

ACCULTURATION FACTORS ASSOCIATED WITH THE PREVALENCE OF
OBESITY IN IMMIGRANT CHILDREN AND ADOLESCENTS

by

SUZELINE DESIR

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Nursing
in the College of Nursing
and in the Burnett Honors College
at the University of Central Florida
Orlando, Florida

Spring Term, 2015

Thesis Chair: Susan Quelly, PhD, RN, CNE

ABSTRACT

Childhood obesity (CO) is a significant public health issue in the United States, including the immigrant populations. Obese children and adolescents are at increased risk for multiple preventable comorbidities that affect their physical health and psychological well-being. The perception exists that the immigrant child population may possess protection against CO, but this group also experienced an increased prevalence of CO. Acculturation, or the adaptation to American culture and lifestyles, has been shown to be associated with the increased obesity rate among immigrant children and adolescents. Understanding the association between acculturation factors and CO is necessary to effectively combat obesity among children and adolescents in immigrant populations.

The purpose of this literature review is to analyze the association of acculturation factors on the prevalence of CO among U.S. immigrant children and adolescents. Only articles that examined CO and at least one aspect of acculturation were included in this review. Twelve articles meeting the criteria were retrieved from CINAHL, Medline, PsychInfo, Academic Search Premier, and ERIC. The review identified the following acculturation factors to be associated with CO: parental immigration factors, child immigration factors, country of birth, generational status and primary home language, parental level of acculturation, and CO related lifestyle practices. There is modest evidence to suggest that a combination of acculturation factors is associated with increasing CO rate in immigrant populations. This review enhances the knowledge and awareness of public and pediatric healthcare professionals to develop targeted interventions that promote healthy weight in immigrant children and adolescents at increased risk for obesity.

DEDICATION

For my family and friends,
who have always been there for me,
and supported me through it all.

ACKNOWLEDGEMENTS

A special thank you to Dr. Susan Quelly for being an amazing mentor and role model. I would not be able to complete this thesis if it were not for your support, guidance, and encouragement.

You are really passionate about research. This passion really made my experience great and memorable. I embarked in this journey with uncertain views about research. But working with you on this thesis, I have grown to love research. So thank you for that. I am grateful to have had you as my chair person.

I express my deepest gratitude to my committee members, Dr. Jonathan Decker and Ty Matejowsky, for your invaluable input and collaboration on this project:

I would also like to thank Andrew Todd, our librarian, for taking the time to help me find articles supporting my topic and show me how to use the resources available to us, UCF students.

A special thank you to the Burnett Honors College and the College of Nursing for working together and providing undergraduate Nursing students with the opportunity to gain some amazing and valuable experience in research.

TABLE OF CONTENTS

ABSTRACT.....	ii
INTRODUCTION	1
BACKGROUND AND SIGNIFICANCE.....	2
PROBLEM.....	6
PURPOSE.....	8
METHOD	9
RESULTS	10
Parental Immigration Factors.....	10
Child immigration Factors	11
Country of Birth.....	11
Generational Status and Primary Home Language.....	13
Parental Level of Acculturation	14
Childhood obesity related lifestyles.....	15
DISCUSSION.....	17
STRENGTHS AND LIMITATIONS.....	22
CONCLUSION.....	23
NURSING IMPLICATIONS.....	24
APPENDIX A: FLOW CHART - ARTICLE SELECTION PROCESS	25

APPENDIX B: TABLE OF EVIDENCE 27

REFERENCES 36

INTRODUCTION

An increase in childhood obesity rate has been observed in immigrant populations in the United States (Singh, Kogan, & Yu, 2009). As this population continues to grow it is important to know the factors leading to the increase of obesity rate among immigrant children and adolescents, as it will aid in the effort to reduce and prevent obesity. Several factors have been studied to be associated with the increase of obesity rate in this population. When studying health related issues pertaining to immigrants, acculturation is a factor that cannot be overlooked, especially when that issue is childhood obesity.

BACKGROUND AND SIGNIFICANCE

Obesity has been an issue in our society for several decades. In order to address this issue and prevent it, screening tools have been studied and developed to determine people who are at risk of being overweight or obese and those who are actually overweight or obese. Obesity is described as having excess fat and is often determined using Body Mass Index (BMI). BMI is calculated by measuring a person's weight as it relates to his or her height (Stockert, 2013). It is used for both adults and children, but is interpreted differently. In children and adolescents, overweight is defined as having a BMI greater than or equal to the 85th percentile but less than the 95th percentile for children of the same sex and age (Centers for Disease Control and Prevention [CDC], 2012). The CDC (2012) also defines pediatric obesity as having a BMI greater than or equal to the 95th percentile for children of the same sex and age. Several studies have been conducted to determine the best method to assess obesity in children and adolescents. BMI is the recommended measure used to screen for overweight and obesity in children and adolescents (Krebs et al., 2007). BMI is a commonly used indicator and is fairly reliable in assessing overweight and obesity among children and adolescents, as well as adults (CDC, 2011).

Although efforts have been made to decrease obesity rates, it remains a public health problem today, especially among children and adolescents. According to the CDC (2014), over the past three decades, childhood obesity rate has more than doubled in children and more than quadrupled in adolescents. Studies show that there was an increase from 7% in 1980 to nearly

18% in 2012 in childhood obesity among children aged 6-11(CDC, 2014). Among adolescents aged 12-19, the obesity rate increased from 5% in 1980 to about 21% in 2012 (CDC, 2014). These staggering findings show that more work needs to be done in order to combat the childhood obesity issue. However, efforts are not without success. A significant decrease in obesity was observed among children aged 2 to 5 years from 13.9 % in 2003 -2004 to 8.4% in 2011- 2012 (Ogden, Carroll, Kit, & Flegal, 2014). Overall, the childhood obesity rate, while stable, remains high (Ogden et al.). Therefore, this issue still needs to be addressed. The best way to do that is through prevention. However, in order to implement effective preventive methods, the causes and the risk factors of obesity must be identified.

Several studies have been done to establish the different factors influencing the prevalence of childhood obesity. The increase in obesity prevalence is noted across all gender, race and socioeconomic groups (Singh et al., 2009). Likewise, childhood obesity rates have escalated among immigrant children and adolescents in the United States (Singh et al., 2009). The immigrant population has been increasing rapidly over several decades. In 2010 there were about 40 million immigrants living in the United States, which accounts for 13% of the American population (Grieco et al., 2012). Of the immigrant population, Latin America was the largest region of birth, accounting for 53% of all foreign born, followed by Asia, which accounted for 28% of the foreign born population (Grieco et al.). The immigrant population will continue to grow. It is, therefore, important to identify the factors propelling the increase of childhood obesity rate in this population, in order to effectively combat and prevent obesity.

There is evidence showing that compared to the U.S.-born children and adolescents, obesity and its related risk factors are different for immigrants and that acculturation is a modifier of the health and behavioral risks of immigrants (Singh et al., 2009). It is understood that acculturation plays a role in the prevalence of childhood obesity among immigrant children and adolescents. However, it is unclear as to how acculturation factors into childhood obesity for this group. Acculturation is the process by which a minority group adopts the cultural lifestyle and behaviors of the host country (Schaefer et al., 2009). Research has shown that compared to their native-born cohorts, newly arrived immigrants have better health, but their health declines the longer they remain in the U.S. and become more acculturated (Van Hook & Baker, 2010). However, there are mixed findings demonstrating that greater levels of acculturation may decrease the prevalence of obesity among immigrant children (Van Hook & Balistreri, 2007).

Several methods have been used to measure acculturation. Some researchers analyzed the level of acculturation based on generational status. However, the definition of generations varies. In one study, generational status is categorized into first generation, which consists of people who were the first in their family to immigrate to the U.S.; second generation, which consists of people who were born in the U.S. to first generation immigrant parents; and third generation, which consist of people who were born in the U.S. and at least one of the parent was also U.S. born (Taverno, Rollins, & Francis, 2010). The third generation is considered native. Another study classified generational status into 1.0 generation, which consists of children of parents who arrived to the U.S. at the age of 12 or after; the 1.5 generation as children of parents who arrived in the U.S. between the age of 0-11; and third generation as children of parents who were born

and raised in the U.S. (Van Hook & Balistreri, 2007). The third generation, again, is considered native and is used as the reference group.

Acculturation is also measured based on primary language spoken at home. Taverno et al. (2010) used language as an indicator of acculturation in their study. Liu et al. (2009) also used this method to measure acculturation. They found that among the less acculturated, English is usually not the primary language spoken at home. The first generation speaks less English at home, the second generation speaks more English than the first, and the third generation speaks English as the primary language in the home (Liu et al.).

Length of stay of stay and age at arrival are also often used as indicators of acculturation to host countries (Oza-Frank & Narayan, 2009). Adult retrospective studies have shown that the risk of overweight and obesity escalated with increased length of residence in the U.S. and that effects varies depending on the region or country of origin and age at arrival (Oza-Frank & Narayan)

Overall, there is not any definitive way to measure acculturation. However, these indicators have been used in several health related studies and have proven to be fairly reliable. More research regarding acculturation is being conducted to better understand its process and its impact on immigrants' life.

PROBLEM

Obesity poses short and long-term complications that affect children and adolescents' health as well as their psychosocial well-being. Overweight and obesity in childhood and adolescence are associated with low socioeconomic status, poor health and increased morbidity and mortality rates in adulthood (Krebs et al., 2007). Obese children and adolescents are at higher risks for developing type 2 diabetes, high cholesterol, cardiovascular disorders, lung disorders, poor self-esteem, and several other diseases (Centrella-Nigro, 2009; CDC, 2012). Furthermore, obese children have a higher risk of becoming obese when they reach adulthood, and they are more likely to experience a severe form of obesity along with the associated comorbidities (CDC, 2012). It is more difficult to lose and maintain a healthy weight as an adult than it is as a child or an adolescent (Centrella-Nigro, 2009). Children may also be more receptive to adopting and establishing healthy lifestyles and behaviors. Therefore, it is imperative that obesity is addressed as children are growing up instead of waiting until they reach adulthood.

Compared to non-immigrant children and adolescents in the U.S., immigrant children and adolescents are subject to these same health risks and complications as they live in the United States and become acculturated. They may actually suffer more from these health complications due to the fact that they have a higher tendency of not having health insurance and regular access to medical care than nonimmigrants (Perreira & Ornelas, 2011).

As mentioned before, Latinos comprised the largest group of immigrants in the U.S. (Grieco et al., 2012). Latino children have a higher prevalence of being overweight or obese compared to non-Hispanic black and non-Hispanic white (Sussner, Lindsay, Greaney, & Peterson, 2008). In 2011-2012, the prevalence of obesity was 22.4% for Hispanic youth, 8.6% for non-Hispanic Asian youth, 20.2% for non-Hispanic black youth, and 14.1% for non-Hispanic white youth (Ogden et al., 2014). This disparity will continue if prevention is not aimed at each minority group to reflect their different needs. The population of immigrant children and adolescents will continue to grow in the United States. Since these groups are also affected by high obesity rates and it has been shown that acculturation is an associated factor, it is important to gain a better understanding of how acculturation is associated with this phenomenon.

PURPOSE

The purpose of this research is to analyze the association of acculturation factors on the prevalence of childhood obesity among U. S. immigrant children and adolescent. Determinants such as length of stay in the U.S., age of migration, country of origin will be analyzed to better understand the relationship between acculturation and childhood obesity.

METHOD

A preliminary research was conducted to determine whether there had been studies done to establish any association between childhood obesity and acculturation among immigrant children and adolescents. The results were sufficient to indicate a need for a thorough review of the literature. The databases used were CINAHL, Academic Search Premier, PsychInfo, Medline, and ERIC, as well as the National Center for Health Statistics and the United States Census Bureau. The keywords “acculturation,” “childhood obesity,” “immigrant children,” “children,” “adolescents,” and “obesity” were used through the databases. Inclusion criteria included English language, peer reviewed articles, published in the past ten years. An exception was made for one article published outside of this timeframe that was found to be significantly relevant in this review. Any article that did not include information about childhood obesity and acculturation was excluded (see figure 1). Using the ancestry approach, previous studies related to the topic were found. Using the descendancy approach, the sources used were analyzed and more recent data as to obesity rate and percentage for immigration population were found. The articles were then analyzed and critiqued to determine their validity and authenticity. After a thorough review of the literature, 12 articles meeting these criteria were identified.

RESULTS

The literature review showed mixed findings regarding the association between acculturation factors and obesity in childhood and adolescence (see table 1). The results are divided into sections to better organize and discuss the factors of acculturation: parental immigration factors, child immigration factors, country of birth, generational status and primary home language, parental level of acculturation. Each section highlights evidence that shows how the factors of acculturation may or may not be associated with CO.

Parental Immigration Factors

Parental immigration factors refer to any information about the immigrant parent upon entry to the U.S., such as their age, socioeconomic status (SES), and country of birth. These factors had been studied in relations to immigrant children's and adolescents' prevalence to obesity. The studies render mixed findings as to how the parental immigration factors are associated with CO among immigrant children and adolescents. In a large sample that included Asian, Hispanic, and Pacific Islander children, Van Hook & Balistreri (2007) found that among children of parents who arrived to the U.S. at the age of 12 or after and came from a higher income country, those children gained more weight compared to children from a lower income country. Among children of parents who came to the U.S. between the ages of 0-11, no significant relationship was found between the economic development of the parents' country of origin and the children BMI growth. As the family's socioeconomic status increased while residing in the U. S., weight gain increased, especially if the parent immigrated from a low

income country as a teen. However, another study found that Hispanic parents' place of birth and parent's acculturation was not associated with child's BMI (Morello, Madanat, Crespo, Lenus, & Elder, 2012).

Child Immigration Factors

Age at arrival, as well as weight at arrival, appears to be associated with childhood obesity among immigrant children. African refugee children who arrived to the U.S. between age 6 to 12 years, or older than 12 years, were more likely to become overweight or obese compared to those who arrived at the age of 6 or younger and the older children gained weight at a faster rate than the younger ones (Hervey et al., 2009). Furthermore, children who were underweight at arrival became normal weight within about a year; those who were of normal weight did not experience any significant change in weight; those who were overweight were at high risk of remaining overweight or becoming obese (Hervey et al., 2009). In a study comparing immigrant children of Mexican origin, males were more likely to be overweight than females and children ages 5 to 9 were more likely to be overweight compared to adolescents ages 15 to 19 (Hernandez-Valero et al., 2011). The age of immigration for the child or parent was not analyzed with child's weight status in this study.

Country of Birth

People from different countries or with different ethnicities have dissimilar cultures. These differences lead to various health practices or behaviors, beliefs and lifestyles that may put certain populations more at risk for obesity compared to another. Obesity prevalence was

compared between three groups of children ages 5 – 19: those born and raised in Mexico (Mexicans), those born in Mexico and raised in the U.S. (immigrants); and those who were born and raised in the U.S. (Mexican-Americans), but have at least one Mexican immigrant parent (Hernandez-Valero et al., 2011). A positive relationship was found between Mexican children who immigrated to the U.S. and an increase prevalence of overweight and obesity. Mexican-Americans had the highest rate of overweight and obesity of these three groups (Hernandez-Valero et al.). Irrespective of place of birth, whether it was the U.S. or Mexico, those residing in the U.S. had a higher BMI than those residing in Mexico (Hernandez-Valero et al.). However, in a study of adolescent Cubans, Mexicans, Puerto Ricans, and Non-Hispanic Whites, U.S. born immigrants were shown to be more likely to be overweight than foreign born immigrants, except Mexicans (Gordon-Larsen, Harris, Ward, & Popkin, 2003). Both studies suggest that acculturation from living in the U. S. may be a factor contributing to childhood obesity rates. Contrary to these findings, children whose families originated from Central or South America, with a low acculturation, as measured by the use of Spanish as the primary language at home, was associated with increased risk for obesity (Wojcicki, Schwartz, Jiménez-Cruz, Bacardi-Gascon, & Heyman, 2012). The primary use of the native language in the home was also found to be associated with dietary habits and other lifestyle practices that may affect the prevalence of obesity. Similarly, a study with Mexican-American and Asian-American girls showed that an increase in the number of generations in the U.S. was associated with increased acculturation and socioeconomic (SES) status, but decreased percentage of body fat. Only Asian-American girls

with an increased SES had increased overweight and obesity rates (Schaefer, Salzar, Bruhn, Saviano, & Van Loan, 2008).

Generational Status and Primary Home Language

Mixed results were found when immigrant generational status and primary home language were studied as acculturation characteristics related to childhood obesity. Increased immigrant generational status refers to the number of generations the child or adolescent has lived in the U. S. For example, a first generation child was born outside of the U. S. with both parents also foreign born. A second generation child was born in the U.S. to at least one immigrant parent. A third generation child, whom is often referred to as native, was born in the U.S. with both parents also U.S. born.

In a large study of immigrant children and adolescents, generational patterns of overweight and obesity were found to vary by race and ethnicity (Singh, Kogan, & Yu, 2009). The prevalence of overweight and obesity increased with each successive generation for white and black immigrants, however, there was no variation in the prevalence of obesity among Hispanic children by generational status (Singh et al, 2009.). Contrary to this finding regarding Hispanic children, Gordon-Larsen, Harris, Ward, & Popkin (2003) found that second generation Hispanic immigrants were more likely to be overweight than first generation immigrants. Taverno et al. (2010) in a cross-sectional study, found that first and second generation non-English speaking Hispanic children had a higher prevalence of obesity compared to third generation English speakers. Mexican American adolescents maintained a similar prevalence of

overweight across all generations, suggesting that the prevalence of obesity may not be related to generational status among Mexican –Americans (Gordon-Larsen et al., 2003).

Schaefer et al. (2008) found that, in general, an increased in generational status in the U.S., meaning from first generation immigrant to native, was associated with an increased in acculturation and an increase in socioeconomic status, which correlated with a decreased in total body fat. However, for Asian-American girls, an increase in SES was associated with an increase in overweight or obesity (Schaefer et al., 2008).

An increase in generational status, was also associated with more English spoken at home, an increase in parental education, and an increase in SES (Liu, Probst, Harun, Bennett, & Torres, 2009). Hispanic adolescents who lived in a household where English was not the primarily language had a higher prevalence of being obese (Liu et al., 2009). Interestingly, Wojcicki et al. (2012) found that Spanish Language use at home was associated with an increased risk of overweight and obesity among children from Central or South America, but not among children from Mexico.

Parental Level of Acculturation

Parents, as the caregivers in the family, play a major role in the development of health habits and practices of children and adolescents. Mixed findings were found when analyzing parental level of acculturation in relation to childhood obesity. In a longitudinal study with a very large sample of immigrant families, Li, Strobino, Ahmed, & Minkovitz (2011) found that the prevalence of obesity was higher among children with foreign born mothers than native born

mothers. There was no difference in the prevalence of obesity related to the length of time foreign mothers had lived in the U.S. This finding suggests that parental acculturation may not be associated with the prevalence of obesity among immigrant children. This is consistent with the finding that parent acculturation was not associated with child's BMI (Morello, Madanat, Crespo, Lenus, & Elder (2012). They found that parent's BMI was more predictive of a child's BMI than parental acculturation, meaning that if the parent had a high BMI it was more prevalent for the child to also have a high BMI (Morello et al., 2012). This is supported by other research that have found parent BMI to be a strong indicator of child's BMI (Wiley et al., 2014). However, a longitudinal study, refuted these results showing that children of Latino mothers who were less acculturated to the U.S. were more likely to be overweight compared to children of highly acculturated mothers (Sussner, Lindsay, & Peterson, 2009). Hispanic children of mothers who were highly acculturated to the U.S., had a higher consumption of "noncore foods" or "junk food" and had higher BMI percentiles (Wiley et al., 2014). This further indicates that there may be a relationship between parental level of acculturation and childhood obesity among immigrant children

Childhood Obesity Related Lifestyles

Researchers also studied lifestyle practices that may be contributing to the prevalence of childhood obesity in immigrant children and adolescents. Some analyzed dietary practices, others investigated involvement in physical activity, or both. Wiley et al. (2014) found that greater acculturation was associated with greater consumption of noncore food, which was associated with a greater prevalence of overweight and obesity. Noncore foods were described as

sugar-sweetened beverages, such as soda and fruit juices, and energy dense low nutrition foods, including processed foods and fast foods. In contrast, Morello et al., (2012) found that children of less acculturated parents consumed more daily servings of fruits; highly acculturated Hispanics have poorer diets, consisting of higher fat intake and lower consumption of fruits and veggies. Foreign born Hispanic adolescents tended to have healthier dietary practices compared to their U.S. born counterparts (Gordon Larsen et al., 2003). They also found that among Cubans and Mexican adolescents inactivity increased with longer stay in the U.S.

Taverno et al. (2010) found that first and second generation Non English speaking children had less screen time than third generation English speakers and were less likely to participate in physical activity, clubs, and sports. Liu et al., (2009) also found similar findings in their study. They found that Hispanic adolescents who lived in households where English was not the primary Language spoken were less likely to participate in physical activity (Liu et al., 2009). These findings suggest that children and adolescents with less acculturated families, as indicated by a non-English primary home Language, is associated with less physical activity, an obesity-related behavior in children and adolescent. Unexpectedly, reduced screen time in less acculturated children was not associated with participation in physical activity. This may be due to physical activity being measured as participation in sports, and recreational activities in parks.

DISCUSSION

Factors of acculturation investigated in this literature review included parental immigration factors, child immigration factors, country of origin, generational status and language used, parental level of acculturation, and childhood obesity related lifestyles. In parental immigration factors, the parents' place of birth, age at migration, and BMI were examined in relation to how that affects their child's weight status and prevalence of being obese or overweight. These factors are important to investigate in association with childhood obesity. Parents play a major role in the upbringing of their children. The way they raise their children are influenced by their cultural beliefs. These beliefs may or may not promote healthy behavioral or dietary lifestyles, which would affect the risks for childhood obesity. The literature, however, provides mixed findings as to how these parental immigration factors affect the prevalence of childhood obesity among immigrant children and adolescents.

If the parents immigrated at the age of 12 or older and were from a high income country, their children gained more weight compared to children of parents of that same generation from a low income country (Van Hook & Balistreri, 2007). Interestingly, if the parents immigrated between the ages of 0 to 11 years, there was no significant relationship between the economic status of the parents' country of origin and their child's BMI growth (Van Hook & Balistreri, 2007). An explanation for that was that the parents who immigrated when they were 0 to 11 years old grew up and socialized primarily in the U.S. (Van Hook & Balistreri). The American culture became their own and they adopted that culture so that their country of birth did not

factor in as much on their lifestyles and how they raise their children. In other words, they were more acculturated. If their children were overweight or obese, the study suggests that their country of birth would not have a significant role. For those parents who arrived at the age of 12 or older, they were primarily socialized in their country of birth and were more likely to practice the lifestyle of their country, which may have included fewer obesity related behaviors in a less obesogenic environment, depending on the SES of that country.

Parental level of acculturation is another factor that was considered to have an effect on the prevalence of obesity in immigrant children and adolescents. The idea was that since parents are very integral in the development of their children's health related behaviors, their level of acculturation would impact those behaviors. It is well established that the longer immigrant adults live in the U.S., the more acculturated they become and the more likely they are to adopt health practices that put them at risk for obesity (Oza-Frank & Narayan, 2010). Therefore, it seems logical to presume that immigrant children of well acculturated parents would be more likely to become overweight or obese. The evidence in the literature, however, suggests that this assumption may be somewhat flawed since the findings varied. These inconsistencies arose due to behavioral and dietary practices that may have acted as mediators between acculturation and the prevalence of childhood obesity in the immigrant population.

Although parental factors of acculturation are involved in the prevalence of childhood obesity, the children themselves also have immigration factors that affect their prevalence of becoming overweight or obese. Most of the research analyzing child immigration factors such as

age at arrival and weight at arrival were retrospective, where overweight or obese immigrant adults provided information about their childhood regarding factors that may have led to their current weight status.

One of the few research studies that was not retrospective suggests that the child's weight at time of arrival to the U.S. was a stronger indicator of the prevalence of obesity than the age at arrival (Hervey et al., 2009). In this same study it was also found that children who immigrated at an older age were at higher risk for becoming overweight or obese than those immigrating at a younger age (Hervey et al.). This finding is not consistent with studies that have been conducted with children of different ethnic background or country of origin, suggesting that the association of age at arrival and childhood obesity to vary by ethnicity. It is worth noting that the study had a very small sample size; so the findings may not be applicable to a larger population. However, it does suggest that there is a relationship that needs to be explored further.

It was also unexpected to find that BMI changes among immigrant children in different age categories did not follow the same pattern as non-immigrant U.S. children (Hervey et al., 2009). In refugee children 0-5 years old, BMI percentiles changes trended upward overtime, while in U.S. children BMI percentiles changes trended downward in early childhood (Hervey et al.). This could be partially due to rapid weight gain, as it was found in the study that underweight children gained weight rapidly (Hervey et al., 2009). It has been shown that low birth-weight children are at higher risk for obesity due to rapid weight gain (Goodell, Wakefield, & Ferris, 2009). The refugee children may have been malnourished and underweight prior to

immigrating to the U.S. Therefore, this may be the reason their BMI percentiles trended upward in contrast to non-immigrant U.S. born children and are also at higher risk for overweight and obesity. While this study primarily focused on refugees, which are a group of immigrants with dissimilar characteristics of other immigrants, it does open the door for more research to be done to see how this new finding would be applicable to other children and adolescents who immigrate to the U.S. under different conditions and for different reasons.

Generational status and primary language used at home are factors used to measure acculturation. In retrospective studies with adults, the prevalence of obesity appears to be greater with increased generational status (Bates, Acevedo-Garcia, Alegria, & Krieger, 2008). Yet, there seem to be mixed findings regarding the relationship of generational status in children and adolescents. It was found that the increased or decreased prevalence of overweight or obesity in immigrant children based on generational status varied by ethnicity (Singh et al., 2009). However, there was no difference in the prevalence of obesity in adolescent and children by generational status (Liu et al., 2009).

When primary language used at home was examined, the first and second generation non-English speaking Hispanic children had a higher prevalence of obesity (Taverno et al., 2010). Similarly, Hispanic adolescents who lived in a household where English was not the primary language had a higher prevalence of obesity (Liu et al., 2009). When primary home language is used as a measure of acculturation to U. S. lifestyles, acculturation may not be highly related to increased childhood obesity rates. These last two findings are inconsistent with studies

conducted with adults that found the first and second generation to be healthier regarding weight status (Bates et al., 2008). Interestingly, Spanish language use at home was associated with an increased risk of overweight and obesity among children from Central or South America but not among children from Mexico (Wojcicki et al., 2012). The main reason for these inconsistencies seem to be based on lifestyle practices and SES observed among these populations. The literature suggests that first and second generation children are less likely to be engage in physical activity, but may eat a healthier diet with more fruit and veggies.

STRENGTHS AND LIMITATIONS

Inconsistencies, with regards to how acculturation and generational status are measured, made it challenging to clearly determine how these factors are related to childhood obesity. Different results are generated depending on how they are measured. Furthermore, there's a dearth of information to encompass other immigrant populations such as people from Europe and the Middle East, for example. There appear to be very few, if any, studies conducted to analyze acculturation relationship with obesity in immigrant children originated from non-Hispanic and non-Asian countries. As a result, some of the findings from this literature review may not be generalized to other immigrant populations. Despite these limitations, the information presented is relevant and will enrich the knowledge as well as enhance awareness of public and pediatric nurses about acculturation factors associated with the prevalence of obesity in immigrant children and adolescents.

CONCLUSION

Overall, the evidence suggests that there is a modest positive association between some acculturation factors and childhood obesity in certain immigrant populations. However, the findings are mixed which may be due to the different methods used to measure acculturation, the population being studied, and also the risk factors of obesity being studied. Other factors often associated with childhood obesity, such as the socioeconomic status of immigrant families and/or their native countries, may also contribute to some of the inconsistent findings in these studies.

More research is still needed to gain a better understanding of how acculturation is correlated to childhood obesity in children and adolescents. There is much more information on adult obesity and acculturation than is available about children and adolescents. Many previous studies about acculturation and childhood obesity focused on the Hispanics and Asian populations. That is understandable since childhood obesity rates are higher among Hispanics and lower among Asians. However, there may be immigrant populations between those two extremes that need to be identified and studied in order to learn what their protective mechanisms are, if any, and how they can be applied to the rest of the population to combat childhood obesity.

NURSING IMPLICATIONS

Nurses, as health professionals, are in a position where they can help combat childhood obesity by educating immigrant families regarding healthy behaviors and dietary practices that can prevent childhood obesity. This education needs to be culturally centered so that nurses can target each immigrant family's needs based on the cultural beliefs and practices that place their children at high risk for overweight and obesity.

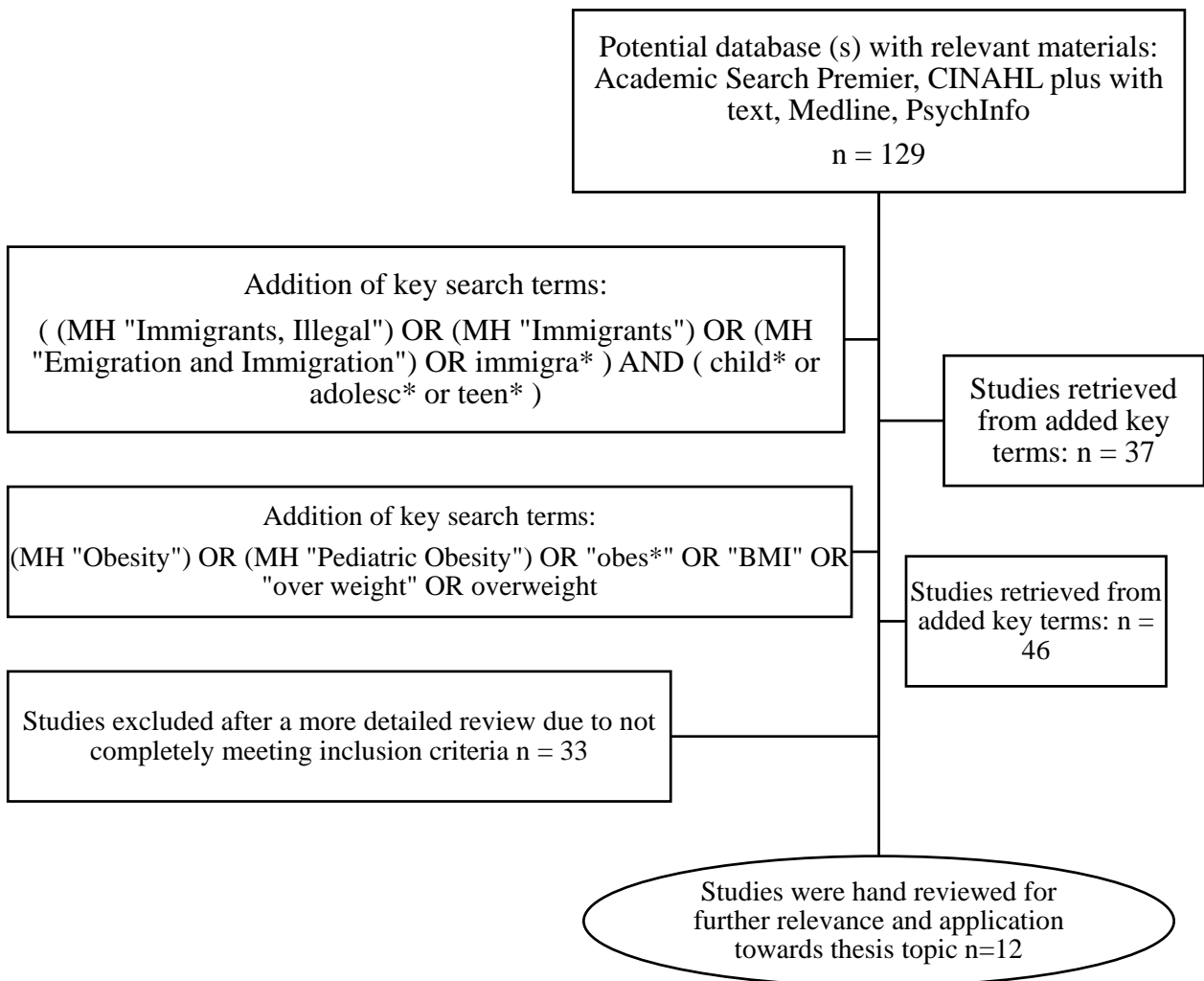
Public health and pediatric Nurses can also influence government officials to build more recreational parks in rural areas, especially where there is a proven need in poorer immigrant neighborhoods. Safety is also a concern, especially since parents who see their neighborhood as unsafe do not allow their children to go to the park or play outside. A lack of viable options for physical activity encourages more screen time, a sedentary lifestyle that place those children at higher risk for overweight and obesity. In order to prevent and reduce childhood obesity in immigrant populations, families should be encouraged to maintain healthy lifestyle behaviors from their native culture and cautioned about adopting unhealthy lifestyle choices commonly found in the U. S., such as fast food consumption and excessive screen time.

APPENDIX A: FLOW CHART - ARTICLE SELECTION PROCESS

Figure 1: Article Selection Process

Key Search terms: Acculturation, childhood obesity, pediatric obesity, immigrants, children, adolescents, obesity

Limiters used: English language, peer reviewed



APPENDIX B: TABLE OF EVIDENCE

Table 1: Association of acculturation factors with the prevalence of CO in immigrant children and adolescents

Articles	Method and Design	Sample size/age	Countries/Regions of immigration	Key findings	other
<p>Gordon-Larsen, P., Harris M. K., Ward, S. D., Popkin, M. B. (2003). Acculturation and overweight related behaviors among Hispanic immigrants to the US: The national longitudinal study of adolescent health. <i>Social Science & Medicine</i>, 57, 2023-2034. doi:10.1016/S0277-9536(03)00072-8</p>	<p>Longitudinal National Longitudinal Study of Adolescent Health</p>	<p>N=8613 Children from 7-12 grade</p>	<p>Non-Hispanic Whites, Mexicans, Cubans, Puerto Ricans</p>	<p>US-born immigrants are more likely to be overweight compared to foreign born immigrants; at the exception of Mexicans who maintain a similar prevalence of overweight across all generations Foreign-born Hispanic adolescents tend to have healthier dietary practices compared to their US-born counterparts.</p>	<p>Generation 1: children not born in the U.S. Generation two: children born in the U.S. with at least one foreign born parent Third generation: children born in the U.S. to U.S. born parents</p>
<p>Hernandez-valero, M., Bustamante-Montes, P. L., Hernadez, M., Halley-Castillo, E., Wilkinson, A. V., Bondy, L. M., Olvera, N. (2012). Higher risk of obesity among Mexican-American and Mexican immigrant children and adolescents than among peers in Mexico. <i>Journal of Immigrant</i></p>	<p>Cross-sectional</p>	<p>N=1717 Age: 5-19</p>	<p>Mexican, Mexican Immigrant, Mexican-American</p>	<p>Irrespective, whether the child was born in the U.S. or Mexico; those residing in the U.S. had a higher BMI than those residing in Mexico</p>	

<p><i>Minority Health</i>, 14, 517-522. doi: 10.1007/s10903-011-9535-9</p>				<p>Overall, Mexican-Americans had the highest rates of overweight.</p> <p>Males were more likely to be overweight than females; younger children aged 5-9 were more likely to be overweight than adolescents aged 15-19</p>	
<p>Hervey, K., Vargas D., Klesges L., Fischer R. P., Trippel, S., Juhn, J. Y. (2009). Overweight among refugee children after arrival in the United States. <i>Journal of Health care for the Poor and Underserved</i>, 20(1), 246-256 doi: 10.1353/hpu.0.0118</p>	<p>Retrospective</p>	<p>N=69 Age:</p>	<p>African refugee children</p>	<p>At the time of arrival underweight children become normal weight; normal weight children could potentially be at risk of overweight; overweight children had minimal change in BMI but remained at high risk of overweight. Older cohort (>6) more likely to become overweight or obese</p>	

				compared to the younger cohort (<6) BMI changes among refugee children in different age categories does not follow the same pattern as U.S. children.	
Li, N., Strobino, D., Ahmed, S., Minkovitz, S. C. (2010). Is there a healthy foreign born effect for childhood obesity in the United States? <i>Maternal and Child Health Journal</i> , 15 (3), 310-323 doi: 10.1007/s10995-010-0588-5	Early Childhood Longitudinal Study-Birth Cohort	N= 9700 at 9 months 8200 at 4 years	U.S.- born children; Foreign born mothers Native (U.S.-born) mothers	Prevalence of obesity higher among children with foreign born mothers than native born mothers No difference in the prevalence of obesity related to mother's length of stay in the U.S.	
Liu, J., Probst, J.C., Harun, N., Bennett J. K., Torres, E. M. (2009). Acculturation, physical activity, and obesity among Hispanic adolescents. <i>Ethnicity & Health</i> , 14(5), 509-525 doi: 10.1080/13557850902890209	National survey of Children's health	N=4704 Age: 10-17	Hispanics	↑ generational status was associated with more English spoken at home, ↑ in parental education, & ↑ in SES. There was no difference in the prevalent of obesity by generational status. Hispanics adolescents in households where English was not	

				primary Language had ↑ prevalence of obesity; & less likely to participate in PA .	
Schaefer, S.E, Salazar, M. Bruhn, C., Saviano, D., Boushey, C., Van Loan, M.D. (2008). Influence of race, acculturation, and socioeconomic status on tendency toward overweight in Asian –American and Mexican-American early adolescent females. <i>Journal of Immigrant Minority Health, 11</i> , 188-197. doi: 10.1007/s10903-008-9150-6	Cross-sectional	N=144 Age: children in grades K-6 th	Asian, Hispanic	Higher prevalence of overweight among Mexican-American girls compared to the Asian American girls; the Mexican Americans were also taller, had a higher BMI and percent body fat. In general, an increased in generational status in the U.S. was associated with an increased in acculturation and an increased in socioeconomic status, which correlated to a decreased in percent of body fat. However, for the Asian-American girls an increased in SES was associated with an increased in overweight	

				or obesity.	
Singh, K. G., Kogan, D. M., Yu, M. S. (2009). Disparities in obesity and overweight prevalence among U.S. immigrant children and adolescents by generational status. <i>Journal of Community Health, 34</i> , 271-281 doi: 10.1007/s10900-009-9148-6	National Survey of Children's Health	N=46,707 Ages 10-17	Non-Hispanic White, non-Hispanic Black, Hispanic, Asians	Generational patterns I the prevalence of overweight and obesity varied by ethnicity For White and Black children obesity and overweight prevalence increases with each successive generation, but no variation in the prevalence in Hispanic children by generational status Immigrant children watch less TV than native-born children Immigrant children were more inactive than native children	1 st generation: foreign born children with both parents being immigrants Second generation: U.S. born children with one or both immigrant parents Third generation: U.S. born children with U.S. born parents; considered the native group
Sussner, M. K., Lindsay, A.C., Peterson, K. E. (2009). The influence of maternal acculturation on child body mass index at age 24 months. <i>Journal of the American Dietetic Association, 109</i> (2), 218-225 doi: 10.1016/j.jada.2008.10.056.	Longitudinal	N=679 Mother-child pairs Child age 24	Latino	Children of mothers with low acculturation – exclusive native language used, were more likely to be overweight.	

		and 36 months			
Taverno, E. S., Rollins, Y. B. Francis, A. L. (2010) Generation, language, body mass index, and activity patterns in Hispanic children. <i>American Journal of Preventive Medicine</i> , 38(2), 145-153. doi: 10.1016/j.amepre.2009.09.041	Cross-sectional 2003 National Survey of Children's Health	N=2012 6-11 years	Hispanic	Higher prevalence of obesity in 1st and 2 nd generation non English speaking Hispanic children; Non English speaking children across generations have less screen time than 3 rd generation English speakers and were less likely to be involved in PA, clubs, and sports	First generation: "an immigrant to the U.S. not preceded by parents or other family members" Second generation: child was born the US; both parents are first generation immigrants Third generation: child was born in the US; parents are second generation immigrants; at least one

					parent was born in the US
Van-Hook J., Balistreri, S. K. (2007). Immigrant generation, socioeconomic status, and economic development of countries of origin: A longitudinal study of body mass index among children. <i>Social Science & Medicine</i> , 65(5). doi:10.1016/j.socscimed.2007.04.032	Longitudinal Early Childhood Longitudinal Survey Kindergarten Class of 1998–1999	N= 16,664 Children from Kindergarten through fifth grade	Hispanic, Asians, Pacific Islanders	Among the 1.0 generation, children of immigrants from higher income countries gain more weight than children from low income countries. No significant relationship between economic development of country of origin and BMI growth for the 1.5 generation. Among children of immigrants from low income countries, generation in the US has greater BMI growth in low SES children; lower BMI growth among high SES children	The 1.0 generation: children of parents who arrived to the U.S. at the age of 12 or after The 1.5 generation: children of parents who arrived in the US between the age of 0-11 Natives: children of native parents who were born and raised in the U.S. – the reference group
Wiley, F. J, Cloutier, M. M., Wakefield, B. D., Hernandez, B. D.,		209 mothers of children	Puerto-Rican and non-	Higher BMI percentile associated with higher	Noncore food: junk food and

<p>Grant, A. Beaulieu, A., Gorin, A. A. (2014). Acculturation determines BMI percentile and noncore food intake in Hispanic children. <i>Journal of Nutrition, 144</i>, 305-310 doi: 10.3945/jn.113.182592</p>		<p>ages 2-4</p>	<p>Puerto-Rican Hispanic</p>	<p>acculturation and higher noncore food consumption, in all participants</p> <p>Greater maternal acculturation to the U.S., greater child consumption of noncore food</p>	<p>nontraditional processed items</p>
<p>Wojcicki, M. J., Schwartz, N., Jimenez-Cruz, A., Bacardi-Gascon, M., Heyman, B. M. (2012). Acculturation, dietary practices and risk for childhood obesity in an ethnically heterogeneous population of Latino children in the San Francisco Bay area. <i>Journal of Immigrant Minority Health, 14</i>, 533-539. doi: 10.1007/s10903-011-9553-7</p>		<p>N=144</p> <p>Children in grades 4-6</p>	<p>Latino</p>	<p>Increased risk of obesity in children from South/Central America, but not in children of Mexican origin, Spanish being the primary language spoken at home</p>	

REFERENCES

- Bates, L. M., Acevedo-Garcia, D., Alegria, M., & Krieger, N. (2008). Immigrant and generational trends in body mass index and obesity in the United States: Results of the national Latino and Asian-American survey, 2002-2003. *American Journal of Public Health, 98*(1), 70-77
- Centers for Disease Control and Prevention. (2011). *About BMI for adults*. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html?s_cid=tw_ob064
- Centers for Disease Control and Prevention. (2012). *Basics about childhood obesity*. Retrieved from <http://www.cdc.gov/obesity/childhood/basics.html>
- Centers for Disease Control and Prevention. (2014). *Adolescents and school health* [fact sheet]. Retrieved from <http://www.cdc.gov/healthyyouth/obesity/facts.htm>
- Centrella-Nigro, A. (2009). Hispanic children and overweight: Causes and interventions. *Pediatric Nursing, 35*(6), 352-356.
- Gordon-Larsen, P., Harris M. K., Ward, S. D., Popkin, M. B. (2003). Acculturation and overweight related behaviors among Hispanic immigrants to the US: The national longitudinal study of adolescent health. *Social Science & Medicine, 57*, 2023-2034. doi:10.1016/S0277-9536(03)00072-8
- Grieco, E. M., Acosta, Y., D., Patricia de la Cruz, G., Gambino, C., Gryn, T., Larsen, L. J., ... Walters, N. P. (2012). *The foreign-born population in the United States: 2010 American community survey reports* (ACS-19). Retrieved from United States Census Bureau website: <https://www.census.gov/prod/2012pubs/acs-19.pdf>

- Hernandez-Valero, M., Bustamante-Montes, P. L., Hernandez, M., Halley-Castillo, E., Wilkinson, A. V., Bondy, L. M., Olvera, N. (2012). Higher risk of obesity among Mexican-American and Mexican immigrant children and adolescents than among peers in Mexico. *Journal of Immigrant Minority Health*, 14, 517-522. doi: 10.1007/s10903-011-9535-9
- Hervey, K., Vargas, D., Klesges, L., Fischer, P. R., Trippel, S., & Juhn, Y. J. (2009). Overweight among refugee children after arrival in the United States. *Journal of Health Care for the Poor & Underserved*, 20(1), 246-256. doi:10.1353/hpu.0.0118
- Krebs, N. F., Himes, J. H., Jacobson, D., Nicklas, T. A., Guilday, P., & Styne, D. (2007). Assessment of child and adolescent overweight and obesity. *Journal of the American Academy of Pediatrics*, 120, 193-228. <http://dx.doi.org/10.1542/peds.2007-2329D>
- Li, N., Strobino, D., Ahmed, S., Minkovitz, S. C. (2010). Is there a healthy foreign born effect for childhood obesity in the United States? *Maternal and Child Health Journal*, 15 (3), 310-323 doi: 10.1007/s10995-010-0588-5
- Liu, J., Probst, J.C., Harun, N., Bennett J. K., Torres, E. M. (2009). Acculturation, physical activity, and obesity among Hispanic adolescents. *Ethnicity & Health*, 14(5), 509-525 doi: 10.1080/13557850902890209
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*, 11(8), 806-814. <http://dx.doi.org/10.1001/jama.2014.732>

- Perreira, K. M., & Ornelas, I. J. (2011). The physical and psychological well-being of immigrant children. *The Future of Children*, 21(1), 195-218.
<http://dx.doi.org/10.1353/foc.2011.0002>
- Schaefer, S. E., Salazar, M., Bruhn, C., Saviano, D., Boushey, C., & Van Loan, M. D. (2009). Influence of Race, acculturation, and socioeconomic status on tendency toward overweight in Asian-American and Mexican-American early adolescent females. *Journal of Immigrant & Minority Health*, 11, 188-197. <http://dx.doi.org/10.1007/s10903-008-9150-6>
- Singh, G. K., Kogan, M. D., & Yu, S. M. (2009). Disparities and overweight prevalence among US immigrant children and adolescents by generational status. *Journal of Community Health*, 34, 271-281. <http://dx.doi.org/10.1007/s10900-009-9148-6>
- Stockert, P.A. (2013). Nutrition. In P. A., Potter & A. G, Perry (Eds.), *Fundamentals of nursing* (8th ed., pp. 996-1041). St Louis, MO: Mosby Elsevier
- Sussner, M. K., Lindsay, A. C., Peterson, K. E. (2009). The influence of maternal acculturation on child body mass index at age 24 months. *Journal of the American Dietetic Association*, 109(2), 218-225 doi: 10.1016/j.jada.2008.10.056.
- Taverno, E. S., Rollins, Y. B. Francis, A. L. (2010) Generation, language, body mass index, and activity patterns in Hispanic children. *American Journal of Preventive Medicine*, 38(2), 145-153. doi: 10.1016/j.amepre.2009.09.041

- Van Hook, J., & Baker, E. (2010). Big boys and little girls: Gender, acculturation, and weight among young children of immigrants. *Journal of Health and Behavior, 51*, 200-214.
<http://dx.doi.org/10.1177/0022146510372347>
- Van Hook, J., & Balistreri, K. S. (2007). Immigrant generation, socioeconomic status, and economic development of countries of origin: A longitudinal study of body mass index among children. *Social Science & Medicine, 65*, 976-989.
<http://dx.doi.org/10.1016/j.socscimed.2007.04.032>
- Wiley, F. J., Cloutier, M. M., Wakefield, B. D., Hernandez, B. D., Grant, A. Beaulieu, A., Gorin, A. A. (2014). Acculturation determines BMI percentile and noncore food intake in Hispanic children. *Journal of Nutrition, 144*, 305-310 doi: 10.3945/jn.113.182592
- Wojcicki, M. J., Schwartz, N., Jimenez-Cruz, A., Bacardi-Gascon, M., Heyman, B. M. (2012). Acculturation, dietary practices and risk for childhood obesity in an ethnically heterogeneous population of Latino children in the San Francisco Bay area. *Journal of Immigrant Minority Health, 14*, 533-539. doi: 10.1007/s10903-011-9553-7