Parenting Practices, Physical Activity Resources, and Hispanic Children's Physical Activity

by

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ABSTRACT

This body of research sought to explore relationships between parenting practices, physical activity resources, and Hispanic children's physical activity. Guided by the Family Ecological Model (FEM) and the Ecological Model of Physical Activity (EMPA) this study examined the influence of parents on children's physical activity through an integrative review. A cross sectional study was conducted to investigate potential relationships between parental perception safety at school, gender, and children's physical activity. A cross sectional study was also utilized to examine potential correlations between parenting practices, physical activity resources, and children's physical activity. Parental role modeling of physical activity and parental support for physical activity emerged as parenting practices that have considerable potential to impact children's physical activity. Gender differences among children's physical activity were also a key finding of this study with boys participating in more physical activity than boys. While quality of physical activity resources did not have significant associations with parenting practices or children's physical activity, more research is needed to determine how resources for physical activity may impact parenting practices, and children's physical activity.

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Chapter One

Parenting Practices, Physical Activity Resources, and Hispanic Children's Physical Activity

Physical inactivity is the 4th leading cause of death globally (WHO, 2014). Daily physical activity (PA) is one of the most important actions that people of all ages can do to improve their health (National Physical Activity Plan, 2010). Most adults and children do not meet PA guidelines (CDC, 2014). Physically active people have a longer lifespan than those who are inactive, as well as lower rates of heart disease, stroke, type 2 diabetes mellitus, depression, and many cancers (Warburton, Nicol, Bredin, 2006). PA helps maintain a healthy body weight, and is associated with reduced adiposity (Warburton et al. 2006; Anderson, Harro, Sardinha, Fraberg, Ekelund, Brange, et al. 2006). One population at risk for higher rates of inactivity is the growing Hispanic population. Currently, 54 million Hispanics live in the United States (United States Census Bureau, 2013); approximately 17% of the US population. It is predicted that by the year 2060, Hispanics will make up 31% of the population in the US (United States Census Bureau, 2013). It is of crucial importance to address health inequities in this growing population.

Hispanic children in the US spend about 7 hours per day in sedentary time (Belcher, 2010). Just 39% of Mexican American children meet PA guidelines compared to 41% of non-Hispanic whites (Whitt-Glover, Taylor, Floyd, Yore, Yancey, & Matthews, 2009). This gap widens in adulthood with 14.4% of Hispanics meeting PA guidelines compared to 22.8% of non-Hispanic whites (CDC, 2014).

Hispanic preschoolers do less PA than non-Hispanic preschoolers (O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski, Lee, Nicklas, & Shewchuk, 2013). Latino preschoolers have higher rates of obesity than their non-Hispanic white counterparts making it even more important that they achieve required levels of PA (Ogden, Caroll, & Flegal, 2014). PA tracks over time in children. Sedentary children are likely to become sedentary adults, supporting the importance of establishing high levels of PA in children of a young age (Pate, Baranowski, Dowda, & Trost, 1996; O'Connor et al., 2013).

For young children, the family provides the most important social context where behavior patterns, like PA, develop (Davison & Campbell, 2005). Parents influence children's PA levels (Sebire, Haase, Montgomery, McNeil & Jago, 2014). Parent values and beliefs about PA impact children's PA (Davison & Campbell, 2005). Parents create the setting that fosters PA by providing equipment and facilitating children's involvement in PA through providing transportation (Davison & Campbell, 2005). Transporting a child to a place where they can be active, enrolling them in activities, and paying for the fees have been associated with higher levels of PA among adolescents (Dunton, Jamner, & Cooper, 2003). While parenting practices have been linked to children's PA, there have been few studies that explore the relationship of the presence and quality of PARs to children's PA. Identifying how presence and quality of PARs might influence what Hispanic parents do to increase their children's PA levels can guide the development of interventions to increase child PA in Hispanics (O'Connor, Cerin, O'Hughes, Robles, Thompson, Mendoza, Baranowski, & Lee, 2014).

Characteristics of neighborhoods, like having high quality physical activity resources (PARs), have been associated with children's PA levels, but there is a lack of understanding of the mechanisms underlying this relationship. PARs are important for promoting PA, but the mere presence of PARs does not guarantee their use by children (Lee, Booth, Reese-Smith, Regan, & Howard, 2005). Qualitative elements of PARs may be a driving factor of rates of PA (Lee et al., 2005; Lee et al., 2011) Ability to access high quality PARs has been linked to parenting practices that foster PA in children, but there has been no investigation examining the objective characteristics of PARs and their influence on PA parenting practices (Lampard, Jurkowski, Lawson,& Davison,2013).

Neighborhoods perceived as unsafe negatively influence the PA of children living in those areas (Molnar, Gortmaker, Bull, & Buka, 2004). Given the high rates of crime in Mexico, parental perception of safety is of particular importance (United States Department of State, 2015). The 4th leading cause of death in Mexico is interpersonal violence (WHO, 2016). School facilities are a resource for community PA. Parental perceptions of safety from crime correlated positively with children's activity in public recreation facilities (Tappe, Glanz, Sallis, Zhou, & Saelens, 2013).

Parental perception of street safety was identified as a barrier to preschool Mexican children's PA (Rodriguez-Oliveros, Haines, Ortega-Altamirano, Power, Taveras, Gonzalez-Unzaga, & Reyes-Moralez, 2011). Further research is necessary to investigate the potential relationship between parental perception of safety and children's PA levels, particularly in Mexico and in schools, which most children visit five days a week.

Importance of the Problem

Effective family based prevention programs must combine information on the link between parenting and child behaviors with knowledge of the conditions in which parenting occurs (Davison & Campbell, 2005). This research addresses the National Institute of Nursing Research's initiatives to promote health and prevent illness through advancing nursing science in environmental causes of illness and to study the behavior of systems to promote development of interventions (National Institute of Nursing Research, 2015). It also addresses the United States National Physical Activity Plan strategy to elevate the priority of PA research (National Physical Activity Plan, 2010). This study fills a gap in research by examining what impact PARs may have on Hispanic parenting practices and how that impacts preschool aged children's PA levels.

Preschool aged Hispanic children are at risk for a sedentary lifestyle and the complications that arise from that risk factor. Further research is needed to explore the influence of PARs on parental decisions regarding children's PA. Very few studies have examined the influence of the PARs on PA parenting practices. This research provides valuable insight into the dynamics of the environment and its influence on PA parenting practices in the Hispanic population.

Theoretical Foundation

This study was guided by the Family Ecological Model (FEM) and the Ecological Model of Physical Activity (EMPA) which posit that understanding human behavior requires consideration of the context in which the person resides, including community characteristics that may drive parenting related to PA behaviors (Davison & Campbell, 2005; Spence & Lee, 2003).

The FEM was derived from Ecological Systems theory which postulates that family provides the context in which socialization occurs and behavioral patterns emerge (Davison &

Campbell, 2005). The FEM is family centered development theory that explains the relationships among the environment and parenting aimed at the promotion of healthy lifestyles (Davison, Jurkowski, & Lawson, 2012). The FEM accounts for contextual and family factors influencing children's PA related behaviors (Davison, Jurkowski, & Lawson, 2012). Parenting is a main component of the FEM and incorporates parental modeling of PA and accessibility to PA options. The model also considers family income, ethnicity, and child characteristics as influential on children's PA (Davison, et al., 2003). Child characteristics include the child's age and gender.

The EMPA describes environmental influences on PA (Spence & Lee, 2003). The micro-level environment is the proximal setting where people interact. It consists of social and physical characteristics (Spence & Lee, 2003). Schools, homes, and parks are examples of micro-level environments. The meso-level environment is the direct interaction among two or more micro-level environments. Children's PA may be influenced on the meso-level environment by both verbal support for PA from home and the physical environment at school (Spence & Lee). The exo-level environment includes the indirect interactions among two or more micro-level environments and the influence of those interactions on the person's PA. This environment does not typically include the individual but may still influence the individual's behavior (Lee & Cubbin, 2009). For example experiences that happen in the parent's work place may influence experiences that happen at the child's school. The macro-level environment encompasses the micro-, meso-, and exo-level environments. It is the larger community structure in which the person resides (Spence & Lee). Biological factors (Body composition, physical fitness) function as mediators between extra-individual factors and PA. Psychological factors (attitudes, social support towards PA) serve as mediators between extra-individual; factors and PA (Spence & Lee, 2003).

The FEM and the EMPA are interconnected at each environmental level of the EMPA. The macrosystem of the EMPA includes safe neighborhoods and the FEM includes neighborhood safety as a component of community characteristics. The microsystem of the EMPA includes high quality playground facilities and parenting within the FEM encompasses accessibility to PA

options. Both models account for the influence of biological factors and psychological factors on PA.

Literature

Chapter 2 contains an integrative review exploring the relationship between parenting practices and children's PA. Family provides the social context in which a person is embedded (Davison & Campbell, 2005). Parents play a major role in influencing children's PA behaviors. Parent's beliefs and knowledge about PA influence the child's PA (Davison & Campbell, 2005). Parental role modeling of PA has been positively associated with children's moderate to vigorous PA (Crawford, Cleland, Timperio, Salmon, Andrianopoulos, Roberts, Giles-Cotri, Baur, & Ball, 2010). Parents can modify the environment to assure that children have access to PA opportunities and resources. Parents who provide logistical support for PA have children with higher levels of PA (Davison, Nishi, Kranz, Wyckoff, May, Earle-Richardson, Strogatz, & Jenkins, 2012). Logistic support for PA includes enrolling the child in sports related activities and providing transport to opportunities for PA.

Safety acts as either a motivator or barrier to PA (Lee, McAlexander, & Banda, 2011). Low socioeconomic neighborhoods have less access to safe playgrounds and participate in less PA (Lee, Booth, Reese-Smith, Regan, & Howard, 2005). Children's levels of PA vary based on gender. Jauregui found that Mexican boys participated an average of 45 minutes more per day in MVPA than Mexican girls (Jauregui, Villalpando, Rangel-Baltazar, Lara-Zamudio, & Castillo-Garcia, 2012). Girls residing in neighborhoods that are perceived as unsafe have higher levels of overweight and obesity (Jennings-Aburto, Nava, Bonvecchio, Safdie, Gonzales-Casanove, & Rivera, 2009). Parents restrict adolescent girl's active transport and PA due to safety concerns resulting in lower levels of MVPA (Carver, Timperio, Hesketh, & Crawford, 2010). Additional research is needed to determine whether parents restrict PA based on gender and perception of safety.

The presence and quality of PARs varies among neighborhoods (Lee et al., 2011). Creation of spaces for PA has resulted in a 26% increase in the quantity of people who exercise a minimum of three times per week (National Recreation and Parks Association, n.d.). Access to

quality PARs increases children's PA levels (Ding, Sallis, Kerr, Lee, & Rosenburg, 2011). White children in the US have more access to parks and recreational opportunities for PA than Hispanic children (Gordon-Larsen, Nelson, Page, & Popkin, 2006). Decreased access to PARs has been associated with reduced rates of PA. The quality of the PARs may influence levels of PA (Lee, Booth, Reese-Smith, Regan, & Howard, 2005). Evidence on the relationship between parenting practices, PARs, and Hispanic children's PA has the potential to guide the development of innovative interventions aimed at disparate communities.

Research Questions

1. What is the influence of PA parenting practices on children's PA?
2. In the Hispanic population, does parental perception of safety at school and gender influence children's PA?
3. In the Hispanic population, what is the relationship between preschool aged parenting practices, quality of PARs, and children's PA?

Research Plan

Research question number 1 was addressed through an integrative review guided by the criteria set forth by Whittemore and Knafl (2005). The manuscript was published in *The Journal of School Nursing*. Research question number two was addressed through a cross sectional study of Dr. Rebecca E. Lee's Fulbright data from Mexico. This study was published manuscript in the peer reviewed journal *Salud Publica de Mexico* and titled *Influence of Parental Perceptions of School Safety and Gender Influences on children's physical activity in Mexico: A cross sectional study.* Research question 3 was explored using the methods described below.

Method

Guided by the Family Ecological Model (FEM), this study examined potential relationships between presence and quality of PARs, PA parenting practices, and preschool age children's PA among Hispanic mothers and children in Phoenix, Arizona. PARs within specified Hispanic neighborhoods in Phoenix area were objectively assessed, along with PA parenting practices and children's objectively measured PA to explore potential relationships.

Subjects

Study participants were a sample of Hispanic children (n=23) aged 3-5 and their parents (n=23). Inclusion criteria was (a) self-identifying as ethnicity of Hispanic or Latino origin, (b) residing in the Phoenix, Arizona area, (c) ability to speak and read Spanish or English, and (d) parent of pre-school age children aged 3-5 years old. All participants were able to read and write in Spanish or English. The only exclusion criterion for children was chronic illness that limits the child's ability to perform exercise or presence of a musculoskeletal injury.

Setting

This study was conducted in community and settings in Phoenix, Arizona. Phoenix is the 6th largest city on the US with a population of 1,563,025 people. The people of Phoenix are 46.5% white, 39.9% Hispanic, 6.8% African American, 1.8% more than one race, and 3.2% Asian (United States Census Bureau, 2014). Eighty percent of Phoenix residents possess a high school diploma or higher, and the median income for residents of Phoenix is $47,326. Neighborhoods were defined as the land area within an 800-meter radius of an early childhood education center (Timperio, Ball, Salmon, Giles-Corti, Simmons, Baur, & Crawford, 2006). To ensure adequate representation of the Hispanic population and to avoid rural or protected terrain, only those neighborhoods that surround schools with greater than 20% Hispanic enrollment were included in the study. Internet searches generated a list of all potential PARs in the community.

Sample Size Determination

The number of neighborhoods and number of participants per neighborhood to be sampled were determined via a simulation-based approach using R statistical software (version 3.2.2). In this approach 5000 simulated datasets were created for (a) various combinations of neighborhood and parent-child pair sample sizes (neighborhood sample sizes of 10, 12, and 15 neighborhoods; per neighborhood sample sizes of 12, 14, 16, and 18 parent-child pairs) and (b) ranges of regression coefficient values, corresponding to expected magnitudes of effects on child MVPA minutes per day (e.g., 1 minute/day increase to 4 minutes/day increase in in MVPA minutes/day per 1-unit change in either PPAPP or QPAR) with neighborhood level intraclass correlation (ICC) set at .20 and alpha at .05. For each simulated dataset a linear mixed model was estimated and the significance of target effect (at alpha = .05) was tested. The proportion of

simulation runs in which the target effect was significant corresponds to the power of the test of that effect (i.e., probability that the null hypothesis of no effect would be correctly rejected by the test). These analyses showed that a sample of 10 neighborhoods with 12 parent-child pairs each (i.e., 120 total parent-child pairs) should afford power to detect effects of PPAPP on child MVPA. The final data set included n=23 parent child dyads and n-=10 neighborhoods.

Instruments

The 3 core measures examined in this study were the presence and quality of publically available PARs, PA parenting practices, and children's objectively measured PA. To measure these variables the Physical Activity Resource Assessment tool (PARA), the Preschooler Physical Activity Parenting Practices instrument (PPAPP) and accelerometers were utilized.

Physical Activity Resource Availability and Quality. The Physical Activity Resource Assessment tool (PARA) instrument was used to address question 3. The PARA instrument provides an objective assessment of PARs. This tool assesses the type, features, amenities, and quality of PARs such as parks, churches, schools, sports facilities, fitness centers, community centers, and trails (Lee et al., 2005). The PARA was used to describe PARs within neighborhoods, and the potential influence those differences had on PA. Features (basketball courts, playgrounds, soccer fields) and amenities (benches, lighting, sidewalks) of PARs were audited and rated as 0=not present, 1=poor, 2=mediocre, 3=good (Lee, Mama, Adamus-Leach, & Soltero, 2015). Incivilities (elements reducing pleasure of using PARs) were rated as 0=not present, 1=little, 2=some, 3= a lot. Each neighborhood was assigned a Quality of Physical Activity Resources (QPAR) index score. The QPAR score equals the sum of the features and amenities ratings, minus the incivilities ratings. This sum for each individual resource, within the specified neighborhood was then divided by the total number of resources in the neighborhood. Reliability of the instrument has been calculated at rs>.77(Lee at al., 2005).

Physical activity parenting practices. The Preschooler Physical Activity Parenting Practices (PPAPP) Instrument developed by O'Connor and colleagues (2014) measures what parents do to encourage and discourage children's PA (O'Connor, Cerin, Hughes et al., 2014). This tool considers cultural influences on parenting in the Latino population. Among the measured

PA parenting practices thought to promote PA are (a) engaging in PA with the child, (a) engaging in PA in front of the child, (c) going on walks with the child, (d) taking the child to the park, and (e) suggesting that the child play outside. PA parenting practices thought to discourage children's PA that will be assessed include (a) watching television with the child, (b) allowing the child to play video games, and (c) keeping the child occupied with screen time activities. Test-retest reliability for the PPAPP instrument ranged from 0.56-0.85 (O'Connor, Cerin, Hughes et al, 2014). Spanish and English versions of the PPAPP were available for participant use. The Spanish version of the instrument has been tested to ensure content validity between English and Spanish (O'Connor et al., 2014). Participants chose the best answer for how often they do each of the listed activities on the PPAPP with their 3-5 year old child. All materials were printed in both Spanish and English.

Children's physical activity. PA was measured using wGTX-3-BT accelerometers. Accelerometers provide accurate measures of PA, r=.83 (Eston. Rowlands, & Ingledew, 1998). Accelerometer readings were recorded in 10-second epochs. A child's accelerometer data was considered complete if ≥ 480 minutes of activity data per day are recoded. Data was processed using Butte's cut points (2014).

Demographic characteristics. Demographic questions measuring age and gender of the parent and child and parent education level, income, marital status, and relationship to child were obtained. These demographic characteristics were selected as they are components of the FEM.

Protocol

The 23 parent-child pairs came from 6 school neighborhoods. Data from Rebecca Lee's Sustaining Active Garden Education (SAGE) program was utilized to answer the remaining research questions.

Environmental assessment protocol. An objective assessment of the presence and quality of all PARs, using the PARA instrument, within the 10 specified neighborhoods was obtained. Ten (n=10) neighborhoods were selected for the study, but only 6 (n=6) had participants. Neighborhoods were mapped as an 800 meter radius circumscribed around selected early child education centers. Each PAR was identified as a fitness club, trail, gym, sports

facilities, park, school, church, or community center. Multiple use resources were coded as the predominant function of the resource. The PARA was used to systematically describe each PAR. Each resource took between 10-30 minutes to assess. All assessments were conducted during daylight hours with safety protocols in place.

Physical activity parenting practices. To address aim 3, parents of children, aged 3-5 years old, within those neighborhoods were asked to complete the Preschool Aged Physical Activity Parenting Practices (PPAPP) instrument. Parents and children were screened for eligibility and received informed consent. This survey determines what Latino parents do to encourage or discourage their children's play. Activities that promote and discourage PA were summed for each respondent. The participants in the study were asked to report any concerns or questions that arose while completing the survey instruments. Immediately following parental completion of the PPAPP, children were required to wear an accelerometer for 7 consecutive days.

Children's physical activity protocol. Preschool aged children of the parents completing the PPAPP wore an accelerometer for 7 consecutive days while awake. The accelerometer was programmed with the child's age, gender, height, and weight and placed at hip level. Parents were instructed to remove the accelerometer from the child while bathing and or being exposed to water. Parents completed a monitor wear log for their child, and the non-wear time along with consecutive "0" counts for greater than 30 minutes were removed (O'Connor, Cerin, Hughes et al., 2014). Study participants had access to research assistants for questions about accelerometer placement and use. After 7 days of wear, research assistants collected the accelerometers, and energy expenditure, minutes, and time from the accelerometer was downloaded to a computer for analysis.

Human subjects protocol. Parents and children were screened for eligibility and received informed consent. The data collectors verified that participants understood the questions of the PPAPP. Data was kept in locked storage at Arizona State University. Data analysis was ran on university office computers and secured with password protection. The PPAPP questions

and accelerometer were not likely to cause psychological discomfort, and participants were allowed to withdrawal at any time.

Participants were recruited through ECECs. Families interested in participating in the study were screened for eligibility, informed of the purpose of the study, and given the opportunity to participate or not. Participants were informed of the confidentiality of their participation in the project and reminded that their participation was voluntary. They were informed that they can withdraw from the study at any time, and they were given a copy of the informed consent with the investigators name and contact information on it.

Data Analyses

Data collection forms were coded to protect identity of participants. Data entry was double checked and verified by a research staff member. Statistical analysis was performed using SPSS version 23. Descriptive statistics were calculated. To examine potential relationships between parenting, physical activity resources and children's PA, bivariable analysis including independent samples T tests and ANOVA were used. Alpha was set at .05.

Human Subjects

Human subjects were used in this project, and the researcher was committed to protecting the rights of all participants. The protocol for this study was approved by the Arizona State University Institutional Review Board.

Participants were notified of the potential benefits and results of the study. The Principal Investigator and research assistants described the data collection procedures in detail including a time frame of how long it would take for data collection. They were informed that the results would remain confidential. Subjects were informed of the researcher's affiliation with Arizona State University to promote trust.

Sources of Materials

Data for this study was derived from 3 instruments. The Physical Activity Resource Assessment (PARA) instrument is an environmental resource assessment tool and does not require human subjects for completion. The PPAPP instrument was completed via participant interview and self-report data. Objective PA data was collected with accelerometers.

Potential Risks

The study involved minimal risks. There was low likelihood of physical risk as only a survey instruments and accelerometers were used.

Potential Benefits of Proposed Research to Subjects and Others

The potential benefits of this study to participants were an increase in awareness of PA parenting practices that may promote or discourage their children's PA. They may also have gained insight on their children's PA levels and PARs within the neighborhood. The benefits outweighed the risks of participation.

Importance of Knowledge to be Gained

This study has the potential to increase knowledge of the influence of PARs on PA parenting practices in the Hispanic population. From this study, interventions and policy could be developed to increase PA in Hispanic children. Additionally the information could be used to promote health equity in the Hispanic population.

Relationships among Chapters

The Family Ecological Model and the Ecological Model of Physical Activity provide the basis for the study (Davison & Campbell, 2005; Spence & Lee, 2003). This model outlines the ecology of parenting and the relationships between community characteristics, organizational characteristics on parenting practices for PA. Chapter 2 contains an integrative review examining how parenting practices influence children's PA behaviors. Chapter 3 explores the influence of parental perception of school safety on children's PA levels, and chapter 4 examined the potential relationships between parenting practices, PARs, and children's objectively measured PA.

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Chapter Two

Parenting Practices and Children's Physical Activity: An Integrative Review

A dramatic reduction in the amount of physical activity (PA) occurs between the school age and adolescent years. People who are physically active typically live longer than those who are not (Paffenbarger, Hyde, Wing, & Hsieh, 1986). They also have lower rates of heart disease, stroke, type 2 diabetes, depression, and some cancers (AHA, 2013). This is also true for children. Physical activity leads to substantial physical and psychological health benefits for youth (Strong, Malina, Blimkie, Daniles, Dishman, Gutin, & Trudeau (2005). Parents influence children's PA levels; however, the extent and nature of this relationship is not clearly defined or documented. Parenting practices include ways in which parents may shape their children's PA habits including increasing knowledge, modeling PA, and providing accessibility to healthy PA options (Davison & Campbell, 2005). It is critical to understand the role that parents play in children's activity behaviors. The purpose of this integrative review is to analyze the state of science concerning the influence of parenting practices on children's physical activity.

Purpose

Physical activity (PA) is a vital component for good health and long life. It is associated with increased fitness, improved cardiovascular and metabolic disease risk factors, decreased likelihood of developing type 2 diabetes, improved bone strength, and improved mental well-being (National Physical Activity Plan, 2014). In the United States, although 42% of children ages 6-11 meet the recommended daily levels of 60 or more minutes of moderate to vigorous PA per day, only 8% of youth aged 12-15 years old meet that recommendation (National Physical Activity Plan, 2014). PA helps one maintain a healthy body weight (McTiernan et al., 2007). By 2030, 13 states could have obesity rates above 60% (Levi, Segal, St. Laurent, Lang, & Rayburn, 2012). Improvement in PA levels may help to prevent obesity.

Although many factors have been shown to contribute to children's PA, parents have been identified as key in the promotion of PA (O'Connor, Jago, & Barnowski, 2009). Parents serve as important guides and role models for PA, and they organize and fund children's involvement in physical activities (Davison, Cutting, & Birch, 2003). Evidence aimed at

understanding the influence of parenting practices on children's PA levels is emerging, but the depth and breadth are not clear. A review of parenting practices was conducted by Xu and colleagues (2015), but did not include qualitative evidence (Xu, Wen,&, Rissel, 2015) limiting the depth of the review and conclusions that might be drawn from it. That review found that parental encouragement and support increase children's PA. (Xu, Wen, & Rissel, 2015). An integrative review is necessary to provide unique insight through the consideration of qualitative as well as quantitative evidence. Inclusion of qualitative evidence may offer a deeper understanding of a phenomenon. It has potential to generate theory, explore participant attitudes in depth, and generate quantitative research (Whittemore & Knafl, 2005). This review will critically analyze the state of science concerning the influence of parenting practices and children's PA levels.

The Family Ecological Model (FEM) and the Ecological Model of Physical Activity (EMPA) provided the theoretical background for the study (Davison, Jurkowski, & Lawson, 2012; Spence & Lee, 2003). The FEM was developed to explain the relationships among the environment and parenting aimed at the promotion of healthy lifestyles (Davison, Jurkowski, & Lawson, 2012). The FEM accounts for contextual and family factors influencing children's PA related behaviors (Davison, Jurkowski, & Lawson, 2012). Parenting is a well-developed, main component of the FEM. The FEM posits that to understand behavior, one must consider the context in which the person is living and that family provides the environment in which behavior patterns emerge (Davison & Campbell, 2005). Parenting is encompassed within the EMPA as a dynamic environmental linkage that helps to promote PA in children, (Spence & Lee, 2003). The model notes the direct and indirect effects of multiple levels of the environment and their influence on PA, and it accounts for the variations in distal and proximal influences on PA. Distal influences of physical activity are buffered by proximal factors (Spence & Lee, 2003). For example, poor neighborhood conditions would have less influence on children's PA if parents were able to provide a supportive home environment for PA.

The existing research suggests that parents influence children's PA by providing the context through behavior patterns emerge (Davison & Campbell, 2005). The purpose of this integrative review was to identify the physical activity parenting practices that potentially influence

children's PA. The integrative review is the broadest type of review; it allows for inclusion of experimental and non-experimental research to obtain a better understanding of the phenomenon of concern (Whittemore & Knafl, 2005), including problem identification, literature search, data reduction, data display, and data comparison as strategies to enhance rigor in integrative reviews.

Method

Eligibility Criteria

This review covered a 19 year period (1998-2017). A 19 year period was used, as the combination of search terms did not generate articles prior to 1998. The CINAHL, Ovid Medline, and PubMed databases were searched in January of 2017 for eligible studies. The search terms consisted of combinations of "parenting", "children", "and "physical activity". Inclusion criteria for this study necessitated that studies used qualitative or quantitative designs, were published in English language peer reviewed journals, and investigated parenting practices that influence PA in children and adolescents. Reference lists of included papers were examined to determine if any of the studies met the inclusion criteria. Studies were not considered if they did not address parenting practices specific to PA. Studies solely examining parenting style (without parenting practices) were excluded. Parenting style as described by Maccoby and Martin (1983) includes authoritarian, authoritative, permissive, and uninvolved. Unpublished studies were not included in the review. Four hundred and seven studies were initially identified from the database searches. A total of 38 studies met the inclusion criteria after full text review. See flow chart in Figure 1.

Polit and Beck's evidence hierarchy was used to identify the levels of evidence for each study to determine the strength of available evidence (Polit & Beck, 2012). The strongest level of research ranked as level 1 by Polit and Beck includes systematic reviews of randomized and non-randomized control trials. Level 2 includes single randomized and non-randomized clinical trials. The 3rd level is systematic reviews of correlational and observational studies. Level 4 incorporates single correlational and observational studies, and level 5 includes systematic reviews of descriptive and qualitative studies. The 6th level described by Polit and Beck are single descriptive and qualitative studies. Last, the 7th level entails opinions from experts.

Quality Assessment

Quantitative studies were evaluated for quality using the GRADE approach (Cochrane Collaboration, 2011). See table 2. This approach ranks the quality of evidence as high, moderate, low, and very low. Rankings are based on underlying methodology, and reviewers may modify the quality of a study based on an assessment of factors that may increase or decrease the quality of the study. RCTs are ranked as high, but can be downgraded to moderate low or very low if they have limitations in design, inconsistent results, imprecision of results, or publication bias (Cochrane Collaboration, 2011). Observational studies are ranked as low, but can be upgraded for reasons that include a large magnitude effect. Observational studies can also be downgraded to very low using the same criteria used to downgrade RCTs.

A variety of methods were utilized for data collection within the qualitative studies. Three of the studies employed 1:1 interviews for data collection (Bentley, Goodred, Jago, Sebire, Lucas, Fox, Steward-Brown, & Turner, 2012; Hosseini, Anoosheh, Abbaszadeh, & Ehsani, 2013; Ickes, Mahoney, Roberts, & Dolan, 2016). Three employed focus groups (De Lepeleere, De Smet, Verloigne, Cardon, & De Bourdeaudhuij, 2013; Hesketh, Hinkley, & Campbell, 2012; Wright, Wilson, Griffin, Evans; 2008). Nominal group technique was used by 2 of the qualitative studies (O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski, Lee, Nicklas, & Shewchuk, 2013; Suen, Cerin, & Wu, 2015). Nominal group technique eliminates potential bias that may occur in traditional focus groups by utilizing a structured method so that on person cannot dominate the discussion (O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski, Lee, Nicklas, & Shewchuk, 2013), Only 2 of the qualitative studies provided interrater reliability between coders. Those were reported at r=0.87 and r=0.84. (De Lepeleere, De Smet, Verloigne, Cardon, & De Bourdeaudhuij, 2013; Wright, Wilson, Griffin, Evans, 2008).

Data Extraction and Synthesis.

Key concepts were identified, and methodological evidence was evaluated (Whittemore & Knafl, 2005). The design of this review also included principles of cross case analysis described by Miles, Huberman, and Saldana (2014). The cross case analysis seeks to enhance

generalizability and deepen understanding and explanation. This review utilized the elements of the variable oriented approach described by Miles, Huberman, and Saldana (2014) through an examination of variables within each study and their interrelationships. Research articles were read and critically reviewed several times. Matrices were developed and analyzed for cross case and within case analysis that included identifying levels of evidence, study design, quality, sample sizes, sample characteristics, measure of physical activity, and relevant themes.

Parental role modeling of PA included the factors of parents' enjoyment of PA, parents' frequency of PA, families' use of sports as recreation, and parents' use of their own behavior to encourage PA (Davison et al., 2003). Studies examining parental role modeling of PA defined it as parents' participation, enjoyment and recreation in PA in front of the child. Parental modeling of behaviors believed to increase children's PA included parental participation in physical activity alone or with their children and parents' arranging of activities that included PA such as walking together, visiting the swimming pool, family sports events, and skating together (Davison & Campbell, 2005). Logistic support of PA incorporated parents enrolling children in sports, attending child sporting events, and assisting with transportation to PA events (Davison et al., 2003). Monitoring PA included keeping track of how much PA the child performed (Gubbels, Kremers, Stafleu, De Vries, Goldbohm, Dagnelie, DeVries, Van Buuren, & Thijs, 2011). Restriction of sedentary behaviors included the parents intentional efforts to limit the amount of time that the child spent being sedentary.

Results

Sample

Sample characteristics of the 38 manuscripts reviewed are presented in Table 1. Descriptive correlational studies of the topic were abundant, with twenty-seven of the studies (71.1%) utilizing those methods to investigate potential association between parenting practices and children's physical activity. Eight (21.1%%) of the studies were qualitative. One (2.6%) was a quasi-experimental design (Davison, Jurkowski, Li, Kranz, & Lawson, 2013), one was a randomized controlled trial (Gerards et al., 2015), and one was a pilot randomized controlled trial (O'Connor, Hilmers, Watson, Baranowski, & Giardino, 2011).

Demographic Characteristics

The children's ages in the study ranged from infancy to 19 years old. The majority of the studies (*n*=19) focused on school aged children ages 6-12. Five studies focused on pre-school aged children, and one study focused on infants only. Sample size of participants in the studies ranged from 21 to 3,175. Studies conducted outside of the United States were abundant. Studies conducted within the US focused predominantly on white families with three studies focused on predominantly African American samples and three on predominantly Hispanic samples. See table 1 for demographic characteristics of the samples.

Data Collection and Measurement

A variety of tools were used to measure the influence of parenting practices on children's PA levels. Nine of the thirty quantitative studies (30%) used the Activity-related Parenting Practices Scale developed by Davison (2003) and colleagues, developed specifically to measure parents' physical activity-related parenting practices influencing girls' PA. The Activity-related Parenting Practices Scale demonstrated moderate to high Cronbach's alpha (.61-.86) in all studies. The Activity-related Parenting Practices Scale was the most frequently used tool to assess parenting practices across the studies included in this review.

Studies not using the Activity-related Parenting Practices Scale used a range of instruments to operationalize parenting practices. Four studies used the Child-Feeding questionnaire to measure parenting practices influencing children's activity (Arredondo, Elder, Ayala, Campbell, Baquero, & Duerksen, 2006; Gerards, Dagnelie, Gubbels, van Buuren, Hamers, Jansen, van der Goot, de Vries, Sanders, & Kremmers (2015); Gubbels, Kremers, Stafleu, De Vries, Goldbohm, Dagnelie, De Vries, Van Buuren, & Thijs (2011); Remmers, Van Kann, Gubbels, Schmidt, Vries, Ettema, Kremers, & Thijs, 2014). Average reported reliability of the Child Feeding Questionnaire was 0.67 (Remmers et al., 2014). Two of the quantitative studies used the Parenting Strategies for Eating and Activities (PEAS) scale. The PEAS included items about parental monitoring of physical activity and parental reinforcement of physical activity. Reliability of the PEAS scale for the included studies ranged from .7-.88 (Lloyd, Lubans, Plotnikoff, Collins, & Morgan, 2014).

Ostybe and colleagues (2013) used the Home Environment Survey (HES) to measure parenting practices related to physical activity in the physical, political, and sociocultural home environment. The HES was the most detailed and inclusive instrument used to measure parenting practices. Cronbach's alpha for items of the HES ranged between 0.65 and 0.8.

Quality

Eighteen of the thirty quantitative studies of included in the review were graded as low quality evidence as a result of the majority of the studies were observational. See table 2 for quality rankings of all quantitative studies in the review.

Accelerometers have been endorsed as the most reliable and valid measure of physical activity in children (Eston, Rowlands, & Ingledew, 1998). Fifteen of the thirty (50%) quantitative studies used accelerometers to measure children's PA levels and fourteen of the quantitative studies (46.7%%) used self-report scales as to measure PA. One (3.3%) of the quantitative studies used pedometers to measure PA (Lloyd, Lubans, Plotnikoff, Collins, & Morgan, 2014). Accelerometers provided an objective measure of PA and contributed to reduced measurement error and higher internal validity, increasing the quality of those studies.

Parental Role Modeling of Physical Activity

Seven of the thirty quantitative studies (23.3%) found significant associations between parental role modeling of PA and children's physical activity levels. According to the Polit and Beck criteria, those seven studies were all level IV evidence. Three of those studies used continuous monitoring of PA, via accelerometers, to measure children's PA (Crawford, Cleland, Timperio, Salmon, Andrianopoulos, Roberts, Giles-Corti, Baur, & Ball, 2010; Edwardson & Gorely, 2010). The other five studies used survey methods to measure children's PA (Davison, Cuting, & Birch, 2003, Heitzler, Martin, Duke, & Huhman, 2006; Lam& McHale, 2015; Loprinzi, Schary, Beets. Leary, & Cardinal (2013); Rhodes, Spence, Berry, Deshpande, Faulkner, Latimer-Cheung, O'Reilly, & Tremblay (2015). Seven of the eight (87.5%) qualitative studies identified parental role modeling of PA as important in promoting children's PA. See table 1.

Logistic Support

Sixteen of the thirty (53.3%) quantitative studies found that parental support of PA was significantly associated with children's PA. Fifteen of those studies were level IV evidence, and one was level II. Of these, six used accelerometers to measure PA, and three used parent completed surveys. Five of the eight (62.5%) qualitative studies identified logistic support as a mechanism of parenting that supports PA in children. One qualitative study using nominal group technique identified "signing the child up for sports", "participating in activities with the child", "playing sports with the child", and "letting the child see the parent be active" as parenting practices that encouraged children's PA (O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski, Lee, Nicklas, & Shewchuk, 2013).

Quantitative studies in the current review consistently operationalized logistic support as enrolling the child in sports activities, attending sports activities with the child, and the importance of parents being actively involved with the child (Davison, Cutting, & Birch, 2003; Davison, Nishi, Kranz, Wyckoff, May, Earle-Richardson, Strogatz, & Jenkins, 2012; Davison, Jurkowski, Li, Kranz, & Lawson, 2013; Heitzler, Martin, Duke, & Huhman, 2006; Henessy, Hughes, Goldberg, Hyatt, & Economos, 2010; Jago, Davison, Brockman, Page, Thompson, & Fox, 2011; O'Connor, Chen, Baranowski, Thompson, & Baranwoski, 2013). Two studies operationalized support for PA as encouraging the child to participate in PA or play sports, providing the child with transportation to sports activities, and watching the child perform PA or sports (Langer, Crain, Senso, Levy, Sherwood, 2014;Tandon, Grow, Couch, Glanz, Sallis, Frank, & Saelens, 2014). The research widely noted the use of logistic support as a concept involved in parenting practices influencing children's PA; however, the results were equivocal.

Monitoring Physical Activity

Two quantitative and one qualitative study found monitoring PA as a significant parenting practice that led to increasing children's PA levels (See table 1.). Bradley and colleagues (2011) found that boys with lower parental monitoring had significantly more MVPA than those with more parental monitoring of PA (Bradley, McRitchie, Houts, Nader, & O'Brien (2011). The majority of the studies in this review did not measure parental monitoring of PA.

Parental Encouragement of Physical Activity

An additional theme generated from the review was parental encouragement of PA. Six of the thirty (20%) quantitative studies identified parental encouragement of PA as positively associated with children's PA. Two qualitative studies identified encouragement of PA as influencing children's PA (Hesketh & Hinkley, 2012; Hosseini, Anoosheh, Abbaszadeh, & Ehsani, 2013). Moreover, lack of parental engagement was also identified as discouraging PA (O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski, Lee, Nicklas, & Shewchuk, 2013).

Discussion

The purpose of this integrative review was to critically analyze the state of the science concerning the influence of parenting practices on children's PA levels. Parental role modeling of PA and logistic support for PA showed the greatest promise as parenting practices that may influence children's physical activity. It should be considered that these two variables were consistently measured across studies examining parenting practices, and other variables that may fall under parenting practices may not have been measured. Variables that may need further examination include parental monitoring of children's PA and parental restriction of sedentary behaviors. Arredondo and colleagues (2006) found parental monitoring of children's PA was significantly associated with children's PA (Arredondo et al., 2006). More studies are needed that examine parental monitoring of PA to determine how it is influential in children's PA, but it shows promise as a potential strategy to increase PA in children.

The inclusion and examination of qualitative studies has provided guidance for additional variables to explore in quantitative studies. It may be beneficial to measure parents' ability to influence children's intrinsic value of PA. One qualitative study found that parents who increased children's intrinsic value of PA also encouraged PA in their children. While it was not the aim of this study to examine the viewpoint of the children, an assessment of what parenting practices influenced children's PA from the perspective of the child may provide helpful insights. One qualitative study also identified physical and emotional abuse as a deterrent to children's PA (O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski, Lee, Nicklas, & Shewchuk, 2013). While this variable might be difficult to measure, it may provide valuable information and treatment for a vulnerable population.

Findings were less consistent for parental monitoring of PA and parental restriction of sedentary behaviors. This may reflect that parental monitoring of PA and parental restriction of sedentary behaviors were not routinely examined as variables in these studies. In general, there is room for improved measurement and measurement development of these parenting constructs. Understanding of the complexities surrounding the relationship between parenting practices and child physical activity may be expanded by using instruments with more detail, depth and contextual reach, like the HES.

The level of evidence of the existing literature linking parenting practices to PA was low to moderate. Most of the existing information relied on cross sectional studies aimed at investigating the influence of parenting practices on children's PA, with few randomized controlled trials. The majority of the studies in this review were cross sectional, non-experimental studies. Three studies at the prediction and control level were located. One of those was a pilot randomized controlled trial, and one was quasi-experimental. Longitudinal designs and randomized controlled trials would provide meaningful gains in this research area. The knowledge on the topic could be broadened with the addition of studies higher quality evidence employing experimental designs with high internal validity.

An additional gap in the literature was the lack of research directed specifically at ethnic/racial minority populations. The available literature contained two (9.5%) studies with predominantly Hispanic samples and two studies with predominantly African –American samples (Arredonodo et al. 2006;O'Connor, Cerin et al., 2013; Henessy et al., 2010; Wright et al., 2008). PA is a major contributor to maintaining health body weight, an arena where there are health disparities in Hispanic and African American communities. Hispanic youth have obesity rates as high as 22.4% compared to 20.2% of African Americans, and 14.3% of Caucasians (Trust for America's Health and the Robert Wood Johnson Foundation, 2014). While Hispanic and African American children engage in equivalent amounts of PA as their non-Hispanic white counterparts, they are likely to follow the same pattern of sedentary behavior as adult Hispanic and African Americans. Twenty–three percent of Non-Hispanic white adults meet PA guidelines compared to 18% of African Americans and 16% of Hispanic adults (CDC, 2014). Data are lacking regarding

parenting practices influencing ethnic minority children's PA levels, and it is essential that research be developed pertaining to these populations to promote health equity within these groups.

Strengths and Limitations

Strengths of the review included a large sample size, generation of definite themes and the inclusion of qualitative as well as quantitative evidence. The limitations to this study were that studies could have been omitted from the search. Three data bases were searched, and others may exist. The primary limitation in the literature was that the extant research is lacking in randomized control trails or other well controlled experimental designs, limiting the quality of the available evidence.

Implications for Research

Indications for future research include examining of the influence of parenting practices on children's PA in ethnic/racial minority populations. Interventions need to be developed that utilize the body of evidence that parental role modeling and logistic support are significant components of children's PA. The body of knowledge could be further developed by original studies with aims of investigating parenting practices influencing children's PA. The existing research could be strengthened by using objective, continuous monitoring measures of PA like accelerometry and pedometry. High quality research is needed to determine if parental role modeling of PA influences children's physical activity levels. Additional research, within ethnic minority populations, aimed at parenting practices may help address health disparities.

Application to School Nursing

School nurses are in the optimal setting for promotion of student health. Information on the nature of influence of parents on children's physical activity can provide helpful insight for school nurses. Regular physical activity is important in the prevention of child overweight and obesity. This research can help school nurses in the development of interventions to increase physical activity and prevent childhood overweight and obesity in children.

School nurses should have an understanding of the dynamics of parenting and children's physical activity when implementing health promotion activities. School nurses could utilize

instruments such as the Physical Activity Parenting Practices tool to assess what parenting practices parents are utilizing the encourage and discourage children's PA (Davison, Cutting, Burch, 2003). By gaining an understanding of parental influences on children's PA the school nurse may tailor interventions to fit the family's needs.

Health promotion interventions in schools should incorporate the plausible influences that parents have on children's PA. School nurses should consider the research on parental role modeling of PA and logistic support for PA when developing and implementing health promotion efforts. Incorporation of this evidence along with inclusion of the parents in health promotion has potential to result in improved health outcomes.

Conclusion

The science concerning the influence of parenting practices on children's PA levels is mainly supported by cross sectional, non-experimental studies. Strong measurement tools exist to measure many parenting practices, and the definition of parenting practices has some consistency across studies. The science could be expanded by the development of randomized controlled trials aimed exclusively at this area. Research involving ethnic minority populations would provide meaningful gains and potentially promote health equity. Parental role modeling of PA and logistic support for PA showed the greatest promise as parenting practices that may influence children's PA and warrant further investigation to determine how these influences may be most effective for promoting PA.

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Table 1.

Quality of quantitative studies using GRADE criteria.

Study	GRADE Rating
Arredondo, Elder, Ayala, Campbell, Baquero, & Duerksen (2006)	Low
Barnes, Plotnikoff, Collins, & Morgan (2015)	Low
Bradley, McRitchie, Houts, Nader & O'Brien, (2011)	Moderate
Crawford, Cleland, Timperio, Salmon, Andrianopoulos, Roberts, Giles-Corti, Baur, & Ball (2010)	Moderate
Davison, Cutting, & Birch (2003)	Low
Davison, Nishi, Kranz, Wyckoff, May, Earle-Richardson, Strogatz, & Jenkins (2012).	Low
Davison, Jurkowski, Li, Kranz, & Lawson (2013)	Moderate
DeLepeleere, De Bourdeaudhuij, Cardon, & Verloigne, (2015)	Low
Edwardson & Gorely (2010)	Low
Forthofer, Dowda, McIver, Barr-Anderson, & Pate (2015)	Moderate
Gerards, Dagnelie, Gubbels, van Buuren, Hamers, Jansen, van der Goot, de Vries, Sanders, & Kremmers (2015)	Moderate
Gubbels, Kremers, De Vries, Goldbohm, Dagnelie, De Vries, Van Buuren, & Thijs (2011)	Low
Heitzler, Martin, Duke, Huhman (2006).	Low
Hennessy, Hughes, Goldberg, Hyatt, & Economos (2010).	Low
Jago, Davison, Brockman, Page, Thompson, Fox (2011).	Moderate
King, Parkinson, Adamson, Murray, Besson, Reilly, Basterfield (2010)	Low
Lam & McHale (2015)	Low
Langer, Crain, Senso, Levy, Sherwood, (2014)	Moderate
Lloyd, Lubans, Plotnikoff, Collins, & Morgan, (2014).	Low
Loprinzi, Schary, Beets. Leary, & Cardinal (2013)	Low
O'Connor, Chen, Baranowski, Thompson, & Baranowski (2013)	Low
O'Connor, Hilmers, Watson, Baranowski, Giardino (2011).	Moderate
Ostybe, Malhotra, Stroo, Lovelady, Brouwer, Zucker, Fuemmeler (2013)	Low
Remmers, Van Kann, Gubbels, Schmidt, Vries, Ettema, Kremers, & Thijs (2014)	Moderate
Rhodes, Spence, Berry, Deshpande, Faulkner, Latimer-Cheung, O'Reilly, & Tremblay (2015)	Moderate

Seabra, Seabra, Mendonca, Brustad, Maia, Fonseca, & Malina (2013)	Low
Tandon, Grow, Couch, Glanz, Sallis, Frank, Saelens, (2014).	Moderate
Taylor, Wilson, Slater, & Mohr (2011)	Low
Verloigne, Van Lippevelde, Maes, Brug, De Bourdeaudhuij (2013)	Low
Zhao, Gao, & Settles (2013)	Moderate

Table 2.

Characteristics of Parenting Practices articles

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Arredondo, Elder, Ayala, Campbell, Baquero, & Duerksen (2006)	Cross sectional, descriptive correlational Level IV	n=812 Latino mean age=6 Parents-96% female, 4% male 48% boys, 52% girls 40% with income ≤$1,500 per month United States	Evaluate the influence of parenting style on children's physical activity (PA) and diet.	Child Feeding Questionnaire Monitoring PA-keeping track of amount of TV watched and exercise child is getting Parental reinforcement of PA-praise child for being active Discipline the child for screen time activities without permission Limit setting-limit screen time activities	Parent completed questionnaire	Parental monitoring of PA was significantly associated with children's PA. Parental reinforcement of PA was significantly associated with children's PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Barnes, Plotnikoff, Collins, & Morgan (2015).	Cross sectional, descriptive correlational Level IV	n=40 mothers and daughters mean age 8.8 Parents-100% female 100% girls SES not reported Australia	Assess maternal correlates of objectively measured PA in girls.	Activity Support Scale (ACTS) Logistic support Modeling	GT3X accelerometers	Logistic support was positively associated with MVPA.
Bentley, Goodred, Jago, Sebire, Lucas, Fox, Steward-Brown & Turner (2012)	Qualitative study Level IV	n=32, parents 6-8 year olds Parents-90.6% female, 9.4% male 62% girls, 38% boys low socioeconomic status (SES) United Kingdom	Formative work to inform the content of a pilot randomized control trial (RCT).	NA	NA	Parental logistic support of PA facilitated child's PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Bradley, McRitchie, Houts, Nader & O'Brien, (2011)	Cross sectional, descriptive correlational Level IV	n=801 77.3% white 9-15 year olds Parents-100% female 49.4% boys, 50.6% girls 26.1% low SES United States	Examine connections between parenting and objectively measured PA in 9-15 year olds.	Parental encouragement of child PA, participating in PA with the child, transportation to PA activity	Accelerometer	Boys with lower parental monitoring and more parental encouragement had more MVPA. In girls, parental encouragement was positively associated with more MVPA.
Crawford, Cleland, Timperio, Salmon,Andria nopoulos, Roberts, Giles-Corti, Baur, & Ball (2010)	Descriptive correlational Level IV	n=301 10-12 year olds 42.5% boys, 57.5% girls Parent gender not reported high and low socioeconomic status Melbourne, Australia	Determine the contributions of family and neighborhood environments to changes in youth PA and BMI score over 5 years.	Parental role modeling of PA Parental rules and restrictions on sedentary behavior Parental social support of PA-participation in PA with the child	Children's MVPA, Actigraph accelerometer	Maternal role modeling of PA was positively associated with MVPA in boys Among girls paternal MVPA role modeling, PA rules, and parental PA coparticipation were positively associated with MVPA

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Davison, Cutting, & Birch (2003)	Cross sectional, descriptive correlational Level IV	n=180 non-Hispanic white girls Parents- 100% female 100% girls 9 year olds Median combined income > $50,000 United States	Examine parent's activity related parenting strategies and similarities and differences in those strategies between mothers and fathers. Examine links between activity related parenting strategies and girls PA patterns.	Activity- related Parenting Practices Scale Father's and mother's logistic support-enrolls child in sports, goes to sporting events with child, important for parent to be involved Father's and mother's explicit modeling-parent enjoyment of PA, parent frequency of PA, family use of PA as recreation, parental use of PA to encourage child to be active	Children's physical activity scale	Mother's logistic support and father's explicit modeling are associated with higher levels of physical activity in their daughters ($p<.01$).
Davison, Jurkowski, Li, Kranz, & Lawson (2013)	Quasi-experimental Level II	n=119 38.5% white 17.8% black 13.5% bi-racial	A parent centered childhood obesity	Activity- related Parenting Practices Scale Support for PA	Actigraph GT3X accelerometer	Significantly higher minutes per hour of light PA, and fewer minutes per day of sedentary activity post intervention.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		6.1% Hispanic 24% undocumented race 2-5 year olds Parents-92% female, 8% male 55% girls, 45% boys SES not reported United States	intervention to improve food, PA and media related parenting outcomes	Family co-participation in PA Screen related parenting		Parents reported increased support for children's PA.
Davison, Nishi, Kranz, Wyckoff, May, Earle-Richardson, Strogatz, & Jenkins (2012).	Descriptive correlational study Level IV	n=767 97.4% white 6-19 year olds Parents- 55% female, 45% male 51.1% boys, 48.9% girls 23.5% low income	Examine parents support of children's PA as a mediator linking social capital and youth PA.	Activity-related Parenting Practices Scale Logistic support Modeling and co-participation Encouragement of child use of community resources for PA	Parent report of children's time outdoors and days per week of recommended levels of PA	Parent support for child PA was associated with higher PA in children.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		United States				
DeLepeleere, De Bourdeaudhuij, Cardon, & Verloigne, (2015)	Cross sectional, descriptive correlational Level IV	n=207 parents 6-12 year olds Parents 87.4% female, 12.6% male 51.7% boys, 48.3% girls 83.5% medium to high SES Belgium	Assess the association between parenting practices and parental self efficacy with children's PA	Parental Support for Physical Activity Scale	Flemish Physical Activity Questionnaire	Children were more physically active when sports equipment was available and when parents found it easy to motivate their child to do PA.
De Lepeleere, De Smet, Verloigne, Cardon, & De Bourdeaudhuij (2013)	Qualitative study Level VI	n= 21 parents 6-12 year olds Parents, 71% female, 29% male Child gender unreported 71% medium to high SES Belgium	An exploration of perceived effective and ineffective parenting practices in difficult situations concerning raising healthy children	NA	NA	Parents experienced that monitoring, being consistent, offering alternatives, reacting empathetically, modeling, motivating, increasing intrinsic value and availability as effective parenting practices in encouraging PA in children.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Edwardson & Gorely (2010)	Cross sectional, descriptive correlational Level IV	n= 117 95% Caucasian 7-10 year olds Both Mothers and fathers answered survey questions 46% boys and 54% girls SES not available British	Explore mothers and fathers activity related support and examine its effect on objectively measured PA.	Activity-related Parenting Practices Scale (modified version) Father's Logistic support Father's explicit modeling Mother's logistic support Mother's explicit modeling Father's Support for limiting sedentary behavior Mothers' support for limiting sedentary behavior	Actigraph GT1M accelerometer	Father's explicit modeling was significantly associated with moderate vigorous and vigorous PA in boys No other variables were significantly associated with children's PA
Forthofer, Dowda, McIver, Barr-	Cross sectional, descriptive correlational	n=693 34% black, 10.6% Hispanic,	Examine agreement between parent and child	Parental support for PA	Actigraph GT1M and GT3X	Mother's perceptions of support had modest positive associations with total MVPA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Anderson, & Pate (2015).	Level IV	16.5% other, 38.9% white mean age 10.6 years Parents,100% female 44.9% boys, 55.1% girls SES not reported United States	perceptions of parent support for PA and associations with children's MVPA.			
Gerards, Dagnelie, Gubbels, van Buuren, Hamers, Jansen, van der Goot, de Vries, Sanders, & Kremmers (2015)	Randomized Control Trial Level II	n=86 parent-child triads 4-8 year olds Both Mothers and fathers answered survey questions 43.2% boys, 56.8% girls	To assess effectiveness of the Lifestyle Triple P intervention	Child Feeding Questionnaire Monitoring PA Parental responsibility regarding PA	GT1M Actigraph accelerometer Days per week of PA behaviors	No significant effects found for children's PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		SES not reported Netherlands				
Gubbels, Kremers, De Vries, Goldbohm, Dagnelie, De Vries, Van Buuren, & Thijs (2011)	Cross sectional, descriptive correlational Level IV	n= 2,021 5-7 year olds Parent gender unspecified 51.2% boys, 48.8% girls SES unspecified Netherlands	Examine child and parent correlates of energy balance-related parenting practices.	Child Feeding Questionnaire Restriction of sedentary behavior Monitoring activity Stimulation to be active	Questionnaire for measuring activity behavior used in Dutch Youth Health Care	Restriction of sedentary time was negatively correlated with physical activity minutes per day ($p<.001$). Parental stimulation to be physically active was positively associated with physical activity minutes per day ($p<.001$)
Heitzler, Martin, Duke, Huhman (2006).	Descriptive correlational Level IV	n=3,114 61.5% white, 15.4% African American 17.1% Hispanic, Other 6% 9-13 year olds Parent gender not specified 51.1% boys, 48.9% girls	Assess correlates of PA in a US sample of 9-13 year olds	Scale developed for the study Parental support Parental Beliefs Parental Barriers	YMCLS self-reported survey	Parental support for PA and parental beliefs about PA were positively associated with children's participation in organized PA. Parental participation in PA with the child was positively associated with children's participation in free time PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		Household income ≤$25,000=22.6 % >$25,000≤$50,000=27.6% >$50,000≤$75,000=22.9% >$75,000=26.8 % United States				
Hennessy, Hughes, Goldberg, Hyatt, & Economos (2010).	Cross sectional study, descriptive correlational Level IV	n=76 parent child dyads 24% white, 33% black, 19% Hispanic 6-11 year olds Parents- 89% female, 11% male 33% boys, 66% girls Low income United States	Determine the relationship between parent's PA related practices, parenting style, and children's PA level.	Activity Support Scale and Parenting Strategies for Eating and Activity Scale (PEAS) Logistic support Explicit modeling	Actigraph model 7164 accelerometers	Parental logistic support was associated with child MVPA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Hesketh, Hinkley, & Campbell (2012).	Qualitative Level VI	n=61 Parents-100% female 48% girls, 52% boys <12 months and 3-5 year olds 94% mothers 58% girls, 42% boys SES not reported Australian	Determine how parents shape physical activity and screen time behaviors.	NA	NA	Providing children with a supportive environment including providing sports equipment, pets, and active transport were thought to support PA in children. Enrolling children in organized PA, parental modeling, and encouragement of PA, teaching their children PA, and encouraging outdoor play were thought to support children's PA.
Hosseini, Anoosheh, Abbaszadeh, & Ehsani (2013).	Qualitative Level VI	n=25 parents and children Iranian 10-19 year olds 16 girls, 7 mothers and 2 fathers,	Exploration of parent's roles in Iranian adolescent girls PA development	NA	NA	Parents influence adolescent girls PA by developing interest in PA through making them familiar with it, discovering their talents, and role modeling PA. Parents influence girls PA by providing both material and immaterial support for PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		SES not reported Iran				
Ickes, Mahoney, Roberts, & Dolan (2016).	Qualitative Level VI	n=57 parents 67% African American, 26% Caucasian, 7% Latino Children's age not reported Parents 94.7% female, 5.3% male SES not reported United States	Identify factors that enable or constrain parents support of and involvement in making dietary and PA changes at home.	NA	NA	Shared goals, modeling, and collective activities promote PA in families.
Jago, Davison, Brockman, Page, Thompson, Fox (2011).	Cross sectional, descriptive correlational Level IV	n=792 10-11 year olds Both mothers and fathers completed the scale	To determine whether parenting styles and practices are associated with children's PA	Activity-related Parenting Practices Scale Logistic support Role Modeling Logistic Support	Actigraph accelerometers	Maternal logistic support was associated with mean CPM for girls. Paternal logistic support was associated with boys mean MVPA and mean CPM

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		43% boys, 57% girls SES not reported United Kingdom		Parental rules for PA		
King, Parkinson, Adamson, Murray, Besson, Reilly, Basterfield (2010).	Cross sectional, descriptive correlational Level IV	n= 480 Caucasian 7 year olds Parents-96% female, 4% male 50.8% boys 49.2% girls SES not reported England	To identify correlates of PA and sedentary behavior among 7 year old children in England	Parent Questionnaire Parental perceived importance of active play Praise and encouragement of PA Parental modeling of PA Parental PA Parental regular use of active transport	Actigraph accelerometers	None of the parenting practices assessed were significantly associated with children's PA.
Lam & McHale (2015).	Cross sectional study,	n=201parent child dyads Caucasian	Examine the developmental patterns and parental	Proportion of father and mother youth joint involvement	Youth leisure time PA, survey	Father's involvement in PA and mothers involvement in PA was significantly

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
	descriptive correlational Level IV	7-18 year olds Parents male and female 49.5% boys 50.5% girls Median income $55,000 United States	correlates of leisure time PA in youth	in PA, engaging in PA with child, coaching or watching		associated with youth leisure time PA.
Langer, Crain, Senso, Levy, Sherwood, (2014).	Cross sectional study, descriptive correlational Level IV	n=421 parent child dyads 73.4% white 6.9% Hispanic 5-10 year olds Parents-92.9% female, 7.1% males 49.4% girls SES not reported United States	To examine relationships between parenting styles and practices and child MVPA and screen time.	Encouragement of child to perform PA Participated in sports with the child Watched the child play sports	Actigraph GT1M accelerometers	Parental support for PA was associated with child MVPA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Lloyd, Lubans, Plotnikoff, Collins, & Morgan, (2014).	Cross sectional , descriptive correlational Level IV	n=70 families 5-12 year olds Both mothers and fathers completed the scale 58.6% boys, 41.4% girls 55.7% high SES, 41.4% mid SES, 2.9% low SES Australia	Examine a range of behavioral and maternal/paternal correlates of adiposity in children.	Parenting strategies for eating and activity scale (PEAS)	Yamax 200 pedometer	Father's reinforcement of PA was negatively associated with children's steps per day ($p<.01$).
Loprinzi, Schary, Beets. Leary, & Cardinal (2013).	Correlational observational study Level IV	n=176 parents and their children 2-5 year olds 89.1% Caucasian Parents 84.6% female 46.8% boys	Examine the influence of parental influence variables on children's PA	Parental support for PA, Restrictive play rules, Monitoring PA	Physical Activity and Exercise Questionnaire for Children (PAEC-Q)	Parental physical activity, parental support, and Parental monitoring were positively associated with children's PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		SES not reported United States				
O'Connor, Chen, Baranowski, Thompson, & Baranowski (2013)	Cross sectional, descriptive correlational Level IV	n= 83 parent child dyads 43% African American, 13% white, 12% Hispanic, 6% other, 25% mixed ethnicity heritage 9-12 year olds Parent gender not specified 57.3% income ≥$20,000-$59,999. United States	Investigate the association of PA and screen related parenting practices with children's PA.	Activity- related Parenting Practices Scale Logistic support Explicit modeling	Actigraph GT3X accelerometer	Parents who reported higher PA logistic support had children with greater moderate to vigorous physical activity and counts per minute (p<.001).
O'Connor, Cerin, Hughes, Robles, Thompson, Baranowski,	Qualitative Study Level VI	n=74 Parents 100% Hispanic	Identify what parents do to encourage and discourage PA among	NA	NA	Parental engagement in child activities, modeling PA, and feeding the child well were named as

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
Lee, Nicklas, & Shewchuk (2013)		3-5 year olds Parents-92% female, 8% male 47% boys, 53% girls, 82% family income <$20,000 per year United States	Hispanic 3-5 year old children			practices that increase children's PA. Permitting TV and video game use, psychological control, physical and emotional abuse, and lack of parental engagement were identified as parenting practices that discourage PA.
O'Connor, Hilmers, Watson, Baranowski, Giardino (2011).	Pilot Randomized Control Trail Level II	n=40,Parents and their children 82.5% Hispanic,12.5% African American, 5% Caucasian 5-8 year olds Parent gender not specified 80% girls, 20% boys	Test the feasibility of the Helping Healthy Activity and Nutrition Directions obesity intervention	Activity-related Parenting Practices Scale Logistic support Role modeling	Actigraph-7064 accelerometer	The parenting practices directed intervention had no significant effect on PA outcomes.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		90% <$30,000 annual household income United States				
Ostybe, Malhotra, Stroo, Lovelady, Brouwer, Zucker, Fuemmeler (2013)	Cross sectional study, descriptive correlational Level IV	n=208, mothers and preschoolers 13% black, 87% white 2-5 year olds Parents 100% female 56% boys, 44% girls SES not reported United States	To examine the role of home PA and food environment on child health behaviors	Home physical activity environment scale Accessibility of PA Role modeling of PA Parental policies in support of PA	Actical accelerometers	Parental policies supporting PA increased MVPA time.
Remmers, Van Kann, Gubbels, Schmidt, Vries, Ettema, Kremers, & Thijs (2014).	Cross sectional study, descriptive correlational Level IV	n=1875 Caucasian 5-7 year olds	Investigate if social factors moderate the relationship between the physical environment	Child Feeding Questionnaire Perceived influence of the respondent and their partner on	Outside play questionnaire	Positive parental attitude towards PA was positively associated with more outdoor play.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		Parents 97.8% female 50% boys, 50% girls SES not reported Netherlands	and outdoor play.	the child's PA behavior Attitude, responsibility, and concern towards child PA Restriction of child screen time Pressure towards child to be active Monitoring child PA		
Rhodes, Spence, Berry, Deshpande, Faulkner, Latimer-Cheung, O'Reilly, & Tremblay (2015).	Cross sectional study, descriptive correlational Level IV	n=1253 parents and their children 5-13 year olds Parents 51.4% boys, 48.6% girls	To model parental support behaviors as mediators of mother's perceptions of children's PA	Encouragement of children's PA Logistical support of children's PA Co-activity	Survey recording children's participation in 60 minutes or more PA over the past 7 days.	Encouragement, logistic support and co-activity were positively associated with children's PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		54% household income >$75,000 Canada				
Seabra, Seabra, Mendonca, Brustad,Maia, Fonseca, & Malina (2013)	Descriptive correlational Level IV	n=683 children, 8-10 year olds Parent gender not specified 51.6% boys, 48.4% girls 24.5% low SES, 13.9% medium SES, 61.6% high SES Portugal	Examine gender differences in relationships between, biologic, demographic, and psychosocial correlates of PA and level of PA in Portugese children.	Parental influence on socialization (PSI) into PA Parental role modeling of PA Parental encouragement of PA Parental enjoyment of PA	Children's leisure time PA, Godin-Shepard questionnaire	Parental encouragement of PA was positively associated with PA in girls.
Suen, Cerin, & Wu (2015).	Qualitative Level VI	n=57 parents 3-5 year olds Parent gender not specified 52.6% boys, 54.4% girls 50.9% low-middle SES,	To identify parenting practices encouraging or discouraging PA in Hong Kong pre-schoolers	NA	NA	Transportation to PA places, payment for sports activities, Verbal encouragement and praise of PA, and engagement in PA with the child were identified as parenting practices that encourage PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		49.1% middle to high SES China				
Tandon, Grow, Couch, Glanz, Sallis, Frank, Saelens, (2014).	Cross sectional study, descriptive correlational Level IV	n=713 children 89% white, 2% black, 4% Asian, 4% other 6-11 year olds Parents-86% female, 14% male 51% boys, 49% girls 9% ≤$39,000, 31% $40,000-$89,000, 60% ≥$90,000 United States	Examine relationships between child PA and home environment factors	Parent support for PA scale Watch child participate in sports Encourage child to do sports or PA Provide child with transport to sports or PA	GT1M Actigraph accelerometer	Parental support for PA was positively associated with MVPA.
Taylor, Wilson, Slater, & Mohr (2011).	Descriptive correlational Level IV	n=175 56% female 7-11 year olds Parents- 91% female, 9% male	An investigation of associations between parent and child reported perceived parenting styles and practices	Parental activity related practices Encouragement of child PA Modeling of PA	Time Use Diary of the Longitudinal Study of Australian Children Parent reported measure	Child PA was associated with parental encouragement of PA.

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		44% girls, 56% boys SES not reported Australia	with weight related behaviors		estimating the child's PA over the past 24 hours	
Verloigne, Van Lippevelde, Maes, Brug, De Bourdeaudhuij (2013)	Longitudinal, descriptive correlational Level IV	n=727 9 year olds Parent gender not specified 48.1% boys, 51.9% girls 51.9% high SES Belgium	Examine family and school based predictors of breakfast and soft drink consumption, and PA and moderating effects of gender and SES	Sociocultural related PA (physical activity with the child) Modeling Logistic Support PA encouragement PA benefits	Flemish physical activity questionnaire	Positive parental attitude towards PA, parental encouragement of PA at age 10 years resulted in more PA at 16 years
Wright, Wilson, Griffin, Evans (2008)	Qualitative study Level VI	n=52 85% AA, 8% Caucasian, 1% Hispanic, 5% other	To assess how parental role modeling and social support influence PA in minority and	NA	NA	Parental role modeling of PA and parental emotional and tangible support of PA influence adolescent PA levels

Author, Year	Design Level of Evidence	Sample	Purpose	Parenting Practices Variables	Children's Physical Activity Variables	Significant Results
		10-14 year olds Parents not included in study 42.3% boys, 57.7% girls Low income SES United States	low income adolescents			
Zhao, Gao, & Settles (2013).	Cross sectional study, descriptive correlational Level IV	n=3175 66.7% Caucasian, 17.2% African American, 7.2% Hispanic, 8.9% other 2-17 year olds 49.8% boys, 50.2% girls Medium SES	Examine impact of parental perception of children's weight and parental support on children's PA.	Parental support for PA	Parent report	Parental support was positively associated with children's PA.

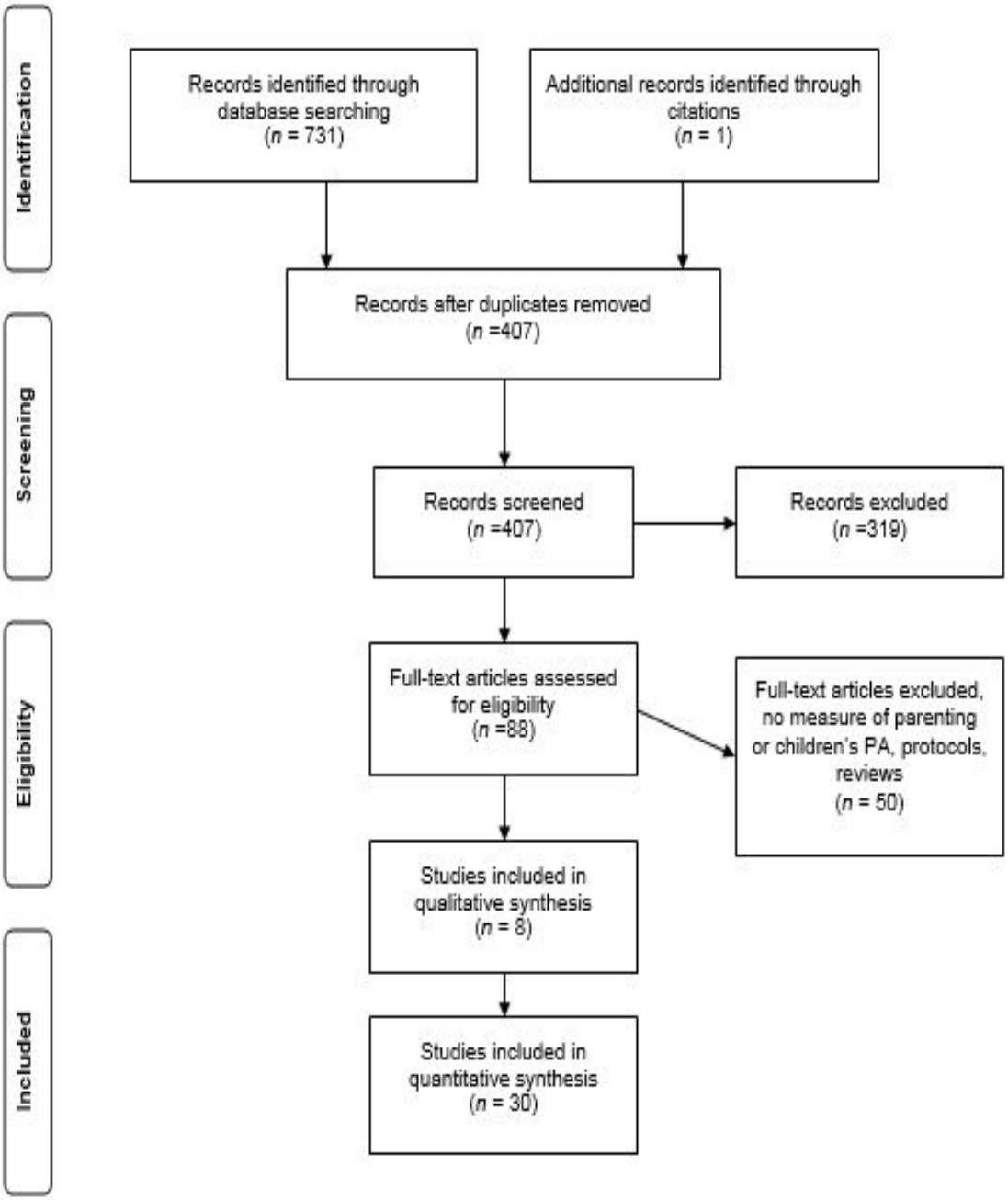

Figure 1. Flow diagram of study selection.

Chapter Three

Parental Perception of School Safety and Gender Influences on Children's Physical Activity in Mexico: A Cross Sectional Study

Approximately 3.2 million people die worldwide each year from a lack of physical activity (World Health Organization, 2017). Physical inactivity in children is a challenging issue in Mexico as data on physical activity (PA) levels of all children in Mexico are sparse. The 2014 Mexican Report Card on Physical Activity for Mexican Children and Youth recently reported improvements in children's PA with physical inactivity in children (aged 10-18 years) declining from 40.4 % to 11.9% (Tremblay, et al., 2014). More knowledge is needed concerning younger children. The same survey found that 58.6% of children aged 10-14 had not been active in any organized sports activities in the past year. Additional data are needed to evaluate children's levels of active play in the Mexican population (Martinez, Galaviz, Ulloa, Gonzalez-Casanova, & Taylor, 2014).

Neighborhoods perceived as unsafe impact physical activity levels of residents residing in these areas. Lower neighborhood safety was significantly associated with less PA in children (Molnar, Gortmaker, Bull, & Buka, 2004). Perception of safety is of particular importance in Mexico given the high rate of crime (Schurman, Schlehr, & Brunette, 2015). Interpersonal violence is the fourth leading cause of death in Mexico (World Health Organization, 2015). Parental perception of safety has been linked to children's physical activity levels, but further research is necessary to investigate the nature of that relationship particularly in Mexico and in specific settings, like schools, which most children visit five days a week. School facilities serve as an outlet for community physical activity. Opening after hours supervised schoolyards to inner city children may increase PA by as much as 84% (Farley, Meriwether, Baker, Watkins, Johnson, & Webber, 2007). Youth who walk to school are leaner and have more minutes of moderate to vigorous physical activity (Mendoza, Watson, Nguyen, Cerin, Baranowski, & Nicklas, 2011). Conflicting evidence exists regarding the impact of parental perception of safety on children's PA levels, and very little evidence exists examining this topic in Mexico. Parental perception of street safety was identified as a barrier to preschool Mexican children's PA (Rodríguez-Oliveros, Haines, Ortega-Altamirano, Power, Taveras, González-Unzaga, & Reyes-Morales, 2011).

Previous research has found that parental perceptions of safety from crime correlated positively with children's activity in public recreation facilities (Tappe, Glanz, Sallis, J, Zhou, & Saelens, 2013).

Some studies have not found a significant relationship between parental perception of neighborhood safety and children's physical activity levels (Carson, Kuhle, Spence, & Veugelers, 2010). In a study of adults in Cuernavaca, Mexico, neighborhood safety perception was not associated with PA despite high crime rates (Salvo, Reis, Stein, Rivera, Martorell, & Pratt, 2014). More research is needed to examine the impact of perception of safety on children's physical activity levels.

Gender plays a role in children's levels of PA. Jauregui (Jáuregui, Villalpando, Rangel-Baltazar, Lara-Zamudio, & Castillo-García, 2012) found that Mexican boys participated an average of 143 minutes per day in MVPA while Mexican girls participated in an average of 98 minutes per day. Girls living in neighborhoods that are perceived as unsafe have been found to have higher levels of overweight and obesity (Jennings-Aburto, Nava, Bonvecchio, Safdie, González-Casanova, Gust, & Rivera, 2009). Carver and colleagues found that parental restriction of children's active transport and physical activity due to safety concerns resulted in lower levels of MVPA and active transport in adolescent girls (Carver, Timperio, Hesketh, & Crawford, 2010). Further investigation is necessary to determine whether these relationships are related to parental restriction of PA based on gender.

It is important to understand the nature of parental perception of school safety and child gender in Mexico on physical activity so that evidence-based interventions may be developed to promote physical activity in this country. The primary objective of this cross sectional study was to investigate the association of parent's perception of school safety and gender on children's physical activity levels. Additionally the authors aimed to determine if gender moderated the relationship between parental perception of school safety and children's physical activity levels.

Methods

Participants

This study focused on school aged Mexican children because of their high risk for physical inactivity and under representation in research. Data were collected on site in 20 schools in Mexico City, 12 schools in Guadalajara, and 8 schools in Puerto Vallarta. The State of Jalisco Secretaría de Educación provided a referral of public schools or schools that were chosen by having participated in another study (Gharib, Galaviz, Lee, Safdie, Tolentino, Barquera, & Levesque, 2015). Schools were located using the Directorio de Escuelas en México (Secretaria de Educacion Publica, 2015).

Parents of school aged Mexican children in grades 3-5 residing in Guadalajara, Puerto Vallarta, and Mexico City completed paper and pencil surveys**.** Parental consent was obtained, and children provided assent. Approval for this study was obtained from the University of Houston Committee for the Protection of Human Subjects as well as the ethics institutional review boards of Queen's University, the Instituto Nacional de Salud Publica, and the Universidad de Guadalajara. Paper and pencil surveys were sent home with children for parents to complete, and the children returned the completed surveys to the school. See table 1 for descriptive statistics. The survey included data on 817 boys and 924 girls.

Measures

Analysis was based on questions drawn from the SPAN instrument, a parent survey that measured physical activity and demographic variables (Thiagarajah, Fly, Hoelscher, Bai, Lo, Leone, & Shertzer, 2008). Similar instruments have been tested and validated (Sallis, et. al, 1996). Independent variables included child age, child gender, child grade level, number of people residing in the household, city of residence, and parental perception of child safety at school. Parental perception of safety at school was used to measure safety because of the likelihood that children attended school near their home. In Mexico, 66.4% of 10-14 year olds walk to school (Tremblay, et al., 2014). Perception of safety at school serves as a proxy measure of neighborhood safety. Parents responded to the question "How safe does your child feel at school?" with "not safe", "a little safe", "somewhat safe", "mostly safe" and "very safe".

Three measures of physical activity were used for the dependent variables. Parents completed three questions on a self-reported questionnaire, which were scored according to established protocols (Lee, et. al, 2016). The first indicator of PA asked parents how many days of the week the child played outside for 30 minutes or more. The number of days was summed for each respondent and recorded as a continuous variable. The second question asked how many sports teams the child had played on during the past 12 months. Responses included 0, 1, 2 or 3 or more sports teams**.** This variable was recoded as a binary variable. If the child had participated in one or more sports teams, it was coded as a yes, and as a no if the child had participated in 0 sports teams. The last question asked if the child currently participated in other organized physical activities or lessons in things like martial arts, dance, gymnastics, soccer, baseball, or tennis. Responses for this question were "yes" or "no".

Analysis

Means and standard deviations were calculated for descriptive characteristics including the age of the children, grade of the children, and number of people residing in the household, and parental perception of safety at school. T tests, chi square and one way analyses of variance (ANOVA) with a Bonferoni correction were used to investigate descriptive associations among variables. Hierarchical linear and logistic regression analyses were conducted to test whether gender moderated the relationship between parental perception of child safety at school and the three PA outcomes. A p value threshold of <0.05 was used for a statistical tests. For all models, the control variables child age, child grade level, number of people living in the household, and city, were entered at step one. The independent variable gender was entered at step two. Parental perception of safety at school was entered at step three, and the interaction term between gender and parental perception of safety at school was entered at step four. To aid in interpretation of multivariate models, parental perception of safety at school was centered. A major aim of the study was to examine gender influences on measures of PA, for this reason cases with missing gender data (n=255) were dropped from the regression analysis. Cases without gender specified were compared to cases with gender specified for differences on the three indicators of PA. IBM SPSS statistics version 20 was used to run all statistical analyses.

Results

Descriptive characteristics. Parents of school aged Mexican children (*M*=9.63 years, *SD*=1.052) in grades 3-5 residing in Guadalajara (*n*=904), Puerto Vallarta (*n*=225), and Mexico City (*n*=867) completed paper and pencil surveys**.** The average number of people living in the household was five (*M*=5.09, *SD*=1.974). Parents reported perception of safety at school included 2.4% as "not safe" (*n*=41), 10.3% as "a little safe" (*n*=173), 12.4% as "somewhat safe" (*n*=202), 22.8% as "mostly safe"(*n*=382), and 52% as "very safe"(*n*=871).

Eighty-two percent of respondents (*n*=1,591) reported that their child played for 30 minutes or more outside for one or more days of the week. Data indicated that 45.5% (*n*=704) of the respondents' children participated in sports teams. Thirty-nine percent (*n*=645) of respondents reported that their children participated in other organized PA such as dance lessons, martial arts, soccer, or gymnastics. See Table 2 for frequencies.

Bivariable Analysis. Participation in outdoor play (girls *M*=2.28, *SD*=2.00 vs boys *M*=2.70, *SD*=2.21); *t*(1,727)=-4.15, *p*<.001), sports teams (girls *M*=1.53, *SD*=.80 vs. boys *M*=1.82, *SD*=.93; *t*(1,547)=-6.64, *p*<.001) and other organized physical activities (boys, yes=345, no=426; girls, yes=300, no=583; X^2 (1, *N*=1,654) =20.08, *p*=<.001) differed significantly by gender.

Anova was used to examine differences in outdoor play between cities. Participation in outside play was significantly greater for residents of Guadalajara (*M*=2.79, *SD*=2.3) than residents of Puerto Vallarta (*M*=2.54, *SD*=2.3) and Mexico City (*M*=2.11, *SD*=1.73; *F*(2, 1726) = 19.81, *p*<.001). Participation in sports teams was significantly higher for residents of Guadalajara (*M*=1.83, *SD*=.98) than residents of Puerto Vallarta (*M*=1.42, *SD*=.67) and Mexico City (*M*=1.56, *SD*=.77; *F* (2, 1,546) =23.81, *p*<.001). Residents of Mexico City reported higher average perceptions of safety at school (*M*=4.2, *SD*=1.04) than residents of Puerto Vallarta (*M*=4.18, *SD*=1.02) and Guadalajara (*M*=4.03, *SD*=1.22; *F*(2, 1,673) = 4.75, *p*<.01).

Cases with missing gender data were examined for differences in the three indicators of PA. A one way ANOVA showed significant differences in outside play between children in which gender was not specified and in children for which gender was specified (*F*=9.7, *df*=2, *p*<.001). Post hoc analysis using the Bonferroni criterion revealed a significant difference between children

with gender not specified (*M*=2.8, *SD*=2.2) and girls (*M*=2.3, *SD*=2) p<.05 on the indicator of outdoor play. This relationship was not significant for boys (*p*=1.0). Results of a chi² analysis showed significant association between gender (boys, girls, gender unspecified) and participation in sports, X^2(2, N=1,642) =44.6, *p*<.001. A chi² test was performed and a significant relationship was found between gender (boys, girls, gender unspecified) and participation in other organized physical activities X^2(2, *N*=1, 764) =21.8, *p*<.001.

Regression models. Hierarchical linear regression analyses were conducted to assess the association of gender and parental perception of safety at school with the children's PA measure of outdoor play. The results displayed in table 3 show that gender significantly contributed to outdoor play (*t*=-3.78, *p*<0.001). Boys were more likely to participate in outdoor play than girls. In this model**,** residency in Guadalajara (*t*=6.28, *p*=<0.001) and residency in Puerto Vallarta (*t*=3.21, *p*=0.001) explained a significant proportion of the variance in outdoor play when compared to Mexico City. Children residing in Guadalajara were more likely than children residing in Puerto Vallarta and Mexico City to participate in outdoor play**.** Child gender did not moderate the relationship between parental perception of safety at school and PA as the interaction term, gender x parental perception of safety, was not significant (*t*=-1.63, *p*=.104). The model accounted for 3.8% of the variance in outdoor play.

Hierarchical logistic regression results revealed residency in Guadalajara (*Wald* (1) =11.7, *p*<.01), child age (*Wald* (1)=14.6, *p*<.001) and child gender (*Wald* (1), =39.8, *p*<.001) as significant in participation in sports teams. Older children were more likely to participate in sports than younger children. Residents of Guadalajara were more likely than residents of Puerto Vallarta and Mexico City to participate in sports teams. Girls were less likely than boys to participate in sports teams. The results of the logistic regression are presented in table 4.

Logistic regression results revealed two factors as significant variables in participation in other organized physical activities. Results of this regression are presented in table 5. These factors were residency in Guadalajara (*Wald (*1) =7.91, p=0.008, Puerto Vallarta (*Wald* (1) =4.07, *p*=0.044), and gender (*Wald* (1) =7.09, *p*<.001). These results indicated that boys were more likely to participate in other organized physical activities such as martial arts, dance, gymnastics

or soccer lessons. Residents of Guadalajara were more likely to participate in other organized physical activities compared to residents of Puerto Vallarta and Mexico City. The overall model was significant (chi^2 (8) =40.78, p<.001). The logistic regression did not support gender as a significant moderator of parental perception of safety at school and child participation in other organized physical activities (*Wald* (1) =1.63, p=0.201).

Discussion

The study sought to examine the relationship between parental perception of safety at school and child gender on physical activity. An additional aim was to determine if child gender moderated the relationship between parental perception of safety at school and child PA. While the hypotheses that parental perception of safety would influence children's physical activity levels was not supported, it was found that girls participated less than boys in all three measures of PA.

The results indicated that girls were less likely to participate in outside play than boys. Most of the data collected in Mexico on children's physical activity demonstrates that boys are more active than girls (Tremblay, et al., 2014). This finding is of particular importance because it contributes to the small existing body of data concerning the influence of gender on PA levels among children in Mexico. Additional studies examining gender differences and the underlying causes for those variations in outdoor play would provide a valuable contribution to the science particularly in this population.

Our hypotheses that parental perceptions of safety at school would influence children's physical activity levels in Mexico was not supported. The findings of the current study do not negate parental perception of safety as relevant in examining physical activity in children, as previous research has found that parental perceptions of safety were significantly associated with increased likelihood of youth achieving appropriate levels of physical activity (Bacha, Appugliese, Coleman, Kaciroti, Bradley, Corwyn, & Lumeng, 2010). Although the statistical analysis did not indicate that gender moderated the relationship between parental perception of safety at school and PA measures, previous studies have found that parent's perceived risk of their children being harmed significantly mediated the relationship between perceived safety and avoidance of

physical activity among girls only (Carver, Timperio, & Crawford, 2008). This conflicting evidence supports the need for further research examining parental perception of safety on children's PA levels, and it should consider issues specific to the Mexican population.

Our finding that girls were less likely than boys to participate in sports teams and other organized physical activity is consistent with one longitudinal study that also found boys were more likely than girls to participate in organized sports (Vella, Cliff, & Okely, 2014). While it is unclear why this gender gap exists in Mexico, research in the United States has indicated issues with less access to participation in sports for girls and a continued presence of social stigma against girls in sports (Women in Sports Foundation, 2014). Future research should explore reasons for the gender gap in sports participation and organized physical activity in Mexico.

Sports participation among children in Mexico itself is limited with a reported 59% of Mexican children not participating in organized sports in the past 12 months (Gutierrez, Rivera-Dommarco, Shamah-Levy, Villaoando-Hernandez, Franco, & Cuevas-Nasu, 2012). This was supported by the finding in the current study that 54.6% of children did not participate in sports teams. While there are many possible reasons for this, the structure of the schools operating in shifts has been suggested as a reason for the low numbers with the rationale that this school structure makes extracurricular PA not possible (Oria, & Sawyer, 2007). The Mexican Report Card on Physical Activity for Mexican children and youth has identified creating larger numbers of extracurricular programs, building public spaces apt for safe sports, and encouraging participation in organized sports as recommendations for action (Tremblay, et al., 2014). Additional research examining the cause for the lack of participation in organized sports is necessary.

Although it was not an aim of the study, variations in children's physical activity among cities were discovered. When compared to Guadalajara and Puerto Vallarta, Mexico City had lower measures outside play, however perception of safety at school was reported as higher in Mexico City. Guadalajara reported the highest levels of all three measures of physical activity. Future studies should examine environmental influences on physical activity in these areas to determine potential causes for variations, if any exist. Both Mexico City and Guadalajara participate in Ciclovia, an effort to reclaim public spaces for physical activity (Ciclovias

Recreativas de las Americas, 2012). It is important to note when considering perception of safety, that the Mexican government makes great efforts to protect visitors to tourist destinations in Mexico, and since Puerto Vallarta is widely considered a vacation destination for foreigners, this area may exhibit lower crime levels when compared to Mexico City and Guadalajara (U.S. Department of State Bureau of Consular Affairs, 2014).

Strengths of this study include a large sample size across multiple cities in Mexico. A limitation of the study was the measure of safety. Parental perception of safety was a question on the survey about safety at school. Perhaps if the question had examined another indicator of safety, perception of safety would have been a significant variable in more of the physical activity measures. An additional limitation of the study is the subjective measurement of physical activity with a questionnaire. PA levels could have been more objectively measured with accelerometers; however, they were beyond the scope of the resources available for this study.

Conclusion

These results are consistent with those of others suggesting that gender gaps exist in physical activity in Mexican children. We have established that gender is a significant contributor to children's PA levels, but it is important to understand the nature of that relationship so that interventions may be designed accordingly. Further research investigating the elements of safety and gender is necessary to increase physical activity levels in the understudied Mexican population.

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Table 1

Sample Descriptive Statistics

Variable	Guadalajara M (SD)	Puerto Vallarta M (SD)	Mexico City M (SD)
Age	*9.65 (1.09)*	9.66 (1.11)	9.59 (.99)
Number of people in household	*5.33 (2.12)*	4.62 (1.42)	4.95 (1.91)
Days per week of outside play	2.79 (2.31)	2.54 (2.33)	2.12 (1.73)
Sports team participation	*1.83 (.98)*	1.43 (.67)	1.56 (.77)
Parental perception of safety at school	*4.03 (1.22)*	4.18 (1.02)	4.2 (1.04)

Note. The SPAN instrument was used to collect all data. All data was reported by the parent. Days per week of outside play=number of days that the child played outside for greater than 30 minutes. Responses were summed. Sports team participation 0=did not participate in sports, 1=participated in one or more sports teams. Parental perception of safety at school 1="not safe", 2="a little safe", 3="somewhat safe", 4="mostly safe" and 5="very safe".

Table 2

Child and Family Characteristics as a Percentage of the Sample

Variable	Boys (n)	%	Girls (n)	%
Child gender	817		924	
Child grade level				
3rd grade	230	28.2	251	27.2
4th grade	275	33.7	332	35.9
5th grade	279	34.1	300	32.5
Resident of Guadalajara	402	49.2	402	43.5
Resident of Puerto Vallarta	86	10.5	121	13.1
Resident of Mexico City	329	40.3	401	*43.4*
Participation in sports teams				
0 teams	336	45.8	509	62.5
1 team	251	34.2	215	26.4
2 teams	88	12	56	6.9
3 or more teams	59	8	35	4.3
Participation in other organized PA				
Yes	345	44.7	300	34
No	426	55.3	583	66
Perception of safety at school				
Not safe	32	4.1	9	1
A little safe	96	12.2	77	8.6
Somewhat safe	104	13.3	104	11.7
Mostly safe	176	22.4	206	23.1
Very safe	376	48	495	55.5

Table 3

Regression of Outside Play on Child Age, Child Grade Level, Number of People Residing in the Household, City of Residence, Gender, Parental Perception of Safety, and Interaction of Gender and Perception of Safety.

Model	B	SE	β	*p* value
Step 1				
Grade	0.032	0.050	0.017	0.524
Child Age	0.036	0.053	0.018	0.496
Number of people living in residence	-0.019	0.027	-0.018	0.474
Residency in Guadalajara	0.707	0.112	0.167	<0.001***
Residency in Puerto Vallarta	0.548	0.174	0.083	0.002**
Step 2				
Grade	0.033	0.050	0.018	0.509
Child Age	0.035	0.053	0.018	0.503
Number of people living in residence	-0.020	0.026	-0.018	0.459
Residency in Guadalajara	0.689	0.112	0.163	<0.001***
Residency in Puerto Vallarta	0.556	0.173	0.084	0.001
Gender	-0.375	0.104	-0.089	<0.001***
Step 3				
Grade	0.034	0.050	0.018	0.498
Child Age	0.032	0.053	0.016	0.546
Number of people living in residence	-0.020	0.026	-0.019	0.447
Residency in Guadalajara	0.700	0.112	0.166	<0.001***
Residency in Puerto Vallarta	0.558	0.173	0.085	0.001**
Gender	-0.391	0.104	-0.093	<0.001***
Perception of Safety at School	0.073	0.046	0.039	0.118
Step 4				
Gender	-0.394	0.104	-0.093	<0.001***
Perception of safety at school	0.141	0.063	0.075	0.024*
Gender X Safety	-0.151	0.093	-0.054	0.104

Note. The SPAN instrument was used to collect all data. *p < .05, **p<.01, ***p<.001

Table 4

Regression of Participation in Sports on Child Age, Child Grade Level, Number of People Residing in the Household, City of Residence, Gender, Parental Perception of Safety, and Interaction of Gender and Perception of Safety.

Model	Odds ratio	95 % CI	*P*
Model 1			
Grade	1.002	0.907 to 1.107	0.974
Child age	1.234	1.109 to 1.373	<0.001***
Number of people living in residence	0.984	0.933 to 1.037	0.541
Residency in Guadalajara	1.502	1.204 to 1.872	<0.001***
Residency in Puerto Vallarta	0.701	0.480 to 1.022	0.065
Model 2			
Grade	1.002	0.906 to 1.109	0.964
Child age	1.238	1.111 to 1.380	<0.001***
Number of people living in residence	0.984	0.932 to 1.038	0.545
Residency in Guadalajara	1.469	1.174 to 1.837	<0.001***
Residency in Puerto Vallarta	0.683	0.466 to 1.002	0.051
Gender	0.513	0.415 to 0.633	<0.001***
Model 3			
Grade	1.003	0.907 to 1.110	0.948
Child age	1.236	1.109 to 1.377	<0.001***
Number of people living in residence	0.983	0.932 to 1.037	0.538
Residency in Guadalajara	1.479	1.181 to 1.852	0.001**
Residency in Puerto Vallarta	0.683	0.466 to 1.002	0.051
Gender	0.508	0.411 to 0.628	<0.001***
Perception of safety	1.044	0.949 to 1.148	0.375
Model 4			
Grade	1.003	0.907 to 1.110	0.947
Child age	1.236	1.109 to 1.378	<0.001***

Number of people living in residence	0.983	0.932 to 1.037	0.537
Residency in Guadalajara	1.479	1.181 to 1.852	0.001***
Residency in Puerto Vallarta	0.683	0.466 to 1.002	0.051
Gender	0.508	0.411 to 0.628	<0.001***
Perception of safety	1.036	0.913 to 1.175	0.583
Gender X Safety	1.017	0.841 to 1.231	0.860

Note. The SPAN instrument was used to collect all data. *$p < .05$, **$p<.01$, ***$p<.001$

Table 5

Regression of Participation in Other Organized Physical Activity on Child Age, Child Grade Level, Number of People Residing in the Household, City of Residence, Gender, Parental Perception of Safety, and Interaction of Gender and Perception of Safety

Model	Odds ratio	95 % CI	*P*
Model 1			
Grade	0.966	0.876 to 1.065	0.487
Child age	1.063	.0958 to 1.180	0.252
Number of people living in residence	0.961	0.912 to 1.013	0.141
Residency in Guadalajara	1.362	1.094 to 1.695	0.006**
Residency in Puerto Vallarta	0.685	0.475 to 0.988	0.043*
Model 2			
Grade	0.966	0.875 to 1.066	0.491
Child age	1.063	0.957 to 1.181	0.254
Number of people living in residence	0.960	0.910 to 1.012	0.131
Residency in Guadalajara	1.341	1.075 to 1.671	0.009**
Residency in Puerto Vallarta	0.686	0.474 to 0.991	0.045*
Gender	0.636	0.518 to 0.781	<0.001***
Model 3			
Grade	0.966	0.876 to 1.067	0.497
Child age	1.061	0.955 to 1.179	0.267
Number of people living in residence	0.960	0.910 to 1.012	0.128
Residency in Guadalajara	1.349	1.081 to 1.682	0.008**
Residency in Puerto Vallarta	0.686	0.474 to 0.992	0.045*
Gender	0.630	0.512 to 0.774	<0.001***
Perception of safety	1.040	0.948 to 1.140	0.408
Model 4			
Grade	0.966	0.875 to 1.066	0.492
Child age	1.061	0.955 to 1.179	0.271
Number of people living in residence	0.959	0.910 to 1.012	0.126
Residency in Guadalajara	1.350	1.083 to 1.685	0.008**

Residency in Puerto Vallarta	0.684	0.473 to 0.989	0.044*
Gender	0.630	0.512 to 0.774	<0.001***
Perception of safety	1.095	0.969 to 1.238	0.145
Gender X Safety	0.886	0.737 to 1.066	0.201

Note. The SPAN instrument was used to collect all data. *p < .05, **p<.01, ***p<.001

Chapter Four

Parenting Practices, Physical Activity Resources, and Hispanic Children's Physical Activity

Hispanics are expected to comprise 31% of the US population by the year 2060 (United States Census Bureau, 2013). From 1990-2014, the Hispanic growth rate in the United States ranged from 2 to 4.8%, and they now represent 57.5 million people in the United States (Krogstad & Lopez, 2015). Hispanics are more likely to die from diabetes, stroke, and liver disease than non-Hispanic whites (CDC). Physical activity (PA) helps maintain a healthy body weight, reduce risk of cardiovascular disease, and diabetes (CDC, 2014). Fakhouri and colleagues (2013) found that Hispanic children were less likely to meet physical activity recommendations than non-Hispanic whites (Fakhouri, Hughes, Brody, Kit, & Ogden, 2013). Hispanic preschoolers spend nearly 70% of the day in sedentary activity (Ruiz, Gesell, Buchowski, Lambert, & Barkin, 2011). It is important to develop an understanding of factors that influence physical activity to achieve health equity and eliminate disparities in this rapidly growing population.

Theoretical and empirical works have explored factors contributing to physical activity in children. This study is guided by the Family Ecological Model (FEM) and the Ecological Model of Physical Activity. The Family Ecological Model (FEM) highlights knowledge, modeling, accessibility, and shaping as parenting aspects that contribute to children's physical activity behaviors (Davison & Campbell, 2005). The Ecological Model of Physical Activity (EMPA) outlines the importance of the physical ecology, biological factors, and psychological factors in PA (Spence & Lee, 2003).

Parents can have both positive and negative influences on children's health habits. Physical activity parenting practices have been linked to children's PA (Sleddens, Kremmers, Hughes, Cross, Thijs, DeVries, & O'Connor, 2012). One systemic review found that parents influence children's PA through active modeling and providing transport to activities involving PA (Edwardson & Gorely, 2010). In preschool aged children, parental logistic support for PA was positively associated with children's PA (Vaughn, Hales, & Ward, 2013). Parental sedentary behavior has been positively associated with their children's' sedentary behavior (Barkin, Lamichhane, Banda et al. 2017). Few studies have investigated the influence of Hispanic

parenting practices on children's PA. Gaining an understanding of potential links between parenting practices and children's PA could contribute to the development of interventions to address PA disparities in this population.

Studies on the built environment have shown that physical activity resources are important in promoting PA (Epstein, Raja, Gold, Paluch, Pak, & Roenmich, 2006). People living in close proximity to recreational facilities have been shown to have higher levels of physical activity than those living further away from them (Roux, Evenson, McGinn, Brown, Moore, Brines, & Jacob, 2007). The same is true for children living in close proximity to recreational facilities (Floyd, Boccaro, Smith, Baran, Moore, Coscso et al., 2011). While the relationship between the presence of recreational facilities and physical activity has been well documented, more studies aimed at exploring potential relationships between the quality of physical activity resources (PARs) and PA are needed. Edwards and colleagues (2015) found that attractiveness of open spaces was associated with higher levels of use (Edwards, Hooper, Knuiman, Foster, & Giles-Corti, 2015). Attributes of park use such as basketball courts and playgrounds have been associated with higher levels of physical activity among youth (Floyd, Boccaro, Smith, Baran, Moore, Coscso et al., 2011). It is crucial to identify which PARS are available within communities and to identify specifically what factors influence their use.

It is imperative to explore the circumstances under which parents adopt PA parenting practices. While the built environment and parenting have been associated with children's PA, little research exists investigating the potential relationships between PARs and PA parenting practices. An exploration of the possible relationship between PARs and PA parenting practices is supported by the FEM and EMPA which propose that physical activity behaviors are influenced by individual factors as well as environmental factors (Davison & Campbell, 2005; Spence and Lee, 2003).

PA parenting may be more critical for children in low socioeconomic status families who experience neighborhood conditions less favorable for independent play (Wilson, Lawman, Segal, & Chappell, 2011). Low socioeconomic status youth engage in less PA (Hansen & Chen, 2007). In a study of low income families, Lampard and colleagues (2013) found positive associations

between parents who feel empowered to access PARs and parenting practices that facilitate PA in children (Lampard, Jurkowski, Lawson, & Davison, 2013). Low and medium socioeconomic status (SES) neighborhoods have significantly fewer physical activity resources than high SES neighborhoods (Estabrooks, Lee, & Gyurcsik, 2003).

Parents have also identified safety as the most important factor determining park use (Sallis, McKenzie, Elder, Broyles, & Nader, 1997). One study of low income preschoolers found associations between traffic safety problems and children's PA (Lovaski, Jacobson, Quinn, Neckerman, Ashby-Thompson, & Rundle, 2011). It is imperative to identify what environmental factors may influence physical activity parenting practices. To the knowledge of the authors, no previous study has been conducted to examine the potential relationships between objective characteristics of PARs and PA parenting practices.

Purpose

First, the authors wish to explore the potential relationships between physical activity resources on Hispanic physical activity parenting practices. It is hypothesized that higher quality physical activity resources will be associated with PA parenting practice that promote PA in children. Second, this study will investigate possible relationships between the presence and quality of physical activity resources and Hispanic children's PA. The authors hypothesize that higher quality PARs will be associated with higher levels of PA in children. Last, the study examines whether parenting practices have relationships with children's PA.

Theory

This study was guided by the Family Ecological Model (FEM) and the Ecological Model of Physical Activity (EMPA). These models propose that human behavior is influenced by the context in which the person resides including community characteristics and parenting PA behaviors (Davison & Campbell, 2005; Spence & Lee, 2003). FEM emphasizes the importance of family in PA health behaviors. FEM posits that parenting is a primary influence in children's PA behavior through modeling and support of PA (Davison & Campbell). The EMPA highlights environmental influences on PA (Spence & Lee, 2003). The macro level environment includes the community in which the person resides and its potential impact on the persons PA. The model

also includes the micro-level environment or proximal setting in which people reside. The presence and quality of PARs would be at the macro level and physical activity parenting practices would fall within the micro-level.

Methods

Participants

Children (*n*=23) aged 3-5 and their parents (*n*=23) were recruited from early care education centers in Phoenix, Arizona. Inclusion criteria for participants was (a) residing in the Phoenix, Arizona area, (b) ability to speak and read Spanish or English, and (c) parent of pre-school age children aged 3-5 years old. Participants were able to read and write in Spanish or English. Informed consent was obtained from the parents. This study was approved by the Arizona State University Institutional Review Board.

Materials and Procedures

R statistical software was utilized to determine the number of participants and neighborhoods to be sampled. The analyses showed a sample of 10 neighborhoods with 12 parent-child pairs each (i.e., 120 total parent-child pairs) should afford adequate power. At the time of analysis, complete data sets for n=23 participants were available.

Parents completed a self-report survey of demographic characteristics including ethnicity, parental education level, marital status, and relationship to the child. The 3 main measures explored in this study were physical activity parenting practices, quality of physical activity resources, and children's objectively measured PA. The Preschooler Physical Activity Parenting Practices instrument (PPAPP), the Physical Activity Resource Assessment tool (PARA), and accelerometers were used to measure these variables.

Physical activity parenting was assessed using the Preschool aged Physical Activity Parenting Practices Instrument (PPAPP). The PPAP Instrument measures what parents do to encourage and discourage children's PA (O'Connor, Cerin, Hughes et al., 2014). This tool was developed specifically for use within the Hispanic population. The tool assesses PA parenting practices thought to promote PA including (a) engaging in PA with the child, (b) engaging in PA in front of the child, (c) going on walks with the child, (d) taking the child to the park, and (e)

suggesting that the child play outside. The tool also assesses PA parenting practices thought to discourage children's PA including (a) watching television with the child, (b) allowing the child to play video games, and (c) keeping the child occupied with screen time activities. Test-retest reliability for the PPAPP ranged from 0.56-0.85 (O'Connor, Cerin, Hughes et al, 2014). The instrument was used to calculate scores for parental promotion of physical activity, parental promotion of screen time, discouragement of physical activity score, and concern for safety score.

To assess quality of physical activity resources, the Physical Activity Resource Assessment tool (PARA) instrument was used. The PARA provides an objective assessment of PARs. It assesses the type, features, amenities, and quality of PARs such as parks, churches, schools, sports facilities, fitness centers, community centers, and trails (Lee et al., 2005). Features and amenities of PARs were audited and rated as 0=not present, 1=poor, 2=mediocre, 3=good (Lee, Mama, Adamus-Leach, & Soltero, 2015). Incivilities were also rated. Each ECEC neighborhood was assigned a Quality of Physical Activity Resources (QPAR) index score equaling the sum of the features and amenities ratings, minus the incivilities ratings. Reliability of the PARA has been calculated at *r*s>.77.

To objectively assess children's physical activity, children wore wGT3X-BT accelerometers on their right hip with an elastic belt for 7 days. Accelerometers are a reliable method for PA measurement, *r*=.83 (Eston. Rowlands, & Ingledew, 1998). Parents were instructed to remove the accelerometers at night and while children were bathing or swimming to avoid getting them wet. Parents completed a monitor wear log for their child and received prompting via text messages or telephone calls. Sleep and wake times were determined with visual inspection of data tracing and comparison to the recording logs. Ten second epochs were used. Young children perform PA in short bouts requiring accelerometry measurements to be collected in short increments or cut points (Butte et al., 2014). Accelerometers measured light, moderate, and vigorous PA as well as time spent in MVPA all in minutes per day.

Demographic questions assessed included age and gender of the caregiver and child, parent educational attainment, marital status, and relationship to child. These were included as they are components of the FEM. These are factors thought to shape physical activity parenting

practices (Davison & Campbell, 2005). The family environment has a critical influence on children's health behaviors. Factors including media access, parenting practices, and family habits are important influences on children's physical activity behaviors (Jago, Davison, Thompson, Page, Brockman,& Fox, 2011). The home environment may contribute to differences in children's PA (Tandon, Zhou, Sallis, Cain, Frank, & Saelens, 2012). It is essential to examine the possible relationship of these characteristics to children's PA.

Descriptive statistics were calculated for sample. Data were analyzed using T-tests for categorical and continuous variables. Correlations were used for continuous variables. Data were missing for n=5 participants to complete the parental promotion of PA subscale calculations. The significance level was set at $p<.005$.

Results

Descriptive Statistics. Parents mean age was 30.38 (*SD*=8.817). Mean child age was 4 (*SD*=0.6172). Fifteen of the 23 (65.2%) respondents preferred to speak English and 8 (34.8%) preferred to speak Spanish. The majority of the children in the study were of Hispanic origin *n*=19 (82%) were of Hispanic origin. Characteristics of participants are reported in Table 1.

Bivariable Analysis. Variables were examined for potential relationships. Child age was negatively correlated with sedentary time $r(21)=-.470$, $p=.027$. An independent samples T-test was ran to determine potential differences in means between gender and parental discouragement of PA. On average, parents discouraged girls PA (*M*=35.5, *SE*=1.53) than boys (*M*=30, *SE*=1.8). This difference neared statistical significance $t(20)=-2.06$, $p=.053$. A one way ANOVA was used to evaluate potential relationships between parent education levels and children's sedentary time. Analysis reflected no other statistically significant bivariable relationships.

Physical activity was assessed in 23 children with a mean age of 4 years old (*SD*=.617). Means and standard deviations for sedentary, light, moderate, vigorous, and moderate to vigorous physical activity can be found in table 2. The majority of children in the sample n=17 obtained the recommended daily levels of PA for children. N=10 early care education centers

were assessed using the Physical Activity Resources Assessment (PARA) instrument. Quality of Physical Activity Ratings (QPAR) scores were recorded for each facility. The minimum facility QPAR score was 3 and the max was 41. The quality of physical activity resources score was grouped into low, medium, and high rankings. The QPAR score of 41 was grouped as high, the QPAR scores of 31 and 27 were ranked as medium, and the QPAR scores less than 11 were ranked as low. While 10 early care education centers were assessed for quality of physical activity resources, only 6 of the education centers had participants in the study. QPAR scores for the 6 were utilized for correlation analysis. Quality of physical activity resources and parental promotion of physical activity were not significantly correlated $r(18)=-.266$, $p=.286$). Quality of physical activity resources was not correlated with parental discouragement of PA $r(21)=.291$, $p=.178$. See figures 1 and 2 for a visual representation of the data.

Correlations were calculated to explore relationships between quality of physical activity resources and children's PA. The quality of physical activity resources was negatively correlated with children's moderate activity $r(21)=-.424$, $p=.044$. There was no correlation between the quality of physical activity resources and children's MVPA $r(21)=-.410$, $p=.052$. See figure 3 for a visual representation of the data. Correlations were also calculated to examine potential relationships between parenting practices and children's PA. No significant correlations were found between parental promotion of children's PA and children's objectively measured PA $r=$ 18-.264, $p=.290$. Parental discouragement of PA was not correlated with children's MVPA $r=(21)$-.288, $p=.183$.

Discussion

The aim of this study was to examine potential relationships between quality of physical activity resources, physical activity parenting practices, and children's physical activity. The hypotheses of the study were not supported. Previous studies have explored relationships between physical activity and the built environment, but few have sought to determine the precise nature of the relationship between the quality of physical activity resources and physical activity parenting practices. One large scale study found that parents with a positive perception of

neighborhood environment had children with less screen time and an increased likelihood of being physically active (Carson, Kuhle, Spence, & Veugelers, 2010). Although this study did not find relationships between parenting practices and physical activity resources. It is plausible that the quality of physical activity resources would influence parents' decisions to use them.

The authors hypothesized that children with access to higher quality physical activity resources would have increased rates of physical activity. While this hypothesis was not supported, a similar study found that increased neighborhood greenness was associated with lower body mass index in children presumably due to increased PA (Bell, Wilson, & Liu, 2008). A meta-analysis positively linked aspects of recreational areas such as walkability to adolescent's physical activity, but found the opposite relationship with children (McGrath, Hopkins, & Hinckson, 2015). Individuals from low and medium SES neighborhoods have less access to physical activity resources, and may lack ability to participate in PA due to inaccessible environments (Cerin & Leslie, 2007). Issues with access to physical activity resources is well documented, but a deeper exploration into the relationships between the quality of those resources and PA is warranted. For adults, access to higher quality PARs can increase PA (Lee, MaMa, Admaus-Leach, & Soltero, 2015). It is important to determine if the quality of PARs impacts parents decisions regarding their children's PA.

Although not an aim of the study, within this sample, parents discouraged girls physical activity at higher rates than they did boys. Girls participate in less physical activity than boys (Telford, Telford, Olive, Cochrane, & Davey, 2016). While this finding in the current study was not statistically significant, other research has found lower physical activity among girls associated with weaker influences at the family level (Telford, et al., 2016). This may be attributed to parents being more protective of girls. It could also be attributed to the adoption of traditional views of gender with boys being expected to be more active than girls.

Study limitations that warrant consideration include a small sample size which limits power and neighborhood sampling limitations. ECEC neighborhoods were used due to the complexity of assessing each individual participant's environment. Mapping resources for physical activity within proximity to each participants home would have been challenging and

complicated. While many children live in close proximity to schools, it is plausible that some may not; thus, the school physical activity resources may have less impact on their physical activity and their parents' decisions to utilize them. An additional limitation is that some of the recreational resources for physical activity were not available for use after certain hours thus limiting parent's ability to access them.

Conclusions and Future directions

This study explored potential relationships between parenting practices, physical activity resources, and Hispanic children's physical activity. Differences in parental discouragement of physical activity neared statistical significance. Further studies to examine reasons parents may be discouraging girls physical activity more than boys is needed for future intervention development. Research investigating the impact of quality physical activity resources on children's PA could lead to policy to increase physical activity resources in disparate communities. It is critical to understand the nature of the relationship between physical activity resources and parenting practices so that community interventions can be designed to address health disparities and promote health equity. Further research with adequate sample size and power is needed to understand the complex nature of resources for physical activity on parent's decisions to utilize them.

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Table 1

Sample Descriptive Statistics

Variable	n	%
Child age		
3 years	4	17
4 years	14	60
5 years	4	17.4
Not answered	1	4.3
Child gender		
Boys	14	60.9
Girls	18	34.8
Parent education level		
8th grade or less	3	13
Some high school	5	21.7
High school or GED	8	34.8
Some college	2	8.7
Trade or vocational school	3	13
College graduate (2 year degree)	1	4.3
College graduate (4 year college) or more	1	4.3
Marital status		
Married	11	47.8
Living with someone	8	34.8
Separated, divorced, or widowed	3	13
Single, never married	1	4.3

Table 2

Sample Descriptive Statistics for Parenting Practices, Physical Activity Resources, and Children's Physical Activity

Variable	M (SD)
Parents (n=23)	
Parent age	30.38 (8.817)
Parental promotion of physical activity	3.285 (.590)
Parental discouragement of physical activity	1.942 (.413)
Promote screen time score	2.212 (.509)
Promote inactivity score	2.014 (.728)
Parent concern for safety score	2.337 (.709)
Parenting practices that encourage PA	56.055 (9.967)
Parenting practices that discourage PA	32.130 (6.355)
Physical Activity Resources (n=10)	
QPAR score	21.7 (11.035)
Count of features	4.3 (1.636)
Quality of features	9 (4.136)
Count of amenities	6.8 (2.485)
Quality of amenities	16.2 (8.14)
Children's Physical Activity (n=23)	
Sedentary time minutes	463.506(77.17)
Light activity minutes	251.792 (50.778)
Moderate activity minutes	51.43 (16.072)
Vigorous activity minutes	24.093 (13.25)
Moderate to vigorous activity minutes	75.525 (28.158)
Wear time minutes	790.879 (96.231)
Days of wear	5.47 (2.107)

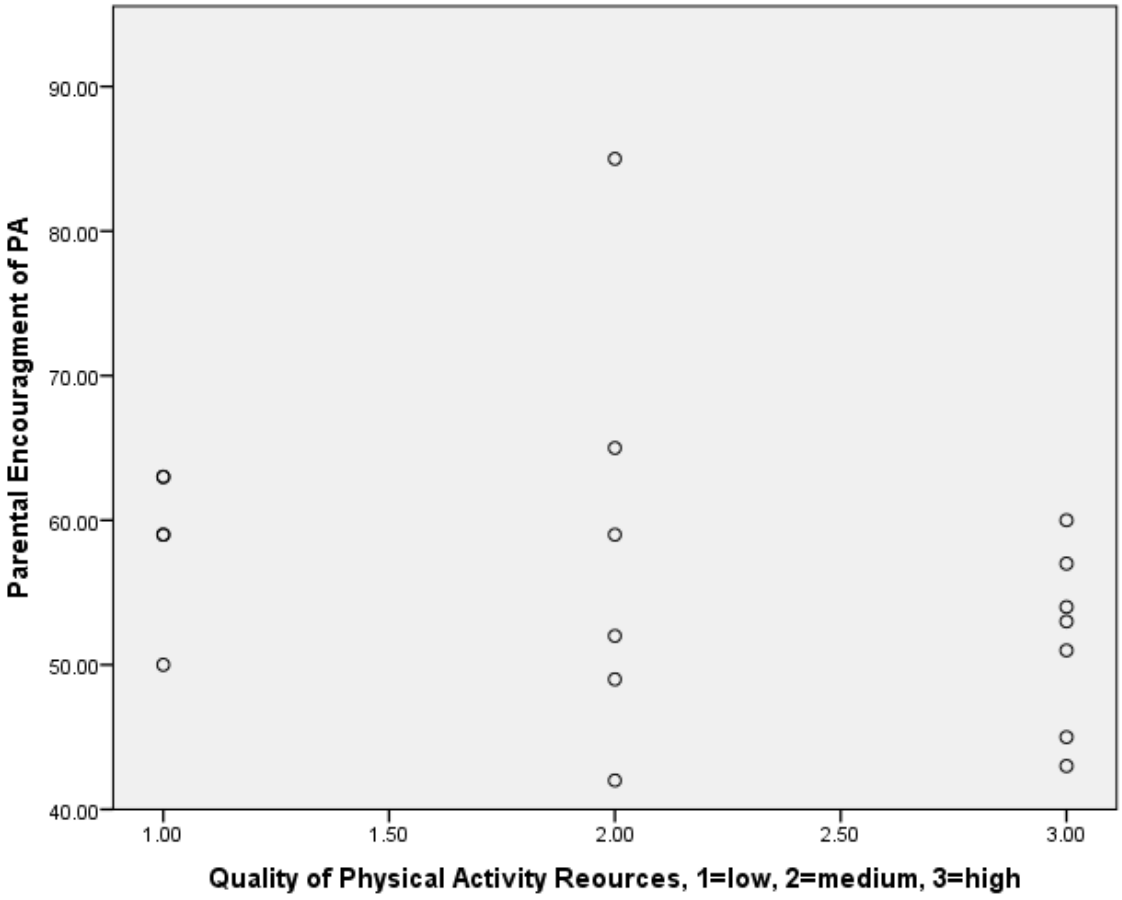

Figure 1.Scatter plot of parental encouragement of PA and quality of physical activity resources.

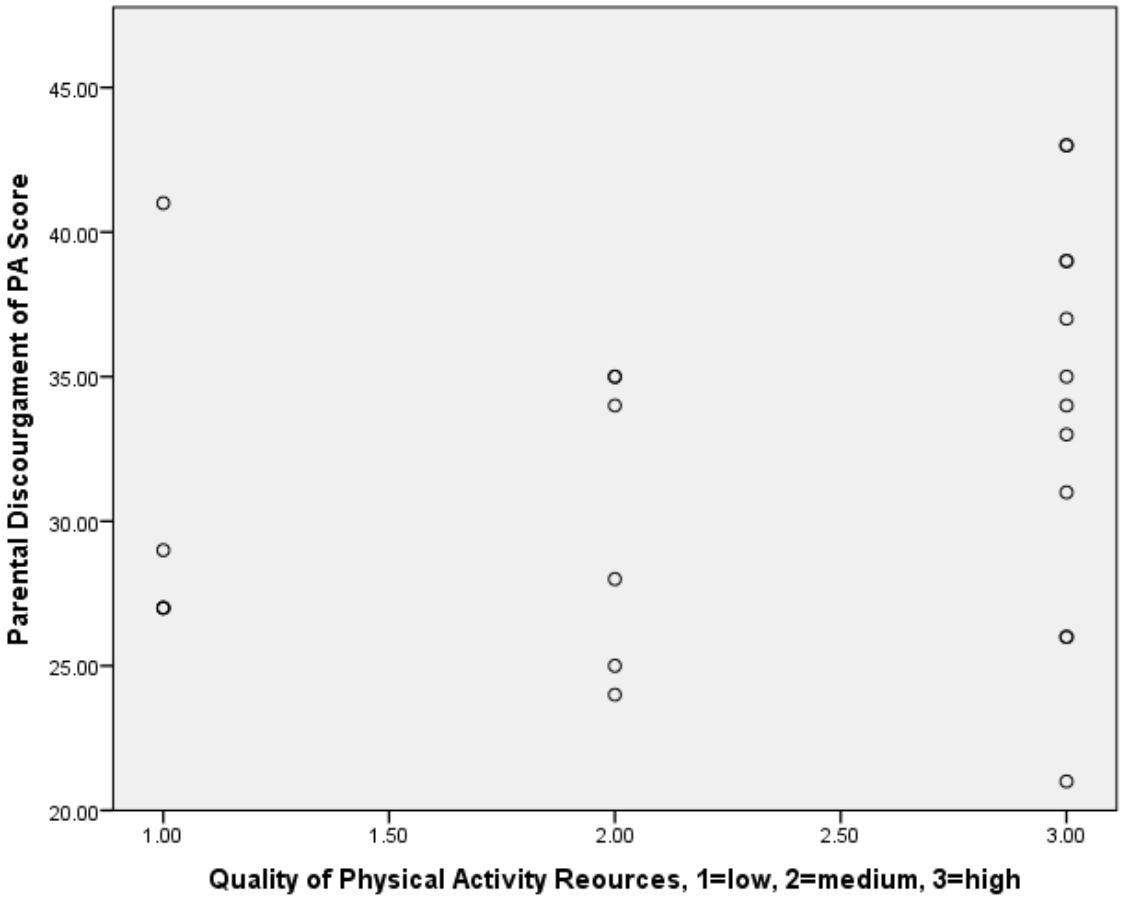

Figure 2. Scatter plot representing parental discouragement of PA and quality of physical activity resources.

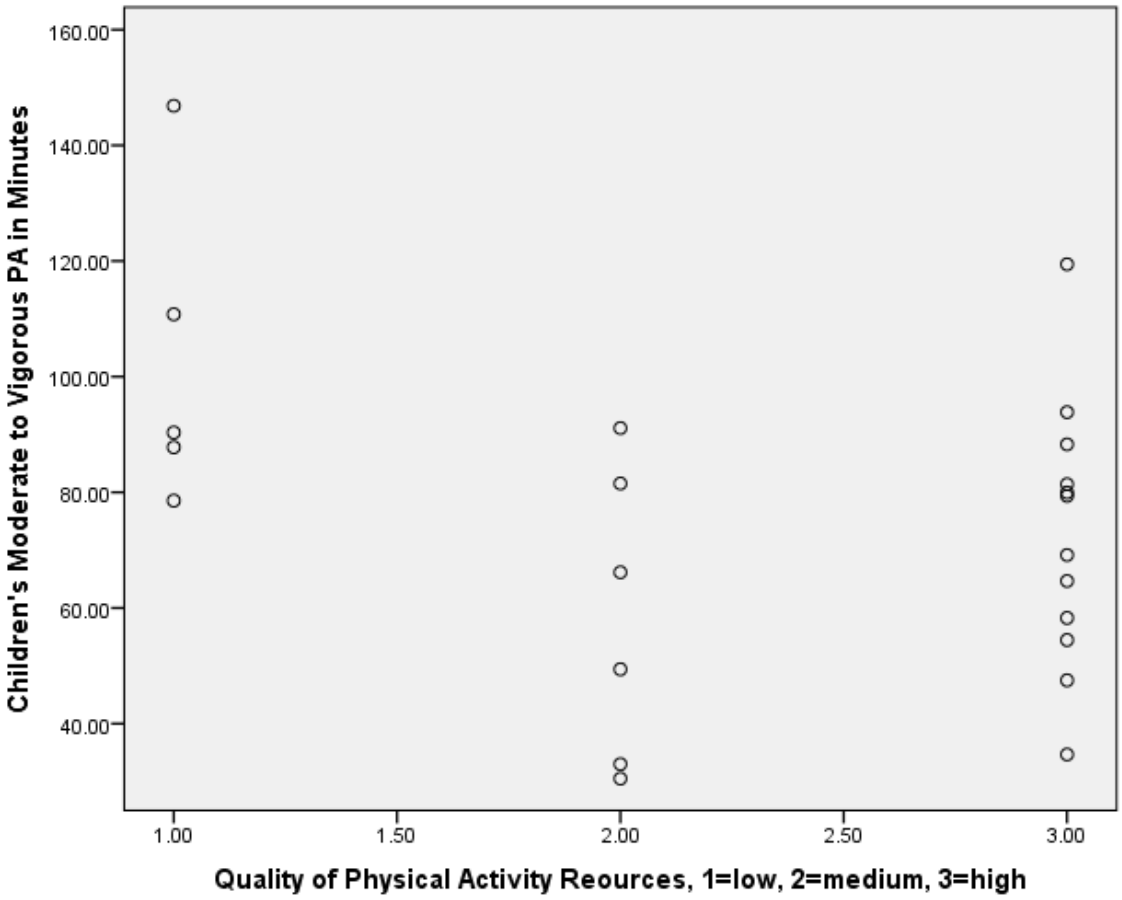

Figure 3. Scatter plot representing children's MVPA and quality of physical activity resources.

Chapter 5

Conclusion

This body of research sought to explore relationships between parenting practices, physical activity resources, and Hispanic children's physical activity. Guided by the Family Ecological Model (FEM) and the Ecological Model of Physical Activity (EMPA) this study examined parent's knowledge, modeling, and support for children's physical activity. Education, marital status, number of children in the household, school environment, child age, and gender were also analyzed. These demographics are thought to shape and constrain physical activity parenting practices (Davison & Campbell, 2005). The EMPA highlights the importance of the physical ecology in physical activity. This research examined parental perception of safety at school and the quality of physical activity resources as environmental factors that may have relationships with Hispanic children's physical activity. Parenting practices have considerable potential to impact children's physical activity if implemented as interventions. Gender differences among children's physical activity were also a key finding of this study. To gain an understanding of human behavior, one must consider the context in which a person is embedded (Davison & Campbell, 2005).

Parenting Practices and Children's Physical Activity

Parents shape children's physical activity behaviors, but this relationship is not well studied. This study explored relationships between physical activity parenting practices and children's physical activity. It was thought that parents would influence children's physical activity levels through physical activity parenting practices. Via an integrative literature review, It was determined that parental role modeling of physical activity and parental support for physical activity positively influence children's physical activity. This review analyzed 38 research studies that examined the probable relationships between parenting and children's PA. Prominent parenting practices themes emerging from the review were role modeling of physical activity, logistic support of physical activity, monitoring of physical activity, and parental encouragement of physical activity (Hutchens & Lee, 2017). Twenty-three percent of the quantitative studies found significant positive associations between parental role modeling of physical activity and children's'

physical activity (Hutchens & Lee, 2017). Eighty-seven percent of qualitative studies found parental role modeling as important factors in the promotion of children's physical activity (Hutchens & Lee, 2017). A moderate amount of evidence exists to support parental role modeling of physical activity as associated with children's physical activity behaviors.

Logistic support of physical activity has been described as enrolling the child in sports activities, attending sports activities with the child, and providing transportation for the child to sports activities (Langer, Crain, Senso, Levy, & Sherwood, 2014; Tandon, Grow, Couch, Glanz, Sallis, Frank, & Saelens, 2014). Fifty-three percent of quantitative studies in the review found significant positive associations between parental support of physical activity and children's physical activity (Hutchens & Lee, 2017). A similar review of quantitative evidence found parental support of physical activity as a promoting factor of children's physical activity (Xu, Wen, & Russell, 2015). Sixty-two percent of qualitative studies identified logistic support as influential in children's physical activity (Hutchens & Lee, 2017). A moderate amount of evidence exists to suggest that parental support of children's physical activity increases children's physical activity. Monitoring physical activity was identified by two quantitative studies and one qualitative study as positively associated with children's physical activity (Hutchens & Lee, 2017). Many studies in the review did not assess monitoring as a physical activity parenting practice. One study found that those with lower parental monitoring were more physically active than those with higher parental monitoring (Bradley, McRitchie, Houts, Nader, & O'Brien, 2011). Parental encouragement of physical activity was positively associated with children's physical activity in 20% of the quantitative studies (n=6) and two of the qualitative studies (Hutchens & Lee).

Parental support for physical activity emerged as the parenting practice with the most evidence for impacting children's physical activity. Strengths of this research include the methodology of using an integrative review. The integrative review allows for inclusion of methods of research beyond qualitative. The review also had a large sample size. Limitations of the review include potentially missed manuscripts and few randomized control trials limiting the strength of the research. This body of evidence widely used cross sectional data which only allows for associations, not causation.

While parenting practices are important indicators of children's physical activity, it is also crucial to examine what other variables may be associated with children's physical activity. In addition to parental support for PA, the FEM and EMPA include safe neighborhoods, high quality playground facilities, child characteristics, and family demographics (Davison & Campbell, 2005; Spence & Lee, 2003). These variables are explored in the next chapters of this body of research.

Parental Perception of School Safety and Gender Influences on Children's Physical Activity in Mexico

An additional aim of this study was to examine potential relationships between parental perception of safety and gender influences on children's physical activity. It was hypothesized that parents who perceived their environment as safe would have children with higher levels of physical activity. Parental restriction of children's active transport and physical activity due to safety concerns has resulted in lower levels of PA in girls (Carver, Timpeiro, Hesketh & Crawford, 2010). This aim was explored via a cross sectional study of data from Guadalajara, Mexico City, and Puerto Vallarta Mexico. The SPAN instrument and a self-report questionnaire were used. Results indicated that boys were more likely to participate in outdoor play and participate in sports than girls. Boys also were more likely to participate in other organized physical activities such as gymnastics or soccer lessons than girls (Hutchens, Soltero, Barquera, Levesque, Jauregui, Lopez y Taylor, & Lee, 2016).

Gender did not moderate the relationship between parental perception of safety at school and children's physical activity. Regardless, parental perception of safety is still a relevant factor in examining predictors of PA as previous studies have found it to be associated with increased PA in children (Bacha, Appugliese, Coleman, Kaciroti, Bradley, Corwyn, & Lumeng, 2010). Girls were less likely to participate in all three measures of PA than boys. This study contributes to the sparse data concerning gender influences and children's PA in Mexico. The study had a large sample size (n=1,741), and data was collected across multiple sites in Mexico. The measure of safety was parental perception of safety at school. While it was thought that most children reside in areas close to school, perhaps the study would have achieved statistical significance with a better measure of safety. This research led to the development of the final study which sought a

deeper exploration of the influence of ecology on parenting practices and children's physical activity.

Parenting Practices, Physical Activity Resources, and Hispanic Children's Physical Activity

The final aims of this body of work sought to examine relationships between physical activity resources, preschool age physical activity parenting practices and children's physical activity in the Hispanic population. This small sample size study neared statistical significance for parent's discouragement of physical activity for girls. While the study did not find statistically significant relationships, a similar study with adequate power may have supported the hypothesis. It is important to explore potential reasons why parents may encourage physical activity more in boys than in girls.

Integration of Studies

This study was guided by the Family Ecological Model (FEM) and the Ecological Model of Physical Activity (EMPA) (Davison & Campbell, 2005; Spence & Lee, 2003). This body of research examined the ecology of parenting and its relationships with physical activity in children. See figure1. The central focus of the FEM is parenting. The model includes parent's knowledge, modeling, shaping, and accessibility to healthy physical activity options (Davison & Campbell, 2005). Like the FEM and EMPA, this body of work noted important associations between parenting practices and children's physical activity including parental modeling of physical activity and parental support for physical activity (Hutchens & Lee, 2017). It is imperative to understand the role that parents play in children's PA as people who are physically active have lower rates of cardiovascular disease, cerebrovascular disease, and type 2 diabetes mellitus (American Heart Association, 2013).

This research reinforces the FEM component of child characteristics specifically gender having relationships with children's PA. While the FEM notes that parents create different activity environments for children based on gender, the EMPA posits that biological factors influence type and extent of physical activity (Davison & Campbell, 2005; Spence & Lee, 2003). The EMPA describes biological factors such as gender as moderators between extra-individual factors and

physical activity (Spence & Lee, 2003). This study hypothesized that gender would moderate the relationship between parental perception of safety and physical activity, and while the results neared statistical significance, the hypothesis was not supported.

The FEM and EMPA note the importance of community characteristics, including safe neighborhoods in the promotion of physical activity. This body of research hypothesized that parental perception of safety at school would correlate with physical activity. It also sought to examine FEM and EMPA components of marital status, parental educational level, and quality of recreational spaces on children's PA, but did not meet statistical significance. Larger sample size studies with adequate power should be conducted to continue to examine potential relationships between parenting practices and resources for physical activity.

Strengths and Limitations

Strengths of this body of research include use of the methodology of an integrative review. Inclusion of qualitative data may provide a broader understanding of the phenomenon under concern (Whittemore & Knafl, 2005). Chapters 2 and 3 had large sample sizes. An additional strength of the study was the use of accelerometer data. Chapter 4 was limited in power to small sample size. Study limitations also include the measure of safety. The research may have been statistically significant if the measure of safety was perception of safety at the home neighborhood instead of safety at school.

Implications for Research, Practice, and Policy

Research

Future research on parenting practices and children's PA should be broadened to include a focus on ethnic minorities as few physical activity parenting practices studies focus on minorities (Hutchens & Lee, 2017). Associations may differ depending on demographic characteristics, and it is important to expand research in minority populations to promote health equity. A small number of randomized control trials examine physical activity parenting practices as a variable (Hutchens & Lee). Well-designed longitudinal studies aimed at examining potential influences of parenting practices on children's PA would increase the level of evidence and quality of research in the field.

While this body of research did not find parental perception of safety as associated with children's PA, parental restriction of children's PA due to safety issues has resulted in lower levels of MVPA in girls (Carver et al., 2010). Additional research exploring if parents limit girls PA more than boys due to safety concerns could provide important evidence on PA parenting. Qualitative studies aimed at exploring gender differences in PA could generate new hypotheses on why girls participate in less PA than boys.

Physical activity parenting practices have been shown to predict girls PA behavior (Davison, Cutting, & Birch, 2003). Studies exploring the reasons for gender being a contributor to children's PA could expand the development and improve effectiveness of interventions designed to promote children's' PA. Future research should investigate potential causes for the gender gap including cultural and environmental influences.

Practice

This research provides parents, nurses, and practitioners with simple ways in which they may impact their children's physical activity including modeling and support for children's physical activity. Parents should provide opportunities to model physical activity patterns through provision of regular physical activity as a familial unit. They can also provide support for physical activity through encouraging outdoor play and driving children to locations where they can be active (Davison & Campbell, 2005). Nurses and practitioners can distribute this information to their clients as specific strategies to improve rates of physical activity in children. Disseminating research to parents, nurses, and practitioners concerning gender influences on children's physical activity may increase awareness of potential gender bias in physical activity promotion.

Policy

In addition to expanding research, parents, nurses, and practitioners can advocate for policies that create safe places for physical activity. They can become advocates for safe routes to schools through provision of planning, communicating with local leaders, and obtaining grants. Parents, nurses, and practitioners can develop and advocate for policy that mandates parenting classes for children's health. This could include information on physical activity parenting practices.

Researchers and practitioners can also promote community programs and policies that make it safe to participate in physical activity through collaboration with schools, worksites, and universities to provide safe spaces to engage in physical activity. Parents, nurses, and practitioners can advocate for open use of public school playgrounds through provision of clear and concise information to local legislators concerning the benefits of public safe spaces for physical activity.

Studies demonstrating the impact of high quality physical activity resources and children's physical activity could lead to policy that provides funding for physical activity resources. Demonstrating that quality physical activity resources increases parents propensity to use them, and therefore increases levels of physical activity among children has potential to increase perception of quality physical activity resources as a prevention tool. Scientists can establish relationships with policy makers, and disseminate information to them on correlations between quality physical activity resources and children's physical activity. Providing local leaders with links between research and policy may lead to adoption of policy to increase the presence and quality of physical activity resources. In addition to investigating quality of physical activity resources, data from other levels including perception of physical activity resources, street connectivity and crime rates could provide a broader picture of physical activity resource use (Lee, McAlexander, Banda, 2011).

In conclusion, this body of research has highlighted the importance of parenting practices, and gender in children's physical activity. Parents play a crucial role in children's physical activity behaviors, and while support for environmental predictors of physical activity exist, more studies examining how environmental factors such as resources for physical activity impact parenting practices that promote or discourage PA. Multi-level interventional studies aimed toward improving resources for physical activity and physical activity parenting practices could produce meaningful outcomes in increasing children's PA levels and long term health outcomes.

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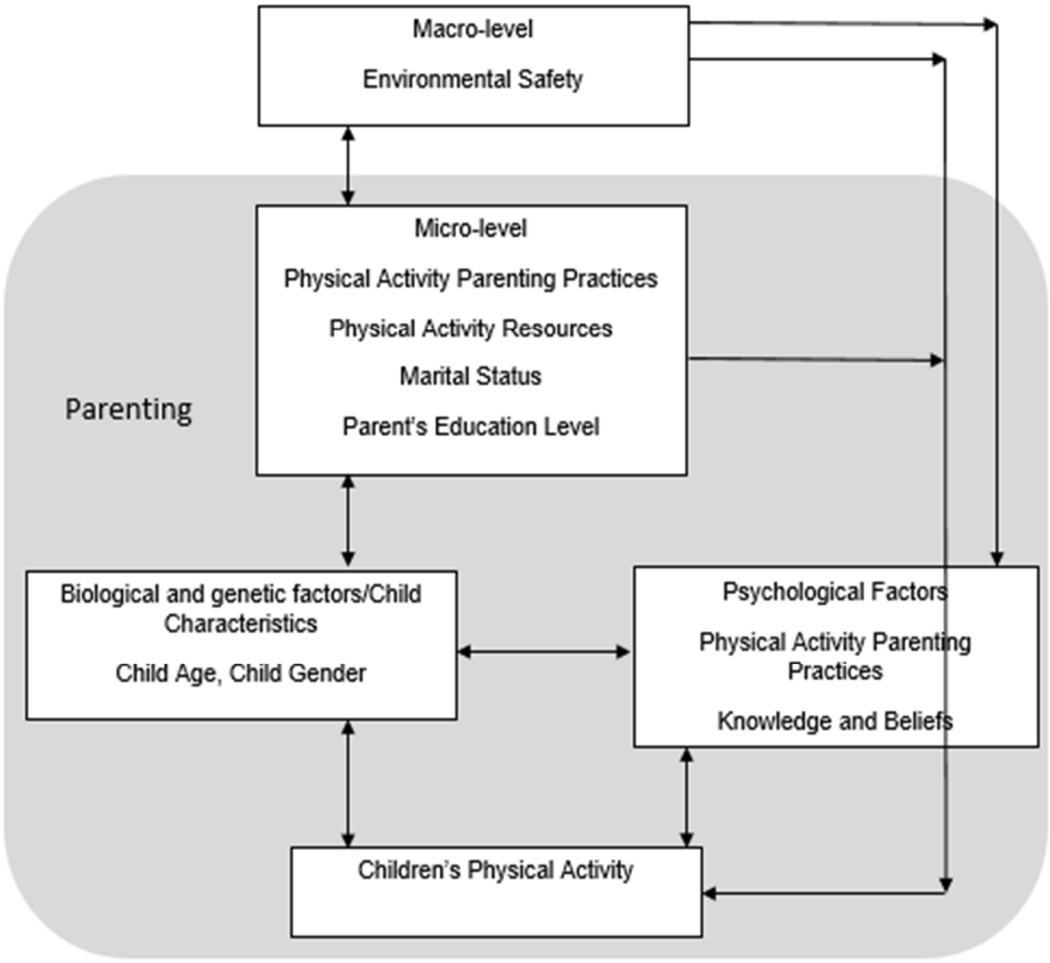

Figure 1. Model representing The Family Ecological Model of Physical Activity and the Ecological Model of Physical Activity. The micro level represents the immediate setting for children's physical activity. The macro level refers to the larger context in which the children reside and includes all other levels.

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APPENDIX A

HUMAN SUBJECTS

ASU Knowledge Enterprise Development

APPROVAL: MODIFICATION

Rebecca Lee
CONHI - Research Faculty and Staff
-
Rebecca.E.Lee@asu.edu

Dear Rebecca Lee:

On 9/21/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Modification
Title:	Partnering for Physical Activity in Early Childhood: Sustainability via Active Garden Education
Investigator:	Rebecca Lee
IRB ID:	STUDY00003761
Funding:	Name: HHS: National Institutes of Health (NIH), Grant Office ID: FGS0440, Funding Source ID: U01MD010667 ; Name: HHS-NIH: National Institute for Nursing Research (NINR), Funding Source ID: 1f31nr017560
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• ECEC Letter of Support, Category: Other (to reflect anything not captured above); • Sustainability Needs Assessment.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Marsiglia_FF CITI_142949669_112020.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • Community Partner Letter of Support, Category: Other (to reflect anything not captured above); • 24hr Diet Recall form, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Garden Build Protocol 5 27 14.pdf, Category: Other (to reflect anything not captured above);

	• O'Connor CITI reports.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • SAGE Curriculum Lesson Plan Example.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • SAGE postcard 1-24-17 SPA aea.pub, Category: Recruitment Materials; • Accelerometer Log ENG_7-18-2017.pdf, Category: Participant materials (specific directions for them); • SAGE Brochure, Category: Recruitment Materials; • Accelerometer log SPA, Category: Participant materials (specific directions for them); • BrueningCITI_Refresher.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • SAGE Cirriculum Outline 3.14.14.pdf, Category: Participant materials (specific directions for them); • SAGE parent consent form 9-6-17 ENG.pdf, Category: Consent Form; • Consent Form Protocol, Category: Other (to reflect anything not captured above); • SAGE Postcard eng, Category: Recruitment Materials; • ECEC Letter of Support, Category: Other (to reflect anything not captured above); • SAGE FAQ, Category: Recruitment Materials; • Eating in the Absence of Hunger Protocol, Category: Other (to reflect anything not captured above); • SAGE parent and child demographic survey T2-T3 - Control, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • USDA Multiple Pass Method Protocol.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Preference Assessment Game.pdf, Category: Participant materials (specific directions for them); • Home Food Inventory Spa, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • SAGE Newsletter Example ENG, Category: Participant materials (specific directions for them); • St.pdf, Category: Other (to reflect anything not captured above); • Director Program Sustainability Survey T1,

	Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Parent SAGE Handout ENG 7-14-17.pub, Category: Recruitment Materials; • Safe Routes To School Community Organization Letter of Support, Category: Other (to reflect anything not captured above); • Shaibi-CITI-Renewal_2016.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • Community Partner Letter of Support, Category: Other (to reflect anything not captured above); • F31 application, Category: Grant application; • Phoenix Parks and Recreation Letter of Support, Category: Other (to reflect anything not captured above); • State of Arizona Department of Education Letter of Support, Category: Other (to reflect anything not captured above); • Community Advisory Board Meeting Agenda, Category: Other (to reflect anything not captured above); • Substudy recruitment script, Category: Recruitment Materials; • SAGE FAQ_1.21.17 SPA (1).pdf, Category: Recruitment Materials; • SAGE Safety Curriculum.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • ECEC Letter of Support, Category: Other (to reflect anything not captured above); • Backtranslation-form_IC_handout_logs.pdf, Category: Other (to reflect anything not captured above); • Parent SAGE Handout SPA 7-14-17.pub, Category: Recruitment Materials; • MTodd_CITI_CompletionReport2952382-ASU-April-25-2016.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • backtranslation-form_SAGE Parent Accelerometer Log Spa.pdf, Category: Other (to reflect anything not captured above); • SAGE parent and child demographic survey T1 ENG, Category: Measures (Survey questions/Interview questions /interview guides/focus

	group questions); • SAGE parent and child demographic survey T2-T3 (ENG) - Intervention, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Hill_CitiRefresher_IRB2016.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • Wilder Collaboration Factors Inventory.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • ECEC Letter of Support, Category: Other (to reflect anything not captured above); • SAGE Environmental Assessment.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Substudy Recruitment Protocol, Category: Recruitment Materials; • Partnership Representativeness Survey.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Eating in the Absence of Hunger Observation Form, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Silver Toten CITI Training, Category: Other (to reflect anything not captured above); • Sustainability Action Plan 6.5.17.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • backtranslation-form_SAGE Parent Exit Survey Signed.pdf, Category: Other (to reflect anything not captured above); • SAGE Content Checklist_Lesson 1.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Protocol for Recruiting & Scheduling Childcare Director Interviews.pdf, Category: Recruitment materials/advertisements /verbal scripts/phone scripts; • SAGE Parent and Child Demographic Survey SPA T1.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Parent Accelerometer Log ENG.pdf, Category: Participant materials (specific directions for them); • Community Organization Letter of Support, Category: Other (to reflect anything not captured

	above); • Recruitment Call Script Example, Category: Recruitment Materials; • SAGE Self Efficacy Questionnaire (1).pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • PARA.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • SAGE Parent and Child Demographic Survey SPA T4.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Opportunity Reception Agenda.pdf, Category: Participant materials (specific directions for them); • SAGE Fasting Finger Stick Blood Sample Data Collection Form.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Maricopa Dept.pdf, Category: Other (to reflect anything not captured above); • Teacher Program Sustainability Survey T2-T4.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Home Food Inventory Eng, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • SAGE parent and child demographic survey T2-T3 (ENG)- Control, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • UofA Agricultural Literacy and School Garden Food Safety LOS, Category: Other (to reflect anything not captured above); • Substudy transportation log, Category: Participant materials (specific directions for them); • Substudy Inclusion Exclusion Questionnaire, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Parent Accelerometer Log SPA.pdf, Category: Participant materials (specific directions for them); • Hunger and Fullness Cues Protocol 5.29.14.pdf, Category: Participant materials (specific directions for them); • Tiger Mountain Community Garden Organization Letete, Category: Other (to reflect anything not

	captured above); • Substudy CMS fact sheet, Category: Resource list; • Teacher Program Sustainability Survey T1 .pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • TiffanyDowling.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • SAGE Grant.pdf, Category: Grant application; • Estabrooks Citi Human Research 10_2014.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • Director Program Sustainability Survey T2-T4, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Teacher self evaluation.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Lee_Soltero CITI Training Certificates.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • SAGE Postcard, Category: Recruitment Materials; • Directors and Teachers IC, Category: Consent Form; • SAGE PostIntervention Survey_Satisfaction_Communication_ENGLISH.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • ECEC Letter of Support, Category: Other (to reflect anything not captured above); • backtranslation-form_SAGE Parent Exit Survey Signed.pdf, Category: Other (to reflect anything not captured above); • Petrov_CITI 2017.pdf, Category: Non-ASU human subjects training (if taken within last 3 years to grandfather in); • SAGE parent exit survey_SPA_7-13-17.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • SAGE_Substudy Consent_9-6-2017.pdf, Category: Consent Form; • AZ Department of Health Services Letter of Support, Category: Other (to reflect anything not captured above); • SAGE parent and child demographic survey T2-T3 - Intervention, Category: Measures (Survey questions/Interview questions /interview guides/focus

	group questions); • SAGE Social Behavioral IRB Application , Category: IRB Protocol; • Substudy fasting finger stick blood sample protocol, Category: Technical materials/diagrams; • SAGE parent consent form 9-6-17 SPA.pdf, Category: Consent Form; • Open Forum Symposium_ Agenda.pdf, Category: Participant materials (specific directions for them); • SAGE Parent and Child Demographic Survey T4.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB approved the modification.

When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Anel Arriola
Michael Todd
Megan Petrov
Amy Hutchens
Anel Arriola
Meredith Bruening
Tiffany Dowling
Gabriel Shaibi
Flavio Marsiglia
Rebecca Lee
Silver Toten
Makenzie Moreno
Nina Palermo
Jacob Szeszulski
Everly Inzunza
Leopoldo Hartmann Manrique
Elizabeth Lorenzo

APPENDIX B

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Co-author Rebecca Lee granted the author permission to utilize the second chapter as a part of this dissertation.

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Co-authors Rebecca Lee, Erica Soltero, Simon Barquera, Lucie, Levesque, Edtna Jauregui, and Juan Lopez y Taylor granted the author permission to utilize the third chapter as a part of this dissertation.

Hutchens, A., Soltero, E. G., Barquera, S., Lévesque, L., Jauregui, E., López y Taylor, J., & Lee, R. E. (2016). Influence of parental perception of school safety and gender on children's physical activity in Mexico: A cross sectional study. *Salud Pública De México, 58*(1), 7-15.