledge of factors associated with PA in the vulnerable Hispanic population; with 100% of the study population was Hispanic and was a representative sample of this population. It also generated new PA measurements of Hispanic mothers and daughters using the Actigraph® and added to the knowledge of PA and young Hispanic girls ages 8-12.

In addressing physical activity issues, especially among the underserved, community based participatory interventions can be key to a successful program. Future interventions should consider utilizing community based participatory design in the methods implementation as part of a multifaceted approach to addressing this issue. Nurses are poised in a variety of settings to promote wellness through physical activity. Bilingual parish and school nurses can work collaboratively with community partnerships. Nurses can determine the types of PA that Hispanic mothers and daughters would enjoy, then partner with various organizations to provide various activities.

Limitations

A major limitation of this study was the language barrier. Interpreters were used for the study, but twice the scheduled interpreter did not arrive for the study and alternates were used at the last minute. Another limitation was that the Actigraph® accelerometers were borrowed from Michigan State University (MSU) for a timeframe of January through March, so participants wore the accelerometers for three days. Due to licensing agreement, MSU could only load the

Actigraph® Lite version for data collection. This version required the Actigraphs® to be downloaded and analyzed by another program at the university. So, at the time the mothers and daughters returned the Actigraph®, the Actigraph Lite version did not immediately display if the mothers and daughters wore the Actigraph®, or for how long they wore the Actigraph®. Minutes of wear time was analyzed at a later date at a local university using the Actigraph® software. Measurement of PA can be improved through longer use of wearing an activity monitor.

Seasonal effects were another potential limitation of the study. Data was collected in the snowy winter months of January, February and March, which may have resulted in the relatively low rates of PA. While the church locations were ideal venues from which to recruit participants, the gathering spaces in which the women and their daughters could meet were often small. Although the study was designed for mothers and daughters, there were a few instances where a grandmother and granddaughter wanted to participate because the grandmother was the primary caregiver.

Implications for Public Health: Key findings

With the high prevalence rate of physical inactivity and its consequences on health, effective physical activity promotion interventions make this issue a priority for public health (Kohl et al., 2012). Resources and evidence based strategies as well as development of partnerships is needed to address this issue to promote sustainable actions. PA surveillance is needed to provide information for policies and interventions (Kohl et. al., 2012).

Findings from this study suggest that Hispanic mothers and daughters are not achieving the recommended amounts of physical activity. Furthermore, their perceptions of how much physical activity they are achieving are not congruent with actual measures. This indicates a need for education on physical activity on its importance and the type and frequency of physical activity that

is needed to promote overall health. The use of public health nurses who are fluent in Spanish would provide an excellent way to reach the Hispanic population and to educate these mothers and daughters regarding health-promoting behaviors such as physical activity. Nurses can determine the types of physical activity that Hispanic moms and daughters would enjoy by interviewing this group, then partner with various organizations to provide the various activities. It is important to embrace an equity approach to reduce disparity in access for physical activity opportunities, as well as tailor cultural sensitivities when creating physical activity interventions (Kohl et al., 2012).

Public health nurses can be advocates and become involved in policy making in physical activity. Health plans play a critical role in addressing the public health crises. Incorporating support for physical activity venues would increase access to individuals to promote physical activity. Policy making interventions should include a multidimensional approach that should include a variety of settings. For example, a clinic approach can increase collaboration between public and private sectors through an interdisciplinary approach to research using academic institutions and health care providers. Public Health nurses can be the link to schools, communities, and homes to provide programs and interventions to increase physical. School employers dictate policies, resources, incentives and or deterrents to physical activity (Sallis et al., 1999).

Community based initiatives can include mass media, public policy, and environmental changes to promote physical activity. Environmental policy changes are needed to increase physical activity environments where people can be physically active. Policies pertaining to parks and recreation, education, transportation and planning departments in government agencies are directly responsible for physical activity environments (Sallis et al., 1999). Support is needed for daily activities such as parks, sidewalks, trails, schools, workplaces, play grounds, childcare settings and private recreation settings. Common places for sedentary behavior exists in living spaces at homes

where the environment is filled with electronic entertainment, labor saving devices, and at workplaces and sports venues where people sit and watch a sporting event (Sallis et al., 1999).

Recommendations and Next Steps

Results and study limitations of this study suggest that further research is needed with the Hispanic population related to physical activity. More evidence-based research is needed on tailoring measurement tools for this specific population. This study also suggests further research on exercise self-efficacy as related to commitment on physical activity. Pender (2011) reports that the construct of SE has been determined to be one of the most important predictors of human behavior. As an individual masters a desired behavior, such as PA, he or she experiences a positive feeling of competence in their ability to overcome obstacles in pursuit of the desired goal (Pender et al., 2006). Bandura (1977) postulates that if SE is strengthened, the ability to overcome undesirable personal behaviors is stronger, and ultimately skill level improves. An individual's perception of personal efficacy has a wide range of self-beliefs that affect the intensity of motivation, affect, thought and action (Pender et al., 2006). SE expectations are influenced by four principal sources of information: mastery expectations (accomplishments), vicarious learning (modeling), verbal persuasion, and somatic responses to specific situations to build self-competencies and confidence (Pender et al., 2011).

The mothers may have poorly understood the Societal Norms Scale, which indicates further revision of the tool is needed specifically for the Hispanic population. A couple of mothers stated that the social norms did not pertain to them because they did not believe anyone they knew expected them to exercise.

As previously reported, exercise-self efficacy is the single most predictor of a commitment to physical activity, intervention studies on self-efficacy and PA may provide a deeper

understanding of the role of exercise self-efficacy and PA. Further research is also recommended on culturally appropriate intervention studies and PA throughout the seasons and with objective Actigraph® monitoring. Using the Actigraph® for longer than three days, will give an accurate assessment of PA and sedentary times. An intervention study using the Actigraph® monitor could not only provide activity data, but could be used as a tool to inform mother and daughters on how active they really are.

Daughters had significant relationships for both social norms and self-efficacy scores for commitment to PA whereas mothers did not have significant relationships for social norms and self-efficacy for commitment to PA. The relationship between self-efficacy and PA related affect among the mothers was in the opposite direction of what was expected, but similar to a study by Castro, Sallis, Hickmann, Lee and Chen (1999). It is unclear why these results occurred. However, research on unmeasured factors such as social support, specific barriers such as lack of transportation or lack of safety should be considered as additional factors that could affect PA (Allison, Dwyer and Makin, 1999).

Researchers and practitioners should design multi-faceted interventions that incorporate Pender's cognitive, behavioral and physical domains. Individuals should be screened for sedentary behavior. Interventions to increase PA can include educational booklets, setting goals, and motivation techniques. Interventions to improve PA among the Hispanic mothers and daughters must include the values and beliefs of the participants. Culture-based worldviews are essential to the success of such strategies and should be at the core from which interventions are planned (Berg and Cromwell, 2002).

Specific areas for future research may address the following research questions:

1. How can the nurse's role have a positive impact on exercise self-efficacy and physical activity?
2. What societal norms concepts are specifically related to the Hispanic culture, and how do these norms affect physical activity outcomes?
3. Does a tailored physical activity intervention have an effect on exercise self-efficacy and physical activity related affect?
4. What are the physical activity outcomes for seven days of Actigraph® use in various seasons among Hispanic mothers and daughters?
5. What are culturally appropriate ways for the women and their daughters to participate in various types of physical activity?

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The author declared no conflict of interests with report to the authorship and/or publication of this article.

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