

Enablers and Barriers to Factors Contributing to Bone Health among Early Adolescent Somali
Girls Living in Minnesota

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Dedication

This dissertation is dedicated to my parents, Edwin and Anna Jane Mescher, who instilled in me a curiosity about the world and a love and appreciation for education and to Bonnie Bata-Jones who first encouraged me to embark on this journey.

Abstract

Purpose: This descriptive qualitative study aimed to (a) gain a better understanding of the socio-cultural and environmental factors that shape lifestyle practices contributing to bone health including the dietary intake of foods high in calcium and vitamin D, sunlight exposure, and physical activity, and (b) to identify enablers and barriers to these lifestyle practices among early adolescent Somali girls who live in urban and more rural areas of Minnesota.

Theoretical/Conceptual Framework: Urie Bronfenbrenner's socio-ecological theory informed the framework used to guide this study. This theory recognizes the complex relationships between the individuals and their numerous environments and considers the individual's development within and across different levels of these environments. This theory was chosen because it acknowledges the social, cultural, historical, and environmental influences on development and behaviors over time.

Subjects: Four cohorts of 6 to 12 girls of Somali ethnicity, ages 11 -14 years, were recruited from two Minnesota communities, Minneapolis and Owatonna. Thirty-nine girls participated. Of the 39 participants, 26 participated in all 3 sessions; 10 participated in only 2 sessions, and 3 girls participated in the first session only.

Methods: A series of three focus groups was conducted with each cohort of girls, a younger cohort and an older cohort from each community, to gather information about enablers and barriers related to diet, dress, activity, and sunlight exposure relative to bone health. The focus groups were conducted according to guidelines published by Krueger and Casey (2000).

Results: Descriptive content analysis was utilized to summarize information derived from the within and across cohort analysis of the focus group data and to identify enablers and barriers to factors contributing to bone health. Cultural tradition, age/developmental stage, acculturation, and environment emerged as key concepts that shaped lifestyle practices and contributed to enablers and barriers to bone health among study participants.

Conclusion: Cultural tradition, developmental stage, acculturation and environment emerged as major contributors to factors shaping, enabling, and acting as barriers to bone health among Somali girls, ages 11 to 14 years, living in Minnesota. These findings must be considered when designing and implementing bone health promotion strategies within these communities.

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Chapter 1: Introduction

1.1 Introduction

Since the mid 1990's, Minnesota has experienced an influx of immigrants from Somalia due to the civil unrest occurring in that country. Most Somalis are Sunni Muslims and come from a nomadic or agrarian background. Somalia is a country on the East Coast of Africa, which follows the coastline along the Horn of Africa. Originally called Somaliland, Britain and Italy ruled Somaliland as protectorates until 1960. Following independence from both powers, the areas merged to form the Somali Republic in July of 1960. Mohamed SIAD Barre headed a coup in 1969, which established an authoritarian socialist rule. During this period, Somalia developed a more urban and educated population. This government provided some stability to the country until its collapse in 1991. Since that time, Somalia has experienced factional fighting and anarchy.

It is estimated that 1.1 million people have been displaced from Somalia since 1988 (CIA World Fact Book, 2009). The United States (U.S.) has received increasing numbers of Somali immigrants and refugees since the 1990s. Factors such as domestic upheaval and changes in immigration laws have contributed to the influx of people from African nations. Between 1985 and 2000, 31,000 Somali immigrants entered the United States and in 2003, 43,000 Somalis entered as refugees (Princeton, 2006). The 2000 U.S. Census shows there were 44,900 individuals living in the U.S. who were either born in Somalia or were of Somalian ancestry, but not born in Somalia. It is conjectured that Somalis were likely undercounted in the U.S. Census in 2000.

Today, Minnesota is home to the largest Somali population in the United States (Wissink, Jones-Webb, DuBois, Krinke, and Ibrahim, 2005). It is estimated there were between 25,000 and 30,000 Somali residents living in Minnesota in 2004 and that number has continued to grow (Condon, 2006). Minnesota International Health Volunteers places the number at between 15,000 and 60,000 individuals (Leinberger-Jabari, 2002). The Minnesota Department of Health

has graphed the influx of immigrants to Minnesota during the last 30 years which reflects the increase in immigration from Sub-Saharan Africa over time (see Figure 1).

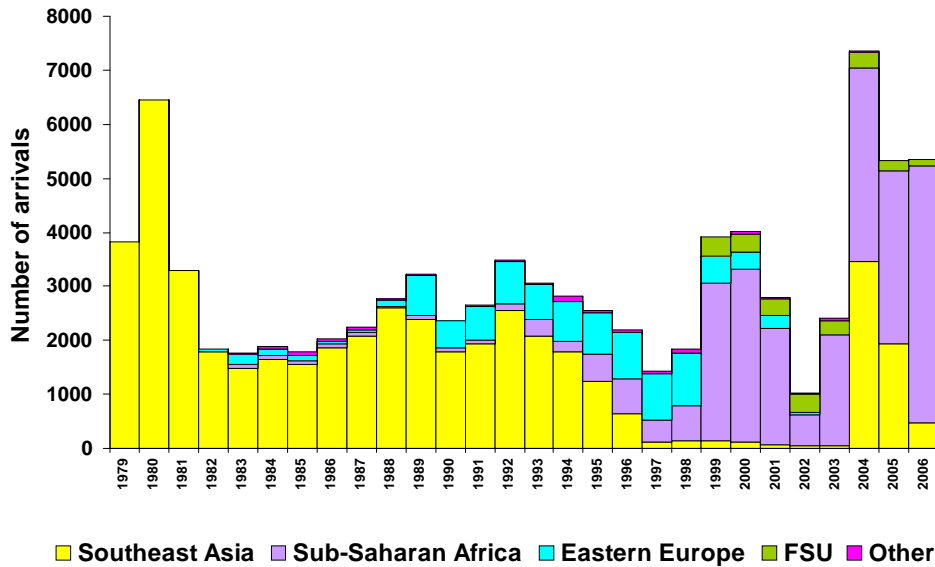


Figure 1. Immigration of Patterns in Minnesota 1970-2006 Adapted from the Minnesota Department of Health Refugees

As the Somali community grows in Minnesota, it continues to attract Somalis from other parts of the U.S. and Canada. It is estimated that 77 - 85% of the Somali population in Minnesota is between the ages of 18 years and 40 years and 12-25% are under the age of 18 years (Plaisted, 2002). In 2008-2009, 1878 children in the Minneapolis Public School system listed Somali as their primary language (Minnesota Department of Education, 2007). Most of the Somalis in Minnesota settled in urban centers such as the Minneapolis-St. Paul metro area, Rochester, St. Cloud, and Owatonna.

Despite the increasing number of Somalis living in Minnesota, little has been published about the health and lifestyle practices of Somali youth and families within a socio-cultural or community context. Minnesota International Health Volunteers (MIHV) has conducted several

studies that describe the nutrition and exercise patterns and attitudes about health of Somalis living in Minnesota, although these have focused on Somali adults (Leinberger-Jibari, 2005; Plaistad, 2002). Even less is known about the lifestyle practices of Somali youth whose parents or grandparents were refugees or immigrants from Somalia, nor the degree to which Somali youth have adopted typical American diet and exercise practices.

In clinical practice as a Family Nurse Practitioner, I noted that many Somali women whom I saw in the clinic presented with bone and muscle pain. On closer scrutiny, many were found to be vitamin D deficient (values < 15-20ng/ml) or vitamin D insufficient (values < 30ng/ml). Vitamin D is essential for the promotion of bone health and the prevention of bone related diseases such as osteoporosis, osteopenia, osteomalacia, and rickets. Additionally, current vitamin D research links vitamin D deficiency to heart disease, diabetes, poor pregnancy outcomes, autoimmune disease, and cancer (Holick and Chen, 2008). These findings prompted my interest in exploring the roots and significance of vitamin D deficiency and the factors affecting vitamin D, specifically by exploring the lifestyle practices and health behaviors of youth within the culture, during the critical period of bone mass accrual. There is growing evidence for insufficient calcium and vitamin D intake during the period of peak bone mass accrual during childhood and adolescence, as well as growing inactivity among children and adolescents living in the United States in general. There is also documentation of diminished vitamin D status in adults, especially dark skinned individuals, in the U.S., thus there is a need to explore the factors that contribute to bone health among first generation Somali youth and to determine the social and cultural contexts that influence health behaviors. The purpose of the current study was to (a) gain a better understanding of the socio-cultural and environmental factors that shape lifestyle practices contributing to bone health including the dietary intake of foods high in calcium and vitamin D, sunlight exposure, and physical activity, and (b) to identify enablers and barriers to

these lifestyle practices among early adolescent Somali girls who live in metropolitan and non-metropolitan areas of Minnesota.

1.2 Theoretical Foundation

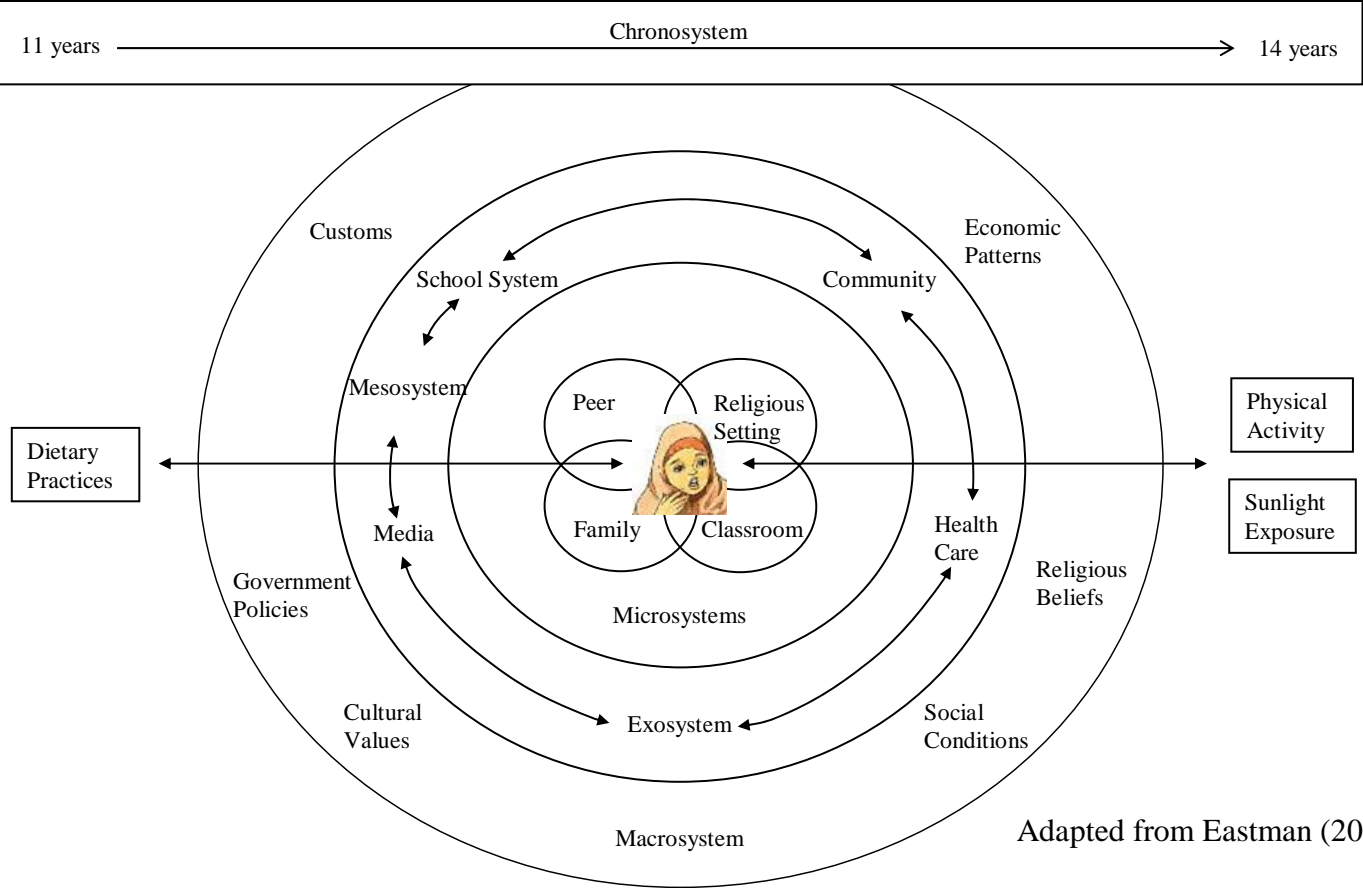
The design of this study is informed by Urie Bronfenbrenner's Ecological Systems Theory. This theory was selected because it acknowledges the complex array of factors within systems that shape health behaviors. An ecological framework guides the conceptual development of the study design aimed at describing enablers and barriers to dietary intake, sunlight exposure, and participation in weight-bearing activities among early adolescent Somali girls living in Minnesota, all of which may affect bone health. The theory guides the study as well as the analysis, and findings were organized specific to the theoretical constructs.

Ecological systems theory. This theory guides exploration of the influence of family, culture, religion, school, society, and the passage of time on factors affecting bone health (dietary intake, sunlight exposure, and weight bearing activity). (See figure 2). It supports the premise that it is necessary to interact with the community to understand and gain perspective on the factors that shape an individual's health behaviors. This theory recognizes the complex relationships between the individuals and their numerous environments and considers the individual's development within and across different levels of these environments. The individual is viewed as nested within an ever-expanding system of networks: the microsystem (family, school classroom), mesosystem (relationships between different microsystems), exosystem (factors that shape the microsystem environment) macrosystem, (culture, religion, government), and chronosystem (time, critical periods in development) (Eastman, 2004). This theory acknowledges the social, cultural, historical, and environmental influences on development and behaviors over time. In this study, the Somali early adolescent girl is at the center of the pictorial model (see Figure 2). The model represents how she is nested within a system of networks that may shape her dietary practices, weight-bearing physical activities, and sunlight exposure. The chronosystem

reflects the age range of participants and is linked to the particular developmental state of the girls.

The Ecological Systems Theory is widely used as a conceptual framework to guide the research process and to lay the foundation for the development of culturally and developmentally appropriate educational health promotion interventions. Indeed, a culturally competent ethical framework is a goal of research with diverse populations. It is necessary to investigate social and cultural realities that are important to diverse groups when designing and implementing research studies and interventions. It is especially useful to portray the wide range of influences on the development of behaviors during childhood and adolescence. At the same time, this framework acknowledges the impact and interaction of multiple cultures and systems and the role of acculturation in shaping the health behaviors explored in this study. See as depicted in Figure 2.

Figure 2. Conceptual Model



Acculturation. As new members of society, Somalis arrive with their own health beliefs and practices. In order to adequately provide care for these individuals and anticipate and meet their health care needs, it is essential for health care providers to gain an understanding of the experiences immigrants and first generation individuals go through in adjusting to the new culture of the host country and how these experiences influence their health behaviors. This process is referred to as “acculturation”. A classic definition of acculturation states that “acculturation comprehends those phenomena which results when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original cultural patterns of either or both groups” (Redfield, Linton, and Herskovits, 1936, p 149).

Inherent in this definition, is the idea that acculturation plays out over time. Thurnwald (1932) recognized the dynamic aspect of acculturation by describing it as a process, not an isolated event. Berry (2001) further developed the concept of acculturation, particularly as it relates to immigrant populations. He identified four attitudes or modes of acculturation: assimilation, separation, integration, and marginalization. A process of mutual accommodation on the part of both cultures is required for integration to occur. He also defined acculturation as having two levels: group and individual.

Numerous models of acculturation have developed from Berry’s work. Horenczyk (1997) extended Berry’s theory of acculturation by adding the concept of acculturation expectations; that is immigrants redefine their identity not only based on their own views of acculturation, but also on their expectations of the views of acculturation held by the receiving society. Bourhis, Moise, Perreault, and Senecal (1997) reviewed the frameworks underlying Western policies regarding immigration. They introduced a new model of acculturation called the Interactive Acculturation Model. The premise of this model is that the final outcome of acculturation depends on the orientation of both the immigrants and the host country and these are shaped by integration policies of the state. More recently, Landine and Klonoff (2004) proposed an Operant Theory of

Acculturation that merges behaviorism with acculturation in an attempt to predict changes in ethnic health a priori in order to reduce health disparities through better health promotion and disease prevention. The process of acculturation, which may affect diet and lifestyle practices, was considered in conducting the current study, with a focus on exploring factors shaping lifestyle practices that contribute to bone health

Developmental stage. The age range for early adolescent participants in this study is eleven years to fourteen years. This encompasses the crucial period of bone mass accrual and is a pivotal age for the development of dietary and lifestyle health practices. Children of this age group are on the threshold of adolescence and are beginning to develop self concept and autonomy. They gravitate toward their peer group. Community, society, and culture may play strong roles in influencing development and the adoption of lifestyle practices during this period (Chen and Farruggia, 2002).

From a traditional developmental standpoint, girls at this age are primarily concrete thinkers, although increasingly capable of more complex and abstract thought. Chen and Farruggia (2002) propose that there may be some cultural variation in the sequencing of development as well as differences regarding the importance of certain stages of development (such as the idea of formal operations) based on cultural context. Youth in this age group are interested in and moving toward more peer influence and away from family influence. They typically like to participate in peer group activities and feel a need to belong (Centers for Disease Control, 2005; Hagen, Shaw, and Duncan, 2008). These developmental milestones were considered in the design of the current study and influenced the author's choice of utilizing focus groups instead of individual interviews to gather data.

Chapter 2: Literature Review

The long-term effects of calcium and vitamin D deficiencies, diminished sunlight and physical activity on bone health could be detrimental for some Somali females. In order to achieve better health outcomes in these individuals, it is essential to understand the environmental, sociocultural, and temporal factors that may act as enablers or barriers to factors contributing to bone health among early adolescent Somali girls. Knowledge about these factors could then be utilized to develop educational and interventional programs that are culturally and developmentally tailored to enhance bone health among Somali youth. This chapter will present literature for a two-fold purpose: a) to provide an overview of the concept of bone health as well as the prevalence, trends, and outcomes of vitamin D and calcium deficiency and inactivity related to bone health, ethnicity, gender, and age, and b) to explore existing literature relative to the environmental, sociocultural, and temporal factors that may act as enablers and barriers to factors contributing to bone health.

A thorough review of existing literature was conducted using the following databases: Medline, PubMed, Google, CINAHL, Google Scholar, and Global Health. Search terms used included: bone health, bone density, calcium, dietary calcium, calcium supplementation, vitamin D, physical activity, vitamin D deficiency, osteomalacia, rickets, immigrant health, East Africa, East African ancestry, immigration and emigration, refugee health, acculturation, acculturation among Somali immigrants, and dietary acculturation. Google Scholar, was searched using the term “bone health in an East African immigrant population”. Searches were initially restricted by age (child, adolescent) and by language (English). The search was limited temporally to publication between the years 1990 – 2009. An additional literature review was also conducted to explore research that compared findings between rural and urban dwellers as the current study was conducted in a both an urban and a more rural setting. Additionally, a literature search was conducted using the following terms: use of focus groups in pediatric populations, pediatric

qualitative research, and descriptive content analysis. Relevant symposia proceedings, primarily related to Vitamin D, were located by searching Google and by utilizing peer networks. National databases such as the National Health and Nutrition Examination Survey, the 2000 Census, Youth Risk Behavior Survey, and local databases such as the 2001 Minnesota Student Survey were also utilized. Literature related to developmental stage and acculturation was included as guided by the conceptual framework.

To further delve into the literature relative to East African culture, the following search terms were combined with immigrant health: bone health, dietary calcium, Vitamin D, osteomalacia, rickets, and vitamin D deficiency. There were relatively few articles found relating specifically to East African immigrants, and fewer still related to children and adolescents. The search was broadened to include adults. Relevant articles originated in Europe, Australia, and the United States. A hand search of reference lists from reviewed articles was also used to find articles meeting the search criteria. To be included, studies were required to a) have a focus on bone health or one or more of the factors known to affect bone health (calcium and vitamin D intake, sunlight exposure, dark skin pigmentation, and physical activity and exercise); b) include study participants of East African ethnicity; c) be written in English (due to lack of translation capabilities); and d) be published between 1990 and the present (period of time of the East African Diaspora). Following the initial restricted search, a broader search of the international literature was conducted in order to compare global studies conducted among native populations with similar lifestyles and practices to that of East African immigrants.

2.1 Bone Health

Females are at greater risk for the development of the long-term adverse effects of diminished bone health. According to the Surgeon General's report in 2004, roughly "10 million Americans over 50 years of age have osteoporosis and another 34 million are at risk of developing it due to low bone mass" (Department of Health and Human Services, 2004, Preface,

p.1). Cooper et al. (1997) define osteoporosis as “a reduction in bone mass which predisposes to fracture”, and state (it) “constitutes a major public health problem” (Cooper et al., 1997, p. 17). This puts older Americans, especially women at risk for fracture in later life. In fact, it is estimated that one out of two women over the age of 50 years will experience an osteoporosis-related fracture at some point in their lives (Department of Health and Human Services, 2004).

As a result of these startling estimates, attention has increasingly focused on bone health and the prevention of osteoporosis. Bone health is a term that is frequently cited, but rarely defined in the literature. Heaney et al. (2000) describe two aspects of bones that reflect bone health: bone mass (bone mineral content and bone mineral density) and bone strength (load bearing capacity of bone). Bone mass is considered a determinant of bone strength and is the marker usually measured. Bone size is a component of bone density measurement. Skeletal growth typically provides a means of measuring bone health in children and occurs across three parameters: length, breadth, and mass from infancy through early adulthood.

The formation of bone is a complex process that is impacted by diet, exercise, genetics and chemicals within the body. The skeleton is formed initially as cartilage. As osteoblasts (the cells that form bone) differentiate, cartilage is replaced with trabecular bone through calcification. In a process called modeling, the length of bone changes when new cartilage is laid down at the end growth plates of the bones and the width of the bone changes in a complex process of bone apposition and resorption. During resorption, osteoclasts (cells that breakdown bone) remove mineral and matrix from within the bone. When this is complete, a reversal process begins during which osteoblasts lay down new bone, thus resulting in increased width. This process of bone turnover (remodeling) begins in utero and continues into adulthood and is influenced by genetics (Raisz, L., 1999). Major skeletal growth (height) ceases for most individuals by late adolescence, but the process of remodeling (the breakdown and build-up of bones) persists over time. At different periods in the life cycle such as infancy, childhood, and adolescence, bone formation is

greater than bone resorption. The trajectory of bone growth follows a rapid-slow-rapid pattern through infancy, childhood, and puberty (Heaney, 2000). For girls, mean height velocity is close to 0 at age 16 years and for boys, age 17 years. Similarly, Ondrak and Morgan (2007) identify two primary periods of bone growth in childhood, ages 1 to 4 years and puberty. It is reported that girls attain roughly 94.1% and boys 89.4% of their total body bone mineral density by 15 years of age (Duppe, Cooper, Gardsel, and Johnell, 1997).

In 2000, the Consensus Development Conference on Osteoporosis Prevention, Diagnosis, and Therapy identified bone mineral accretion during childhood as a key factor in the risk of developing osteoporosis later in life (National Institutes of Health, 2000). In order to understand how and why osteoporosis develops, researchers have begun to look backward in time to study events that occur in childhood and adolescence when peak bone mass is accrued (Kalkwarf, Khoury, and Lanphear, 2003). The importance of the adequacy of dietary calcium intake and vitamin D during the growth spurt in pre-puberty and adolescence is increasingly recognized (American Academy of Pediatrics (AAP), 1999; Greer, Krebs, and Committee on Nutrition, 2006). Greer et al. (2006) indicate that roughly 40% of lifetime bone mass is accrued during adolescence while Abdullah et al. (2002) note that “adolescence is a critical period for increasing bone mass, as almost 60% of adult bone mass is accumulated, and therefore adolescents are at risk for developing bone problems if not adequately supplied with vitamin D and calcium, among other factors” (Abdullah et al., page 1017).

Yet, while bone mineral accrual increases during this time, there is evidence to show that some environmental factors necessary for bone mineral accrual may decrease during this time. Factors affecting peak bone mass accrual and bone health include skin pigmentation, and environmental factors such as the intake of foods rich in calcium and vitamin D, sunlight exposure (essential for the synthesis of active vitamin D in the body), and weight-bearing exercise. Heaney et al. (2000) discussed the impact of some of these environmental factors on the

course of bone mass across the life cycle in females and noted differences between those who reach genetic potential and those who do not. He found an association between lower bone mass in childhood and lower bone mass in adulthood among females. It is these factors that have recently garnered increased study among children and early adolescent populations.

2.2 Dietary Calcium

Calcium has been recognized as an essential component in the promotion and maintenance of bone health (Abrams, 2002; Gordon, DePeter, Feldman, Grace, and Emans, 2004; French, Fulkerson, and Story, 2000; Kalkwarf et al., 2003; Zhu et al, 2006). Calcium is the primary component of bone mineral. It is considered a threshold nutrient in that certain levels of calcium are required for bone mass accumulation, but intakes in excess of this level cannot be stored by the body and likely have no beneficial effect on further bone mass accumulation (Heaney et al., 2000). Inadequate dietary calcium intake during critical periods potentially affects optimal peak bone mass accumulation (Greer et al., 2006) and height (Black, Williams, Jones, and Goulding, 2002; Whiting et al., 2004; Wiley, 2005). Heaney and Weaver (2005) also identify calcium's effect in indirectly regulating skeletal remodeling, the process of bone breakdown and formation. There is evidence that diminished bone mass during this critical period contributes to an increase in fracture risk during childhood and adolescence. Goulding, Jones, Taylor, Williams and Manning (2000) reported on an increase in forearm fractures among girls 3 to 15 years with diminished bone mass. Ferrari, Chevalley, Bonjour, and Rizzoli (2006) also noted childhood fractures were associated with decreased bone mass gain during puberty.

Wiley (2005) reported that milk consumption during childhood and adolescence was positively associated with adult height. Black et al. (2002) concluded that prolonged diminished cow's milk consumption in childhood correlated with short stature. Milk intake in childhood and adolescence was also found to correlate with improved bone health in later years. A study which correlated historical reports of milk intake during childhood and adolescence with bone mineral

density and bone mineral content in adult women found that women aged 20 to 49 years who had a low intake of milk (< 1 serving of milk/week) in childhood had a 5.6% lower bone mineral content than those women who reported a high milk intake (> 1 serving/day). Similarly, low milk intake in childhood and adolescence for women ages > 50 years was associated with a fracture risk that was two-fold greater than women with a high milk intake (Kalkwarf et al., 2003).

Youth in the United States generally have sub-optimal intakes of calcium and vitamin D-enriched food, especially during the early adolescent and adolescent years. It is estimated that only about 30% of children overall in the United States consume enough calcium to meet the recommended daily allowance (RDA) (Schrager, 2005). (See Appendix A for Recommendations for Adequate Dietary Calcium Intake in the United States). The 2001 Minnesota Student Survey found that the majority of students, ages 12 to 19 years, do not get 3 to 4 servings of milk per day, which is the recommended amount for this age group (Minnesota Department of Health, 2004). Similarly, the Youth Risk Behavior Survey (YRBS), (2007) reported that only 14.1% of 9th – 12th grade youth surveyed drank three or more glasses of milk per day in the preceding seven days. These data showed a declining trend in milk consumption from 1999 – 2007. The trend for calcium intake during childhood and adolescence is to decrease over time from infancy through adolescence (Auld et al., 2002; Fiorito, Mitchell, Smicklas-Wright, and Birch, 2006; Fleming and Heimbach, 1994; Greer et al., 2006; Lytle et al., 2002; Wiley, 2005). While, there are conflicting results regarding dietary calcium inadequacies among minority youth in the U.S. versus Caucasian youth, the YRBS (2007) revealed that Hispanic, Black, and Caucasian students all reported dietary calcium intakes below recommended levels for age. Of these, black students were more likely than white students to consume less than three glasses of milk per day. The nadir for dietary calcium intake is reported to occur during adolescence, which is the critical period for bone mass accrual.

For adolescent girls, the number meeting RDA for calcium falls to about 10% (Greer et al., 2006). This trend was noted among Caucasian adolescents as well as among Hispanic, Asian, Native American, and African American youth (Auld et al., 2002; Greer et al., 2006; and Lytle et al., 2002). The Minnesota Department of Health (2004) reports that only 13% of girls and 36% of boys, ages 12 to 19 years, have adequate calcium intakes. Breakdown of data by gender in the YRBS (2007) revealed that females were 91.2% likely to drink less than three glasses of milk per day versus males who were 80.6% likely to drink less than three glasses per day. Numerous other studies reported gender differences as well. In these studies, males typically had higher calcium intakes than females from age 11 years to old age (Fleming and Heimbach, 1994; Larson, Story, Wall, and Neumark-Sztainer, 2006; Lytle et al., 2002; Wiley, 2005).

Skipping meals, especially breakfast was associated with decreased calcium intake (Affenito et al., 2005; Auld et al., 2002; Bowman, 2002; Larson et al., 2006). In fact eating meals appeared to be a positive influence on milk intake. Bowman (2002) noted that drinking milk was most often associated with eating meals at home or at school, although there was variation in milk intake at school over time. With increasing age, children tended to drink less milk, at home and school, beginning in middle school. Larson et al. (2006) identified some factors that increased the likelihood of enhancing milk and calcium intake among adolescent girls. Socioeconomic status (SES) is one such factor. Larson et al. (2006) reported higher calcium intakes with higher SES. Lytle et al. (2002) indicated that SES is a confounding factor when examining cultural influences on dietary intakes. Larson et al. (2006) also identified liking the taste of milk, having healthy attitudes about nutrition and being able to make healthy food choices is positively associated with calcium and milk intake among adolescent girls.

One of the findings associated with decreased intake of milk over time is the availability of and the ability of adolescents and older children to substitute other beverages for milk. Having these beverages at home and allowing them as alternatives to milk intake intensify the problem.

Bowman reports that milk intake decreased by 36% from the mid 1970's to the mid 1990's. During this same time, consumption of soda and fruit juice nearly doubled (Bowman, 2002).

Auld et al. (2002) also reports on changing attitudes regarding milk intake among female adolescents. They reported that adolescents no longer thought it was necessary to drink milk and they were less likely to receive messages from parents about drinking milk. They cite lack of family role modeling and valuing of milk intake, along with peer influence as being primary elements of change in beverage selection during this age period. Some of these differences in family support appear to be cultural, but are confounded by other factors such as socioeconomic status, food preferences, and different marketing techniques (Lytle et al., 2002). Weaver also raises the question of whether calcium requirements might vary according to ethnicity due to differences in calcium absorption. She notes differences in foods high in calcium between ethnic diets and the U.S. diet (Weaver, 1994).

The Somali diet typically includes rice, meat (goat, camel, lamb, chicken, or beef most commonly) fried in ghee (clarified butter). Corn flour is commonly used for making bread. Beans such as pinto and red and pasta are also reportedly commonly eaten. Bananas are added to many foods. Vegetables are added to sauces, but rarely eaten plain or as a side dish. Foods are listed as Halaal (foods of plant or animal origin that have been slaughtered in the Islamic way) or Haram (foods that are forbidden such as pork, alcohol, drugs or any foods thought to contain pork products). Some Somalis avoid foods such as yogurt, infant formula, and cheese because they are thought to contain pork. The traditional diet has not included large sources of calcium and vitamin D enriched foods. Somalis also believe that Camel's milk is the best milk, but it is largely unavailable in many parts of the world (Haq, 2005). Maxwell, Salah, and Bunn (2006) reported minimal intake of calcium rich foods among Somalis living in Liverpool, England. Diet acculturation is reflected by the addition of fast food, cheese, ready-made pasta, fruit juices, soda,

sugar, and pancake mix to traditional foods among Somalis living in Seattle, Washington (Haq, 2005).

2.3 Vitamin D

Vitamin D is essential for bone mineralization, because it promotes calcium absorption in the intestine and plays a role in maintaining serum phosphorus and calcium levels. Insufficiencies in vitamin D result in decreased calcium absorption and increased parathyroid hormone (PTH) levels. Elevated PTH may contribute to increased bone turnover over time. PTH levels are known to increase normally during adolescence, although the significance of this on vitamin D levels is unclear (Cashman, Hill, Cotter et al. (2008). When vitamin D levels are inadequate during puberty as peak bone mass accrues, there is risk of negative calcium balance and diminished bone mineral mass accrual. Lehtonen-Verormaa et al. (1999) reported that vitamin D levels decreased in Finnish girls from the period two or more years prior to menarche to the period two years after menarche, which is of concern due to the long-term effect on bone mass accrual. Cashman et al. (2008) reported that 12 to 15 year-old girls living in Ireland who had low vitamin D levels had lower BMDs of the forearm and higher bone turnover marker concentrations and higher PTHs than their counterparts with high vitamin D levels. In this study, high vitamin D levels were considered $> 74\text{nmol/L}$ and low Vitamin D levels were considered $< 46.3\text{nmol/L}$. The American Academy of Pediatrics recommends Vitamin D levels of $>50\text{ nmol/L}$ for children and adolescents based on current research (AAP, 2008). It is estimated that 1 to 17% of adolescents living in North America have vitamin D levels $< 30\text{ nmol/L}$ (Wagner & Greer, 2008, page 1147).

Primary sources of vitamin D in the United States include vitamin D fortified foods such as milk, infant formula, cereal, and fish and fish oils. Ethno Med reports that fish has not traditionally been a food widely eaten by East African Somalis (Haq, 2005). The recommended dietary intake of vitamin D in the absence of sunlight exposure is 5.0 ug/dl (Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, 1997). NHANES III data indicates that

vitamin D intake among adolescents in the U.S. is below recommended amounts (National Center for Health Statistics, 2004).

Sunlight exposure is the most important source of vitamin D. The ultraviolet B rays in sunlight act as a stimulant to the conversion of pro-vitamin D (precholecalciferol) in skin to vitamin D (Abrams, 2002; Cheng et al., 2003). Several factors can interfere with the photosynthesis of pro-vitamin D. Wearing clothing that covers typically exposed skin such as long sleeves, pants, or long skirts will decrease the absorption of ultraviolet rays, since the clothing will absorb most of the rays (Abrams, 2002; de la Jara, Pecoud, and Favrat, 2004). The majority of East African immigrants, including the Somali, are Muslims. The Muslim religion typically requires females to wear the traditional attire of long dress with long sleeves and a head covering (hejab or hijab), which reduces sunlight exposure. Style of dress has been found to be a contributing factor to hypovitaminosis D among girls and women even in sunny countries such as Saudi Arabia and Turkey (Abdullah et al., 2002; Al Faraj and Mutairi, 2003; Budak, Cicek, Sahin, & Tutus, 2004).

Dark skin pigmentation has been implicated as a factor that decreases absorption of ultraviolet rays and contributes to vitamin D deficiency (Harkness and Cromer, 2005; Looker et al, 2002). Ten to fifteen minutes of full body sun exposure in the summer would generate 10,000 to 20,000 International Units of Vitamin D in light-skinned adults and individuals with dark skin pigmentation would likely need five to ten times that amount to generate the same levels of vitamin D (AAP, 2008, p.1144). Youth in the United States may be at risk for low levels of vitamin D and its complications such as rickets, osteomalacia and myositis. The American Academy of Pediatrics recognized the increased risk for rickets secondary to insufficient vitamin D in dark skinned infants, especially if they are exposed to minimum sunlight (Spence & Serwint, 2004). A cross-sectional study conducted at a primary care clinic in Boston found that 24.1% of healthy patients aged 11 to 18 years were vitamin D deficient [25 hydroxyvitamin D, (25OHD) <

15ng/ml] and 42% were diagnosed as vitamin D insufficient (25OHD < 20ng.ml). The highest incidence occurred in African American youth and among those youth tested during the winter months, but was noted in other ethnicities (Caucasian, Hispanic, and Asian) as well (Gordon, DePeter, Feldman, Grace, and Emans, 2004).

Moore, Murphy, and Hollick (2005) reported that data from the National Health and Nutrition Examination Survey (NHANES) 1999-2000 revealed that the lowest reported dietary intakes of vitamin D were among teenage girls and women. African American girls, ages 9 to 18 years, were found to have slightly lower intakes of vitamin D than their counterparts from other ethnic groups. Looker, Dawson-Hughes, Calvo, Gunter, Sahyoun (2002) also reported on NHANES data showing that African American adolescent girls and young adults were two to eight times more likely to show hypovitaminosis D than their white counterparts. Harris and Dawson-Hughes (1998) raised similar concern about hypovitaminosis D among African American adolescent girls living in the Boston area. Harkness and Cromer (2005) conducted a study among adolescent girls ages 12 to 18 years in Cleveland, Ohio that measured and compared levels of vitamin D between African Americans and non-African Americans during different seasons of the year. Results showed that 26% of African American girls were vitamin D deficient [(25(OH)D levels < 27.5nmol/L] and 71% were vitamin D insufficient [(25(OH)D) levels < 50 nmol/L] compared with <1% vitamin D deficient and 24% vitamin D insufficient among non-African American girls. There were also seasonal differences within and across groups, but African American girls consistently had lower levels of Vitamin D than non-African American girls (Harkness and Cromer, 2005). Subclinical hypovitaminosis D has been found in international studies as well. In a study of Palistinian immigrant children ages 9 to 16 years living in Denmark, 81% of them were found to be vitamin D deficient on screening despite no clinical evidence of rickets.

Living in northern climates, (such as Minnesota at 42 - 49 degrees latitude north) results in seasonally weaker sunlight. An increase in the zenith angle at which the sun reaches the earth decreases the number of UVB rays hitting the earth thus decreasing vitamin D synthesis (Holick and Chen, 2008). Research has shown that vitamin D levels decrease during winter and part of spring in Northern latitudes (Anderson et al., 2005; Cheng, 2003; Gordon et al., 2004). Seasonal fluctuations in vitamin D levels have also been noted in the southern hemisphere (Rockell et al., 2005).

2.4 Physical Activity

Estimates of physical activity among early adolescents and adolescents in the U.S. indicate that children are not very active. Almost one-half of youth ages 12 to 21 years in the U.S. do not regularly participate in vigorous activities and girls are more likely to be inactive than boys, 14% versus 7% [Centers for Disease Control (CDC), 1999]. The 2007 Youth Risk Behavior Surveillance System (YRBSS) (CDC, 2008) reported that only 34.7% of 9th to 12th grade youth surveyed in the U.S. met the physical activity requirement of exercising for 60 minutes on five out of the preceding seven days. This trend was stable from 1991 to 2007. Furthermore 74.4% of girls versus 56.3% of boys did not meet recommended physical activity requirements. Girls were also more likely than boys to not attend physical education class. In the Minnesota Student Survey (Minnesota Department of Health, 2007), 6th graders reported being active for 30 minutes per day in the prior five out of seven days 47.6% of the time, but that number decreased to 41.4% by 12th grade. There was no breakdown by gender provided. Trioano, Berrigan, Dodds et al. (2008) reported on data from The National Health and Nutritional Examination Survey (NHANES, 2003-2004). They reported a declining trend in physical activity from childhood through adolescence. Data revealed that while 42% of children 6-11 years reported activity equaling 60 minutes per day 5 days per week, only 8% of adolescences reported meeting that recommendation. Similarly, in a five year longitudinal study, Nelson, Neumark-

Sztainer, Hannan, Sirard, & Story (2006) observed a negative trend in physical activity and an increase in computer use among a group of adolescents over time.

A declining trend in participation in athletic activities was also found from early to late adolescence. Studies as early as the 1980s observed the phenomenon of declining participation in athletic activities beginning in early adolescence and accelerating throughout adolescence. The decline among girls was greater than among boys (Brown, 1985). Kirshat, Ham, & Richards, 1989 identified that adolescents dropped out of organized sports, as well as informal sports. They hypothesized that this was due to multiple factors including decreased enjoyment, and increasing awareness of skill level deficits. They also observed that adolescents were least enthusiastic about participation in gym class at school. The importance of continued sports participation was demonstrated by Pfeiffer et al. (2006). They investigated sport participation and physical activity among adolescent females from 8th to 12th grade. They determined that girls who participated in sports were more likely to remain physically active.

Salvy et al. (2008) conducted a study to determine the role of social relationships in fostering physical activity. The author noted that overweight adolescents in this study reported increased intensity of physical activity when they participated with a peer group. This was not noted among lean participants. The authors recommend further examination of the role of social relationships in promoting physical activity particularly among overweight children and adolescents.

Baranowski et al. (1997) also identified the perceived benefit of having fun as a motivator for physical activity in children and adolescents. Peer participation and support were also noted to be influential in promoting physical activity. Additionally, staying in shape, improving appearance, and physical prowess were identified as perceived benefits. Physical and athletic skill and ability were also factors that influenced participation in physical activities. Lack of time was most often cited as a barrier to participation in physical activity.

Springer, Kelder, and Hoelscher (2006) conducted a secondary data analysis of 6th grade girls investigating the importance of social support on physical activity versus sedentary behaviors. They found that friend and family encouragement and friend's involvement in physical activities were positively associated with physical activity. The authors recommended further study of causal relationships. Prochaska, Rodgers, and Sallis (2002) explored whether using different methods to evaluate social support and physical activity would cause the association to vary and whether separating support into peer support and parent support would change findings. Their findings were inconsistent, however suggestive of association between peer support and physical activity. Spence & Lee (2003) used an ecological model to explain the factors that affect physical activity. They identified intrapersonal, social, and environmental domains as factors affecting level of physical activity.

Participation in sedentary activities as a barrier to physical activity and the development of obesity has been explored. In a study conducted by Feldman, Barnett, Shrier, Rosignol, and Aberhaim (2003), authors concluded that physical activity was not inversely associated with watching T.V. or playing video games. This study indicated that some children are better at time management than others. However, results from the Canadian Community Health Survey (Koezuka et al., 2006) reported that television watching was associated with physical inactivity among adolescents of both genders. Interestingly, this did not hold true for all sedentary activities. Activities such as reading and computer usage were associated with physical activity among girls and boys respectively. In, the U.S., rates of television watching have been found to be quite high in some areas. Wu, Rose, and Bancroft (2006) found that 55.1% of 8th graders they surveyed on behaviors related to active lifestyles in an urban Midwestern region watched more than 3 hours of T.V. per day.

There are also ethnic differences in physical activity noted in the literature. In the YRBSS (2007), Blacks reported only a slightly greater likelihood of not meeting physical activity

requirements than whites (68.9% versus 63%). A study conducted in South Africa revealed that 9 year-old black children tended to be less active than white children (McVeigh et al., 2004). Despite this, they found that the black children had higher BMCs and BMDs than their white counterparts. They theorized that although physical activity was not associated with enhanced BMC and BMD among Black children, the role of physical activity in increasing bone mass might become more important over time as the genetic benefit begins to wane in response to the environment. In the United States, it is estimated that 21% of African American girls are inactive versus 12% of Caucasian girls [Centers for Disease Control and Prevention (CDC), 2000]. Kimm et al (2002) conducted a longitudinal study among African American and European American girls over a ten-year period of time from ages nine or 10 to ages 18 or 19 years. They found that leisure-time physical activity decreased by 100% among African American girls and by 64% among white girls and accelerated over time for both groups of girls. Findings also showed that lower level of parental education correlated with decreased physical activity among white girls of all ages and among black girls at older ages. Higher body mass index also correlated with a decline in leisure activity among girls of both ethnicities. Modifiable behavioral factors such as smoking and pregnancy were also identified as determinants of diminished activity level among older girls.

Some of the previously reviewed studies recognized the role environment may play in shaping participation in physical activities. Similarly, the U.S. Department of Health and Human Services Healthy People 2010 (2001) identified risk factors for low levels of physical activity beyond ethnicity. Two such factors include: living in neighborhoods where outdoor activity is restricted by climate, safety concerns, lack of facilities; and living in public housing or apartments. Cohen et al. (2006) used a cross-sectional design to determine that girls who lived in close proximity to parks that had active features such as basketball courts showed a slight

increase in moderately vigorous physical activity compared to peers who did not have access to such facilities.

There is limited information available regarding physical activity among Somalis living in Minnesota. The Minnesota International Health Volunteers (Leinberger-Jabari, 2005) conducted surveys and focus groups to determine activity levels and barriers among Somali adults living in Minnesota, but respondents did not include adolescents. Respondents were older than 35 years for women and older than 40 years for men. Both genders showed minimal physical activity. This finding seems to indicate that adult role models for physical activity in the Somali population appear to be limited.

It appears that there may be inherent risks for the development of vitamin D deficiency and diminished bone health among Somalis living in Minnesota including traditional Muslim dress, skin pigmentation, low physical activity level, and dietary patterns characteristic of the Somali culture. Additionally, age and developmental state characteristic of early adolescents may impact lifestyle practices contributing to bone health. The seasonally weaker sunlight characteristic of Minnesota's more northern climate may also impact factors contributing to bone health.

2.5 Cultural Context Relative to Bone Health

Five themes related to bone health were identified in the literature review specific to culture. They include: a) the prevalence of Vitamin D deficiency, b) the association between myositis and vitamin D deficiency, c) the association between veiling and vitamin D deficiency, d) ethnic bone mineral density differences, and e) adequacy of nutrition. Findings are summarized by theme.

Vitamin D deficiency. Vitamin D deficiency was reported among East African female immigrants in numerous studies (de Torrente de la Jara et al., 2006; Diamond et al., 2002; Nozza and Rodda, 2001; Plotnikoff and Quigley, 2003; Reed et al., 2007; Robinson et al.; 2005; Skull et

al., 2002; and van der Heyden et al., 2004). These studies primarily focused on childbearing females. Three of the studies focused on rickets (Nozza and Rodda, 2001; Robinson et al., 2005; van der Heyden et al., 2004). Nozza and Rodda (2001) tested vitamin D levels of mothers and siblings of infants in Australia who were diagnosed with rickets. The authors identified that women with dark skin pigmentation, low dietary intakes of calcium and vitamin D, and decreased sun exposure due to traditional dress were more at risk for vitamin D deficiency. The authors concluded that mothers and siblings of infants diagnosed with rickets should be evaluated for Vitamin D deficiency whether or not they are symptomatic. There were no studies specific to early adolescents.

Robinson et al. (2006) attempted to extrapolate risk factors for vitamin D deficiency rickets in immigrant children ages one year to fifteen years living in Australia. The population studied was immigrants primarily from Africa, India, and the Middle East. Similar risk factors such as reduced sunlight exposure, dark skin pigmentation, and dietary intake patterns were identified. In this study, males were more often diagnosed with vitamin D deficiency and at an earlier age than females. Typically, females are more often found to be vitamin D deficient than males. The authors proposed that their uncommon finding was due to an increased rate of breastfeeding and exclusive breastfeeding among male versus female infants. Prolonged breastfeeding, especially among Vitamin D deficient mothers correlates with low vitamin D levels among offspring as well. While this study included the age group in question, the overall age range and population studied was broader.

van der Heyden et al., 2004 described three cases of hypovitaminosis D in adolescent immigrant veiled females (one East African) in the Netherlands who presented with limb-girdle muscle weakness and evidence of rickets. Assessment of female relatives revealed similar sub-clinical cases of hypovitaminosis D. All subjects responded to vitamin D supplementation. The authors concluded that myopathy secondary to vitamin D deficiency should be suspected in cases

with similar presentation and risk factors (diet, sunlight exposure, dark skin pigmentation). They also recommended that female relatives of individuals diagnosed with rickets should be screened for vitamin D deficiency. These findings were consistent with international studies of children with rickets who had similar backgrounds and resided in their native sunnier countries (Abdullah et al., 2002; Hatun et al., 2005 Narchi et al., 2001).

Myositis and vitamin D deficiency. An association between vitamin D deficiency and myositis and osteomalacia was reported in the literature. Maxwell et al. (2006) reported that roughly one-third of the respondents in the nutritional survey of Somali immigrants in Liverpool, England had been diagnosed with osteomalacia and two-thirds knew someone with bone and muscle pain. De Torerent de la Jara et al. (2006) reported on the delay in and under-diagnosis of hypovitaminosis D in adult female asylum seekers. Improvement in three outcomes following treatment with vitamin D supplementation (musculoskeletal symptoms, number of medical visits, and the use of prescription drugs by study participants) was demonstrated in this study.

Similarly, Plotnikoff and Quigley (2003) found the prevalence of hypovitaminosis D to be high in immigrant and non-immigrant patients in Minnesota who presented with chronic persistent musculoskeletal pain. Women of childbearing age in the study sample had significantly lower mean hydroxyvitamin D levels than older perimenopausal and postmenopausal women. Plotnikoff and Quigley (2003) recommended standard screening for all patients who present with these symptoms. Reed et al. (2007) measured vitamin D levels in 71 of 75 veiled Somali immigrant female subjects living in Washington State and all 71 were found to have some level of vitamin D deficiency. Forty percent of these reported mild musculoskeletal pain, although the severity of clinical symptoms did not correlate with magnitude of vitamin D deficiency.

Veiling and vitamin D deficiency. The issue of dress and its correlation with vitamin D levels was highlighted in several studies. de Torrente de la Jara et al. (2006) reported that two-thirds of the women in their study on the prevalence and treatment of musculoskeletal pain in

female asylum seekers wore veils. They concluded, however, that wearing a veil did not affect the resolution of symptoms of myositis following treatment with vitamin D supplements. Similarly, in their study measuring bone turnover in women with vitamin D deficiency, Diamond et al. (2002) reported that 75% of the women they studied wore veils, but severity of vitamin D deficiency did not correlate with wearing a veil. Reed et al. (2007) determined that traditional dress (veiling) is one of several factors that may play a role in deficient vitamin D levels. Plotnikoff and Quigley (2003) found that East African veiled females had lower vitamin D levels than their East African male counterparts. Likewise, Skull et al. (2002) found that female immigrants from the Horn of Africa had lower vitamin D levels than male immigrants and at earlier ages and that Muslim women and “covered” women had the greatest risk. They also noted that longer time residing in Australia correlated with higher risk of vitamin D deficiency.

The negative effect of traditional Muslim dress styles, such as veiling on sunlight exposure and vitamin D levels in young adult Muslim females of childbearing age, has been suggested in the literature in studies conducted in native sunny countries (Abdullah et al., 2002; Budak, Cisek, Sahin, and Tutus, 2004; Feleke et al., 1999; Hatun et al., 2005; Narchi et al., 2001). Hatun et al. (2005) identified an association between veiling and diminished vitamin D levels in adolescent Turkish school girls. Girls who were veiled in the traditional Muslim tradition, had lower vitamin D levels year round and were shorter than their counterparts who did not wear full veiling. Socioeconomic status was controlled for in this study.

Bone mineral density. Bone mineral density (BMD) was the focus of some studies. Gong et al. (2006) reported on bone mineral densities in recent African immigrants. While the focus of the report was on comparison of Sudanese immigrants’ BMDs and their African American and Caucasian U.S. counterparts, this article also included information comparing the BMDs of Somali men and women with U.S. African American and Caucasian men and women and other immigrant populations. The authors surmised that the differences in BMDs are more

likely due to environmental factors such as diet and duration of that exposure rather than to ethnicity or race. Similarly, Melton et al. (2002) reported on differences in bone mineral density between African American, Caucasian, and Somali men and women in Minnesota. They also speculated that the differences in bone mineral density within the African race might be due to nutritional deficiencies rather than genetic differences. In both studies, individuals of African heritage, with adjustment for bone size, were found to have higher bone mineral densities than their white counterparts.

There are few studies that measured BMD of children or adolescents relative to vitamin D levels. Cashman et al. (2008) studied the correlation between vitamin D level and BMD among a group of representative adolescents from Northern Ireland ages 12 and 15 years. Findings indicated that 12 and 15 year-old girls with higher vitamin D levels had greater bone mineral density of the nondominant forearm, but not of the dominant heel. They also had lower parathyroid hormone concentrations and lower levels of bone turnover markers. This held true across seasons and in winter only. There were no significant findings for boys.

The effect of vitamin D deficiency on BMD in younger age groups was explored in other studies as well, and results were indeterminate. Hatun et al. (2005) noted that low hydroxyvitamin D levels did not necessarily correspond with decreased BMD at younger ages. However, Budak et al. (2004) and Hatun et al. (2005) noted that women who wore traditional (Muslim) dress had shorter stature than their counterparts who did not. Diamond et al. (2002) found higher rates of bone turnover with increasingly deficient levels of vitamin D in Muslim women as young as age 20 years and concluded that additional bone densitometry studies are needed in this population. These findings suggest that the effects of low vitamin D levels on bone mineral density might not be reflected immediately. Further studies to evaluate bone densitometry were recommended by the authors. Kalkwarf et al. (2007) have only recently published reference values for bone densitometry in children, so continued study in this area is necessary.

The impact of low calcium intake (i.e. milk) on BMD among East African immigrants is clearer. Gong et al. (2006) noted decreased BMD with decreased milk intake in a Sudanese immigrant population in the U.S. These findings are consistent with findings in research studies with nonimmigrant populations (Kalkwarf et al., 2003). Abrams (2002), Matkovic et al. (2005), and Molgaard, Thompson, and Michaelson (2004) suggested that calcium supplementation might decrease the incidence of bone fragility fractures (forearm fractures) during the rapid growth of adolescence. While the short-term effects of low calcium and vitamin D levels and inadequate sunlight exposure on bone health in young female immigrants are unclear, further study is recommended to determine the long-term effects of these factors on bone health.

Nutrition. Nutrition was a commonly studied topic among new immigrants (Burns, 2004; Geltman et al., 2001; Gong et al., 2006; Maxwell et al., 2006; Nozza and Rodda, 2001; Patil, Hadley, and Nahayo, (2008); Reed et al., 2007; and van der Heyden et al., 2004). Most of the studies briefly surveyed dietary intake of foods rich in calcium or vitamin D or summarized the diets of immigrants in the host country. In some studies, food frequency surveys or dietary recalls lasting 1 to 7 days were conducted (Burns, 2004; Maxwell et al., 2006; and Robinson et al., 2006). The data were collected by self-report. Dietary deficiency in foods high in calcium and vitamin D in the target populations was identified in several studies (Gong et al., 2006; Maxwell et al., 2006; Nozza and Rodda, 2001; Reed et al., 2007; and van der Heyden et al., 2004). Female relatives of affected individuals were found to be deficient also, even though asymptomatic.

While Geltman et al. (2001) did not directly describe dietary patterns among refugee children in Massachusetts, they did note differences in growth parameters among groups of immigrant children. Wasting and low weight-for-height scores were especially prominent among African and East Asian refugee children. The authors indicated these findings are likely due to malnutrition. It is also known that vitamin D deficiency can cause growth retardation in children

(Holick and Chen, 2005) and short stature has been observed in individuals having low vitamin D levels (Hatun et al., 2005).

The literature suggests the importance of looking at the effect of acculturation on immigrant diets (Burns, 2004; and Maxwell et al., 2006; Patil et al., 2008). Maxwell, Bunn, and Salah (2006) identified a low intake of calcium rich foods among Somalis living in Liverpool, England. Patil et al. (2008) reported on the increased influence of immigrant children on dietary choices within the family. The increased influence of children of immigrants on dietary choices within the family was borne out in interviews with adult Somali women and an adolescent focus group in the pilot study conducted by Benbenek (2008) as well. Information on the East African diet in the United States is limited to a general report on the Somali diet on Ethno Med and a focus group study conducted with mid to older adult Somali immigrant males and females in Minnesota regarding diet and exercise patterns (Leinberger-Jabari, 2005). Investigation of dietary changes post immigration and the adequacy of the dietary intake of calcium and vitamin-D enriched foods in the East African diet in the United States is lacking, specifically among young females.

International studies have found evidence of sub-clinical vitamin D and calcium deficiencies in the 10 to 40 year old female population (Abdullah et al., 2002; Belachew, Nida, Getaneh, Woldimarium, and Getinet, 2005; Narchi, El Jamil, and Kulaylat, 2001). Studies in Germany, Norway, and in the United Kingdom have identified deficiencies in calcium and vitamin D specifically in immigrant populations, though not necessarily East African (Erkal et al., 2005; Holvik, Meyer, Haug, and Brunvand, 2005). Many of the women and girls in these studies were dark-skinned, Muslim, and wore traditional dress including head coverings.

2.6 Acculturation

Nursing literature views acculturation within a socio-cultural and temporal context and discusses the impact of acculturation on the health status of immigrants over time. An attempt is

made to distinguish between “assimilation” in which the original culture is swallowed by the host culture and “acculturation” which implies a blending of the two cultures (Choi, 2007). Flaskerud (2007) identified two key issues in acculturation: a) the effect on health status and b) the measurement of acculturation. The measurement of acculturation is often conducted on the basis of two measures: English competency and time spent in the U.S. (Patil et al., 2008). Patil et al. (2008) argue that this offers a limited view of the process of acculturation and they suggest a more complex approach that considers the lived experiences of new groups of people to a country relative to food, diet, and activity. The concept of acculturation is essential to understanding this study, but in keeping with the underlying framework for the study, it is not the only determinant of health behavior. While the purpose of this study was not to measure acculturation among young Somali girls, there is an emphasis on gaining an understanding of how acculturation may act as an enabler or a barrier to health behaviors contributing to bone health.

Much of the U.S. literature on acculturation reports on the acculturation process among Hispanic immigrants to the United States and the impact of acculturation on health practices, particularly in the realm of maternal-child nursing (Fullerton, Bader, Nelson, and Shannon, 2006; Harley, Eskenazi, 2006; Harley, Stamm, and Eskenazi, 2007; Heileman, Lee, Stinson, Koshar, and Goss, 2000; Jones, Bond, Gardner, and Hernandez, 2002; Nguyen, Clark, and Ruiz, 2007; Page, 2006; Peragallo, Fox, and Alba, 2000; Siatkowski, 2007). These studies indicate acculturation may have a mixed effect on health outcomes. In some studies, first generation immigrants had better birth outcomes than women who had been in the U.S. longer (Jones, Hughes, and Bone, 1999). Over time and with increased acculturation, maternal risk factors among Latina women often increased (Leslie, Diehl, and Galvin, 2006). Similar findings were reported relative to obesity and heart disease among various ethnic groups. More recently, Flynn, Foster and Brost (2009) investigated indicators of acculturation among Somali women living in the U.S. and their effect on birth outcomes. The authors concluded that factors hypothesized to

reflect acculturation are increasing, but they could not expressly link these factors with increased rates of preterm birth among Somali women living in the U.S.

Acculturation may affect diet and lifestyle practices. Reddy and Crowther (2007), for example, applied Berry's concept of acculturation on an individual level by exploring the effects of acculturation and culture conflict on psychosocial correlates of body image and eating habits among Asian women. Dubowitz, Acevedo-Garcia, Sakeld, and Lindsay (2007) collected qualitative data to determine how acculturation affected food preparation and purchasing among low-income immigrant mothers. They found that first-generation immigrant women were more likely to purchase and prepare foods they considered appropriate and that contained familiar ingredients. They were also likely to travel farther to purchase food. Primary concerns relate to food purchase and preparation were lack of time and challenges in transportation. Additionally, Unger et al. (2004) studied the effects of acculturation on diet and physical activity levels of Hispanic and Asian early adolescents living in the U.S. Those who demonstrated greater acculturation to the U.S. in sixth grade were more likely to have diets containing more fast food and less frequent physical activity in seventh grade. While adolescents of Somali ethnicity were not included in the study, the study suggests that acculturation to the U.S. may be a risk factor for unhealthy dietary and activity practices.

There are some studies specific to dietary acculturation among Somali, although much of the acculturation literature regarding Somalis in the U.S. focuses on mental health issues, women's health and well-being, and post traumatic stress (Flynn, Foster, & Borst, 2009; Nilsson, Brown, Russel, Khamphakdy-Brown, 2008). Haq (2005) reports on the dietary changes among Bantu Somali living in Seattle, Washington. Diet acculturation involved adding fast food, cheese, ready-made pasta, fruit juices, soda, sugar, and pancake mix to traditional foods among Somalis living in Seattle, Washington. In the pilot study conducted by Benbenek (2008), juices, cereal, pizza, soda, fast food, and cheese were common additions to the diet of a group of Somali girls

living in Minneapolis, Minnesota. Burns (2004) reviewed dietary patterns in a group of Somali women in Australia following immigration. She did not specifically address calcium and vitamin D dietary intake, but noted differences in native diet and substitutions for commonly eaten foods following immigration. Patil, Hadley, and Nahayo (2008) proposed a conceptual model explaining why dietary changes occur among immigrant populations and what facilitates dietary choices. They found that economic and time constraints as well as children's influence on food choices and support systems were key factors in dietary acculturation.

There are differences in rates of acculturation based on age. Several studies focusing on youth, highlighted the effects of generational and cultural conflict on mental health and health behaviors (Ebin, Sneed, Morisky, Rotheram-Borus et al., 2001; Smokowski and Bacallao, 2006; Ying and Han, 2007). Matsouka (1990) compared the process of acculturation among different age groups within Vietnamese refugees and between American and Vietnamese youth. He concluded that transition was more difficult for individuals at critical developmental stages, such as adolescence.

Adan (2007) identified that Somali youth in Minneapolis, Minnesota learned English and acculturated at a faster rate than their parents. He found that in some instances, Somali youth used their advantage in English to limit their parents' access to information such as communications about behavior or school performance. The rate of language acquisition also set up a "role reversal" phenomenon which upset the usual balance of parent-child power and led to more autonomy on the part of the child (Reitsma, 2001). Adan (2007) also suggested that cultural norms such as the expectation that Somali girls would remain at home to help or attend after-school classes rather than participate in extracurricular activities or recreation may impede acculturation. Similarly, Patil et al., (2008) found that immigrant parents often relied on their children for nutritional assistance in the grocery store. They also noted, that because children picked up the language faster than their parents, they were more influenced by advertising than

their parents. It is important to recognize that acculturation is a multidimensional process that takes place at an individual level as well as at a group level and that there are differences within the process among different ethnic groups.

2.7 Developmental Stage

Much has been written about autonomy during this stage of development. Steinberg and Silverberg (1986) described three measures of autonomy: emotional autonomy from parents, resistance to peer pressure, and self-reliance. In their study, a battery of questionnaires was administered to 865 youth in grades five, six, eight, and nine to test these measures. Findings suggested that most children in this age group traded parental dependency for peer dependency rather than moving directly into autonomy. It was also observed that resistance to peer pressure actually decreased in this group of children over time. There were also gender differences. Girls were generally more autonomous than boys and more self-reliant, however the girls most self-reliant and resistant to peer influence scored lower on emotional autonomy from parents. Relative to the current study, girls in this age group may be more dependent on peers as either enablers or barriers to health practices.

Dietary practices are one area that may be influenced by peers during this age group. Numerous studies have shown that intake of fast food increases as adolescents age (Niemeier, Raynor, Lloyd-Richardson, Rogers, Wing, 2006; Larson et. al., 2008). In a recent study that reviewed trends in fast food consumption over time, it was found that weekly fast food intake as well as the percentage of fast food consumers increased among males and females during the transition from early to middle adolescence (Bauer, Larson, Nelson, Story, Neumark-Sztainer, 2009). The authors speculated that this trend may be due to increasing autonomy and increased time spent with the peer group. As discussed previously, changes in physical activity are also noted during adolescence showing a generally negative trend over time.

Of interest in conducting research with adolescents is the need to establish trusting relationships. Hearn, O'Sullivan, and Dudley (2003) explored the test-retest reliability of urban minority youth self report on sexual activity. They recognized the possibility of bias in self-report studies, particularly among this age group. Their findings revealed a high degree of test-retest reliability especially when information was collected via computer, but also when strong trusting interpersonal relationships were established with participants. Participants needed to feel their responses were confidential and be comfortable with the interviewer. These points are integral to the current study and to that end, individuals from within the culture were recruited as co-facilitators during focus group sessions to foster trust.

2.8 Differences Between Rural and Urban Health Behaviors

The current study was conducted in two different geographic locations, a metropolitan center (Minneapolis, MN), and a more rural nonmetropolitan setting (Owatonna, MN), in order to get a broader perspective on the enablers and barriers to factors contributing to bone health among early adolescent Somali girls and to determine whether health behaviors were different in the two settings. There are many studies comparing various social and emotional characteristics of urban and rural dwellers. This literature review focused on those location differences relative to health behaviors including diet and exercise.

Zulkowski and Coon (2004) explored the barriers to maintaining nutritional health among rural and urban elderly. They found that while health ratings were higher for urban dwellers, both communities showed increasing risk of malnutrition among elderly dependent on social, physical and environmental factors. A study by Wu et al. (2007) explored eating habits among youth in rural Appalachia. Students at two high schools were surveyed to collect data on their eating habits, the eating habits of significant others, social support surrounding healthy eating, and report of weight teasing or witnessing of weight teasing. Findings included a high prevalence of unhealthy eating habits among respondents and their significant others. They also witnessed

weight teasing regularly. Respondents who perceived healthier eating habits among parents or who were supported to eat healthy reported healthier eating patterns. The authors concluded that the eating habits of rural teens were shaped by their perceptions of social norms and available social support.

Liu, Bennett, Harun, and Probst (2008) reviewed data from the 2003 National Survey of Children's Health and compared physical activity rates and obesity rates among rural and urban children and adolescents. Rural children had higher rates of obesity as did minorities and those from families having lower socioeconomic status. Urban children and adolescents had lower rates of physical activity. Woodfield et al. (2002) also reported that youth of lower socioeconomic status (SES) tend to be less physically active than children of higher SES.

A global study from Cameroon, Africa that compared the eating habits and nutritional status of rural and urban youth ages 12 to 15 years revealed that rural youth were more likely to eat three meals per day with fewer between-meal snacks than their urban counterparts. They also had greater arm muscle area and greater waist-to-hip ratios. The authors reported rural youth were more likely to eat traditional staple foods and less likely to include junk foods. The authors felt exercise habits also played a role in these differences (Dapi, Nouedoui, Janlert, and Haglin, 2005).

2.9 Preliminary Study

A pilot study, "Dietary Habits, Dress, and Sunlight Exposure Among Young Somali Adolescents" was conducted by Benbenek, the principal investigator (PI) in the summer of 2008. The pilot study was developed in partnership with the Somali community in Minneapolis. In this pilot study, the PI conducted informal conversations with leaders in the Somali community to discuss the relevance and feasibility of the study. These included the director of the Confederation of the Somali Community, an organization founded in 1994 to bring together major different sectors of the Somali community living in Minneapolis, the Somali youth director

at the Brian Coyle Center, and an adult Somali female who was active at the Wellness Center in Minneapolis and who acts as an interpreter within the Somali community. Additionally, a story in the Minneapolis Star-Tribune about a Somali Girl Scout troop in Minneapolis prompted the PI to contact the Metropolitan Girl Scout Council and speak to the leader of the troop at that time who expressed an interest in participating in the study.

The investigator then recruited two adult Somali women from the Minneapolis-St. Paul Somali community for one and one half hour long key informant interviews conducted in May and June of 2008 to ascertain information regarding traditional lifestyle practices related to dietary food choices, sunlight exposure, and physical activity and to consult on the development of culturally and developmentally appropriate materials and focus group questions for use in a focus group conducted with Somali girls. Subsequently, a focus group was conducted with three Somali girls, ages 12 to 15 years who were members of a Somali Girl Scout troop in Minneapolis. The goal of the focus group was to gather initial data regarding dietary food choices, sunlight exposure, and physical activity and to pilot the questions for cultural and developmental appropriateness.

The purpose of the pilot study was to determine culturally, developmentally, and linguistically appropriate ways to: (a) assess dietary patterns, especially those related to calcium and vitamin D intake among 11 to 15 year-old Somali females living in the Minneapolis-St. Paul metropolitan area; (b) identify variations in style of dress that could affect sunlight exposure among 11 to 15 year-old Somali females living in the Minneapolis-St. Paul metropolitan area; (c) identify usual daily sunlight exposure (and, indirectly, outside physical activity) among 11 to 15 year-old Somali females living in the Minneapolis-St. Paul metropolitan area. Sociocultural influences on dietary choices, dress, and sunlight exposure were identified as family (especially maternal influence), culture (local community and broader U.S. culture norms), and gender role expectations.

2.10 State of the Science

There are few published studies relating to factors affecting bone health in young East African girls, or specifically to Somali girls. Many of the studies reviewed were conducted in Australia and Europe, not in the U.S. While study samples included the age groups of interest for the current study, the reported results often focused on adults with older mean ages or on infants. This was true of studies originating in the United States as well. In background preparation, the literature search revealed that there is interest in the study of factors affecting bone health in the young female population in the United States (Gordon et al., 2004), however, there are no studies generated in the United States specific to girls of East African origin on this topic. Additionally, there is evidence to suggest that developmental stage likely influences the development of dietary and exercise habits that may affect bone health among adolescents, but this has not been explored specifically among East African girls. There are also numerous studies relative to nutritional habits and exercise among rural and urban communities, but none specific to girls of East African descent. The role acculturation plays in the development of exercise and dietary habits among East African girls has also not been explored. This leaves a considerable gap in the literature considering the large numbers of East Africans who have immigrated to this country.

Finally, the literature supports that there are inherent risks for vitamin D deficiency among young veiled women in general and that this age group in the U.S. is at risk for vitamin D and calcium deficiency as well. Exploring and understanding the enablers and barriers to health behaviors affecting bone health among this unique group of early adolescent girls at a critical period of development is worthwhile and necessary and may provide insight into the role acculturation plays in these health behaviors. Findings from this study will contribute to the further development of culturally appropriate bone health promotion efforts within this group.

Chapter 3: Research Design and Methods

3.1 Study Aims

The purpose of the current study was to (a) gain an understanding of the socio-cultural and environmental factors that shape lifestyle practices contributing to bone health including the dietary intake of foods high in calcium and vitamin D, sunlight exposure, and physical activity, and (b) to identify enablers and barriers to these lifestyle practices among early adolescent Somali girls who live in metropolitan and non-metropolitan areas of Minnesota. The specific aims of this study were:

- Aim 1. To describe the socio-cultural-environmental factors which shape early adolescent Somali girls' lifestyle practices that contribute to bone health including the intake of high calcium and vitamin D foods, physical activity and sunlight exposure.
- Aim 2. To identify perceived enablers of and barriers to lifestyle practices contributing to bone health among early adolescent Somali girls living in Minnesota.
- Aim 3. To compare and contrast the perceptions of enablers and barriers to factors contributing to bone health among Somali girls living in the Minneapolis-St. Paul metropolitan area and the non-metropolitan area of Owatonna, Minnesota.

3.2 Situation of Self

I have spent much of my nursing career working with diverse, often low income populations in various health care settings despite an upbringing in a white, rural, Midwestern, middle class background. One of the health care venues where I practiced as a Family Nurse Practitioner/Pediatric Nurse Practitioner for seven years included an outpatient clinic that served a large percentage of Somali and East African immigrants/refugees and their families. Experiences in this clinic prompted an interest in better defining the health care needs of this community. This led to volunteer commitment at the East African Women's Center in the heart of the East African community in Minneapolis, MN and a stronger relationship with East African women and their

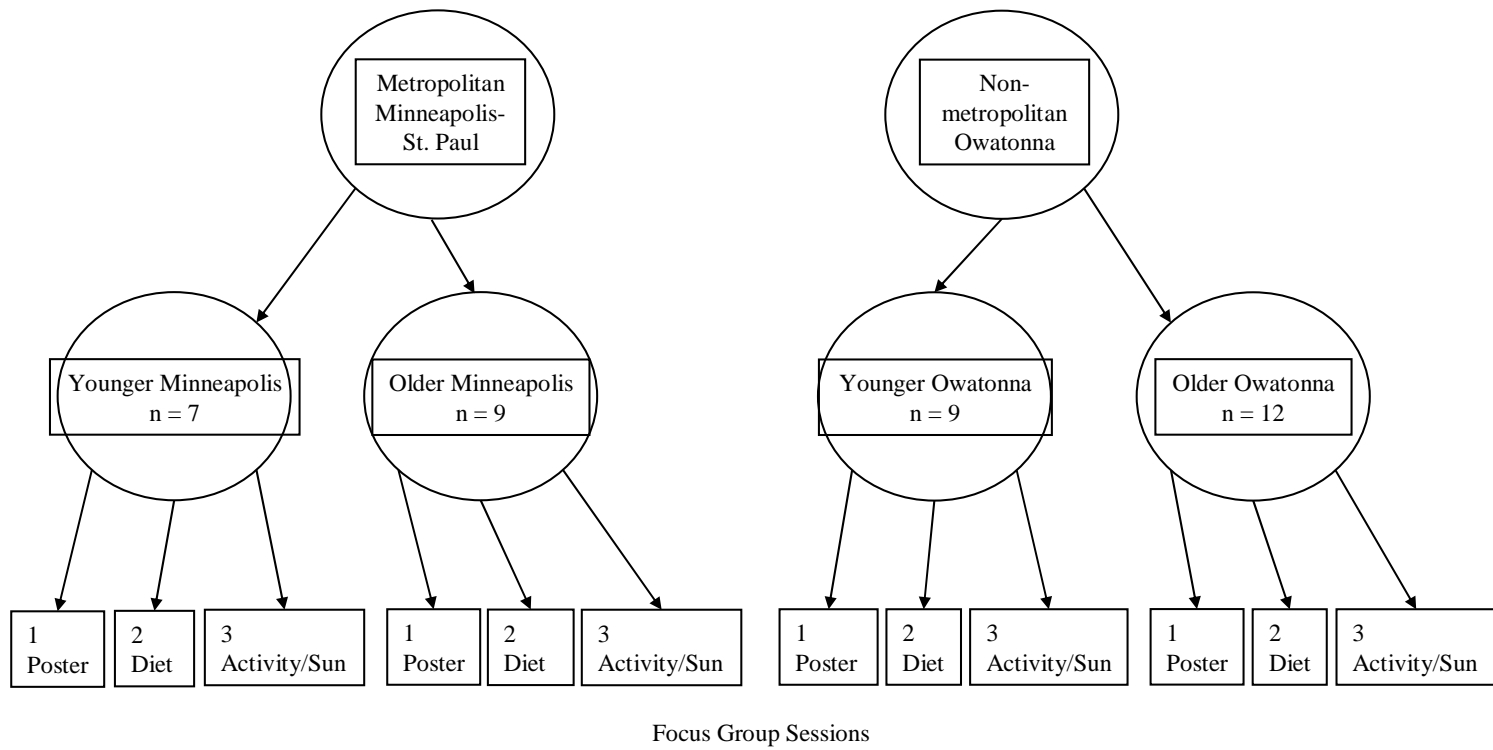
children. Participation within the East African community in Minneapolis also facilitated the completion of the pilot study (Benbenek 2008) which, in turn, helped inform the current study.

These experiences have generated some personal assumptions and biases: (a) Somali lifestyle in the U.S. is in flux as it grapples with the effects of acculturation and attempts to maintain its identity; (b) Somali youth are acculturating at a faster rate than their parents and they hold greater influence over behavioral habits such as diet; (c) there are gender differences within the Somali community relative to health behaviors such as physical activity and lifestyle; (d) religion, cultural, and maternal behaviors have a strong influence on dress and lifestyle among early adolescent Somali girls. To address these assumptions and biases in the current study, memos and reflective entries were recorded by the investigator and perceptions and opinions were tested with community co-facilitators throughout data collection and during analysis.

3.3 Research Design

A descriptive qualitative study design utilizing four cohorts of Somali girls, ages 11 to 14 years, who participated in a series of three focus group discussions was developed in conjunction with community partners. The four cohorts included two cohorts comprised of younger girls, grades five and six, primarily ages 11 to 12 years, and two cohorts comprised of older girls, grades seven and eight, primarily ages 13 to 14 years. A younger and older cohort of girls was recruited in each geographic location. A series of focus groups was utilized within each cohort to focus discussion on content relative to the specific aims, which covered dietary practices, physical activity, and sunlight exposure. A summary of findings from each cohort is reported in chapter four and comparisons by age and location are also discussed. See Figure 3 for a conceptual representation of the design.

Figure 3. Research Design



The goal of qualitative descriptive design is to assure the accurate accounting of participants' responses, and to accurately render the meaning of recorded and observed data from the participants' perspectives in order to assure interpretive validity (Sandelowski, 2000). Participant interview data are the main focus in qualitative description and emphasis is placed on accuracy in recording and interpretation. The final purpose of qualitative description is to disseminate the findings in a meaningful and useful way. Findings from the current study can be used to address gaps in knowledge relative to the perceptions of early adolescent Somali girls regarding the sociocultural and environmental enablers and barriers to health behaviors that impact bone health including dietary practices, physical activity, and sunlight exposure. Subsequently, these findings may aid in raising the awareness of the importance of bone health within these communities and in the future development of culturally and developmentally appropriate bone health promotion activities within these communities.

3.4 Setting

The current study was conducted in two different geographic locations, metropolitan center (Minneapolis, MN), population 377,392, and a non-metropolitan setting (Owatonna, MN), population 25,548. Both of these communities have high concentrations of Somali immigrants and refugees living there. Minneapolis has a mean family income reported as \$59,816 and Owatonna has a median family income reported as \$59,263 (U.S. Census Bureau, 2007). Data on the number of families below poverty level were not available. The study was conducted at the Cedar Riverside Community School, a charter school serving large numbers of East African children in Minneapolis and with two River Valley Girl Scout troops in Owatonna, which held meetings at McKinley Elementary school and at Owatonna Junior High School. The addition of metropolitan and non-metropolitan groups provides a broader range of data for analysis and allows for comparison between groups of Somali youth who live in different locales.

3.5 Community Liaison and Partner Involvement and Consultation

The information gained in the pilot study conducted by the investigator (Benbenek, 2008) was utilized to inform the focus group protocol for use in the current study. It is both worthwhile and essential to gain community participation in the development of the study design and in conducting a focus group with diverse populations in order to connect with the participants, establish trust, and gain insight regarding their experiences. Indeed, the success of focus groups in studies involving culturally diverse groups is highly dependent on the cultural competence of the investigators and the relevance of study questions to the experience of the groups being studied (Halcomb, Gholizadeh, DiGiacomo, Phillips, and Davidson; 2007). Inclusion of community key informants in the preliminary study as well as community liaisons and partners in the current study design and implementation helped ensure a culturally relevant protocol and allowed for data checking and feedback during data analysis that informed the dissemination of findings.

Building on the earlier pilot study, community liaisons were identified within the respective communities through existing contacts. These individuals were contacted in both geographic settings prior to the study. These community liaisons included representatives from the mainstream culture who worked closely with the young women participants on a regular basis and had access to the community. They assisted in identifying respected Somali community partners who were known to the girls and their parents. Somali partners assisted in recruitment and some became co-facilitators who helped lead the focus groups. Collaboration involved multiple phone conversations, electronic communications, as well as site visits to introduce the proposed study, explain the co-facilitator role, and gain insight into recruitment strategies, cultural appropriateness of the protocol, attainment of venue, and feasibility of the study. The community liaisons and community partners were essential to the success of the study. They facilitated participant recruitment and participation and three community partners served as co-facilitators during focus groups.

3.6 Participant Recruitment

Community agencies that serve Somali youth in the Minneapolis-St. Paul and Owatonna areas were contacted to recruit participants for the study. These included the Cedar-Riverside Community School, the East African Women's Center, and the Metropolitan Girl Scout Council in Minneapolis, and the River Valley Council of Girl Scouts in Owatonna. These organizations were chosen, because they serve large numbers of Somali girls. Participants with similar backgrounds and experiences were recruited to ensure adequate interaction and discussion of the topic of interest. Inclusion criteria for study participation included: Somali ethnicity, English language fluency, ages 11 to 14 years, and female gender. English language fluency was included in the inclusion criteria at the suggestion of community liaisons and partners who indicated youth typically are fluent in both Somali and English. Also, from a practical standpoint, the principal investigator is English speaking. To ensure accurate interpretation of terminology in focus group findings, bilingual focus group co-facilitators were selected who are fluent in English and Somali. Peterson-Sweeney (2005) recommended the consideration of gender, socioeconomic status, location, and ethnicity in recruitment. This study considered gender, location, age, and ethnicity in keeping with the inclusion criteria.

Participants were recruited from pre-existing community groups or organizations serving Somali female youth for the focus groups, such as Girl Scout troops and youth groups, to enhance group interaction and to better understand the perspectives of youth of the same ethnicity and locale. Rabiee (2004) acknowledges that an existing level of trust among members of established groups may enhance and facilitate discussion, which was the intent of the current study. It must also be recognized that existing relationships also have the potential to limit discussion. Peterson-Sweeney (2005) reports, that in general, the greater the homogeneity of a group, the better the discussion. However, she warns that if too much homogeneity of group members exists, it could result in the need for additional focus groups in order to enhance data collection. Ruf, Alexander

and McKie (2005) note that homogenous groups may provide an opportunity to better explore culturally specific topics of discussion.

Six to twelve individuals were recruited for each focus group cohort. Typically, a focus group contains anywhere from four to twelve participants. Most sources recommend six to eight individuals depending on the purpose of the focus group. Heary and Hennessey (2002) recommend including only four to six individuals in pediatric focus groups in order to more efficiently conduct the focus group. Generally, fewer participants per focus group session yield richer data (Carey, 1994). In conducting the pilot study during the summer of 2008, however, unforeseen conditions arose which precluded participation of two of the girls recruited for the study, which decreased the overall number of participants to three (Benbenek, 2008). In the current study, the number of participants was expanded to 6 to 12 from 4 to 6 to minimize the effect of attrition among this age group.

When contacting community organizations, the principal investigator (PI) briefly described the purpose of the study and brainstormed with community leaders about recruitment strategies. Snowballing strategies among community members as well as suggestions provided by community partners were utilized to promote recruitment. Snowballing strategies included liaison-to-community communication, liaison-to-girl communication, community parent-to-parent communication, and girl-to-girl communication. One community partner, a parent of one of the girls, suggested home visits to explain the study and recruit participants and he did this within his community. Another community partner suggested telephoning parents to verbally explain the study to parents of potential participants to facilitate parental consent. Posters and flyers publicizing the study were also circulated within the schools and throughout the communities. The necessity of obtaining interpreter services for consent, translation of study materials, and telephone follow up was assessed following conversations with community

administrators and group leaders and in compliance with Institutional Review Board (IRB) requirements.

Following consultation with a community member from the East African Women's Center and a School of Nursing colleague who had existing ties to the organization, contact was made with the Cedar Riverside Community School. This elementary charter school is situated in the heart of the East African community, in the Cedar Riverside Plaza housing complex in Minneapolis. This housing complex is home to over 4000 people and roughly 85% of people living there originate from East Africa (Minnesota Department of Health, 2010). This charter school serves 108 students in grades kindergarten through 8th grade, whose primary language is not English (Cedar Riverside Community School Homepage, 2009). Most of the students are of East African origin and reside within the housing complex in which the school and the East African Women's Center are housed.

The social worker of the school, who is also the health class instructor, was contacted and the study aims and methods were reviewed. Contact with the school principal was also made to introduce the study aims and method and provide investigator background. The school granted permission to proceed and the health care instructor agreed to incorporate the proposed focus groups into the health class curriculum for 6th, 7th, and 8th grade girls as she felt study content had relevance to the health curriculum. The girls were split into two health classes based on age. Younger girls, grades five and six were in one class and older girls, grades seven and eight, were in the other class. A community leader from the East African Women's Center was recruited as co-facilitator for the focus groups. She was informed of the study aims and methods and agreed to participate. She was also known to the social worker at the school who was in agreement with this plan. The specific role of co-facilitator was reviewed with the community liaison based on the Krueger method of conducting focus groups (Krueger and Casey, 2000). The co-facilitator was responsible for recording observations during the focus group, for recording participant responses

on flip charts throughout the series of discussions, and for assisting with framing some of the questions within the community and cultural context and in clarifying questions for the girls.

An introductory visit was made to the school during the health class period two weeks prior to study commencement with the co-facilitator and school representative to introduce the investigator and the study, review assent and consent forms and establish timelines. A folder containing study materials printed in English and in Somali, which included an introductory flyer, and consent and assent forms, was sent home with potential participants. The community co-facilitator made follow up phone calls to the girls' parents to further explain the study and answer any questions. The fact that the co-facilitator is fluent in Somali and known to the parents greatly facilitated recruitment. The school social worker also reminded the girls of the need to return required consent and assent forms prior to participation.

The River Valley Girl Scout leader and youth leader in Owatonna was contacted during the time of the pilot study conducted in 2008. Her contact information was provided by the Metropolitan Girl Scout Council. She was very enthusiastic about the study and led large Girl Scout troops of Somali girls in that age group who resided in Owatonna. She was re-contacted in the winter of 2009. By that time, the organization had been restructured and she was no longer the Girl Scout leader. She was the River Valley Girl Scout youth coordinator, however, so still had active connection with the community. She facilitated the recruitment of a respected community partner to work with the PI to facilitate recruitment and introduced the PI to the new Girl Scout leader. The youth coordinator also identified two young adult Somali women who could act as co-facilitators for the focus group. Communication took place by phone and e-mail communication. Community liaisons were sent electronic copies of all study materials two months in advance of study commencement. Input was gained regarding recruitment strategies to use within this community from community liaisons and community partners. Many of the Girl

Scouts reside in several housing complexes in close proximity to the schools where Girl Scout troop meetings were held.

A site visit was made to the Girl Scout meetings to introduce the investigator, and the study and the study timelines two weeks prior to study commencement. Two Girl Scout troops were addressed. One included girls ages 11 and 12 years, primarily 5th and 6th graders and the other included girls ages 13 and 14 years, primarily 7th and 8th graders. Girl Scout personnel and community liaison and co-facilitators were also present. Each potential participant was sent home with a folder containing study materials: introductory flyer, consent and assent forms. The community partner made follow up phone calls and/or home visits to the families to explain the study and to assist with forms. The Girl Scout youth coordinator reminded the girls to return consent forms. The locations for the study were the same setting as troop meetings (McKinley Elementary School and Owatonna Junior High School) and permission for use of these locations was secured by the Girl Scout troop leader. Transportation to all Girl Scout troop meetings was already in place and utilized for the current study as well.

The timing of the study activity depended on the community organization. An attempt was made to conduct focus groups at the usual time and site of the Girl Scout meeting. If not all members of the group elected to participate, an alternate activity was provided for girls who elected not to participate or who did not meet inclusion criteria while the others completed the study during the regularly scheduled meeting time.

3.7 Protection of Human Subjects

Protection of participant data. Participants were not identified by any personal identifying information in the transcription of focus group proceedings or in data analysis. Girls were assigned numbered codes for demographic surveys and dietary posters. Identifying information was de-identified in the final data analysis. Data are stored in a locked cabinet in the PI's office. Only the PI has access to the cabinet.

Participants are not only minors, but also members of a vulnerable population. A multi-level consent procedure was implemented in order to maintain confidentiality, privacy, and parent approval of participant involvement and to minimize risk. Institutional Review Board approval was obtained through the University of Minnesota. Additionally, policies on obtaining minor consent within the specific community organization were determined and compliance assured. Child assent was obtained via simple written agreement to participate in the research study. Organization liaisons and participants were advised that no child was to feel coerced to participate. Additionally, children were informed that refusal to participate would not result in penalty. Refusal to participate ended further communication by the principal investigator with the child. A formal written consent form that outlined the purpose of the study, methodology, audio-taping of the focus group, inherent risks, and commitment to confidentiality was given to the parent or to the legal guardian(s) of each child who agreed to participate. A Somali interpreter was available to facilitate understanding of all study materials and proceedings. The consent forms were written in English and in Somali. The IRB recommended use of the standard Somali consent form and this was included in the parent packet.

Study risks were minimal and included: potential psychological harm by embarrassment related to sharing personal information; censure for behaviors or dietary intake not sanctioned by culture or religion; feeling coerced secondary to peer pressure; and/or fear or distrust secondary to sharing culturally related information with person(s) of another culture. Potential study benefits included the opportunity for young Somali girls to share their perspectives on enablers and barriers to factors contributing to bone health within their community and contributing to the understanding of their unique experience within the broader community.

Ethical principles. In working with a vulnerable group, it is essential for the research team to respect the individual participant's autonomy and the culture's autonomy and traditions. A preliminary study including key informant interviews and a focus group within the Somali

community was conducted to inform the research protocol and assure that the design was culturally acceptable and developmentally appropriate. The consideration of age, development, and culture in designing the research protocol is necessary from an ethical standpoint and consistent with Bronfenbrenner's socio-ecological framework used to guide this design.

3.8 Data Collection

Method. A series of three focus groups was conducted with four cohorts of girls in two settings. Focus group sessions were conducted utilizing semi-structured questions to explore the usual dietary, exercise, and sunlight exposure practices of these girls and to identify enablers and barriers associated with each of these components (See Appendix B for Focus Group Discussion guide.) Semi-structured questions were utilized in order to ensure that these key topics were addressed in the focus groups, and also to allow opportunities for participants to elaborate on key topics. Prior to commencement of the first focus group session, parental consent forms and student assent forms were collected and each participant was assigned an identifying number that was recorded on the demographic survey and the food posters that were completed during the first session.

Focus group one. The first focus group session in the series introduced the study and provided the basis for future focus group discussions. Before the discussion, girls first completed the demographic survey (see Appendix C). The demographic survey included questions related to the participant's age, length of residence in the US, residence and zip code, number of individuals living in the home, and free and reduced lunch status. These questions provided background information about participants within each cohort and location.

Next, participants in each cohort were given two poster boards divided into sections for breakfast, lunch, dinner, and snacks. One poster was labeled "Yesterday" and the other labeled "Weekend Day". Participants were asked to glue pictures of foods and beverages they ate and drank within the previous 24 hours and within the most recent weekend day when they spent the

day at home. These posters were designed to represent the participants' dietary intake of typical types of foods eaten, but did not reflect specific quantities eaten. The food pictures were generated from data collected in the pilot study. The pictures reflect the food choices typical of the Somali girls who participated in the pilot study focus group as well as likely food choices of Somali girls reported by the key informants in the pilot study and the food choices of Somalis living in the U.S. identified in the literature review (Haq, 2005). The pictures of food choices were inclusive of American foods and beverages typical of this age group as well as more traditional foods and beverages. Markers were also provided so participants could draw or write in additional choices not available in pictures to ensure that all food choices were represented. This technique was used in the pilot study and served as an effective way to engage the participants and establish an open environment. Poster creation generated informative discussion among participants (Benbenek, 2008). In the current study, nine girls did not participate in session one because they did not bring signed parental consent forms (four in the older Minneapolis cohort, three in the younger Owatonna cohort, and two in the older Owatonna cohort).

The PI collected the posters at the end of the session and compiled food and beverage choices into common categories for use in discussion during the next session. Participants were asked to think about the reasons they chose to eat and drink the foods and beverages they included on their posters, the setting they were in when they ate, the people with whom they ate, and the person(s) who purchased and prepared the food and beverages they consumed. They were given a worksheet on which they could record this information prior to the next session (see Appendix D). The girls were informed that the second session would focus on discussing this information. Few girls returned with the worksheet for session two (two in the younger Minneapolis cohort, one in the older Minneapolis cohort, one in the younger Owatonna cohort, and two in the older Owatonna cohort). The information recorded on the worksheets did not

contribute any different information from that generated in focus group discussions; therefore it was not included in analysis.

Focus group two. The second focus group session in the series was scheduled to occur within two weeks of the first focus group and focused on the discussion of the data collected during the first session. The two-week interval was planned so that not too much time would elapse between focus groups and participants would remain engaged in the topic. During the interval, the PI compiled flip charts summarizing the list of foods and beverages recorded on the posters for review in the second focus group. The flip charts provided participants and investigator an opportunity to visualize the responses and were used to explore the reasons for their choices. The nine girls who were unable to participate in the first session due to not returning parental consent were given an opportunity to add to the flip chart lists compiled from the posters created in the missed session. Probing questions helped identify and clarify the social, cultural, developmental and environmental factors that shaped their dietary choices. This discussion was essential to the specific aims of the study to gain information about the socio-cultural and environmental factors shaping lifestyle practices.

Participants were also asked to identify which foods and beverages they thought helped build strong bones and these items were then circled on the flip charts of their compiled food lists. Reasons as to why they were likely to choose or not choose specific foods and beverages they thought would help build strong bones were explored and recorded on flip charts. Consistent with the specific aim of the study, to identify barriers and enablers to factors contributing to bone health, enablers were described as those factors that would promote the dietary consumption of foods rich in calcium and vitamin D, and barriers were those factors that would inhibit the consumption of foods rich in calcium and vitamin D. From the list of factors identified as shaping dietary practices, girls were asked to identify which factors enabled (promoted) the consumption of foods and beverages rich in calcium and vitamin D and which factors acted as barriers to the

consumption of these foods and beverages. All data generated during the second focus group session were labeled by cohort and date and collated for storage.

Focus group three. The third focus group session in the series was also scheduled within two weeks of the second focus group, with the exception of older Owatonna cohort. Data collection in the third session focused on participation in physical activities and sunlight exposure. In terms of physical activity, participants were asked to think about physical activities they participated in during the previous week (See Appendix A). They were then asked to recount all the activities they participated in during the previous week and whether or not each activity occurred outside or inside. These responses were recorded on a flip chart. Next, participants were asked to define weight bearing physical activities. They were then asked to look at the different activities they listed and identify any activities they considered to be weight-bearing activities. Those activities identified as weight bearing were circled. Participants were asked to think about the reasons for participating or not participating in weight-bearing activities, or outdoor activities (indirectly reflecting sunlight exposure). Their responses were further explored to determine which reasons enabled (promoted) participation in weight bearing activities and which reasons were considered barriers to participation. These reasons were recorded on flip charts and labeled as enablers or barriers to weight-bearing activities. This procedure was repeated to ascertain factors shaping, enabling, and acting as barriers to participants' practices relative to sunlight exposure. The accuracy of the flip charts was checked with participants at each step of the process. The use of flip charts was useful in promoting active participation and validating findings during the sessions.

Finally, participants were asked to comment on usual attire of dress within different settings of home, school, and social settings and to explore factors shaping dress style practices in these settings. Responses were recorded on flip charts. Usual style of dress in different settings and whether participants continued to adhere to traditional dress styles that may affect sunlight

exposure was assessed. All data collected during the third focus group was labeled with cohort number and date and bundled for storage. See table 1 for the research design timeline.

Table 1

Research Project Timeline

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Months 1-2	Months 2-3	Months 3-5	Months 6-12	Months 13+
Method	Telephone/In-Person	In-person	Analysis	Dissemination
Protocol	Sample	Focus Groups	Descriptive	Data Synthesis
Development	Recruitment	Demographic data collection	Content Analysis	Dissemination to participant groups and public
<u>Level:</u> Investigator	<u>Level:</u> Community Organizations	<u>Level:</u> Participants	<u>Level:</u> Investigator	<u>Level:</u> Community Organizations

Focus groups. Focus group discussions were chosen because they offer a means of efficiently collecting data about the perspectives of a group of individuals within a particular community and cultural context. Focus groups have been widely used as a tool to collect data in studies with individuals from diverse backgrounds and with adolescents (Brand, Abi, Couch, Vindigni, and Wark, 2008; Halcomb, Gholizadeh, DiGiacomo, Phillips, and Davidson, 2007; Peterson-Sweeney, 2005; Ruff et al., 2005). Neumark-Sztainer, Story, Perry, and Casey (1999), for example, effectively utilized focus groups to collect data on adolescent perspectives regarding the behavioral, socio-environmental, and personal factors that influenced their food choices. In the current study, focus group discussions provided a group opportunity for early adolescent Somali girls to provide their perspectives on the socio-cultural and environmental enablers and

barriers to factors contributing to bone health. Focus groups also provided an opportunity for the investigator to develop a rapport with participants and to strengthen community relationships for potential future partnerships centered on health promotion.

There were 6 to 12 participants in each cohort. Cohort retention was important as the study design in the current study specified repeated focus group sessions with the same cohorts of girls. To enhance retention in this study, participants were given a Target gift card incentive equal to \$10 for each focus group session attended for a total of \$30 if all three focus group sessions were attended. Monetary incentives are frequently cited as successful means to enhance retention in studies conducted with this age group (Ayala et al., 2006; Folta, Goldberg, Marcotte, and Economos; 2004; Garwick, Rhodes, Peterson-Hickey, and Hellerstadt, 2008). Peterson-Sweeney (2005) also indicates offering a gift card is a suitable way to acknowledge participation by children and adolescents in focus groups. The technique of making reminder phone calls the evening before the focus group as reported by Ayala et al. (2006) was also utilized to enhance continued participation of those who missed the previous focus group session. These phone calls were carried out by community liaisons and co-facilitators.

Focus group protocol. Each focus group met at two-day to two-week intervals three times, except for the older Owatanna cohort which met at a three-week interval for the last session. Originally, the plan was to conduct a focus group session with each cohort every two weeks to allow time to process data in between. However, due to organizational requirements, the schedule at Cedar Riverside Community School in Minneapolis was shortened to accommodate spring testing requirements to a two-day schedule. All focus groups at this location were completed within a two-week period. The schedule in Owatonna followed a two-week schedule consistent with normally scheduled Girl Scout troop meetings with one exception. The final session with the older cohort had a three-week interval to accommodate a school scheduling

break. All changes in focus group protocol were approved by the Institutional Review Board (IRB) at the University of Minnesota.

The focus groups in Minneapolis, MN were conducted at the Cedar Riverside Community School in the Media Center during regularly scheduled health class time, which was the period just before lunch. This venue provided a large table that the girls and facilitators sat around which facilitated discussion. The focus group sessions in Owatonna were held at two venues: an elementary school (McKinley Elementary) and the junior high school (Owatonna Junior High School). These venues were the usual venues for the Girl Scout meetings and they were held at the usual time. Two of the sessions at the elementary school were conducted in the Media Center around small tables. The final session was conducted in the gymnasium around a table, and the acoustics limited discussion to some extent. The cohort at the junior high school met in a classroom and the desks were pulled into a circle to facilitate discussion. Each focus group session was an hour in length to accommodate usual class periods and usual duration of Girl Scout meetings. This is in keeping with recommendations regarding duration of focus groups in groups with children as well (Peterson-Sweeney, 2005). Original plans included the offering of a snack during the focus groups, but the IRB requested food not be offered during the focus groups. The Girl Scout leader in Owatonna did provide snacks for the younger girls during meetings, so this practice continued.

The community co-facilitator(s) were present for each session and assisted in framing some of the questions within the community and cultural context and in clarifying questions for the girls. There was one adult female community co-facilitator in Minneapolis and two young adult female co-facilitators in Owatonna. Additionally, a male parent of one of the younger girls in Owatonna facilitated the acquisition of parental consent and assisted with transportation to and from the focus groups as per usual Girl Scout meeting routine. The role of the community co-facilitator was discussed prior to commencing the study at both sites. They maintained an active

presence in order to facilitate the establishment of trust among the group of girls. The PI met with the co-facilitators after each session to gain their perspective on participant responses and to check accuracy of key responses.

The PI reviewed all data between each session in order to clarify and organize data collected in each session. As data collection built on previous data, it was important to organize this in preparation for the upcoming session. For example, the girls were asked to reflect on their food and beverage choices they talked about in session one during session two and to identify the social, cultural, and environmental factors that influenced what they ate and drank. Between sessions, the PI organized the food charts generated in session one to a representative list that was recorded on a flip chart for use in session two. At the beginning of focus group session two, participants reviewed the list and added information missed in session one. In addition, worksheets distributed to participants in session one were collected and used to stimulate discussion to identify factors shaping dietary choices.

Additionally, lessons learned in session one with the first cohort prompted changes in the session one procedure for the next cohort. For example, in the first cohort, the younger girls at CRCS in Minneapolis created posters of the food they ate for the previous week day and weekend day by using markers, drawing pictures, and pasting pictures onto poster boards in session one. This was very time consuming and shortened the actual discussion time as participants were intent on artistic presentation. Consequently, for the remaining cohorts, this task was scaled down to represent a list of foods eaten in the previous 24 hours and on a previous weekend day. Participants were still allowed to use colored markers, but this revised approach was more efficient and still collected relevant information that also allowed more time for discussion. Also, during the first session at CRCS with the younger cohort, discussion was very limited partially due to limited time, but also because the girls were reluctant to talk. The semi-structured questions were developed to stimulate open-ended discussion; but to minimize risk in

volunteering a lot of information in the first session, the investigator utilized a few nonthreatening yes/no questions to ease participant anxiety. This was a useful tool to increase comfort level among a younger group of girls and did eventually foster more open discussion. This technique was used among other cohorts when discussion lagged. Additionally, since the communities are tightly knit and many people are known to each other, it was noted during session one for the first two cohorts that seating the co-facilitator among the participants seemed to dampen discussion. Moving the co-facilitator slightly away from the group during subsequent sessions seemed to improve discussion.

Observations and field notes. Observations, field notes and flip charts were useful tools for recording nonverbal data. The co-facilitator recorded field notes representative of group dynamics and nonverbal behavior throughout each focus group session to assist with interpreting the focus group data. These observations were discussed by the PI and co-facilitator at the end of each focus group session and later reviewed by the PI prior to the subsequent session. Clarification with the co-facilitator was sought as needed. Flip charts recorded by the co-facilitator were most useful in helping participants recall pertinent information in future sessions, summarizing focus group discussions and providing participants the opportunity to review and validate the findings.

Additionally, co-facilitators were asked for their perspective on the accuracy of the data collected during debriefings after each focus group session. Generally, the co-facilitator felt the data gathered was reflective of the girls' experiences and perspectives. They also offered additional insight into participant responses. For example, after the first focus group session with the older girls in Minneapolis, the co-facilitator commented that she was surprised at the influence the girls seemed to have over food purchases.

The PI made field notes following each focus group session where she recorded her observations and key findings. She also recorded strategies that worked as well as those that did

not work well; descriptions about the environment; contextual factors; memorable discussion points; inconsistencies or consistencies with other cohorts; and helpful notes for subsequent sessions. Additionally, reflexive journaling was used to self reflect on the process and to provide insight into the investigator's initial interpretation of the qualitative data at the time data were collected. All posters, worksheets, and field notes completed during the focus groups were labeled consistently by cohort number and date and bundled for storage in order to keep cohort data separate.

3.9 Data Management

Focus group sessions were audio taped using standard recording equipment as well as a digital recorder. To assure confidentiality, digital recordings were downloaded to a password protected computer that only the PI had access to after each focus group session. The downloaded recordings were then posted to a secure server that was password protected so only the transcriptionist and the investigator had access. The audio tapes were stored in a locked cabinet in the PI's office.

3.10 Focus Group Data Analysis

Systematic data analysis was carried out guided by the Krueger method for analysis of focus group data (See Appendix E) (Krueger, 2008). The goals of content analysis for the focus group data were consistent with specific aims of the study: (a) to describe the socio-cultural-environmental factors which shape early adolescent Somali girls' lifestyle practices that contribute to bone health including the intake of high calcium and vitamin D foods, physical activity and sunlight exposure (b) To identify perceived enablers of and barriers to lifestyle practices contributing to bone health among early adolescent Somali girls living in Minnesota, and (c) To compare and contrast the perceptions of enablers and barriers to factors contributing to bone health among Somali girls living in the Minneapolis-St. Paul metropolitan area and the non-

metropolitan area of Owatonna, Minnesota. Transcripts of each focus group session were read and coded by cohort to facilitate later comparisons.

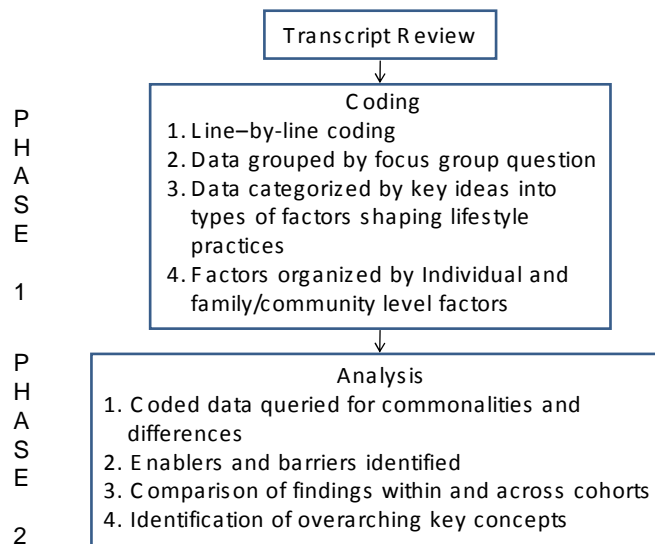
In the first phase of data analysis, individual transcripts from each session of each cohort were read and audited as needed to ensure accuracy in verbatim transcription of the audiotape recording. Next, the PI read and re-read each individual transcript in its entirety to better understand the context in which topics were discussed within each of the series of focus groups. The PI first read the transcripts related to factors shaping dietary practices from focus group sessions one and two conducted in the younger cohort in Minneapolis followed by the older cohort in Minneapolis, the younger cohort in Owatonna, and finally the older cohort in Owatonna. Next, line-by-line coding was conducted on the individual transcripts from each cohort and organized according to the topics of the semi-structured questions utilized in the focus group protocol for sessions one and two. Data relating to each question were identified by inserting topical headings reflective of the question into the transcripts. Next the data under each focus group question was analyzed to identify emerging key ideas from the verbatim transcripts and to code them into categories consistent with the specific aims of the study. Data were further analyzed to identify subcategories under each coded category. These categories and subcategories were reflective of the factors shaping lifestyle practices as well as the enablers and barriers to factors shaping lifestyle practices. A list of the coded categories along with subcategories was generated and these were inserted into the verbatim transcripts. These were then entered into NVIVO 8 software (see below). This process was repeated for data collected during focus group session three for each cohort. Participant responses relative to physical activity/exercise and sunlight exposure/dress were sorted and coded following the procedure noted above.

In phase two of the analysis, the PI queried the coded data and looked for commonalities among codes. Commonalities were identified by organizing like codes into broader categories, recognizing recurrent patterns of responses, and studying cohort responses by age and by

geographic location. In this way, comparisons within and across data could be made to identify similarities and differences in the socio-cultural and environmental factors that shape dietary, sunlight, and physical activity practices. Similarly, data were analyzed to report differences and commonalities among identified enablers and barriers to the factors contributing to bone health by age group and by location. A profile emerged of early adolescent Somali girls' dietary, physical activity, and sunlight exposure practices and the factors that emerged as enablers or barriers to these practices that contribute to bone health. Findings were organized into outline format and then into table summaries of data based on identified response patterns with most common and recurrent responses tabled. See Figure 4 for a summary of the analysis process.

Figure 4.

Analysis Process



NVIVO 8 software is qualitative data analysis software that was utilized to assist in organizing focus group data. Once the focus group transcripts were organized and coded, the data were entered into NVIVO 8 software. The focus group question headings were identified as tree nodes within the software system and relevant data were entered under each tree node. Data from different cohorts were identified by using different colored type, i.e. younger Minneapolis cohort

data were identified by blue type, older Minneapolis cohort data by green type, younger Owatonna cohort data by black type, and older Owatonna cohort data by red type. Data were further organized into branches from the tree nodes within the NVIVO 8 software system consistent with the coded categories and subcategories that had been identified in the transcripts. This provided ease in reviewing, querying, and clustering data during analysis.

In qualitative research, constant comparative analysis is ongoing. Analysis occurs simultaneously with data collection. Comparison to previous discussions across cohorts was ongoing. For example, among the older cohort in Minneapolis, the discussion centering on physical activity prompted an animated discussion of gender roles within the Somali community which provided the girls with an opportunity to voice their perspectives on enablers and barriers to physical activity. The data collected in this session were useful in teasing out perspectives on gender roles among subsequent cohorts during session three. Focus group session questions were modified and updated to reflect developmental and cultural input in order to enhance data collection. Continuous analysis of the data was useful in planning subsequent sessions and testing data.

Triangulation of data is essential to qualitative research analysis. Observations, field notes and flip charts were used to record nonverbal data and participant responses. The co-facilitator recorded field notes representative of group dynamics and nonverbal behavior throughout each focus group session to assist with triangulation of data. These observations were discussed by the PI and co-facilitator at the end of each focus group session to check for accuracy and later reviewed by the PI prior to the subsequent session. Clarification with the co-facilitator was sought as needed. Flip charts recorded by the co-facilitator were most useful in recording pertinent data during the session that the participants could verify. The flip charts were used to summarize data on specific topics throughout the focus group sessions. Utilizing transcripts from recordings, field notes and memos as well as recorded flip chart data allows for methodological

triangulation in that data are collected from multiple sources. This approach assists in enhancing the validity of findings, and insuring that the girls' perceptions are accurately reflected in the data as well as minimizing bias.

3.11 Rigor

Miles and Huberman (1994) identified five concepts that can be used to establish rigor in a qualitative study: confirmability, auditability, credibility, transferability and application.

Confirmability refers to a study that is free from bias and replicable by others. In the current study, steps were taken to compile an audit trail throughout the study to facilitate confirmability. Steps in the research process were described under the Methods section and included the design, implementation, and modification of the research protocol as the need arose. The analysis section describes the steps followed in analysis and relates methods used to triangulate data. During the coding process, memos were kept regarding investigator thoughts relative to coding decisions. Finally, the PI maintained (a) notes from debriefing sessions with co-facilitators that followed each focus group session, (b) records of co-facilitator's recorded observations, (c) summaries of techniques that worked well and those that did not work well during the focus groups, (d) written memos about the environment, contextual factors, memorable discussion points, inconsistencies or consistencies with other cohorts, and (e) helpful notes for subsequent sessions. Additionally, journaling was used to self reflect on the process and gain insight into the investigator's interpretations of data at the time data were collected.

Potential bias was reduced in the current study in a number of ways. The focus group protocol was developed based on preliminary studies to develop developmentally and culturally appropriate questions to avoid influencing participants' responses or creating misunderstanding of question wording and intent. Furthermore, the questions were semi-structured to focus content area, but also to allow for greater latitude in participant responses. Utilizing triangulation of data helped promote accuracy in data collection as mentioned earlier, which reduced bias. The PI also

took steps to minimize bias. She identified personal biases at the start of the study and throughout analysis in an effort to prevent this from influencing data collection or analysis. Additionally, during each focus group session, an effort was made to remain neutral during questioning and to attempt to establish a trusting relationship with participants. The study design which included three focus group sessions, helped to promote the development of trust.

Auditability refers to the stability of the research process across time and space. In this case, the same research protocol was used for each cohort, although in keeping with constant comparative analysis, slight modifications in focus group questions and/or processes such as poster making were made to adapt to cultural background, time constraints, and developmental level. The research protocol was developed directly from the specific aims, guided by the conceptual framework and reflective of the issues of interest identified in the literature review. Co-facilitators at each site were briefed on their role and the same process was followed in each focus group session for each cohort. All posters, worksheets, and field notes completed during the focus groups were carefully labeled with cohort number and date and bundled for storage in order to keep cohort data separate and to allow for easy retrieval. The PI's academic adviser who has extensive qualitative research training and expertise met with the PI on a regular basis throughout the research process, from the development of the protocol to the data collection and data analysis to review and audit the steps in the analytic process. For example, the adviser conducted an independent review of the coding scheme against sample transcripts for one cohort to validate the coding scheme before the PI coded the remaining transcripts from the other three cohorts. The few discrepancies in coding that were identified were addressed through a consensual process that involved clarification of the coding categories. Having an expert qualified researcher follow and audit the logic trail helps ensure that the analytic process could be replicated by another investigator. Also having an independent reviewer evaluate how the data were considered and reduced for analysis and whether the identified categories were appropriate to and reflective of

the data was essential to establishing the rigor of this study. Additionally, utilization of qualitative analysis software assisted in enhancing the transparency of the method of analysis by allowing for another investigator to more easily view the decision trail that was used during analysis.

Credibility refers to the truth-value of the study and reflects how faithful the study is to participants' perceptions (Sandelowski, 1986). The goal of descriptive content analysis is to accurately describe and reflect the participants' perceptions of their experiences. In an effort to obtain rich data, triangulation methods of data collection were used. In addition to the recorded focus groups, the PI maintained field notes after each focus group to record her observations and thoughts related to the data collection process and the overall data. Additionally, co-facilitators recorded observations on nonverbal behaviors of the girls and recorded responses the girls volunteered on dietary choices, physical activities, and their reasons for dietary choices, physical activities, and sunlight exposure on flip charts. These flip charts were maintained by group and session and utilized during content analysis as additional sources of data to the focus group transcripts. Community co-facilitators were also asked for their perspective on the accuracy of the data collected during each session at session end. Generally, the co-facilitators thought the data gathered was reflective of the girls' experiences and perspectives. However, the co-facilitators also questioned data on occasion. For example, during the third session with the older cohort in Owatonna related to physical activity, the co-facilitator pointed out discrepancies in what several of the girls reported in the discussion and what was actual observed behavior in the community.

Transferability or fittingness refers to the ability to apply findings from the data analysis to other contexts. In this study, the groups were described by location, age, gender, and ethnicity and demographic surveys contributed data relative to income, residence, and stability of residence. This provides a description of the group that may allow readers to assess the potential transferability of the findings to other settings. Findings will also be compared to the findings previously reviewed in the broader literature during the discussion section in chapter five.

The final element of rigor is application. Lincoln (Miles & Huberman, 1994) defines this to mean that the research enhances understanding of the issue and that findings may prompt action among participants and stakeholders. The idea behind this study was to increase understanding of factors contributing to bone health among Somali early adolescents living in Minnesota relative to practices related to diet, exercise, and sunlight exposure. Only by understanding the factors at play that shape dietary, exercise, and sunlight exposure behaviors can steps be taken to effectively address barriers to health promoting lifestyle practices. In other words, the data collected in the current study could be utilized to inform the future action. This study reflects the reconnaissance phase of action research according to Watkins (1991), a step on the way to application.

Chapter 4: Results

This chapter focuses on reporting the results following the analysis procedure outlined in chapter three. Demographic data are displayed first. Data from the demographic survey completed by participants are displayed in table format. Tables two and three include individual cohort data and tables four and five include data by age and by location. Results were organized according to the specific aims of the study: (a) factors shaping lifestyle practices related to dietary intake, physical activity, and sunlight exposure, (b) enablers and barriers to lifestyle practices that contribute to bone health, and a summary of (c) within and across group comparison by age and location. A narrative summary of core common findings across cohorts is provided along with supporting qualitative data from individual cohorts. Summaries of factors shaping lifestyle practices contributing to bone health as well as summaries of enablers and barriers to these factors are displayed in table format and organized at the individual level as well as the family/community level. These levels are reflective of the nested systems consistent with the conceptual framework for this study. Individual cohort summaries of factors shaping lifestyle practices and identified enablers and barriers identified through the within group analysis are found in tables 4 through 39 in the tables appendix for chapter four.

4.1 Participant Characteristics

Participants in this study matched inclusion criteria: female gender, age range 11 to 14 years, Somali ethnicity, and English speaking. A demographic survey was administered at the start of the study to collect information about the background of participants in order to better describe the participants (See Appendix C). The average overall age of participants was 12.6 years with a range from 11 to 14 years. Girls were recruited into cohort by grade and age. For reasons unexplored, although likely due to grade in school and English language ability, three 13 year-old girls were in the younger grade cohorts and one 12 year-old was in the older grade cohort. There were 39 participants who returned consent and assent forms, but only 26 who

participated in all three focus group sessions. Four girls in the older group in Minneapolis out of nine girls missed the first session due to not returning assent and consent forms and three out of nine girls in the younger group in Owatonna who had home commitments or did not return consent missed the first session. Two girls in the older Owatonna cohort dropped out after session one, but were replaced by two other girls who attended sessions two and three, leaving the net number for that cohort size (12) stable for all focus group sessions. One girl in the older group in Minneapolis dropped out after the first session. The reason for this withdrawal was not determined, because of the IRB stipulation that the PI would not further contact children who opted not to participate. See tables two and three for summaries of demographic data. The older participant in Minneapolis who dropped out of the study after the first focus group session did not complete any questions on the demographic survey. Percentages reported in the tables were calculated based only on the girls who completed the demographic survey (38) and do not reflect missing data from the uncompleted survey. See tables two and three for demographic data.

Table 2

Demographic Data

	Younger Minneapolis		Older Minneapolis		Younger Owatonna		Older Owatonna	
	n	n	n	n	n	n	n	n
Number of Subjects	7		9*		9		14	
Place of Birth	U.S.	3	U.S.	3	U.S.	2	U.S.	1
	Africa	4	Africa	4	Africa	6	Africa	11
			No answer	1	Unknown	1	Other	2
Years in U.S.	<1 year	0	<1 year	0	<1 year	1	<1 year	1
	1-5 years	3	1-5 years	0	1-5 years	2	1-5 years	3
	5-10 years	4	5-10 years	4	5-10 years	5	5-10 years	8
	>10 years	0	>10 years	3	>10 years	1	>10 years	2
	No answer	0	No answer	1	No answer	0	No answer	0
Free and Reduced Lunch Status	Yes	3	Yes	5	Yes	6	Yes	12
	No	0	No	0	No	1	No	0
	Unknown	3	Unknown	3	Unknown	2	Unknown	2
	No Answer	1	No Answer	0	No Answer	0	No Answer	0
Average Age	12.1 years		13.1 years		11.6 years		13.6 years	
Age Range	11-13 years		12-14 years		11-13 years		13-14 years	

*Missing data from 1 participant; values in table reflect data only from those who completed demographic survey.

Table 3

Family and Housing Data

	Younger Minneapolis	n	Older Minneapolis*	n	Younger Owatonna	n	Older Owatonna	n
Head of Household	One parent	1	One parent	5	One parent	0	One parent	5
	Two parents	5	Two parents	2	Two parents	9	Two parents	8
	Other	1	Other	1	Other	0	Other	1
Language Spoken at Home	English	2	English	2	English	4	English	0
	Somali	3	Somali	4	Somali	4	Somali	11
	Both	1	Both	2	Both	1	Both	2
	Other	0	Other	0	Other	0	Other	1
	No Answer	1	No Answer	0	No Answer	0	No Answer	0
Dwelling	Apartment	6	Apartment	8	Apartment	7	Apartment	7
	House	1	House	0	House	0	House	0
	Townhome	0	Townhome	0	Townhome	2	Townhome	6
	Other	0	Other	0	Other	0	Other	1
Average Time at Current Residence	14 months		49 months		29 months		43 months	
	No Answer	2	No Answer	4	No Answer	4	No Answer	7
Range of Time at Current Residence	8-20 months		24-64 months		24-30 months		17-84 months	
			No Answer	4				
Average Times Moved	4.7 times		5.2 times		3.6 times		4 times	
Range of Times Moved	4-7 times		4-6 times		1-7 times		2-12 times	

**Note.* Missing data from 1 participant; values in table reflect data only from those who completed survey.

The majority of participants were not born in the United States. Only nine of the 38 participants who completed the survey (24%) reported being born in the United States. Twenty-

four participants (63%) reported country of birth in Africa with specific identification of Somalia (n=5, 13%), Kenya (n=13, 34%), Gambia (n=1, 2%), Tanzania (n=1, 3%), Libya (n=1, 3%) and Ethiopia (n=1, 3%). Two participants (5%) reported just Africa as place of birth. Three (8%) of the participants reported Middle Eastern countries: Saudi Arabia (n=1, 3%) and Yemen (n=2, 5%) as country of birth. Three (8%) did not respond. Parent ethnicity was reported as Somali by the majority of girls (29 of 38) or 74% of participants.

There were differences in demographics by location. Forty percent of the Minneapolis participants who responded reported birthplace as the United States while only 17% of Owatonna participants reported country of birth as the U.S. In contrast, 82% of girls in Owatonna reported being born in Africa while only 53% of girls in Minneapolis reported Africa as place of birth. The amount of time girls had lived in the U.S. varied slightly by location also. No girls in Minneapolis reported having lived in the U.S. less than 1 year, while two girls in Owatonna (9%) reported living in the U.S. less than one year. The majority of girls in both locations reported living in the U.S. 5 to 10 years. Statistics were similar across location for other lengths of residence.

Family and housing data also showed differences by location. Sixty-three percent of the girls in both locations came from households with two parents, while 29% reported residing in single parent families. Three participants (8%) reported other living arrangements, residing with another relative or with a step mother. There were more participants residing in two-parent households in Owatonna (n = 18, 78%) than in Minneapolis (n = 7, 47%).

Differences in language spoken at home were also noted across location. Fifty-eight percent of participants overall reported speaking Somali at home, however Somali was the primary language spoken at home by 65% of participants' families in Owatonna versus 47% in Minneapolis. Minneapolis participants reported English and combination Somali/English languages spoken more often at home than participants in Owatonna.

Data on free and reduced lunch status at school were also collected to ascertain some estimate of socio-economic status among participants. Qualification for free and reduced lunch status is based on family income guidelines, and/or eligibility for FOOD STAMPS, Minnesota Family Investment Plan, or Food Distribution Program on Indian Reservations (See Appendix F). The majority of participants fell into the free and reduced lunch category reflecting lower socio-economic status. Sixty-eight percent (n=26) reported receiving free and reduced lunch at school with one participant (3%) not responding to this question and 26% reporting they did not know their free and reduced lunch status. Only one participant indicated she did not receive free and reduced lunch. Fifty percent of Minneapolis participants designated free and reduced lunch status, however, 37% responded they didn't know (n=6). In Owatonna by contrast, 81% of participants identified free and reduced lunch status while 19% (n=4) indicated they did not know.

The majority of participants (n=28, 72%) reported living in an apartment. Twenty percent (n = 8) reported living in a townhome. All of those who reported living in a townhome resided in Owatonna. Only one individual, who resided in Minneapolis, reported living in a house. One participant wrote "other" under place of residence. Participants in Minneapolis listed one of two zip codes – one within the heart of Minneapolis in the same zip code area as the school (87%) where the study was conducted and the other within a first ring suburb of Minneapolis (n=2, 13%). According to the school liaison, most of the Minneapolis participants resided in a large housing complex located in the same city block as the charter school they attended. The Owatonna participants listed one zip code as place of residence which is the only zip code assigned in that city. Community liaisons reported the participants from Owatonna primarily resided in one of two high-density housing areas in the city, where large numbers of Somalis lived.

Limited data were collected on the stability of housing. Only 21 participants (55%) responded to the question: "How long have you lived at your current residence?" The average

length of residence among all groups, based on the average of the four groups from the data collected, was approximately 18 months. The younger participants in Minneapolis reported the shortest average duration at current address (14 months) while the older cohort in Minneapolis reporting the greatest average residency at 49 months. However, given the missing data (45%), this is only a rough estimate of the actual length of time participants lived at their current address.

Thirty-four out of 36 participants (94%) responded to the question “How many times have you moved?” The average for all four cohorts was 4.4 times moved. The average number of times moved for each cohort is listed in Table 2. The younger participants in Owatonna reported the least number of moves. Three girls in the older Minneapolis cohort did not respond or stated “don’t know” or “a lot”. The data for all other cohorts were complete. The data reflect the girls’ reports of number of remembered moves and may not reflect actual times moved in their life time. Nevertheless, the data demonstrate that residence appears to be somewhat short term among these participants.

Comparisons by age revealed fewer differences. Participants in younger cohorts were more likely to report place of birth as the U.S. (5 of 16, 31%) compared to participants in the older cohorts (4 of 22, 18%). Participants in younger cohorts were most likely to report living in the U.S. for 1-5 years, while participants in the older cohorts were most likely to report living in the U.S. for 5-10 years. Additionally, girls in the older cohorts were more likely to report living here for greater than 10 years. Older girls were more likely to know free and reduced lunch status than were younger girls.

Analysis of Family and Housing data revealed that younger girls (14 of 16, 88%) were more likely to reside in two-parent households than were older girls (11 of 22, 50%). Additionally, participants in the younger age cohorts (6 of 16, 38%) were more likely to report speaking English as the primary language at home than were participants in the older age cohorts (2 of 22, 9%). Somali was the primary language spoken at home by the majority of girls in all

cohorts; however more participants (15 of 22, 68%) in the older age cohorts reported speaking Somali at home as the primary language than participants in the younger age cohorts (7 of 16, 44%). There was little difference in dwellings by age. Both younger and older participants showed poor response rate on length of time dwelling in current residence.

4.2 Focus Group Findings

The findings for the within case analysis for this study were initially organized by cohort into separate sections according to the specific aims of this study: (a) to gain an understanding of the socio-cultural and environmental factors that shape dietary practices, physical activity, and sunlight exposure that contribute to bone health, and (b) to identify enablers and barriers to these lifestyle practices. Analysis of findings by cohort across age and location revealed markedly similar findings relative to factors shaping dietary, physical activity and sunlight exposure practices as well as identified enablers and barriers to these practices, although there were subtle differences across age and location. Overall, the findings indicate that individual characteristics, cultural tradition, developmental stage, environmental factors (such as availability of foods and beverages and access to physical space), and acculturation play a major role in shaping lifestyle practices contributing to bone health. Subtle differences across age revealed increasing awareness of gender differences in role and responsibilities with increasing age as well as increasing freedom to make choices relative to food and beverage selection. A possible stronger connection to cultural tradition among the non-metropolitan cohorts in Owatonna was also noted. Increasing age in combination with cultural traditions appeared to be barriers to continued participation in physical activities among these girls. School attendance appeared to be an enabler to factors shaping lifestyle practices that contribute to bone health by supporting milk consumption as well as participation in physical activity. Acculturation to mainstream U.S. culture was evident among the girls, but tempered by maintenance, and to varying extent, acceptance of cultural traditions relative to dietary practices, physical activity and style of dress.

Table summaries for within cohort findings including factors shaping dietary intake, physical activity, and sunlight exposure as well as enablers and barriers to these factors are included within the Tables appendix under Chapter 4 Tables, Tables 4 through 39. Common core findings across all cohorts for factors shaping lifestyle practices are reported by specific aim in the next sections. Tables reflecting these common core factors shaping lifestyle practices across cohorts are found in Tables 40, 41, and 42 in the Tables Appendix, Chapter 4 Tables. Common core enablers and barriers (identified during focus group discussion and from data analysis) to lifestyle practices related to calcium and vitamin D intake, physical activity, and sunlight exposure across cohorts are also reported in the next section and summarized on Tables 43, 44, and 45 in the Tables Appendix, Chapter 4.

4.3 Aim 1: Socio-cultural and Environmental Factors Shaping Dietary Practices.

Girls across the different cohorts independently identified common core factors that shaped dietary. Within case (cohort) factors shaping dietary practice are found in Tables 5, 8, 11, and 14 in the Table Appendix, Chapter 4 Tables. Common core factors shaping dietary practices and particularly those related to the intake of foods and beverages rich in calcium and vitamin D were identified at the individual level and at the family/community level (see Table 40 in the Tables Appendix, Chapter 4 Tables). Individual level factors included food appeal, seeking variety, and developmental stage; and family/community level factors included availability of foods and beverages (containing calcium and vitamin D), maternal influence on dietary practices, cultural traditions relative to dietary practices, and dietary acculturation. Specific individual level factors and family/community level factors will be described in the following sections. Quotes from individual girls within the cohorts are provided as exemplars of the factors. Each girl's cohort is identified by initial at the end of the quote e.g. Older Minneapolis Cohort (OMC), Younger Minneapolis Cohort (YMC), Older Owatonna Cohort (OOC), and Younger Owatonna Cohort (YOC).

Individual level factors shaping dietary practices.

Food appeal. The factor, Food Appeal, encompassed participant comments related to the taste, texture, temperature, appearance, smell of food, perceived healthiness of food, and in one cohort, perceived advertising appeal. Of these characteristics, taste was most frequently identified as a factor shaping dietary practices in all cohorts. Other characteristics were reported less consistently across cohorts..

Taste. Participants in all cohorts strongly expressed that taste, an aspect of Food Appeal, was a large determinant of food and beverage choices. There were wide variations on likes and dislikes among girls within the different cohorts relative to preferred tastes.

Vegetables. Most participants did not like the taste of vegetables. The only vegetable consistently identified as having appeal was raw carrots, but some did not even like those. Vegetable sources of calcium such as kale were reportedly not eaten and not readily available. The younger cohort in Owatonna seemed to have more exposure to vegetables than the Minneapolis cohorts, although participants still reported not liking them. Participants in the younger cohort in Owatonna were able to name more vegetables they had tried such as beans, broccoli, cucumbers, green bell peppers, peas, and tomatoes compared to participants in other cohorts. Participant comments included:

I hate vegetables, I never eat them. I don't know. I just don't like them. (MYC)

I don't eat it [vegetables]. No. (MOC)

They're [vegetables] nasty. (MOC)

Carrots are disgusting, corn's disgusting, broccoli is disgusting. (MOC)

Many indicated that vegetables were used for flavoring, but not commonly eaten alone. An example they gave was onion. Onions were frequently included in meat sauce for flavor, but the girls did not eat them. For example,

I put it [vegetable] in there for flavoring, but then I don't actually eat it. (MOC)

When asked whether their mothers encouraged them to eat vegetables, they collectively replied no. The girls indicated that vegetables were not a regular part of their traditional diet.

I never really eat vegetables that much. Like, when I was a kid the only vegetables were maybe like salad and carrot sticks. I guess I'm not used to eating vegetables. (MOC)

Another girl said:

When you were a kid they always tried to make you eat meat 'cause they think it was really healthy, but then no one made me eat vegetables. (MOC)

Fruit. Fruit was reportedly widely consumed as were fruit juices and girls due to taste. Fruit juice was listed regularly on the girls' food posters. Beverage consumption was further explored. Girls in all cohorts reported regular consumption of various juices, water, and milk. Only the older cohort in Owatonna indicated they drank tea with regularity. While all girls reported having tea available, drinking it was not a daily occurrence in most cohorts. Mango juice was a favorite juice and girls indicated their mothers could buy it at the "Somali store." They also listed Kool Aid® and numerous other sweetened fruit juices. Girls indicated juice was their preferred beverage, because of the sweet taste. When asked if they typically drank juice with meals, one younger Minneapolis participant replied, "Usually." When queried about when they drank juice, two younger Minneapolis girls remarked, "Every day, all the time." This was echoed in all cohorts. The girls reported preferring juice to milk if given the option.

Milk. Milk consumption varied widely. For example, one participant indicated, "I love milk. I drink it a lot, every day for meals and with my cereal." Alternately, among the older girls in Owatonna, only five out of 12 girls indicated that they drank milk regularly. When asked about whether they would choose to drink milk when dining out, most reported that they were not likely to order milk when they were eating at a restaurants or out with friends. One older Owatonna girl captured this sentiment by stating, "Because people are going to think you're weird when you order milk."

All participants were slightly more likely to consume milk during the week than during the weekend. School attendance was a factor in this. Younger girls reported having milk more often overall than older girls, but older girls were more likely to indicate that they might only have milk for lunch when they did not like the food choices being served at school. The type of milk consumed at school differed from that at home. The milk at school is “low fat” by report, but girls were more likely to drink whole milk or 2% milk at home. At school, girls more often had a choice between white milk and chocolate milk. When given the choice, many chose chocolate milk because of the taste. Many girls, in all cohorts, indicated that they did not like the taste of milk. One younger girl in Minneapolis indicated, “I don’t like the way it tastes. It doesn’t have any taste.” Others agreed. One added that it was bitter. Another girl described milk thus: “Like after, like the yellow milk. After you eat it for a while, and like if you wait a couple minutes and feel the taste of it, it’s nasty” (OYC). One older girl in Owatonna said, [I will drink it] “only if I can drink it fast.” When asked what would make them drink milk more often, most shrugged and one said, “I just don’t like the taste” The older girls in Owatonna indicated that they would be more likely to drink milk if it “went with a food.” Comments reflecting this included: “[We drink milk] whenever we eat cookies or cereal.” Another participant indicated, “It depends on what I was eating [whether I would drink milk].” Only one younger girl in Owatonna indicated that milk made her feel sick.

Soda. Participants were asked specifically about consumption of soda as soda has been suggested to be a factor in declining milk intake in the U.S. This varied widely among the girls within and across cohorts with responses ranging from several cans every day to rarely. The most common reason for why they drank soda was they liked the taste. They preferred regularly sweetened soda to diet soda because of taste, referring to the taste of diet soda as fake. One older girl in Owatonna also indicated sweetened soda “makes me feel good.” The most common soda

of choice was Coca Cola ®, regularly sweetened, not diet. Most did not consume soda with meals.

Calcium-containing foods. Other food sources of calcium were identified. Several volunteered that ice cream was a good source of calcium and they liked the taste of ice cream. Fish was identified as another source of calcium, although they were not sure what kind of fish contained calcium. The majority of participants in all cohorts reported not liking the taste of fish and not eating fish very often. If they did report eating fish, it was usually canned tuna, although several girls in both locations mentioned salmon, which is a source of calcium.

Snacks. Girls in all cohorts reported eating snacks regularly. Most of these were sweet in nature which reflected a preference for sweet tastes. They did not originally list fruit as a snack, but when asked about fruits, they said they did eat various types of fruit for snacks regularly. Cake, brownies, and juice were popular snack choices. Convenience foods were also appealing. If they prepared their own snack, they were likely to choose convenience foods. One young girl in Owatonna said: “When my mom gets my snack, she puts a lot of effort into it. And when I get it, I’m tired and I don’t want to do anything.” Younger girls were more likely to have their mothers prepare their snack than were the older girls in both locations.

Other food characteristics. Older girls reported additional food characteristics such as smell, appearance, and texture, as reasons to eat or not eat foods. One older girl in Minneapolis commented. “The dark green stuff. Like she makes it in spinach with sauce and it looks nasty. It smells bad to me.” One older girl in Owatonna indicated she was likely to want a particular type of cereal if she liked the appearance of the box. The appearance of food was also important. For example, one older Owatonna girl stated that she ate a particular brand of sweetened cereal, “Because they’re (Fruit Loops) colorful.” Advertising was also reported to be a factor in shaping whether or not a food was eaten for some participants. An older Owatonna girl remarked, “How it (food in a commercial) looks would make me want it.” The older girls in Owatonna introduced

advertising as a factor that might influence whether or not a food was purchased or tried. This was not mentioned in other cohorts. Comments which reflected the types of advertisements that appealed to them included:

McDonalds commercials and they show people having those fries. (OOC)

Hamburger Helper. Because of the little hand guy. (OOC)

The thermal characteristic of foods was also discussed. Whether or not a food was identified as “hot or cold food” was identified as a determinant as to whether or not food was eaten. Most of the girls reported not liking “cold foods” which were synonymous with uncooked or raw food. They did, however, note that they liked ice cream. They were especially verbal about disliking “raw” or cold cheese. One older girl in Owatonna commented, “They [cold foods] don’t taste right. It’s weird when it’s cold.” Girls in all cohorts reported eating melted cheese, but generally did not like cold cheese unless it was string cheese. String cheese was identified as a common snack among girls in all cohorts.

Healthy foods. The girls were also questioned about what foods they considered to be healthy foods and whether identifying a food as “healthy” shaped their dietary choices. Most girls listed fruit and vegetables first as healthy foods. Several in each cohort indicated that milk and dairy foods were good for your bones. One older Minneapolis girl stated, “If you have a calcium deficiency your bones are really weak and that’s how you get osteoporosis.” Information regarding food sources that may contribute to bone health arose from different sources and varied by location. Most girls in Minneapolis reported they had learned about these food sources in health class at school or from books. The girls in Owatonna reported hearing this on T.V., although the older girls in Owatonna did not believe advertisements made by professional athletes that they actually drank milk. Reasons given for eating healthy foods included: to get energy, to build your bones, and to lose weight or look good. One younger girl in Owatonna commented about foods that contain a lot of sugar, “Because if you ate just stuff like things with sugar in

them, it wouldn't be better. It would make you feel tired." Despite being able to name foods that they considered healthy and unhealthy, having a healthy label did not increase the food's appeal. The girls indicated health was not a primary motivator for their dietary practices at present. For example, one younger girl in Owatonna commented that to maintain strong bones, "You can't ever stop drinking milk and eating ice cream." However, when questioned about how often she consumed milk, she indicated that she did not drink milk every day. The most common reason participants cited for not eating healthy foods was the belief that they did not need to worry about that yet. They noted that adults like their parents were more likely to eat healthy foods.

Comments reflecting this included:

I don't think we have to worry about that yet. (MYC)

Yeah, they (parents) are older. (MYC)

The appeal of eating healthy food was associated with weight loss or weight control in all cohorts. Again, girls expressed that this wasn't really relevant to them right now.

No, I don't care (about my weight). I have a high metabolism. (MYC)

But I always think if you exercise enough it kind of balances it [eating whatever you want] out, right? (MOC)

Some girls also mentioned that eating healthy meant you didn't eat junk food. When asked to elaborate on that, they described junk food as being "American food" or food that was "too oily." They listed chips, sweets, soda and convenience foods like pizza, hamburgers, and tacos as American food. Not all girls, however, identified a difference between American foods and Somali foods. The girls indicated that they liked eating those foods because they tasted good and they were easy to prepare. One older Minneapolis girl stated junk food was "Like things that you eat—I eat that between meals. It's not a meal; it's just something to put in your mouth."

Seeking variety.

Boredom. Seeking variety in food and beverage choices was another factor shaping dietary practices. The girls reported wanting to try new foods, because they were bored with the foods that were offered to them every day. Most girls participated in free and reduced lunch at school and were, therefore, likely to eat school meals. Both groups expressed boredom with routine food choices offered at school and generally did not think the food tasted very good.

Comments reflecting this included:

It's [food] all the same. We eat what everyone else eats. (MYC)

Sometimes I just get tired of eating it. (MYC)

It just tastes the same. (MYC)

Additionally, consumption of pork is forbidden in Islam and some of the younger girls in Owatonna expressed not trusting that the school was being truthful about whether or not different foods that were served contained pork. One girl stated, "We're told that it's [corndogs] not pork, but last time they told like the Somali interpreter it is, but we just want them to eat it."

Boredom with food served at home was also reported. Food served at home was very often described as traditional Somali food purchased and prepared by the girls' mothers. These foods included rice or pasta with meat sauce as well as traditional foods such as *injera*, a pancake like food. Girls in all cohorts reported a lot of repetition in dietary options:

We tend to eat like the same thing, cause my mom just keeps buying the same things.

(MOC)

There's only two varieties that we eat that's good for dinner. Like rice and pasta, and then if you really want to go crazy you mix it together. And that's really exotic.

(MOC)

I say I'm just getting really tired of the other things that I'm eating, and I don't want to eat that, I want to try something different. Or I see the other things getting boring,
(MYC)

Trying new foods. Boredom with food prompted girls to identify a desire for variety. Seeking variety added food choices to their diet. These included non-traditional Somali foods such as dairy products and cheese. The addition of ice cream was widely noted as an example of a new food that tasted good and that the girls thought was good for you, because it was milk based. The older girls in Owatonna identified combination foods such as macaroni and cheese and pizza as foods that they have tried and that have been added to their diet and contain calcium. Dining outside the home enabled trying new foods, although new foods were not necessarily identified as healthy foods. The girls in both cohorts reported that their restaurant of choice was most often a fast food restaurant such as McDonalds ® or Subway ®. One older girl in Minneapolis stated, “When we go to a restaurant, I try different things, and then I start eating those things.”

Developmental stage. With increasing age, girls reportedly gained and assumed more responsibility for lifestyle practices. Reported self-determination in making dietary choices is one aspect that demonstrates this. Reported lack of time was a component of dietary choices along with incorporation of convenience foods into the diet. Additionally, many girls reported being able to cook which allowed them increased responsibility and ability to make food choices. Peer influence was not identified as a strong determinant of dietary choices in any cohort.

Increasing self-determination in making dietary choices. Girls in these cohorts were beginning to have more self-determination in dietary choices consistent with their developmental state. They perceived increasing freedom to choose what they wanted to eat that increased with age. Some of the older girls in Owatonna identified that around age 13 years was when they were permitted to make more choices about what they ate. As mentioned, older girls in both cohorts were more likely to choose and prepare their own snacks than were younger girls. Similarly,

some of the older girls in Minneapolis reported they walked to the store or to a nearby restaurant and bought food. The girls in Owatonna were less likely to do that. For example, older girls discussed having a lot of dietary freedom as evidenced by the following comments:

At my house nobody controls our eating. It's like whatever you want, you go and get. You get what you like. (MOC)

You take what you want, put it in the microwave or the oven and then you eat. (MOC)

People get a plate of pasta. You get a candy and a chocolate over here, some chicken over here. (MOC)

Pretty much I eat whatever I want, and it seems to balance itself out somehow. (MOC)

You eat when you want how you want. (OOC)

In fact, one of the older girls in the older Minneapolis cohort expressed some concern about the lack of control about her eating patterns. She stated:

I think the problem that I kind of have it feels like control, when to stop. Cause there's no nutrition. Like it's not like we have nutrition, it's not my mom's going to say, ok, you only get a couple of these today. It's just eat until you get full, and that's the problem. You don't know when to stop.

Ability to cook. The girls identified the ability to cook as a factor shaping food choices. Those who could cook could elect to make something else if they did not like the food that was served or if nothing was prepared. The older girls were more likely to indicate that they would prepare an alternate food if they did not like what was prepared or did not want to eat it or if nothing was prepared for them. Comments to demonstrate this include:

Like right now we're here. When I go home, me and my sisters, I don't know, if my mom makes something, we just eat. If she didn't, I start cooking and we eat (MOC).

Like a lot of times, when I come back from school, I, like, make myself a turkey sandwich or a chicken burger. (OYC)

The older girls were more likely to cook than the younger girls, but there were girls in all cohorts who reported cooking and not cooking. The age at which girls learned to cook varied widely, from 6 to 14 years. While some girls in the Minneapolis cohorts and in the younger Owatonna cohort indicated that it was an expectation they would learn to cook, the older girls in Owatonna indicated that the choice to cook was theirs. An example of that is:

If you want to learn [to cook] and then you will learn, but if you don't, you slack off.

(OOC)

Yeah, nobody's going to force you. (OOC)

When asked what they were likely to cook, responses varied. One older Owatonna girl indicated that girls were expected to cook whatever a mom could make. Others indicated they were more likely to cook “something out of a box.” One younger Owatonna girl stated, “I usually just make things that are quick.”

Convenience foods. Indeed, the girls reported liking convenience foods over all. Snack lists reflected a large proportion of quick foods like chips and french fries, as well as sweet foods such as brownies, cookies, candy and ice cream. As noted above, girls liked to choose “quick foods” for snacks, because it was easier. They also liked the taste of chips. One of the older girls in Minneapolis reported that she and her two siblings were likely to each eat a bag of chips for snack. She noted that her sister sometimes had chips for dinner as well. As mentioned above, Subway® and McDonalds® were most often cited as restaurants they would frequent.

Other convenience foods such as pizza and macaroni and cheese, two combination foods, were frequently included on the food posters in all cohorts along with frozen foods like chicken patties that the girls could heat up themselves. See tables 4, 7, 10, and 13 in the Tables Appendix, Chapter 4 Appendix for a list of foods recorded on food posters in each cohort.

Time constraints. The girls in Owatonna were more likely to report that lack of time affected their likelihood of eating breakfast. Older girls reported this more often than younger

girls, even though the younger girls started school earlier. Most of these girls rode a bus to school, so they had to be ready well before the start of school. In contrast, most of the participants in Minneapolis lived in the high-rise building complex where the school was situated, so they conceivably had more time to get ready for school. Girls in Minneapolis did not report lack of time as a factor affecting their likelihood of eating breakfast.

Peer influence. Interestingly, peer influence did not appear to be a major shaper of dietary practices. Other than the comment above about not drinking milk in restaurants because people would think you're weird, the girls overall stated that they were not influenced by their peers in deciding what to eat. Only one younger girl in Owatonna indicated that what her peers ate might prompt her to try a food. This is demonstrated by her comment about watching kids eat food at school, "If I don't like the food, and I watch other kids eat, sometimes I will try it."

Community/Family level factors shaping dietary practices

Availability of foods and beverages. Having particular foods and beverages available to them was a big factor shaping dietary choices for participants in all cohorts. Again, there were numerous commonalities across cohorts. The girls reported eating and drinking what was available to them in different settings. Availability of foods and beverages in the settings of school and home were widely instrumental in shaping participants' dietary choices.

Availability of foods and beverages at school. Most participants reported eating school lunch regularly, so choices during the school day were limited. As one older girl in Minneapolis stated about eating at school, "Like we don't get to choose what we eat. They just make it. We just eat it." School meal choices for the younger girls were more limited than for the older girls in Owatonna, because the junior high offered more options for lunch. Choices for Minneapolis participants were more limited than for the older Owatonna girls, because Minneapolis girls attended a charter school that had only one option for lunch. The older Owatonna girls attended a junior high school that offered more options for lunch. Girls expressed differing opinions about

school food. Their biggest complaint was that the food was the same. That is, they were offered the same selections over and over again.

Most girls participated in the free and reduced lunch program at school or at least indicated that they ate school meals. Since milk was provided as the beverage with school meals, participants were more likely to drink milk at school. For example, one older girl in Owatonna reported, “Usually when we’re at school every day, we drink milk.” While milk was reportedly available at both school and home, the girls were free to choose other beverages at home, but had no alternative beverage choices at school, so they were likely to drink milk at school.

Availability of foods containing calcium and vitamin D. Participants were questioned specifically about the availability of foods rich in calcium and vitamin D such as fish high in oil, like salmon, nuts such as almonds, dairy (other than milk) such as cheese, yogurt, and ice cream, and specific greens. As mentioned previously, many of the girls did not like the taste of some of these foods, nor did their mothers buy or prepare them regularly. Fish is an example of that. Girls also indicated that they had nuts rarely, and if they did, it was likely to be peanuts or peanut butter. The exceptions to that were yogurt and ice cream. Ice cream was frequently listed on food posters as a snack food and the girls indicated this was a food their mother could be influenced to buy in the grocery store. Yogurt was not readily listed on their food posters, but when questioned, some girls in each cohort indicated they did eat it.

As mentioned previously, the girls reported a lot of repetition in their diet in both school and home settings, although one of the younger girls in Owatonna felt she had more variety on weekends and others in her cohort agreed. Factors identified as contributing to dietary choices at home included: (a) the influence of cultural tradition on dietary offerings and, (b) maternal influence on purchasing, preparing, and serving food in the home. Each of these factors is discussed in more detail.

Cultural tradition. Girls in both locations talked a lot about “Somali foods”. These appeared to be the cornerstone of dietary choices in the home setting. Since mothers were more comfortable purchasing and eating food they were familiar with, traditional Somali foods were widely eaten. As one younger Owatonna girl said, “It’s the way it is.” The traditional Somali diet consisted primarily of beans, rice or pasta with meat sauce. Fruit such as mangoes, bananas, guava juice, and some greens were included along with traditional foods such as injera. Injera is a traditional Somali pancake-like food made with flour and sugar and oil that can be eaten at most meals. For many of the girls, this was most often consumed on weekends when their mothers had more time to make it. Other more traditional foods the girls described were reserved for holidays and celebrations. See Appendix G for a list and description of these foods. Girls’ descriptions of traditional Somali foods eaten daily included:

In Somalia we ate a lot of meat, and we never—you don’t even like really eat a lot of beef, though. (MOC)

Like the way we make pasta. That’s tradition food. (MOC)

The kind of tea we drink. (MOC)

The sauce (for pasta or rice). It’s the way it’s cooked and the things they put in it. They put ground meat in there. It’s just different than American. (MOC)

Another overarching finding was the girls’ adherence to not eating pork as required by the Muslim religion. The girls indicated that cultural traditions dictated what they could eat as well as whether they would eat as in the case of Ramadan when they fasted from sunrise to sundown. While girls in all cohorts expressed adherence to not eating pork or foods that contained pork products, there was animated discussion and disagreement within cohorts about which foods contained pork products and which did not. It was clear that the girls were not certain about the ingredients in many foods. Candy was an especially controversial food. As an

example, a younger girl in Owatonna talked about eating jelly beans and some of the other girls told her that jelly beans contained gelatin which contained pork, so she shouldn't be eating them.

Maternal influence on food purchase and preparation of meals at home. Girls in all cohorts identified their mother as being the primary purchaser and preparer of food in the home. As such, the girls reported that their mothers were most likely to buy and prepare foods they were familiar with, which were typically described as "Somali foods". Somali foods were identified as rice or pasta with meat sauce. An older Minneapolis girl stated, "She (mom) buys pasta 'cause that's what she used to eat when she was a kid I guess." Consequently, available foods tended to be repetitious and a reason for ensuing boredom with available food choices as previously reported. Nevertheless, eating what their mother prepared or purchased was typical as demonstrated by the following comments:

You might [eat something] because it's like the only thing you have. (OYC)

It's her [mother's] choice and whatever she wants to cook is what you have. (OYC)

Our moms don't know how to cook that food [American food]. (OYC)

I eat whatever's in the refrigerator. (MOC)

It's [traditional food] what my mom cooks. (OOC)

Our moms don't know how to cook, like, hamburgers. (OYC)

There was some variation, however, in whether or not participants ate foods prepared by their mother. As noted, some of the girls could cook and older girls in both locations indicated they were more likely to cook an alternate food if they did not like what their mother prepared or if they did not want it. This was most often reported by the older girls:

Cook something else [if you don't like what was cooked]. (OOC)

Yeah, do your thing. (OOC)

Younger girls in Owatonna were more likely to try what their mothers had prepared as demonstrated by the following comments:

First she makes us try it (food), and if we don't like it, we should find something else.

(OYC)

Stay open-minded. She (mother) says to try it. (OYC)

Dietary acculturation. While participants reported that their mothers were most likely to buy and prepare Somali foods, other foods had been added to their diet over time in the U.S. Girls labeled these additional foods “American foods”. As mentioned previously, American foods by participants’ definition, included: Ramen noodles, hamburgers, hot dogs, pizza, tacos, cereal, macaroni and cheese and junk food. Several older girls in Minneapolis commented on the change in diet between their mother’s generation and their own:

‘Cause we have a lot more like—I went to Africa with my mom and I saw all the stuff they eat. They have like basically zero options. You have a number of foods that you can eat for breakfast, lunch and dinner, and it’s the same thing, every day. I feel like in America you have options. You can eat different things. You don’t have to eat one food three times a day. (MOC)

Me and my mom eat differently. She doesn’t like pizza, she doesn’t like hamburgers. My mom thinks that Americans are too fat. They don’t eat like natural food. She’ll be like—well, that’s kind of true actually. All our foods are kind of like preservatives and everything. But where she comes from, everything is like all natural and stuff. Nothing has any preservatives, so you just eat it while it’s fresh. So it’s kind of—she thinks that I eat kind of unhealthily. (MOC)

Another girl commented that her mother might buy American food, but her mother was less likely to eat it.

She lets us buy it, but she’s never tempted. She doesn’t go near it. It’s like she’s scared of it. Like if we like put it there, she’s like, no, no and she backs away. (MOC)

Despite some parents not seeming to like American foods, the girls' food posters indicated that these foods were included in the diet on a regular basis. Pizza, macaroni and cheese, and ice cream were widely listed across cohorts and some girls reported that their mothers would make pizza and macaroni and cheese. Several of the girls indicated their mothers might be more likely to cook American foods if they had the recipes for them, but many did not know how to make the foods. Some of the more common Somali foods such as goat meat were not listed often and most girls indicated they did not like the taste of goat meat. One younger girl in Owatonna commented:

I can't eat any of my mom's food. I don't know [why]. White rice with sauce on it. It makes me puke. It's like marinara sauce. Regular sauce.

The younger girls in Owatonna did not feel there was a distinction between Somali and American foods and felt like everyone in their family ate the same things. They indicated that they had the same kind of food at home as at school, while most of the cohorts indicated they ate primarily traditional cultural foods at home. The older girls in Owatonna summed up their thoughts about changing diet by indicating that they did not feel dietary changes were unusual and pointed out that the U.S. is a different country, so they expected food habits to change.

Girls' influence on food purchases. Girls' influence on food purchases was variable. Most reported they regularly grocery shopped with their mother. The girls in Minneapolis reported shopping more often than those in Owatonna. Girls in both locations indicated they were able to influence food purchases to some extent. One older girl in Minneapolis indicated that if she requested something like fruit, her mom was much more likely to purchase it. There was a wide range in reported maternal responses to the girls' requests for specific foods, such as:

We just tell her and she buys it. (MYC)

If she's in a good mood she will buy some things I want. (MOC)

Like if you want to buy a piece of candy that's like ten dollars or something—she won't do that. But if it's family food she would be more likely to buy that. (OOC)

No, she (mom) doesn't like it [soda], although we buy it in the grocery store sometimes. (MOC)

Girls were most likely to influence snack food purchases, cereal purchases, and to some extent, main dish purchases which included what they identified as “American foods.”

Family meal patterns. Family meal patterns were reported to be irregular. Many of the girls in both locations indicated they did not have regular family meals. That is, the entire family was not likely to sit down together to eat in the vast majority of households in both locations. Eating alone or with other family members in front of the T.V. was a common response. This was at least partially attributed to family schedules. Comments regarding family meals included:

But like regular days, some of us are like in our room; some of us are in front of the TV.

(MOC)

Like three goes upstairs and four stay downstairs and watch TV while they're eating.

(OYC)

We eat by ourselves on the floor. (OOC)

The boys eat with the boys, and the girls eat with the girls. (OOC)

You eat when you want how you want. (OOC)

Family meals were most likely to occur during Ramadan, a season of fasting in the Muslim calendar during which Muslims do not eat from sunrise to sundown. The meal after sundown was typically described as a family event during which special traditional foods were served. Some girls also indicated they would eat together if their father was home or they had guests. Girls' comments regarding occasions during which they would eat together included:

Ramadan you have to kind of eat together, because that's when you break your fast together. (OYC)

We eat together on Ramadan and on holidays. (MOC)

4.4 Aim 2: Enablers and Barriers to Dietary Practices Related to the Dietary Intake of Calcium and Vitamin D-Containing Foods

Enablers and barriers to dietary practices relative to the intake of calcium and vitamin D containing foods were identified within the focus groups by the girls and additionally derived from the data by the PI during analysis. Enablers and barriers to dietary practices by cohort are listed in Tables 6, 9, 12, and 15 in the Tables Appendix, Chapter 4 Tables. Enablers and barriers to dietary practices were organized by individual and family/community levels consistent with the conceptual framework. Core common enablers and barriers to dietary practices identified across cohorts are reported in the following sections and are summarized in Table 43.

Individual level enablers to dietary intake of calcium and vitamin D. Individual level enablers included positive food appeal, primarily the taste of a particular food or beverage, and the desire for variety which expanded food options on an individual basis. For example, the taste of chocolate milk was preferred over white milk and acted as an enabler to the milk consumption. Eating foods that girls described as “going together” such as “cereal and milk”, and “cookies and milk” increased the dietary intake of calcium and vitamin D and in this way acted as an enabler. The way a food was presented or cooked also acted as an enabler to the consumption of foods containing calcium and vitamin D. Girls did not like raw or cold cheese, unless it was packaged as string cheese. They preferred melted cheese such as that found in grilled cheese sandwiches, cheeseburgers and any number of baked combination foods that contained cheese. Melting the cheese before eating was therefore an enabler to the consumption of cheese.

Family/community level enablers to dietary intake of calcium and vitamin D. Family/community level enablers to the intake of calcium and vitamin D –containing foods included dietary acculturation which introduced numerous new foods to the traditional diet, participant influence on parental grocery purchases which expanded food options, and school

attendance which provided girls the opportunity to drink flavored milk while not offering beverage alternatives. The addition of combination foods such as lasagna and pizza and the incorporation of foods like yogurt and ice cream added sources of calcium and vitamin D to the traditional Somali diet, which was typically low in such foods. Movement toward dietary change as reported by participants has resulted in expanded options that potentially enable the intake of calcium and vitamin-D enriched foods. The girls' willingness and openness toward dietary change was clearly evidenced by the foods listed on their food posters, their comments about wanting to try new foods as well as their knowledge of and appetite for American foods such as pizza, tacos, and hamburgers. School attendance acted indirectly to enable the intake of milk, because milk was the only beverage offered in the participants' schools for school lunch. Eating school lunch, therefore, enabled participants to drink milk for lack of other options.

Individual level barriers to dietary intake of calcium and vitamin D. Individual level barriers to dietary practices relative to the intake of calcium and vitamin D-containing foods included negative food appeal such as not liking the taste, smell, or texture of a particular food or beverage such as cheese or milk; feeling sick after ingesting milk; and developmental stage including increasing self-determination relative to dietary choices, choosing to eat junk food and convenience foods, and a lack of concern about eating unhealthy foods and/or beverages. While taste could be an enabler, it was just as easily a barrier for certain types of foods and beverages. Not liking the taste of milk or preferring alternate beverages such as juice, soda, or water to milk acted as barriers to milk intake. Only one girl indicated that milk made her feel sick, but that too acted as a barrier to the consumption of milk. Many girls objected to characteristics of other calcium and/or vitamin D containing foods as well such as raw cheese and oily fish. Negative food appeal was therefore a barrier to the consumption of some foods that contained calcium and/or vitamin D.

The girls verbalized having increasing freedom to make dietary choices with increasing age. With this increased dietary freedom, girls reported choosing to skip meals, have alternate foods or beverages than what was prepared, and eat junk food and convenience foods when available. Additionally, girls in all cohorts verbalized a lack of concern about eating healthy foods at their ages. This increasing dietary freedom appeared to act as a barrier to a healthy diet in general. The girls did not volunteer that they were likely to choose foods that were high in calcium or vitamin D as part of their increasing determination in dietary choices.

Family/community level barriers to dietary intake of calcium and vitamin D.

Family/Community level barriers to the dietary intake of calcium and vitamin D were identified relative to the limited, repetitive dietary choices at home and school; the unavailability of foods and beverages rich in calcium and vitamin D in the home setting brought about by the maternal role in food purchase and preparation and adherence to traditional Somali dietary practices; and the lack of coordinated family meals in most home. Availability or access to foods and beverages containing calcium was a key determinant of whether or not girls would eat these foods. Although girls reported milk was available to them at home, they were less likely to drink it at home than at school, because other, more preferred, beverage options were available to them at home. In this way, the availability of other beverage options acted as a barrier to milk consumption.

Closely related to availability of food was cultural tradition. The traditional Somali diet, which was commonly served at home, did not include a lot of foods that contained calcium. Furthermore, girls' mothers, who were the primary purchasers and preparers of food in the home were likely to buy and prepare traditional foods that they were familiar with. Calcium-containing foods, therefore, were somewhat unavailable at home and the traditional Somali diet could be seen as a barrier to the dietary intake of calcium-containing foods and beverages. Girls in all cohorts also professed adherence to the religious directive against pork and pork products.

However, as mentioned, girls were confused about which foods actually contained pork products and as a result some eliminated potential calcium-containing foods such as yogurt from their diet.

Irregular family meal patterns appeared to be the norm in many participants' households. The lack of regularly scheduled meals promoted dietary self determination, especially as girls aged. Foods the girls reported choosing for meals were not always healthy and did not promote the dietary intake of calcium-containing foods. In fact, most girls indicated they preferred eating or making convenience foods that were quick and easy. Irregular family meal patterns, therefore, appeared to act as a barrier to the dietary intake of calcium-containing foods.

4.5 Aim 3: Comparison of Enablers and Barriers to Dietary Practices Within and Across Cohorts

The following sections summarize comparisons of enablers and barriers to dietary factors contributing to bone health between cohorts within location and across location consistent with the third specific aim of this study. The summaries provide specific comparisons between cohorts rather than just core commonalities across all cohorts.

Comparison of enablers and barriers to dietary practices between younger and older cohorts in Minneapolis. Taste was identified as a primary motivator for food choices among both cohorts. There was also a wide variety in taste preferences within and across Minneapolis cohorts. Older girls reported additional food characteristics such as smell, appearance, and texture as reasons to eat or not eat foods.

Most girls participated in free and reduced lunch at school and were, therefore, likely to eat school meals. Both groups expressed boredom with routine food choices offered at school and generally did not think the food tasted very good. However, because school lunches provided milk as a beverage, girls were more likely to drink milk at school than at home; although it was available in both settings. School attendance was, therefore, identified as an enabler to milk intake. Younger girls reported having milk more often than older girls. Consumption of soda

varied, although younger girls reported more soda consumption than older girls in Minneapolis. The majority of girls in both cohorts preferred regularly sweetened soda.

Boredom with food served at home was also reported across Minneapolis cohorts. Food served at home was very often described as traditional Somali food purchased and prepared by the girls' mothers. The younger girls were more likely to report cultural and religious traditions prohibiting consumption of pork or foods made with pork products, although participants in each cohort noted this. Fruit and fruit juices were consumed regularly and were preferred beverages in both cohorts. Having the option to drink beverages other than milk at home was a barrier to milk consumption for both cohorts.

The desire for variety in food was an enabler to trying new foods, which included non-traditional Somali foods such as dairy products and cheese. Dining outside the home was also identified as an enabler to trying new foods, although new foods were not necessarily identified as healthy foods. The girls in both cohorts reported that their restaurant of choice was most often a fast food restaurant. Girls in both cohorts reported acquiring a taste for foods identified as "American foods" such as hamburgers, pizza, macaroni and cheese. Eating combination foods such as pizza and macaroni and cheese was identified as an enabler to eating foods that contain calcium. Both cohorts reported parental disapproval of many American foods. They indicated that their parents did not think the food was healthy.

Girls in both Minneapolis cohorts were able to identify healthy foods and foods rich in calcium. Similarly, girls in both groups were able to identify that foods rich in calcium were good for their bones. More of the younger girls than older girls reported this belief. Their sources of information related to healthy foods included school, books, and media. Younger girls were more likely to report school health classes as their source for nutritional information. Older girls expressed an awareness that their diet was likely not that healthy, but they were not currently motivated to change their diet.

Girls in both cohorts had varying influence on food purchases, with younger girls reporting more influence than older girls. Both cohorts reported freedom of choice in choosing snack foods, which typically consisted of baked goods and chips. Older girls, however, had more freedom of choice in food options for meals. This acted as a barrier to the consumption of foods rich in calcium and vitamin D as these foods, with the exception of pizza or macaroni and cheese, were not likely to be chosen. The younger girls also expressed an aversion to “cold” foods such as “raw” cheese. Both cohorts reported a general lack of family meals, although this was more pronounced among the older cohort.

Comparison of enablers and barriers to dietary practices between younger and older cohorts in Owatonna. Similar to the two Minneapolis cohorts, the cohorts in Owatonna most commonly cited taste as primary motivator for eating certain foods. The older girls were more sophisticated in their descriptions of taste than the younger, but likes and dislikes varied widely within and across groups. Additionally smell was important to the older girls as was appearance. Both cohorts also commented on hot and cold foods. Generally, they did not like cold foods other than ice cream. Not liking cold foods was a barrier to the consumption of some calcium-containing foods in both cohorts. The older girls were more verbal about eating foods that went together such as cookies and milk or cereal and milk. Since most of the examples they provided involved milk and another food, this proved to be an enabler to milk consumption. This idea was not promoted as widely in other cohorts. Both cohorts in Owatonna referred to advertising as being something that would influence their food choices, although the older cohort emphasized this more. The way a food looked in a commercial or the way it was packaged was influential in getting them to try something.

Availability of food was also an enabler to eating certain foods, while lack of availability was a barrier to eating others. Most girls in Owatonna, as in Minneapolis, ate school lunch, so dietary choices during the day were somewhat limited. Again, school was an enabler to drinking

milk, because it was readily available and schools offered the choice of chocolate milk, something not all girls had access to at home. In general, both cohorts of girls in Owatonna expressed boredom with the same food choices over and over again. The younger cohort spoke to this in more depth than the older girls did and cited boredom as a reason to eat at a restaurant. The older cohort in Owatonna was less likely to eat school food if they did not like it and more likely to prepare in advance by bringing their own lunch.

The Owatonna cohorts noted differences in food choices dependent on day of the week as well as setting. The older cohort indicated that during the weekend, they were more likely to have traditional Somali foods than during the week. Both cohorts reported eating traditional Somali food regularly and listed many Somali foods on their food lists. They also indicated that many of the food choices at home varied little. Culture was a pivotal contributing factor identified by these two cohorts to shape food choices. Consuming a lot of traditional foods was seen as a potential barrier to the consumption of foods rich in calcium and vitamin D as traditional Somali foods do not characteristically include a lot of calcium containing components. Both cohorts were keenly aware of and adherent to avoiding foods that were thought to contain pork or pork products. They self censored each other during the discussion debating which foods contained pork. Fear of eating foods that contained pork was a barrier to the dietary intake of calcium, as the girls' information about the ingredients in food was not always accurate.

The Owatonna participants also made a distinction between American and Somali foods, although the older cohort made less of a distinction than the younger cohort. The older group did not think their diet had changed considerably from their parents, except perhaps in expanded choice and the way in which food was eaten. Both groups readily characterized American food as consisting mostly of fast food choices. Including combination foods like pizza and macaroni and cheese was seen as an enabler to eating calcium-containing foods.

Family meals were informal for both groups, with formal meals most often eaten for celebrations such as Ramadan. The younger cohort indicated they were more likely to have food prepared for them for meals and would be asked to try the prepared food. The older cohort indicated they would prepare something for themselves if they did not like what was prepared. They also indicated that they very often chose their own foods for meals. The younger girls indicated they had more choice for choosing snacks than meals and reported eating a wide variety of snacks. Their snack choices were somewhat healthier than the older girls' choices. Both cohorts reported that they were able to prepare food for themselves. The age at which they learned to cook varied widely. The older girls voiced positive opinions about being able to cook.

The older cohort in Owatonna addressed the issue of cost more than any other cohort. It came up during the discussion of whether or not they could influence grocery purchases. The girls agreed that cost was a factor in determining food choices, particularly food served within the home setting. Both groups had variable influence over grocery shopping.

Lack of time to eat was a greater factor for older girls in Owatonna than for younger girls. Their school start time was slightly earlier, so many of them did not eat breakfast. Lack of appetite in the morning was cited by both groups of girls as being a barrier to eating breakfast. On the other hand, lack of time in the morning prompted some of the older girls to drink only a glass of milk in the morning because it was quick.

Comparison of enablers and barriers to dietary practices between the Minneapolis cohorts and the Owatonna cohorts. Overall, many of the same types of factors and enablers and barriers shaping dietary choices emerged from the data in both settings as evidenced by the previous sections describing core common findings. Taste was a predominant factor contributing to food choices for both geographic settings and varied widely within and across groups. All cohorts reported boredom with repeated food choices at home and at school and described being curious about new foods and having a desire to try new foods. The adoption of American foods,

usually identified as fast foods, was one means of trying new food choices. Similarly, adopting combination foods such as pizza and macaroni and cheese introduced sources of calcium-containing foods to the diet.

The traditional Somali diet was consistently reported as the mainstay of dietary choices at home. Pasta and rice with meat sauce were readily identified in all cohorts as prime staples of the Somali diet. Cultural tradition seemed to be a greater reason for specific food choices among the Owatonna cohorts than among the Minneapolis cohorts. The Owatonna participants listed more cultural foods and went into great detail describing them. All girls expressed knowledge of pork prohibitions and fasting during Ramadan. Fear of inadvertently consuming pork-containing foods was strong across age and location.

Participants in three of the four cohorts (all except the older Owatonna cohort) thought their diet had changed drastically from their parents' diet. The greatest change came in variety of food choices. Only the older Owatonna cohort cited change in meal patterns as being the primary way their diet varied from their parents. All cohorts indicated that while their parents might buy and/or prepare American food, they did not, as a group, seem to like American food. Most of the girls in all cohorts perceived that their parents' diets were healthier than their own.

While several of the cohorts indicated that it was important to eat healthy foods, most did not believe it mattered as much at their age. Girls in all cohorts cited fruits and vegetables as being healthy foods. They could also recount that calcium-containing foods were good for your bones and could identify common calcium containing foods such as dairy foods. School was an enabler to milk intake across age and location. Milk was more widely consumed in school than at home despite its availability in both settings.

There was consistency in family meal patterns with all cohorts reporting a somewhat informal approach to family meals. Traditional sit down family meals were more the exception than the rule. These types of meals were more likely to occur during celebrations like Ramadan

than on a daily basis. Most cohorts reported eating meals individually or around the television. The only difference was that the older girls in Minneapolis were more likely to be given money to go to the store to buy food for dinner when their mother was working. This was not true of the other cohorts.

4.6 Aim 1: Socio-cultural and Environmental Factors Shaping Physical Activity Practices.

Similar to dietary practices, there were many commonalities in identified factors shaping physical activity practices across the different cohorts. Summaries of findings for each cohort are found in the Chapter 4 Tables section of the Table Appendix in Tables 16 through 27. Common core factors shaping physical activity practices across cohorts are listed in Table 41 in Chapter 4 Tables in the Tables Appendix. Common core factors shaping physical activity practices and particularly those related to weight-bearing exercise were identified at the individual level and at the family/community level. Individual level factors included seeking socialization, enjoyment of activity, improving health, individual characteristics, not having time, having other interests, and developmental stage. Family/community level factors included cultural traditions and gender roles relative to physical activity, environment (relative to space, equipment, safety), and school attendance/meeting school requirements. Findings for each of these factors are reported in the following sections.

Individual level factors shaping physical activity practices.

Seeking socialization. An overriding reason many girls participated in physical activity was for the opportunity to socialize. Physical activities were reported to provide an opportunity to socialize and to have fun with friends. Participation in physical activities offered an easy way to socialize outside of school. Girls indicated they would be likely to participate if their friends were playing. As one young girl in Owatonna stated, “If you have a lot of people you know or some friends. Like play tag, it’s fun.”

Older girls in Minneapolis indicated that joining physical activities might foster new friendships and provide an opportunity to meet different people. Their comments included:

'Cause like you get more friends. Like you get to know other people, that maybe you wouldn't normally talk to. You get more friendships.

Sometimes the people make it easier for other people to talk to you, because they know something about you, and they say, "Hey, we like that game."

For some of the older girls in Owatonna, the extent of their activity was to go outside, walk, and talk. As one girl commented, "We walk around and talk. Every weekend we walk."

Enjoyment of activities. Enjoying the activity and liking the excitement of some sports were other reasons the girls listed for participation. As one girl stated, [you do an activity] "Cause you enjoy it." Girls described enjoying participation in activities for a variety of reasons such as excitement, action, wanting to participate in something that was unique. Exemplars include:

There's so much action going on. (OYC)

Like if you see someone else watching it and you see them getting excited, then you want to play. (OYC)

It's unique, something different. (OYC)

Improving health. The girls also volunteered that they thought participating in physical activities was healthy. One of the most commonly cited benefits of physical activity was weight loss or weight control. Many of the girls expressed the opinion that they were already fat. They also expressed a concern for their appearance and thought that exercise might help them look better. For example, one girl stated a reason to exercise was to look better, "So we'll look like celebrities". Examples of opinions about the effect of physical activity on weight include the following:

You lose weight. (OYC)

It burns fat. (OYC)

It helps when you have too much weight. (OOC)

I don't know. It's just, it's kind of like a runner's high, you just feel good. (MOC)

Yeah [exercise is a benefit] Like, if you're not overweight. Sometimes it's harder to be overweight. Like, people look at you different and stuff. And if you're thinner they don't. (MOC)

The girls in the younger Minneapolis cohort indicated that physical activity was healthy and offered that people probably exercise to lose weight, but they did not feel that they would be likely to exercise in order to become healthier. Participants identified both short and long term benefits to participation in physical activity, which included:

It (physical activity) exercises your legs. (OOC)

Like if you were like in the running team it might help you one day. (OYC)

It [physical activity] gives you a lot of energy. (OYC)

Not having cholesterol. It could help that. (OOC)

Girls were not familiar with the term weight-bearing exercise, but understood the concept that weight-bearing exercise might improve bone mineral density. Participants easily identified activities they thought would be considered weight-bearing exercise from the lists they created of physical activities they participated in. See Tables 16, 19, 22, 25 for each cohort's list of activities they identified as weight-bearing. Comments girls made about why having healthy bones would be important include:

[You need to have strong bones] So you can like do things. (OOC)

You won't be breaking your arm or something easily. (OOC)

Individual characteristics. In addition to an individual sense of enjoyment or excitement that some girls experienced through participation in physical activities, some girls also cited individual characteristics that made it less likely for them to participate in physical activities.

These included: feeling tired, feeling uncomfortable, and feeling like the physical activity was physically too difficult and not feeling accepted. A younger girl in Owatonna stated, “If you exercise too much you get tired and – sometimes you don’t feel like it”. Another noted that doing the same activities over and over was sometimes not conducive to continued participation, “You get bored and stuff”. The older girls in Minneapolis expressed the idea of not feeling accepted in determining whether or not they would participate in physical activities. These girls expressed the perception that culture and environment played large parts in creating the sense of fitting in or being accepted when engaging in physical activity and this will be discussed further in later sections. The younger girls in Owatonna also mentioned not feeling accepted, but this had more to do with their individual fears that they would not be accepted on main stream teams due to style of dress which included wearing long skirts and head coverings, although none reported actually experiencing this. One girl stated, “They [organized sports] might not let me wear my skirt.”

Not having time or not wanting to commit the time. For many of the girls, whether or not they participated in physical activities was a matter of time. Girls commented that their schedules did not allow them to participate in organized after-school activities like sports teams. Girls in all cohorts reported having to go home after school in order to complete tasks or fulfill family obligations. This factor will be discussed more in the section on gender roles and again in the findings related to sunlight exposure. A number of other girls indicated that they had other activities they would rather do, so there was no time to participate in physical activities. Still others, primarily younger girls in Minneapolis, indicated that they did not want to make a commitment to participate in organized physical activities. For example,

Rather than people directing you, you’d rather do stuff by yourself (MYC).

I don’t want to be on a team because I just like to play soccer (MYC).

Having competing interests. Many of the girls stated that they had other things they would rather do than participate in physical activities. Girls identified activities such as watching T.V., playing on the computer and listening to music were things they might rather do. One younger girl in Owatonna stated, “TV, computer, outside, sleep, eat, that’s what I do.” Everyone but one girl in the younger Owatonna cohort indicated she might watch T.V. instead of going outside and doing something.

There were girls in each of the cohorts who reported watching T.V. rather than going outside to play. Among the older girls in Owatonna, almost half of the girls indicated they would be most likely to go home from school and watch T.V. A greater number indicated they watched T.V. every day for at least two hours. On weekends, one participant indicated she was likely to watch T.V. for eight hours. Many of the girls also indicated that they would be more likely to watch sports on T.V. than actually participate in them. The girls in Owatonna reported watching T.V. more often than the girls in Minneapolis. One older girl in Minneapolis reported she preferred to do “indoor things” and would not likely participate in physical activities outside.

Developmental stage. The belief that participation in physical activity changed with increasing age was verbalized by participants in all cohorts. The girls reported that as girls got older, they were less likely to participate in physical activities of any kind, not just sports. Girls noted this change began in middle school, around 12 or 13 years of age with increasing inactivity by age 15 years.

Older girls stop [playing outside]. (MYC)

Yeah, age 15. That’s when my sister stopped going outside. (OYC)

Not all the big people, like in high school, they don’t come out, but like junior high, yeah, they come out. (OYC)

Numerous factors were identified shaping diminished physical activity and similarities in identified factors were noted across location and age. Girls hypothesized that being more mature was a reason for this phenomenon. These comments demonstrate this belief:

But it's ok to do that [play outside, be active] when you're a kid. When you're a kid you can do whatever you want. And then after you become a teenager—you go [outside to play] less than what you were, like you mature more. (MOC)

Because you get older, and – you become more mature. (OYC)

They also thought that interests changed, and some expressed feeling less like being active. Comments to demonstrate this include the following:

They talk. When they come to the park, they sit and talk. (MYC)

They do walk, but they don't run and play around. (MYC)

You grow out of your childhood and then—and it's not your thing. (OYC)

Or maybe they hang out with their friends and stuff like that. (OYC)

You're more lazy when you're like – this age. (OOC)

Because when you're little you want to play outside. That's what you want to do mostly. (OOC)

Fitting in. One younger girl in Minneapolis stated, “It's ... not required [changing activity patterns], but it's like that.” When asked to explain that comment, she indicated that it was less accepted in her community for older girls to play outside. Older girls in Minneapolis also talked about fitting in, specifically as it related to community acceptance of physical activity and feeling comfortable exercising in environment. Additional findings relative to fitting in are reported in the next sections.

Family/community level factors shaping physical activity practices.

Cultural traditions and roles.

Traditional dress style as a hindrance to participation in physical activity. Opinions about this were divided. A minority of girls in each cohort thought it was difficult to exercise while wearing long skirts, but others voiced that this was no impediment. Participants cited examples of individuals who were able to participate fully in sports and other physical activities. One younger girl in Owatonna stated, “Yes, you can [play sports]. I play basketball in my skirt.” An older girl in Minneapolis proclaimed, “Dress is not an issue.” A younger girl in Owatonna stated, “I don’t know. I see girls playing where they have like a lot of long skirts. It’s hard to run.” A few girls in Owatonna expressed worry about being accepted by the mainstream culture if they wore their traditional style of dress as mentioned previously.

Differing gender rules about permission for and acceptability of being away from home. Older girls in both locations reported there were different rules for girls and boys regarding being allowed to be away from home. Older girls in Minneapolis appeared to be more bothered by this discrepancy than did older girls in Owatonna. An older girl in Minneapolis commented, “A boy and a girl, if they’re both the same age, the boy can do whatever he wants, but the girl can’t go anywhere. It’s like a double standard. They’re going to get hurt.” Another older girl in Minneapolis said, “And you can’t just go outside, ‘cause your mom has to let you go outside. You don’t have the option. Like you can’t just go. You need permission.” Older girls in Owatonna agreed that boys were free to leave home more easily, although a few noted that their brothers did have household chores:

But the boys leave [the house] like really early. (OOC)

They [brothers] come home, change, take a shower, eat, sleep. That’s what they

[brothers] do the same way every day. (OOC)

Younger girls in both locations were less reactive to and less aware of these differences, however those who had brothers were aware that their brothers had more freedom to leave home and to participate in activities. Younger girls did not report differences in activities among children in their grade levels. However, they did report it was less likely for them to be allowed to go out alone. For example, one younger girl in Owatonna stated, “My mom would say the same like this. You’d have to go out in a group.”

Perceived community messages about the inappropriateness of physical activity for older girls and women. The view that physical activity among girls as they aged was less acceptable within their communities was expressed. However, the degree to which this view was expressed varied by age in both locations. Younger girls in both locations, while aware of decreasing levels of physical activity with increasing age, were less verbal about the role of community beliefs and cultural traditions in shaping level of participation in physical activity. The older girls in Minneapolis were quite verbal about some of the community and cultural messages they received regarding the inappropriateness of participation in physical activity. There was also a geographic difference noted relative to this idea. Girls in Owatonna reported this belief less commonly and less emotionally than older girls in Minneapolis. Younger girls in Owatonna were more likely to report not being allowed to participate in physical activities, than were older girls in Owatonna. Older girls in Minneapolis reported that it was considered unfeminine as well as inappropriate to participate in physical activity. Their comments were as follows:

It’s (being involved in sports) unfeminine. (MOC)

Yeah, like they’ll act like boys or something. (MOC)

When you’re 12 they start telling you all this and that. You can do it, but they’re going to just be like, oh, you shouldn’t be doing that. And then the other people are like, oh ... (MOC)

When you turn 18, that's when they tell you can't do that. You're a big girl and what not.

(MOC)

A prime example the girls in the older Minneapolis cohort gave of ceasing to participate in an activity when they got older was riding a bike. Several of the older girls in Minneapolis indicated they would like to ride around, but didn't feel they could because it isn't the norm in their community. They expressed that they did not feel like they would fit in.

My grandma says they [girls] can't ride a bike. (MOC)

I wanted a bike, but then my mom said you're a girl and you're big. (MOC)

I got a bike, but then I got too embarrassed by it — I have it, but I don't ride it no more.

(MOC)

I had a bike, and then I rode it. But then when I was 12 I stopped, because no other girl my age rode a bike. (MOC)

One older girl in Minneapolis also spoke about attempting to exercise in her apartment building. She reported that she did not want anyone to see her, so she exercised on the treadmill in the exercise room with the lights off:

I have one [exercise room] in my apartment. Actually, yeah, I do [use exercise room and bike]. Once I turned off all the lights and I exercised and this lady and this man were sitting watching me. (MOC)

In addition to feeling that the community did not approve of girls' participation in physical activity beyond a certain age, the older girls in Minneapolis also identified that parental peer pressure existed. Many of the girls thought that the belief about participation in physical activity was not necessarily their parents' issue. They thought their parents were heavily influenced by community and peers. From their perspective, parental peer pressure caused their mothers to prohibit girls' participation in some activities. The girls in the older Minneapolis cohort shared a number of examples.

And most of the times it's not even your parents that care, just their friends. They see their kid there—like, oh my god, your daughter's playing over there. No, it's like another parent. Like, my mom says yes to you, like oh, you can play basketball. Next she sees another lady, and some other lady she says, oh, she shouldn't be playing basketball. Oh, why you want her to do that? She's a girl. She's supposed to be at home. She plays basketball. Next time she goes to the movie with a guy. Next time you don't know what she's doing now. I mean, What makes me mad is like when somebody just goes your daughter shouldn't be doing that, it's like Hello, you've been a kid, I think you've done that before. (MOC)

The parents don't even care; it's just that their friends make them care. (MOC)

They (parents) feel like if they don't listen to them, they're abandoning their culture. (MOC)

The less friends your mom has, the more freedom you have. (MOC)

Not all girls felt strongly about not participating in physical activities. One older girl in Minneapolis stated, “I don't really—I don't really care if I do a sport or not. I'm used to not doing it, so I'm OK.” When asked if girls would be likely to participate in sports or physical activities if there were a facility just for girls available to them, one older girl in Minneapolis stated, “I wouldn't really care [if there was a facility just for girls to play sports in]. I wouldn't play sports anyway, so it wouldn't matter—.” Another older girl in Minneapolis indicated that she had played sports and suggested that, because she played with all girls and wore traditional style of dress, she encountered no problems:

No, [we didn't have any problems] because it was only girls, and only girls would come. Because most of the girls were like Somali, and their parents approved of that. And when—like we played against another team, we would like wear this thing, it's like a

long culotte and we'd wear our pants underneath that and then just wear a jersey on top of that.

Some of the younger girls in Owatonna indicated they had played on a Somali girls' soccer team in the past. However, another younger girl stated, "My family wouldn't let me." The River Valley Girl Scout leader, a community liaison for the current study, had been instrumental in starting the girls' soccer team and verified that she had encountered resistance among some Somali families to organizing a girls' soccer team. Overall, girls in Owatonna, regardless of age, seemed to have greater acceptance of not being allowed to participate in some physical activities. One younger girl stated, "It's just not what we do. Like showing our hair and wearing shorts." One girl reflected on level of activity among girls living in Somalia, like when her mother was younger. She stated: "Everybody would play soccer. Boys would play, the dads would play. The girls wouldn't." She indicated that girls' non participation in activities was not a new phenomenon.

Interestingly, the older girls in Owatonna did not think there were a lot of cultural taboos against participation. They felt their families were supportive of involvement in physical activities. One girl reported that she was a cheerleader and regularly participated in physical activity. A number of them ran track. They also indicated that their parents were supportive of their activities. Their comments reflect this:

Yeah. They (family) come and support you. (OOC)

They support us like sometimes when they have like a track thing. (OOC)

The Girl Scout community liaison in Owatonna, however, reported that she had encountered parental disapproval for girls' participation in soccer when she attempted to start teams there.

Having role models. Some girls also noted that watching people play sports, either live or on television sometimes made them want to participate. As an example, one older participant in Owatonna noted she sometimes watched sports on T.V. and that got her interested, "Like a sport

that you saw on TV and you're like, oh I want to play this sport." For many of the girls, watching the sport was good enough, and they did not necessarily want to participate in the activity. One older Owatonna girl stated, "I pretend that I'm doing the thing that I'm watching." They named some role models that influence them to want to at least watch sports, if not participate in them. An older girl in Owatonna stated, "Well, I like soccer, to play for the Somalians, like in Minneapolis, there is one dude who is really good."

On the other hand, girls in both locations reported that there were few adult women role models in their communities who participated in physical activities. The younger girls in Owatonna reported that their mothers might walk around outside while watching younger siblings, but they mostly stayed in the house. The older girls in Owatonna and Minneapolis expressed that it wasn't common even in Somalia for women to participate in physical activities. One of the older girls in Minneapolis reported that women in Somalia walked in groups to the houses of their friends or families, but that was about it. In Minneapolis, the older girls reported seeing an older Somali woman jogging in the park, but noted that people laughed at her. One of the girls stated she admired her. Girls in Minneapolis did report seeing older girls and women walking around the nearby park.

Increasing role responsibilities over time. Having other responsibilities sometimes prevented girls from participating in activities. These responsibilities increased as the girls got older. In discussing this topic, the girls in Owatonna talked about their own mothers' experiences in Somalia. One older Owatonna girl indicated that girls in Somalia were expected to do even more than girls here. She stated, "They had more stuff [chores and responsibilities] to do." Girls in all cohorts commonly reported expectations at home that they would assist with child care and household chores. Doing their school work was also identified as important, so some girls reported having to go home and do homework before they could go out. One younger girl in

Owatonna stated when asked if she would participate in after school physical activities, “No, because I’m a stayhome—I babysit.”

Environment.

Feeling comfortable in the environment. The older girls in Minneapolis provided a broad assessment of environment. One girl stated, “That’s [environment] basically the most important. Like what kind of area you are in.” This discussion related to the discussion about fitting in and feeling comfortable in the environment, which was verbalized only in the older cohort in Minneapolis. Older girls in Minneapolis discussed that they felt more comfortable exercising if they were in an environment where it was acceptable to do so. One girl summarized:

When you’re in like, a different area [than where I live], sometimes it [physical activity] is more accepted, because none of those people are staring. You’re in an area that thinks it’s OK. Like an area where people are doing it. Like at the Y, it’s OK, because everyone—that’s what the whole point is. Everyone’s OK. No one’s going to be looking at another person. It’s how the feel of everything is.

Having adequate space. Having adequate space was instrumental to participation in physical activities. Girls in all of the cohorts were fortunate to live near city parks that provided adequate space for physical activity. In fact, most of the activities the girls described participating in were outdoor activities. Most of the girls in Minneapolis lived in a high-rise apartment complex across the street from a city park and community center that contained a gym and meeting rooms. There was also a nearby YWCA that offered exercise programs and had a pool. The girls in Owatonna lived in one of three high density housing areas near two city parks. Some girls also lived within walking distance of the junior high school. There were also accoutrements such as a basketball hoop on the premises that fostered participation in playing pick-up basketball as often as every day. The girls indicated the basketball court was a common place to meet and socialize. One girl noted, “You just see people out there and then you join them.” When asked

whether girls could exercise within their apartments, answers were less certain. One younger girl in Minneapolis indicated, “Yeah there would be space [in an apartment] to hula hoop or jump rope.”

Having necessary equipment. The girls discussed the necessity of having access to the necessary equipment used to exercise. Several referred specifically to exercise equipment such as a treadmill. One older girl in Minneapolis indicated that she had friends and family who owned exercise equipment and she was sometimes able to use that. She commented,

Like the house I lived in has it [exercise equipment]. Most of my family members, they have it. I don't know if they—they see it on TV. And they buy it. Everybody has credit cards. So, all they do is they see it on TV, they want it, they buy it. And most of them, they don't actually use it. Sometimes, when it's just me, my cousins, when we're playing around. We get on the machine for fun or whatever. Yeah, and play around. Like the running ones. We make it super fast just by seeing who beats who or whatever.

Overall, girls indicated if they had access to such equipment, they would exercise more often. An older girl in Minneapolis stated, “Yeah. If you had a place to do half of the stuff, then we would be doing it like — every day”.

Having acceptable weather conditions. Because there was limited access to indoor space for participating in physical activities in both locations, many of the girls participated in outdoor activities. Almost all of the girls indicated that weather was a major factor in whether or not they would participate in physical activities outside. They almost unanimously indicated across cohorts that they would participate in activities outside during the summer months and the warmer part of fall. They did not tend to participate when the weather was cold or wet. One younger girl in Owatonna commented: “Yeah. like we go out during spring, fall and summer. Winter's too freezing.”

Feeling safe. The final aspect of environmental factors was feeling safe. This was reported to be a concern for girls and their parents alike. Since the girls lived in cities, parents were especially concerned about safety. While the younger girls in Minneapolis indicated they could go to the park by themselves if they wanted, they indicated they usually went with a family member. During the focus group debriefing, the focus group co-facilitator who lived in the community indicated that it was unlikely the girls would be allowed to go to the park by themselves, because she said most parents had safety concerns. The older girls in Minneapolis were very conscious of safety and this was a subject they reported was stressed by their parents as well. There were rules as to places they could go. Of note, there was a shooting of a young Somali male outside the community center just across from the high rises where most of the girls live. The girls indicated that this had intensified their own and their parents' awareness of safety issues. They stated:

No, they (parents) don't want you to go outside. They say stay home and watch TV.

(MOC)

Maybe they think you're going to get stolen. Or shot in the head, stuff like that. (MOC)

Similarly, girls in Owatonna discussed safety concerns. There are city parks near the townhome complexes, but the girls reported activities away from home were limited due to parental safety concerns. One younger girl in Owatonna indicated, "My mom is scared. Like if my brother's out, where is he? And he's right next to her." Some girls were allowed to go to the nearby park and others were not. The older girls in Owatonna commented less about safety concerns than other cohorts.

Meeting school requirements. Another family/community factor commonly identified to shape participation in physical activities was school attendance, and more specifically, meeting school requirements. All of the schools had physical education requirements, so the girls were required to participate in activities. At the charter school in Minneapolis, physical education was

held daily, so girls attended daily. The girls also participated in outdoor recess. In Owatonna, the younger girls also had physical education class every day. Both schools in Owatonna participated in the Presidential Fitness Award. Many of the younger girls in Owatonna were especially proud of their participation in this program and were actively trying to attain that goal. There were a few, however, who indicated that they did not like the physical activity requirement. The younger girls also participated in Track and Field Days, which they seemed to enjoy. They also spoke of their parents coming to watch and indicated their parents were very supportive of this. Likewise, older girls in Owatonna reported that their parents were supportive of physical activity in school. The older girls in Owatonna participated in a variety of activities at school including swimming. Some girls talked about wearing a headscarf while swimming. Another girl indicated that she wore shorts while swimming. While the classes were coed, they reported that the boys stayed in the deep end, so they were not together.

4.7 Aim 2: Enablers and Barriers to Participation in Physical Activity

Individual level enablers and barriers as well as community/family level enablers and barriers to participation in physical activity were identified. Specific enablers and barriers were perceived differently across cohorts. For example, the perception of community beliefs about inappropriateness of physical activity for older girls was a much stronger barrier to participation in physical activity for girls in the older Minneapolis cohort than for other cohorts. Similarly, having household responsibilities was a more strongly voiced barrier in the Owatonna cohorts than in the Minneapolis cohorts. Enablers and barriers to physical activity identified within each cohort are listed in Tables 18, 21, 24, and 27. Enablers and barriers were organized by individual and family/community levels consistent with the conceptual framework. Core enablers and barriers to physical activity practices across cohorts are reported in the following sections and are summarized in Table 44.

Common core individual level enablers across cohorts that were identified included socialization, especially peer involvement; enjoyment of the activity; and developmental characteristics such as fitting in. All of these were reported to enhance participation. At the community/family level, environment was important as an enabler to physical activity.

Environmental factors such as having access to available, convenient, safe spaces for physical activity were identified as enablers. School attendance also proved to be an enabler to physical activity as the girls were required to participate in physical education and recess activities.

Barriers included both individual and community/family level factors as well. Individual characteristics and preferences hampered participation in physical activity and shaped level of participation. Developmental stage as a barrier included not feeling accepted, and developing other interests or competition from engaging in electronic activities. At the family/community level, environment was again a key element that shaped participation. Inclement weather acted as a barrier to participation as many of the activities took place outside. Cultural traditions, particularly perceived restrictive beliefs about gender role and expectations were identified as barriers to participation in high levels of physical activity. Community role models were important to the girls, but generally lacking. See Table 44 for a summary of common core enablers and barriers to participation in physical activity.

Individual level enablers to physical activity. The opportunity to socialize was identified by the girls as being central to participation in physical activities. Girls in all cohorts reported being much more likely to participate if friends were involved or if they thought they would make or meet friends by participating in an activity. Girls in each cohort lived in high density housing areas where participation in common, accessible forms of physical activity was identified as a primary means of socialization within their peer group. Furthermore, having a positive experience during participation in physical activity enhanced girls' participation.

From a developmental standpoint, the need to “fit in” was expressed by some girls. The girls in the older cohort in Minneapolis were most likely to express this, although girls in Owatonna also commented about “fitting in” respective to their style of dress. The girls explained that they were much more likely to participate in physical activities if they felt they or the activity itself was accepted. For the older girls in Minneapolis, community acceptance was important. For the girls in Owatonna, feeling personally accepted within a group was important. Both aspects of fitting in were enablers to participation.

Family/community level enablers to physical activity. At the Family/Community level, environment was important as an enabler to physical activity. Environmental factors such as having access to available, convenient, safe spaces for physical activity were identified as enablers. For girls in both locations, ready access to nearby parks was an enabler to physical activity. Having good weather was also important as girls were more likely to go outside and engage in physical activity in nice weather.

School attendance also proved to be an enabler to physical activity as the girls were required to participate in physical education and recess activities. Girls in each cohort also expressed enjoyment in activities with very few expressing negative feelings about involvement in physical activities at school. For the older girls in Owatonna, school physical education provided an opportunity to participate in a variety of activities that they might not otherwise participate in. One of these they identified was swimming, which occurred in the junior high school as part of physical education. The younger girls in Owatonna reported pride in participating in the Presidential Fitness Award program as well as Track and Field Days at their school. For the girls in Minneapolis, participation in physical activity at their charter school occurred daily. Given their inner city location, they also frequently walked to venues for school field trips. School was a consistent enabler to physical activity.

Individual level barriers to physical activity. Core individual level barriers to physical activity across cohorts included individual characteristics, developmental stage, and time constraints. Individual characteristics such as feeling tired, or feeling it was too physically challenging negatively affected the girls' participation in physical activities. Obvious physical characteristics such as being sick or suffering an injury were also identified as barriers to participation. Some girls also indicated they did not like to sweat and that would preclude participation, especially in outdoor activities during hot weather.

Developmental stage as a barrier to physical activity was characterized by several aspects. Not fitting in was identified by participants as a barrier to engaging in physical activity. They described feeling uncomfortable when engaging in physical activity in environments where they didn't feel it was accepted. Increasing age was also identified as a barrier to physical activity. Decreased participation in physical activity beyond middle school was considered a normal progression by many. Most girls reported that increasing age was associated with increased maturity and therefore, less participation in physical activity. At the same time, many girls identified developing other interests as they aged that competed with physical activity. Engaging in electronic activities was an interest most often cited as a barrier to physical activity. Girls also verbalized having more freedom to choose which activities they wanted to engage in. Some of the girls, particularly in Owatonna expressed not wanting to commit to participation in an organized physical activity. In fact, many of the girls in both locations indicated they would rather just participate in spontaneous activities than being involved in organized activities. Having the ability to choose could act as a barrier to participation in physical activity.

Some girls also cited lack of time as a barrier to physical activity. Participating in other activities as well as fulfilling home responsibilities and school responsibilities contributed to time constraints. Girls in Owatonna were more likely to report this.

Family/community level barriers to physical activity. Girls identified several family/community level barriers to physical activity. Cultural tradition was most often cited as a barrier to physical activity and included traditional dress style, restrictive gender rules regarding permission to be away from home, perceived cultural messages about the inappropriateness of girls engaging in physical activity as they aged, having increasing home responsibilities, and lack of adult women role models in the community. Environmental barriers were also described and included inaccessible space, unsafe environments, and inclement weather.

A few girls viewed wearing traditional style of dress as a barrier to participation in physical activity, but the majority of girls did not identify this as a barrier. Girls in each cohort articulated awareness that boys had more freedom to be away from home than girls did. They indicated that boys were allowed to leave home for longer periods of time with fewer restrictions than were girls. Girls reported that they had to obtain permission from parents to be away from home and had restrictions placed on where they could go and what they could do. These rules were identified as barriers to participation in physical activity.

The perception that it was culturally inappropriate for girls to participate in physical activities as they got older was most strongly verbalized by the girls in the older Minneapolis cohort. Older girls in Minneapolis identified this perceived cultural belief as a major barrier to participation in physical activity. They received these messages from adults within their community and described parental peer pressure and perceived community disapproval as means of communicating this message. In the other cohorts the phenomenon of decreased physical activity with increasing age was viewed more as a normal progression of age, but still acknowledged as a barrier to physical activity.

The girls in all cohorts indicated that with increasing age, they had increasing responsibilities at home. Because of these activities, many girls reported they were not free to participate in any activities until their household chores were completed. If they did go outside, it

was often to watch younger brothers and sisters and did not allow for participation in physical activities. Increasing gender role responsibilities is therefore, seen as a barrier to participation in physical activities.

Girls in each cohort reported that older girls and women were not likely to be physically active within their communities. Girls in Minneapolis described seeing women walk in the park or in their apartment buildings sometimes, but girls in Owatonna reported their mothers and aunts were unlikely to walk more than short distances. The older girls in Minneapolis expressed that this was representative of the lack of acceptability for participation in physical activity. Having a lack of older adult role models who regularly participate in physical activities was identified as a barrier to participation in physical activity with increasing age.

Available space to exercise was not always available to girls in either location. The girls in Owatonna competed for space with the boys who lived in their housing units. In Minneapolis, safety concerns sometimes prevented the girls from going outdoors to exercise and most were not allowed to go to the neighborhood recreation center due to parental concerns about safety. Both inaccessible space and unsafe conditions were barriers to physical activity. Inclement weather was identified as another environmental barrier to physical activity. Girls in all cohorts reported going outdoors mostly in warm weather. Since most of the reported physical activities the girls engaged in took place outdoors, cold and wet weather were barriers to physical activity.

4.8 Aim 3: Comparison of Enablers and Barriers to Physical Activity Within and Across Cohorts

The following sections summarize comparisons made between cohorts within location and across location regarding identified enablers and barriers to physical activity. The comparison builds on the initial analysis and addresses the third specific aim of the study.

Comparison of enablers and barriers to physical activity between older and younger Minneapolis cohorts. The older cohort in general, had more discussion around the topic of

physical activity than did the younger cohort. Socialization was widely cited by both Minneapolis cohorts as an enabler to participating in physical activity. Cultural traditions were reported to be factors influencing physical activity. Older girls were more likely to report differences in gender rules regarding physical activity. They reported that there were few rules imposed on boys within their culture and that boys had more freedom to engage in activities outside the home. Younger girls also observed this, but did not report experiencing this. Girls in both Minneapolis cohorts identified cultural gender rules as barriers to physical activity.

Older girls in Minneapolis also cited cultural beliefs about the inappropriateness of older girls engaging in physical activities as a barrier to physical activity. They reported that parents were influenced by peers not to allow older girls to participate in physical activities. The older cohort also expressed more desire to fit in, as evidenced by their comments about being embarrassed to participate in activities not deemed appropriate by community elders and not engaged in by other girls their ages. A lack of public acceptance for participation in physical activities was a barrier among the older girls.

Younger girls did not report similar cultural beliefs about the inappropriateness of engaging in physical activity, but acknowledged that girls typically became less active in middle school. Increasing age was, therefore, identified as a barrier to participation in physical activities. Neither cohort expressed a strong desire to participate in team activities. Dress did not seem to be issue for either cohort. They did not feel that wearing traditional clothing inhibited participation in activities. Both groups reported on successful participation in athletic activities while wearing traditional dress.

Having adequate space and facilities in which to participate in physical activities was important to both cohorts and identified as an enabler to physical activity. Having nice weather was also identified by both cohorts as an enabler to engaging in activity. A parental concern for safety was identified by the older cohort as barrier to physical activity.

Comparison of enablers and barriers to physical activity between the older cohort and the younger cohort in Owatonna. The older girls tended to cite many of the same factors that shaped participation in physical activities as the younger girls. As a group, however, it was more difficult to get the older girls to listen to each other. The older girls expressed a greater tendency to watch activities rather than participate in them. This was identified as a barrier to participation that was unique to this cohort. While both Owatonna cohorts cited electronic activities as a competing activity to physical activity, it seemed to be a bigger factor for the older girls. Girls in both Owatonna cohorts also noted decreased physical activity among girls relative to increasing age. While the younger girls cited being more mature as a reason for decreasing physical activity, the older girls cited being lazy or just being more interested in other activities. Increasing age was seen as a barrier to participation in physical activities by girls in both Owatonna cohorts. Older girls also expressed more concern about appearance and gaining weight and were more likely to view exercise as a way to offset weight gain. This was identified as an enabler to participation in physical activity, but only in this cohort.

Both Owatonna cohorts indicated traditional dress could be a hindrance to activity, but they also talked about successfully participating in activities while wearing traditional clothing, especially if it was made of stretchy material or they could wear shorts underneath. The likelihood of participating in organized sports was mixed for both cohorts. Setting was instrumental in physical activity for both cohorts. Living in housing complexes where basketball courts were easily accessible proved to be an enabler for participation and socialization. Similarly, going to school required a certain level of activity for both cohorts. While the younger girls recognized this, the older cohort did not readily cite this as a reason for participating in physical activities. Having home responsibilities was a factor that acted as a barrier to activities for both cohorts. The age range where girls began to have responsibilities was 9 to 12 years, so both sets of girls were affected by these home responsibilities.

Comparison of enablers and barriers to physical activity between Minneapolis and Owatonna. Many of the factors contributing to physical activity in both locations were similar. The opportunity to socialize by engaging in physical activity was widely cited as an enabler for participation for girls in all cohorts. Genuine enjoyment of the activity was also frequently listed as an enabler to participation. As girls aged, it appeared that the level of physical activity decreased among the girls in all cohorts. Increasing age was cited as a barrier to participation in all cohorts. The older cohort in Minneapolis thought that physical activities for girls were less accepted by the community as they got older. This perceived community belief about the inappropriateness of physical activity participation was identified as a barrier by the older Minneapolis girls. Both cohorts in Owatonna were more likely to report participating in electronics such as video games or watching television as barriers to participation. Competition from electronic activities as a barrier to physical activity seemed to be strongest for the older cohort in Owatonna. Wearing traditional Somali dress was not identified as a barrier to physical activity by the majority of Somali girls in both locations.

For both locations, elements of environment were important in shaping participation in physical activities. School attendance and participation in school physical education classes and recess were identified as enablers to participating in physical activities. Additionally, home physical environment was also important to level of physical activity. All cohorts lived in housing complexes where large numbers of people of Somali ethnicity were housed. This facilitated socialization and participation in activities. The Owatonna cohorts had ready access to basketball courts at their housing complexes. Both locations had access to public parks. Having access to safe environs for physical activities was an enabler to participation for all cohorts. The girls voiced some parental concerns about safety which were identified as barriers to physical activity. There were more parental concerns about safety reported by Minneapolis girls than by Owatonna girls.

The older girls in Minneapolis reported the greatest gender differences in allowed activities. They were very verbal about the perceived disparity between permitted activities for boys and girls and voiced that this disparity was a barrier to participation in physical activities. The older girls in Owatonna alluded to it briefly, but it did not seem to be as large an issue for them. Older girls in Owatonna also indicated that their parents were more accepting of their participation in physical activities. The younger girls as a whole were less verbal about gender differences.

Girls in each cohort listed home responsibilities and chores as barriers to participating in physical activities. Because of these activities, girls were commonly not able to participate in activities until the late afternoon in the summer time. For girls in all cohorts, the likelihood of participating in organized team sports was mixed. The majority of girls indicated they would be unlikely to do this, expressing fears about acceptance, the hindrance of wearing traditional clothing, cost, being accustomed to not participating, and not having the time to do so. Some of them simply indicated they didn't want to. Dress did not seem to be an overwhelming barrier to physical activity for girls in any of the cohorts. While a few girls reported there were problems encountered in wearing traditional dress when exercising, others reported successful participation in physical activities wearing traditional dress.

4.9 Aim 1: Socio-cultural and Environmental Factors Shaping Sunlight Exposure.

Sunlight exposure was discussed in the third focus group session along with physical activity. There was some overlap in the discussion of sunlight exposure with physical activity as many physical activities the girls reported participating in took place outdoors. Factors that contributed to sunlight exposure were identified at the individual and the family/community levels. Individual level factors included: seeking socialization, individual preferences related to sunlight characteristics; individual characteristics such as skin color; perceived health benefits and risks of sunlight exposure; and developmental stage as it relates to appearance.

Family/community level factors included cultural tradition, participation in group activities, time, and weather. Cultural tradition encompassed wearing traditional style of dress, perceived differences in gender rules about going outside and participating in physical activities, and having increasing home responsibilities. Enablers and barriers to sunlight exposure were also identified. Tables displaying summaries of identified factors for sunlight exposure and style of dress within each individual cohort are found in the Tables Appendix Chapter 4, Tables 28, 29, 31, 32, 34, 35, 37, and 38. Tables showing summaries of enablers and barriers to sunlight exposure for individual cohort are found in Tables 30, 33, 36, and 39. Common core factors shaping sunlight exposure across cohorts are found in Table 42 in the Tables Appendix for Chapter 4. Common core enablers and barriers to sunlight exposure are summarized in Table 45 in the Tables Appendix for Chapter 4.

Individual level factors shaping sunlight exposure.

Seeking socialization. Like physical activity, many girls went outside as a means of socializing with their peers. As mentioned, most of the physical activities took place outdoors. So to socialize, girls were likely to join outdoor activities. A common outdoor activity, particularly among the older girls was walking and talking.

Individual preferences regarding sunlight characteristics. Girls in all cohorts expressed strong opinions about specific characteristics of sunlight. Common among them were dislike of bright light and/or heat. Comments such as “It’s too hot” and “It’s too bright” were common. On the other hand, girls in some cohorts, such as the younger Minneapolis cohort, indicated that they liked the warmth of sunlight and were likely to go outside in the summer because of the warmth.

Individual characteristics: Skin color. The older girls in Minneapolis discussed having dark skin pigment as a factor that affects their sunlight exposure. They especially noted the significance of this in older people within their culture. One girl remarked, “Oh yeah, cause they (older Somalis) have a lot of melanin, so it’s harder for them to like — get vitamin D.” An older

Minneapolis girl was unclear as to why vitamin D from sunlight exposure was necessary. She stated, “I don’t know. I don’t know why you need it, [vitamin D], but you just can’t get it all from food”.

Perceived health benefits and risks of sunlight exposure.

Health benefits. Recognition of health benefits was a reason a few girls gave for going outdoors to spend time in the sun. An older Owatonna girl indicated that being in the sun gave her energy and a chance to exercise. Other girls mentioned the social aspects of going outdoors. The girls did not readily make a connection between bone health and sunlight exposure, but with prompting, one girl in the older Owatonna cohort volunteered that sunlight was a source of vitamin D. She stated, “[Vitamin D is important] so when you grow old your bones don’t fall apart.” A younger girl in Owatonna indicated that sunlight was a source of vitamin D and another added that this could help your bones. One girl explained, “She [my aunt] always comes to my back yard for vitamins [from the sun].” Similarly, a younger girl in Owatonna stated, “It [sunlight] has some sort of calcium.”

Health risks. A majority of girls, however, did not believe that sunlight was healthy. Sentiment related to this included getting sunburned, hurting your eyes, and being at risk for cancer. Comments to demonstrate this included:

If you have too much sunlight you can get cancer. (MYC)

The light is bad like ultraviolet rays. (MYC)

Don’t look at it (It can hurt your eyes). (MYC)

Getting darker skin color was frequently mentioned by the girls in Owatonna as a reason to stay out of the sun. One younger Owatonna girl indicated, “Getting darker is not healthy for me.” Getting darker held a negative connotation in general for the girls in Owatonna. Only one girl in Minneapolis mentioned this. This fear of getting darker will be discussed further under developmental state as it affects appearance.

Developmental stage

Appearance. Girls in this age period tend to be concerned about appearance. These girls demonstrated an awareness of appearance particularly as it related to sunlight exposure. The girls in Owatonna expressed a fear of getting darker due to sunlight exposure. Some of them reported receiving messages from their mothers that getting darker was not encouraged. Comments demonstrating this included the following:

I hate it (being out in the sun). Because, I turn darker. (OYC)

You get dark and ugly. (OYC)

(My mom) tells me to put sunscreen on. Put sunscreen on so you don't look dark and ugly. (OYC)

It makes your skin darker, so you shouldn't be outside. (MOC)

The reason why we don't want to be outside is we get darker, and that stays permanent.

And we like to not be too dark. (OOC)

One older girl in Owatonna volunteered that if you get too dark, "People will make fun of you." Other concerns related to appearance included avoidance of sweating or developing body odor.

Increasing age. Getting older was identified as a reason for not going outside as often and for not participating in physical activities as previously mentioned. While girls could not indicate exactly why girls stopped going outside, they voiced opinions for the observed phenomenon. Girls indicated that this most often occurred during the middle school and high school years. They also noted that older Somalis did not go outside frequently. The exception to that was their mothers who sometimes went out to keep track of the younger kids.

Yeah, age 15. That's when my sister stopped going outside. (YOC)

You grow out of your childhood and then— and it's not your thing. (YOC)

Cause they (older Somalis) don't go outside. (YOC)

Other interests. Girls in this age group developed other interests as implied in the statement above about growing out of childhood. This was noted in the physical activity section as well. As a result, some girls in all cohorts expressed less interest in going outside. They were more likely to report staying indoors to play electronics or listen to music. The younger girls in Owatonna were most likely to state this, but there were a few girls in other cohorts as well.

Comments to demonstrate this include:

Sometimes the computer does (causes me to stay inside and play). (OYC)

I like to play video games. (OYC)

I watch it (TV) everyday. (OYC)

Family/community level factors shaping sunlight exposure.

Cultural tradition. Cultural tradition was a core factor shaping sunlight exposure. As mentioned, cultural tradition encompassed several aspects: wearing traditional style of dress, perceived differences in gender rules about going outside and participating in physical activities, and having increasing home responsibilities which affected available time. Each of these is reported in the following sections.

Traditional style of dress. Girls in all cohorts wore the traditional style of dress worn in Somali communities which included long gown and head covering. Coverage of arms varied with some wearing short sleeves and others long sleeves. Veiling typically covered the head and neck, but not the face. There was no variation in dress by age or location. Girls reported wearing the traditional style of dress whenever they were out in public. Reasons given for adhering to dress style included:

Because we have to (dress traditionally). (OYC)

It's comfortable. (OYC)

It's our religion. (OYC)

It's a routine. (OYC)

We don't want people to see our hair. (MYC)

They reported having greater freedom of dress at home, but only if immediate family was present. A younger girl in Minneapolis stated, "We don't have to wear it [headscarf] at home." If their family had guests, girls reverted to traditional dress style. An older Minneapolis girl commented, "If other people come you have to like put them [traditional clothes] back on."

Despite the acceptance of relaxed dress at home, some girls indicated that they were likely to continue to wear full traditional dress. An older girl in Minneapolis indicated that she wore her head covering all the time, "Well, I can [show my hair at home], but I don't." Similarly, a younger girl in Owatonna stated, "This (head covering) is my best friend." Another said, "I don't take this (head covering) off. I sleep with it." The girls were in agreement that style of dress affected their sunlight exposure as most of their body was covered. Most of the girls did not feel, however, that style of dress was dictated. They appeared very comfortable adhering to traditional cultural dress style. Family and community were identified as important factors in determining dress style. Most of the girls indicated their family was influential in what they wore. Again, the need to be appropriate and fit in was expressed. The perception of community pressure on parents and themselves in terms of style of dress was voiced by the older girls in Minneapolis. Examples of community influence on dress included:

And community, 'cause if you go outside people give you a look like, oh..." (MOC)

They judge you, yeah. (MOC)

Oh, her? That's her daughter. Is that that lady's daughter? Look what she's wearing. I know you saw her. You saw what she's wearing. (MOC)

The age at which girls started to wear a head covering also varied widely from age two years to age seven years of age. Most indicated that when they started to go to school, they began to consistently wear a head covering. By their report, there are differences across the country as to whether or not traditional style is adhered to. A younger girl in Owatonna commented:

That was my cousin. Like she used to wear this (head scarf), and skirt, and then like they had to move because most of their family members lived there and then once they moved there, there was no more of that (headscarf) and skirts.

The girls in all cohorts also noted that some older girls and women in their communities did not wear head coverings any longer. One younger girl in Owatonna commented:

Yeah, they (older girls who leave home) become more like they try to do what their friends are. Like start wearing pants, yeah.

An older girl in Owatonna indicated that environment might affect how you dressed:

Like if you live in a white neighborhood you might dress like how the girls are dressed there. And if you live in a Somali neighborhood, you might dress like them.”

Gender rules about going outside and participating in physical activity.

As noted previously, the girls in all cohorts perceived, to varying degrees, a difference in gender rules about going outside and about participating in physical activities. There were reportedly fewer restrictions placed on boys about leaving home and going outside. Again, the older girls in Minneapolis were most vocal about this. Comments to demonstrate this include:

It's [rules about going outside] more for girls. (MOC)

They [boys] don't have any rules. They come back at like 12:00 o'clock. (MOC)

Most of the girls, on the other hand, reported requiring parental permission to go outside or leave home. One younger girl in Owatonna stated she usually needed permission or had to have someone accompany her. She stated, “Depends on if you get in trouble (for going out alone).” An older girl in Minneapolis stated, “And you can't just go outside, 'cause your mom has to let you go outside.”

Home responsibilities and time. As noted in the physical activity section, girls in all cohorts reported being assigned increased home responsibilities as they got older. Due to this, many girls were not free to go outside until later in the day and then for limited periods. This was

particularly true in the summer. Girls reported generally not going outside until late in the afternoon or evening, which meant that they typically missed the strongest sunlight. They typically fulfilled babysitting duties, cooking and cleaning chores before they went outside.

Comments that illustrated this include:

Sometimes you can't just fit it in the schedule, so thirty minutes would be enough like each day. (MYC)

After I do my chores and eat (I go outside). (OYC)

First we wash the dishes, get the room clean. (OOC)

We go outside like around five or six or so. (OOC)

Participation in group physical activities. As mentioned in the physical activities section, most of the physical activities girls in these cohorts engaged in took place outside. Therefore girls who played basketball or other group games were likely to do so outside. These girls had the potential to achieve more sunlight exposure than those who did not participate, because they tended to be outside more often.

Environment. Two elements of environment played a role in shaping being outdoors. These were similar to those identified in shaping physical activity. They include setting and weather.

Setting. The girls in both locations had ready access to settings deemed safe for being outdoors. These settings included nearby city parks as well as exercise equipment such as basketball courts. This provided a place for girls to socialize outdoors without having to travel far. Girls were able to obtain parental permission to frequent these settings.

Weather. The final factor that shaped sunlight exposure was weather itself. Some of the girls in both locations pointed out that they lived in the north, so they got less sunlight than they used to get in Somalia. Summer was identified as the primary season where girls would go outside. One of the older girls in Minneapolis commented, "In the summer we spend a lot of time

outside.” Several girls in all cohorts indicated they did not like the heat, so they were less likely to go outside mid day in the summer when it was hottest. Some older girls in Owatonna indicated they did not like to sweat and worried about body odor, so they were unlikely to go outside when it was hot. Finally girls in all cohorts reported not liking cold weather, so they were unlikely to go outside during the winter months, other than to walk somewhere. As one older girl in Minneapolis commented, “We just go back and forth to the store basically.”

4.10 Aim 2: Enablers and Barriers to Sunlight Exposure

Enablers and barriers to sunlight exposure among girls living within these communities were identified at the individual level as well as the family/community level. Individual level enablers that were identified include individual preferences such as liking the heat of the sun, recognizing benefits of being outside such as socialization and having fun, the opportunity to exercise, and the opportunity to get away from home. Enablers at the family/community level include: participation in group physical activities, having access to available settings for outdoor activities, and nice weather. Barriers are also identified by individual level and family/community level. Individual level barriers included individual preferences such as disliking the heat or brightness of sunlight, skin characteristics (having darkly pigmented skin), being worried about appearance (fear of getting darker), concern about health (sunburn and skin cancer), and not having time to go outdoors. Family/community level barriers included cultural traditions relative to style of dress, perceived negative connotation to getting darker skin, gender rules about time outdoors and physical activity, increasing gender role responsibilities, and inclement weather and latitude.

Individual level enablers to sunlight exposure. Girls’ reported having individual preferences which would enhance their likelihood of spending time outdoors. This included liking the warmth of the sun or the sunlight and promoted going outdoors during these periods, usually in summer. Additionally, many girls reported other benefits of being outdoors. These benefits

included socialization and having fun as well as being able to participate in exercise and being able to get out of the house. These perceived benefits were enablers to sunlight exposure as revealed in the following sections.

Family/community level enablers to sunlight exposure. Family/community level enablers were closely linked to individual enablers as well as to enablers to physical activity. They revolved around physical activity and environment with emphasis on accessible space and weather. Girls in these communities who participated in physical activities were most likely to do so outdoors. Participation in physical activity was therefore, an enabler to sunlight exposure. Girls in all cohorts lived close to city parks and/or had spaces such as basketball courts available to them. Just as accessible space was an enabler to participation in physical activity, it was also an enabler to sunlight exposure. Having nice weather was also a core enabler to sunlight exposure. The girls were most likely to go outdoors during the summer months when the weather was “nice.”

Individual level barriers to sunlight exposure. Barriers to sunlight exposure mirrored some of those for physical activity. Some girls in all cohorts reported not liking extreme heat or brightness. Those who did not like these features of sunlight were less likely to go outside during peak sun times and more likely to wait until evening when the sunlight was weaker to go outdoors. Many girls also reported not having time to go outside during the day.

Participants also identified barriers to sunlight exposure based on appearance and health. Exposure to sunlight prompted concern about potential sweating, body odor, and getting darker skin. Some girls articulated that getting darker equated with being ugly, so they were careful not to get too much sun exposure. Girls also indicated that sunlight exposure could cause cancer and sunburn. However, many articulated that because their skin was dark, these were not concerns for them. Few reported wearing sunscreen, and if they did, it was primarily to avoid getting darker

skin color. Concern for health was therefore identified as a weak barrier to sunlight exposure among these girls.

Family/community level barriers to sunlight exposure. Most of the family/community barriers were rooted in cultural traditions and environment, similar to those identified under physical activity. Traditional style of dress was a core barrier to sunlight exposure. All girls in all cohorts wore traditional dress which leaves very little skin exposed to sunlight. Girls reported beginning to wear traditional dress as early as age two years and consistently by the time they went to school. Girls were uniformly comfortable and accepting of dress style at this age, although they noted differences in adherence patterns in older girls and in other parts of the country. They felt style of dress was strongly influenced by religion, community cultural tradition and parental peer pressure.

Girls in some cohorts also received the cultural message that getting darker skin color was neither healthy nor attractive. As a result, they avoided sunlight exposure or wore sunscreen which diminishes the absorption of ultraviolet rays. While not all girls verbalized this, it was voiced often enough in some cohorts to be identified as a barrier to sunlight exposure.

Similar to barriers to physical activity, gender rules governing time outside impacted sunlight exposure as well. Girls reported having more restrictions placed on them about time outdoors and away from home. They were most often required to have parental permission to leave and be outdoors and were more likely to have to go with others than alone. They also noted that it was not traditional for girls and women to spend a lot of time outdoors even in Somalia. These differing rules about time away from home, therefore, acted as barriers to sunlight exposure. Similarly, they recounted that they had home responsibilities that often prevented them from going outdoors until late in the day.

Environmental barriers were also identified. Girls reported they were aware that living in Minnesota meant sunlight was weaker and this was, therefore, a barrier to sunlight exposure.

Similarly weather was a barrier, in that participants voiced being likely to go outside only during warm, sunny weather. Sunlight exposure therefore appeared to be seasonal. Finally safety concerns governed whether or not girls went outside.

4.11 Aim 3: Comparisons of Enablers and Barriers to Sunlight Exposure

The following sections summarize comparisons made between cohorts within location and across location. While there is overlap with previously reported findings, the narrative summary addresses the third specific aim of the study, to compare and contrast the perceptions of enablers and barriers to factors contributing to bone health among Somali girls living in the Minneapolis-St. Paul metropolitan area and the non-metropolitan area of Owatonna, Minnesota. The summaries provide specific comparisons between cohorts rather than just core commonalities and differences.

Comparison of enablers and barriers to sunlight exposure between younger and older Minneapolis cohorts. There were many similarities between discussions by age in Minneapolis. For both Minneapolis cohorts, weather was an important factor in determining whether the girls would go outside. For the younger girls, summer and being warm was an enabler to outdoor activities. For the older cohort, weather extremes, whether too warm or too cold were factors in determining in outdoor activity. For most girls in both the younger and the older cohort, summer was the primary season when they were likely to go outside. Physical activity was closely linked to sunlight activity as many of the activities the girls participated in took place outside. Having a nearby park available to them was an enabler to sunlight exposure as they went there to participate in activities as well as to socialize.

The older Minneapolis cohort was more aware of sunlight as a source of vitamin D, although neither cohort could really articulate why that was important. The older cohort also noted that older Somali individuals were less likely to go outside at all, except for short trips and thus had limited sunlight exposure. The older Minneapolis cohort also recognized that older

Somalis likely had unmet needs of vitamin D and commented that they might take supplements. The older cohort also mentioned becoming darker as a barrier to sunlight exposure, but did not elaborate on this. The younger Minneapolis cohort did not mention this. Both cohorts were aware of the link between sunlight exposure and skin cancer.

As during the physical activity discussion, the older Minneapolis cohort identified gender differences in being allowed to go outside. They cited requiring parental permission to go outside and expressed that this was not as easily granted for girls as for boys. The younger Minneapolis cohort was less likely to express this view.

Style of dress was consistent across age for the Minneapolis cohorts. Both cohorts adhered to traditional dress styles when out in public. There were variable degrees of freedom of dress when at home. Most girls indicated they did not wear head coverings when at home. The older cohort expressed strong views about the influence of community on their dress style. While both Minneapolis cohorts acknowledged that their immediate family, their religious beliefs, and their community influenced their dress pattern, the perception of community pressure in determining dress style was stronger among the older cohort. Traditional dress with head covering was identified as a barrier to sunlight exposure.

Comparison of enablers and barriers to sunlight exposure between younger and older Owatonna cohorts. Both of the Owatonna cohorts were less focused during the last session. It was a warm day on each occasion and the girls in general seemed to be restless. There were commonalities identified between cohorts relative to reasons for going outdoors, such as nice weather. The older Owatonna cohort attached more significance to socialization than the younger girls as an enabler to physical activity, although it was mentioned by both. Both cohorts noted time of day as being a factor in going outdoors. Most of these girls had responsibilities early in the day during the summer, so the usual time period for going outside was late afternoon and evening. Some also indicated that there were benefits to this in that it was less hot and less

bright at these hours. The younger girls were mixed in terms of requiring parental supervision to go outdoors. The older cohort noted gender differences for going outside and indicated that the boys had few rules regarding going outside.

Neither cohort immediately saw the link between sunlight exposure, Vitamin D, and bone health, but with prompting they did recall it. The older girls reported receiving their information in school health class. The girls in each cohort were better able to list negative effects of sunlight exposure than positive effects. For both cohorts, a fear of getting darker was paramount to sun avoidance. They voiced a negative perception of getting darker and equated it with being ugly. The younger girls indicated they got that message from their parents.

The girls in both cohorts reported dressing traditionally, citing their culture as the primary reason for this. They showed pride in their dress style and were quick to support it. As one of the younger girls said, her head scarf was her best friend. The girls did have more freedom of dress when at home and many chose not to wear head scarves or skirts when at home. There were some individual differences among the girls as to when they were required to wear their headscarves, but all agreed they would wear them in public.

Comparison between Minneapolis and Owatonna. Most of the cohorts indicated they were likely to go outside in the late afternoon and early evening. The younger cohort in Minneapolis was less specific about this. The cohorts in Owatonna emphasized this pattern more. There were also differences in whether parental supervision was required. The two older cohorts noted there were gender differences in being allowed to be outside, but the younger cohorts did not as readily express this. In general, there seemed to be more rules in Minneapolis regarding being outdoors than in Owatonna.

For all cohorts, weather was a huge factor in determining whether girls went outside or not. Most girls preferred to go outside during warm weather, with summer being the season of preference. Only a few girls at both locations indicated they liked going out in the winter.

Reasons for going outside included: socialization with friends, more prominent among the older cohorts at both locations than among the younger; participating in physical activities; and having fun. Generally, all cohorts were able to identify more reasons for not going outside than for going outside. Health was not readily identified as a reason to get sunlight exposure and only with prompting were the girls able to see a connection between sunlight exposure and bone health. In general, there was considerable overlap in the reasons for outdoor activity and for physical activity as many of the physical activities the girls participated in took place outdoors. The cohorts in Owatonna most emphasized competition from electronic activities for time spent outdoors. They also cited increasing age and maturity as reasons why girls were outside less. The older cohorts recognized that older Somalis in the community did not spend that much time outdoors or get that much exposure to sunlight.

One of the biggest deterrents to sunlight exposure cited by three of the four cohorts was the fear of getting darker skin color. The girls in Owatonna discussed this in more detail than did the girls in Minneapolis. This was only mentioned in the older cohort in Minneapolis and was not picked up on by the other participants during discussion. In the later focus groups in Owatonna, the girls were quick to agree with this and expressed a negative perception of potentially getting darker skin color from sunlight exposure.

Style of dress for all cohorts was traditional with culture being a primary reason for this. Only the older Minneapolis cohort discussed feeling community and parental pressure to comply with traditional dress. The cohorts in Owatonna, especially the older cohort, displayed increased pride in their traditional dress style and some indicated they dressed that way, because they wanted to. All cohorts reported adhering to different dress styles when at home. At home, they were more likely to go without head scarves and to wear pants.

Chapter 5: Discussion

Enablers and barriers to factors contributing to bone health among early adolescent Somali girls living in Minnesota are shaped by a variety of individual and socio-cultural forces. Consistent with the conceptual framework for this study, Bronfenbrenner's Ecological System's theory, early adolescent Somali girls living in two communities in Minnesota appear to be nested within an integrated network of systems which impact their lifestyle practices that may enable or present barriers to future bone health. *Cultural and family traditions* emerged as a major contributor to the evolution of the girls' dietary, physical activity, and sunlight exposure practices. *Environmental factors* were also major contributors in shaping factors related to bone health. School attendance played an enabling role in both the intake of milk and in participation in physical activities. Having accessible, safe physical space in which to go outdoors and participate in physical activity was also identified as essential to these lifestyle practices. Additionally, *acculturation and developmental stage* were major contributors to shaping lifestyle practices made evident by focus group discussions regarding lifestyle practices that revealed similarities to life style practices of other children of similar ages living in the United States. The following four core concepts of cultural and family tradition, environment, developmental stage, and acculturation emerged as major contributors to bone health among Somali girls in the across cohort analysis.

5.1 Discussion of Findings

This section discusses the findings of the current study in the context of existing literature and from the perspective of the ecological framework that guided this study. The discussion of lifestyle practices and enablers and barriers related to dietary practices, physical activity, and sunlight exposure is organized by the overarching core concepts of cultural tradition, environment, developmental state and acculturation. Overall, there were more commonalities than differences in identified factors shaping lifestyle practices, and enablers and barriers to these

lifestyle practices that were spontaneously and independently described by Somali girls within each of the four cohorts. There were only subtle differences in findings identified in the across case analysis by age and by location.

5.2 Cultural and Family Tradition

Cultural and family tradition emerged as a core theme in shaping lifestyle practices contributing to bone health among girls in the current study. Cultural tradition played a strong role in available dietary options, food preparation, and food choices. Cultural traditions and roles also shaped beliefs about participation in physical activity as well as styles of dress and sunlight exposure. Particular cultural traditions such as traditional diet, traditional style of dress, and cultural beliefs about girls' participation in physical activity primarily acted as barriers to lifestyle practices contributing to bone health. In short Somali cultural traditions seemed to permeate these girls' daily lives. The impact of cultural tradition on the lifestyle practices of study participants is discussed in relationship to the literature in the following sections which are organized by diet, physical activity, and sunlight exposure.

Impact of cultural tradition on dietary practices.

Traditional diet. Traditional Somali foods were reported to be a large part of the diets of girls in all the cohorts. The Somali diet has typically not included sources rich in calcium and vitamin D according to the literature (Haq, 2005; Maxwell et al., 2006; Reed et al., 2007; and van der Heyden et al., 2004). Traditional Somali food staples were described by the girls to include rice or pasta with meat sauce. These habits persisted in the U.S. after immigration. The participants in the current study reported regular consumption of traditional foods. Dairy foods were not widely available in Somalia, and were, therefore, not widely consumed. The study participants indicated that most of the meals served at home were prepared by their mothers who tended to purchase, prepare, and prefer traditional Somali foods. This is consistent with a study conducted by Dubowitz et al. (2007) in which it was reported that first-generation immigrant

women were more likely to purchase and prepare foods they considered appropriate and that contained familiar ingredients.

A study by Arcan, Neumark-Sztainer, Hannen, van den Berg, Story, and Larson (2007) demonstrated that parental dietary intake and habits may be predictive of dairy intake among adolescent girls. In the current study, girls in all cohorts indicated that milk and dairy products were not widely included in the traditional parental diet or in meal plans in these girls' homes. This lack of availability was identified as a factor shaping dietary practices by girls in all cohorts as well as a barrier to the intake of dairy products at home.

Cultural belief governing consumption of pork. One of the most consistent views expressed by the girls in all cohorts was their concern about inadvertently eating pork. The Muslim faith which is the predominant faith among Somalis forbids eating pork and the girls were very aware of this. Participants in all cohorts listed and speculated on countless foods and beverages believed to contain pork. Foods such as yogurt and cheese were included on the girls' lists of foods containing pork. Consequently, this belief about yogurt and cheese could serve as a barrier to calcium intake. There appeared to be widespread uncertainty about which foods contained pork. In one cohort's focus group discussion, mistrust in communication from school authorities as to whether foods contained pork was also noted. Neumark-Sztainer et al.(1999) also mentioned an adherence to religious and cultural beliefs as factors shaping dietary choices.

Impact of cultural tradition on participation in physical activity.

Cultural traditions and gender expectations. The literature is limited regarding the role of culture and gender expectations in shaping level of participation by children and young women in physical activities. Carter, Goto, Schuldberg, and Wolff (2007) reported on cultural beliefs regarding the importance of physical activity within the Hmong culture. Participation in physical activities was not highly valued in the Hmong culture and authors speculated that this might contribute to lower levels of activity among Hmong youth. Similarly, several national studies

have shown differences in the rates of physical activity among different ethnic groups and by gender (YRBSS, 2007; CDC, 2000).

In the current study, Somali girls in four cohorts talked about cultural expectations regarding girls' participation in physical activities beyond early adolescence. Older girls (primarily in Minneapolis) voiced the belief that physical activity in their community was deemed inappropriate for older girls and women. Participants in all cohorts, regardless of age, acknowledged that becoming less active as girls aged was a natural phenomenon within their communities. This phenomenon is consistent with the U.S. trend of diminishing physical activity over time during adolescence.

Responsibilities and time constraints. Having other responsibilities was a factor in whether or not girls participated in physical activities. Girls in all cohorts (many in Owatonna) reported having home responsibilities right after school and during the summer that prevented them from participating in physical activities. These activities reportedly increased with increasing age. Common activities identified included completing household chores and child care most commonly. Some girls also expressed the expectation that they would complete any homework before being able to go outdoors. This finding is consistent with literature that has identified an expectation within the Somali culture that girls would be home after school and would have responsibilities to carry out (Adan, 2007; and Rietsma, 2001).

Girls in the current study also reported that such activities were traditionally rooted in culture. By their report, girls and women in Somalia were expected to be indoors taking care of domestic duties as well. Participants identified the age at which this typically occurred in Somalia as age 12 years. Other studies reported similar findings. Humbert, Chad, Spink, Muhajarine, Anderson, Burner et al. (2006) found other responsibilities to be a barrier to physical activity among both high and low socioeconomic status (SES) youth in Canada. Low SES youth were

more likely to report family obligations as a barrier to physical activity, much like the girls in the current study.

In a study by Robbins, Pender, and Kazanis (2003), 72% of mostly inactive 5th and 7th grade girls (primarily Caucasian and African American) who lived in the Midwest in the U.S. indicated that conflicts with other activities kept them from participating regularly in physical activities. Many girls in all cohorts in the current study also indicated that they would not be likely to participate in organized physical activities if they were available, because they did not feel like they had the time or would be able to attend all practices.

Adult role models. Consistent with the study conducted by Minnesota International Health Volunteers (Leinberger-Jabari, 2005); Somali girls in the current study noted there were few adult role models for physical activity in the girls' communities. The girls indicated seeing only a few adult women exercise by walking in their communities. The older girls in Minneapolis cited one older woman in their community who jogged, but they articulated that this was very uncommon. Some of the girls volunteered that their mothers rarely went outside, or if they did, only to watch children. The American Academy of Pediatrics policy statement on active healthy living (2006) indicates that having inactive role models may contribute to the development of inactivity among children. It is possible that the inactivity of older girls and women in their communities that was observed by study participants may have contributed to the phenomenon of declining activity with increasing age by girls in this study.

Impact of cultural tradition on sunlight exposure.

Traditional dress. Girls who participated in the current study all wore traditional dress with long skirt and head covering. While participants reported being aware of Somali girls who did not wear traditional style of dress as they got older or who lived in other locations, wearing traditional style of dress did not appear to be an issue among girls in these communities. Girls in all cohorts in the current study indicated that traditional dress was standard when in public and

many girls described a sense of pride in wearing traditional clothing. Participants in these communities did not wear veils covering their faces, so faces were exposed when outdoors. Similarly, arms were sometimes exposed in the summer.

According to the American Academy of Pediatrics (2008, p. 114), light-skinned adults would require ten to fifteen minutes of full body sun exposure in the summer to generate 10,000 to 20,000 International Units of Vitamin D. They estimated that individuals with dark skin pigmentation would likely need five to ten times that amount to generate the same levels of vitamin D. Vitamin D levels were not checked in this study, but in keeping with the literature review (Abdullah et al., 2002; Al Faraj and Mutairi, 2003; Budak, Cicek, Sahin, & Tutus, 2004; de Torrente de la Jara et al., 2006; Plotnikoff & Quigley, 2003; and Reed et al., 2007), it is likely that traditional dress could impact the absorption of UV rays from sunlight as clothing covers most exposed skin.

Fear of getting darker. This phenomenon was not found in the Somali literature. Girls in three of the four cohorts indicated that they did not want to get darker skin, so avoided sunlight exposure. Most of the girls who expressed this received this message from their mothers. There appeared to be a negative connotation within their respective communities to getting darker which acted as a barrier to sunlight exposure. The PI did not initially pick up on this topic when it was briefly mentioned during the older Minneapolis cohort's discussion about sunlight, but it proved to be a recurring idea in subsequent cohort discussions in Owatonna about sunlight exposure. It was unclear where the belief originated, but seemed to be passed from generation to generation.

5.3 Environment

Impact of environment on dietary practices and food and beverage availability.

School environment. School attendance and qualification for free and reduced meals (most of the study participants were eligible, see Appendix F) acted as enablers to milk intake

because alternative beverages to milk were not available in that setting. Consistent with current policies, none of the schools these Somali girls attended offered soda as an alternate beverage to milk at meal time. Milk was the beverage available at school lunch, so most girls in all cohorts reported drinking milk at school. The availability of chocolate milk at school further facilitated the consumption of milk at school as most girls preferred chocolate to white milk.

Utilizing the school environment to promote healthy behaviors has been shown to be useful by others as well (CDC, 1996; Wechsler, Devereaux, Davis, & Collins, 2009). School was identified as the place where girls frequently received messages about healthy eating. They reported learning about healthy diet in health class at school. Most of the girls, if they had knowledge about bone health, also reported learning about it at school. Girls in Minneapolis who attended a charter school were more likely to report receiving these messages at school. Utilizing school as an environment to promote health is consistent with the CDC policy recommendations (CDC, 1996).

Home environment. The home setting offered primarily traditional foods as discussed previously with the addition of some junk food, convenience foods, and what the girls deemed, “American foods.” American foods most commonly included combination foods such as pizza and tacos, which did contain cheese as a source of calcium. Milk was typically available at home as was ice cream. Other dairy sources were not widely available. Girls reported feeling bored with repetitive usual food choices at home and school.

Impact of environment on physical activity.

Social environment. Girls were most likely to participate in physical activity when friends were participating or the activity provided an opportunity to socialize. Having fun and socializing with peers were commonly cited as enablers for girls’ participation in physical activities in all cohorts. Other researchers have reported similar findings among youth of varying ethnicities (Baranowski et al., 1997; Humbert et al., 2006; Salvy et al., 2008; Springer et al.,

2006). Humbert et al. (2006) and Springer et al. (2006) also noted that parental support was associated with increased physical activity. Most of the girls in all four cohorts of the current study required parental permission in order to participate in physical activities or to leave the house. Therefore, parental support appears to be essential to participation in physical activity within these communities.

Physical environment and access. Environmental factors such as space, equipment, weather, and safety were identified as key enablers to participation in physical activities by the girls in these cohorts. Similarly, Humbert et al. (2006) cited the importance of environmental accessibility and safety in influencing physical activity among youth, especially among youth of low socioeconomic status (SES). Most of the girls in the current study were considered low SES by virtue of qualifying for free and reduced lunch. Additionally, most girls lived in public high density housing, another marker of lower SES.

Similar to findings in the Humbert et al. study (2006), girls in all cohorts also reported needing space and necessary equipment, which was not always readily available or affordable. Girls, primarily older girls in both locations, reported walking around outside as their primary form of physical activity. Girls in both locations also reported not having indoor exercise facilities readily available, but reported they did have access to nearby parks and outdoor basketball courts. Despite this, many girls in all cohorts reported they were not allowed to go to the facilities or parks near their home at times due to parental safety concerns. While few of the girls reported having safety concerns similar to their parents, the majority of girls in all cohorts indicated they typically required parental permission to participate in outdoor activities. Safe environment and accessibility were identified as enablers to physical activity similar to findings in the Humbert study.

Weather. Additionally, increased outdoor physical activity was reported during times when the weather was most pleasant, mostly in summer with some activity in spring and fall.

Inclement weather and winter appeared to be deterrents to outdoor physical activity by girls in all cohorts. Consistent with Healthy People 2010 guidelines, findings suggest girls in these cohorts are at risk for diminished physical activity due to living in neighborhoods where outdoor activity is restricted by climate, safety concerns, lack of facilities; and living in public housing or apartments. These risk factors may be offset by their environment in that girls in all cohorts lived close to parks and/or basketball courts which were shown by Cohen et al. (2007) to increase levels of moderate physical activity among girls compared to peers who did not have access to these spaces.

Environmental alternatives: Competition from sedentary activities. Watching T.V. was a competitive activity to engaging in physical activity. Girls in Owatonna were more likely to indicate that they sometimes preferred to watch T.V. rather than go outside. The preference for T.V. watching over outdoor activities is noted in the obesity literature as well. Associations between sedentary activities such as television watching and inactivity are supported in some studies, but no relationship has been found in other studies. Koezuka et al. (2006) for example, reported a positive relationship between T.V. watching and inactivity among Canadian adolescent girls between the ages of 12 and 19 years while reading and computer usage were shown to be inversely related to physical inactivity. On the other hand, Feldman et al. (2003), in their study with Canadian youth in 7th through 10th grade, did not find that watching TV or playing on the computer was inversely associated with physical activity. They did find, however, that youth who engaged in more productive sedentary activities like homework or reading or working on the computer were more likely to be more physically active. In the current study, T.V. watching was identified as a barrier to engaging in physical activity.

Impact of environment on sunlight exposure. Physical activity and sunlight exposure were closely linked as most physical activities the girls in these cohorts participated in occurred

outdoors. Consequently, many of the findings relayed in the section on physical activity participation hold true for sunlight exposure as well. Key among these was weather.

Weather. Weather was a major factor for all cohorts of girls in terms of time spent outdoors. The Somali girls in these cohorts elected to go outdoors primarily when weather was warm and sunny. Numerous studies have shown that individuals are more at risk for diminished Vitamin D levels during periods of diminished sunlight exposure such as in areas at northern latitudes, particularly during winter months, when sunlight is less strong (Anderson et al., 2005; Cheng, 2003; Gordon et al., 2003). This vitamin D risk factor is further potentiated by the limited amount of time girls in this study spent outdoors. In addition to going out primarily during warm, nice weather, which is a relatively brief season in Minnesota, the girls also stated that they were more likely to go out late in the day when sunlight was further reduced.

5.4 Developmental Stage

Developmental stage emerged as a primary factor that shaped lifestyle practices. First generation Somali girls in these cohorts showed similar tendencies to other U.S. girls in the early adolescent age group in the areas of dietary choices and physical activity. Girls reported limited milk consumption with a preference for alternate beverages or flavored milk, and a preference for fast foods if given the option. Girls' taste preferences played a big role in determining food and beverage choices. Like other girls their ages, these girls also reported becoming less active with increasing age. Participants in all of the cohorts also reported that they were aware of the benefits of healthy eating and regular exercise, but concern about health was not a motivator to dietary choices or physical activity at their age. The impact of developmental state on factors shaping lifestyle practices is discussed in the following sections.

Impact of developmental stage on dietary choices.

Milk consumption. Consistent with other research, Somali girls (ages 11 to 14 years) living in Minnesota, appear to have a less than adequate dietary consumption of calcium-

containing products, particularly milk. The 2001 Minnesota Student Survey found that the majority of students, ages 12 to 19 years, do not get 3-4 servings of milk per day, which is the recommended amount for this age group (Minnesota Department of Health, 2004). Similarly, zero to two servings of milk per day was the most common report among girls in all cohorts, with the exception of the younger cohort in Owatonna. The younger girls in Owatonna indicated that they drank 3-4 glasses of milk per day, although this was not evident on the dietary posters they created. Most of the girls described drinking milk primarily at school, although it was available to them at home as well. This finding is consistent with that reported by Bowman (2002), although he also noted a trend toward decreased milk intake even at school during the middle school years. As there are no data available on milk intake at school among Somali girls at younger ages, it is unclear whether the participant responses reflect a decrease in intake from previous years.

Consumption of vitamin D-containing foods. Similarly, the consumption of vitamin D rich foods in the U.S. is lowest among adolescent girls and women, particularly among African American girls (Moore et al., 2005 & Looker et al., 2002). Primary food sources of vitamin D include fish and fish oils, milk, cereal, and infant formula. Among fish, oily fish such as salmon are the best sources of vitamin D. A few girls in the current study reported eating fish, but primarily reported eating tuna. The combination of milk and cereal was eaten with some regularity for breakfast, snack and sometimes dinner by study participants. Other than the combination of milk and cereal and drinking vitamin D fortified milk at school, participants reported little intake of food sources of vitamin D, similar to other girls of similar age in the U.S.

Food appeal and taste. Taste was most commonly cited by participants in all cohorts as a primary determinant of food and beverage choices, including the intake of milk and calcium containing foods such as cheese and ice cream. Girls in all cohorts expressed a preference for chocolate milk over white milk. Almost unanimously, girls did not like un-melted cheese with the exception of string cheese. In fact, girls expressed a dislike for what they termed “cold foods”

such as “raw cheese”. The exception to disliking cold food was ice cream. Ice cream was a preferred taste in all cohorts and was frequently listed as a snack food. While taste has been identified in other studies (Larson et al., 2006; Neumark-Sztainer et al., 1999) as a factor strongly shaping dietary choice, the preference for melted versus un-melted cheese has not been noted in the literature reviewed. Texture and smell were also identified by participants as factors affecting the appeal of foods and beverages. There were wide individual preferences within and across cohorts relative to food appeal.

Available beverage alternatives. One of the most common reasons given for not consuming milk at home was having alternative beverages available. The most commonly consumed beverage was juice. Juice was most commonly consumed with meals and for snacks. This finding is consistent with literature that reports the increase in consumption and preference for juice and soda within the adolescent age group (Bowman, 2002; Cullen, Baranowski, Rittenberry, & Olivera, 2000). The girls in the cohorts in the current study did not describe drinking a lot of soda. Although there were girls who reported drinking soda several times per week, the majority of girls rarely drank soda. When they consumed soda, it was likely to be sweetened soda.

Intake of soda is documented in the literature as a reason for decreased milk intake, but among Somali girls in the current study, soda intake did not seem to be consumed regularly enough to interfere with milk consumption. Additionally, the girls expressed the view that there was general parental disapproval of soda intake, which likely influences how much soda they drink. These data differed markedly from the data obtained in the pilot study where Somali participants in Minneapolis reported drinking one or more cans of soda per day (Benbenek, 2008). This difference is difficult to explain as girls who participated in the pilot study in Minneapolis and those who participated in the current study in Minneapolis resided in the same area. It was not determined where pilot study participants attended school.

Seeking variety. Additionally, girls expressed boredom with regularly available foods and sought variety in their diet. Variety including eating out at a restaurant as well as choosing to eat foods that appealed to them rather than whatever their mothers had cooked for the meal. The most common restaurants listed for eating out were Subway ® and McDonalds ®.

Participants described a lot of autonomy related to dietary intake at home. Having dietary autonomy offered an opportunity to potentially consume foods rich in calcium that might not otherwise be offered at home. The girls, however, reported more often choosing fast foods or convenience foods when they created their own meal, so there was no evidence that dietary autonomy enhanced their intake of foods rich in calcium and/or vitamin D. Ice cream was the only food the girls in these cohorts consistently indicated they would choose that contained calcium. The Somali girls in these cohorts displayed typical behaviors regarding food choices among youth in this age group. Other studies have shown that it is not uncommon for youth in this age group to choose fast foods or convenience foods when they have a choice. Neumark-Sztainer et al. (1999) noted adolescent preferences for convenient foods as did Cullen et al. (2000) and Unger et al. (2004).

Messages about healthy foods and beverages. Auld et al. (2000) postulated that one of the reasons for decreased milk consumption during adolescence was not receiving parental or societal messages about the continued importance of drinking milk. Most of the participants in this study indicated that they did not receive messages encouraging them to drink milk at home, but they had learned at school that milk was important to drink. There were girls in all four cohorts who articulated that milk was important for healthy bones and two girls mentioned the risk of developing osteoporosis. Older girls in Minneapolis reported that their parents were much more likely to encourage them to eat meat than to drink milk. Girls in all four cohorts also reported a surprising lack of oversight of their diet overall by their parents.

Interestingly, while some of the girls were aware of the need for calcium containing foods to build strong bones, they were not strongly motivated to consume these foods and beverages at this point in time. From a health standpoint, they more often noted eating particular foods to “lose weight,” “look good,” or “get energy” than to promote bone health. This phenomenon of youth not being overly concerned about health habits at this age was also identified in a study conducted by Neumark-Sztainer et al. (1999)

Impact of developmental stage on physical activity.

Individual characteristics. Girls in these cohorts spoke of feeling tired, lazy, or feeling like the labor associated with physical activities would be too difficult. These characteristics were, therefore, identified as barriers to physical activity. These characteristics have been cited in other studies dealing with adolescents and physical activity as well (Robbins et al., 2003).

Interestingly, only a handful of girls indicated that they might participate in physical activity to improve their appearance and none suggested that physical activities negatively affect appearance. In the literature, the effect on appearance (e.g. getting sweaty, ruining make-up) is cited as a reason girls do not participate in physical activities as they get older (Robbins et al., 2003). Somali girls in the current study did focus on “fitting in,” which is consistent with developmental tasks for age. Many girls in this age group described a need to be a part of the peer group and/or community, particularly among the older cohort of girls in Minneapolis. Kirshnit et al. (1989) observed that girls in early puberty become more aware of gender identity and gender stereotypic behavior. This phenomenon may help to explain why Somali girls’ reported participation in activity decreases during their teen years. The added negative cultural messages some Somali girls received about participation in physical activities with increasing age may add to this trend.

Limited participation with increasing age. National surveys indicate that the youth in the U.S. are not very active (CDC, 2000; YRBSS, 2007). The finding that activity trends in the U.S.

tend to decrease from early adolescence through late adolescence (CDC, 2000; Kimm et al., 2002; Nelson et al., 2006; YRBSS, 2007) was also evident in the current study. Reasons for decline in physical activity with age included lack of cultural acceptance for continued participation in physical activity by girls of increasing age, changing interests, and “maturity.” Only one girl indicated participation in physical activity might depend on skill level, although this is noted in other studies that track declining participation over time (Baranowski et al., 1997; Robbins et al., 2003). None of the girls in these cohorts mentioned fear of failure as a barrier to participation.

Type of physical activities. Activities the girls in all cohorts engaged in tended to be informal. The girls were unlikely to participate in organized sports, although some reported having participated in them in the past. This pattern is consistent with findings observed by Kirshnit et al. (1989) who noted that adolescents (girls and boys) were less likely to participate in organized sports from age 12 years on. Reasons for attrition in physical activities elucidated in that study included decreased enjoyment in organized activities. For the Somali girls in the current study, having fun and enjoying participating were key enablers to participation in physical activities. As in the Kirshnit et al. study (1989) where adolescents preferred to engage in informal activities, so did many of the Somali girls in these cohorts. Particularly in Owatonna, the girls reported playing informal games of basketball outside their housing complexes. All girls also reported school as a place where they were regularly active. While Kirshnit et al. (1989) indicated adolescents liked to participate in school gym classes least of all, this finding was not reported in the current study. In fact, most of the girls expressed enjoyment of physical activity in school. This may reflect current emphasis on capitalizing on promoting physical activity in settings where children and adolescents spend time (Kelder et al., 2003; McKenzie et al., 2003; Naylor & McKay, 2009). Kirshnit et al. (1989) also commented that participating in gym class takes choice away from teens and this might account for a lack of motivation. From the perspective of Somali

girls, it is possible that few options for physical activity are available to them outside of school, so participation in gym class may actually add to their opportunities to participate in various types of physical activity; consequently participation in school gym class may actually enhance motivation rather than dampen it, unlike teens of other ethnicities. Additionally, among one cohort, participants indicated they would feel more comfortable participating in physical activities when they felt accepted and when physical activity was considered “normal” in the environment. It is likely that school provides such a setting.

Socialization and peer relationships. Peer interaction is an integral part of early adolescence. Having fun with friends and participating in physical activities with friends were identified as primary enablers of participation in physical activities for the Somali girls in this study. Girls in all cohorts indicated they participated in physical activities to socialize or be with friends. They were also more likely to participate if friends were also participating. These findings are consistent with other studies that have found that children and adolescents see having fun as a benefit to exercise and are more likely to participate when peers also participated or supported their participation (Baranowski, 1999; Prochaska et al., 2002; Salvy, 2008; Springer et al., 2006).

Impact of developmental stage on sunlight exposure.

Age relative to vitamin D levels. Girls in these cohorts indicated they spent limited time in the sun. It is known that sunlight acts as a precursor to vitamin D in the body. While inadequate sunlight exposure may contribute to vitamin D deficiency, there is suggestion in the literature that age may be a risk factor. Numerous studies have shown that children in the early adolescent age group (a peak time for bone mass accrual), especially girls in the U.S., are at risk for vitamin D deficiency. For example, Wagner and Greer (2008) estimated that 1 to 17% of adolescents living in North America have vitamin D levels < 30 nmol/L. Globally, Lehtonen-Verormaa et al. (1999) reported that vitamin D levels decreased in Finnish girls from the period

two or more years prior to menarche to the period two years after menarche. This age group corresponds to the age group of Somali girls in these cohorts. Similarly, a study in Boston revealed that 24.1% of youth between the ages of 11 and 18 years tested at a primary care clinic had low vitamin D levels (Gordon et al., 2004). NHANES III data indicates that vitamin D intake among adolescents in the U.S. is below recommended amounts (National Center for Health Statistics, 2004).

5.5 Acculturation

Acculturation reflects the dynamic process of acclimating to a host country. The girls in these cohorts were present in the U.S. for varying amounts of time along with their families. Acculturation is often measured by language ability and dietary changes. While level of acculturation was not measured in this study, there were indications of acculturation to mainstream U.S. culture among girls in all cohorts. These indicators will be discussed in the following sections relative to current literature.

Dietary acculturation.

Dietary acculturation was evident in the incorporation of “American” foods such as tacos, cold cereal, hamburgers, and macaroni and cheese into participants’ diets. The introduction of these foods introduces some calcium as well as Vitamin D containing foods such as dairy and fortified cereal into the traditional diet. Haq (2005) and Burns (2004) described the addition of similar foods in their studies with Somali immigrants in Washington state and Australia. The girls also spoke of junk food and pointed out that junk food was not something their parents grew up eating. They also indicated that when they went out to eat, they were likely to go to Subway[®] or McDonalds[®], both fast-food restaurants. The inclusion of fast food into Somali girls’ diet fits with the study conducted by Unger et al. (2004) in which adolescents of Hispanic and Asian ethnicity who scored as more acculturated were more likely to include fast food in their diet.

An interesting finding was the lack of emphasis on family meals in the homes of Somali girls, other than during special celebrations. It is unclear whether this is a departure from typical meal patterns in Somalia. In a study by Dubowitz et al. (2006), it was noted that Mexican American immigrants to the U.S. move from seeing food preparation and meals as a central family function to a secondary activity, partially due to time constraints. It is possible that the Somali families of the girls in these cohorts were experiencing similar phenomena. Dubowitz et al. (2006) also noted that dietary choices moved toward faster, more convenient choices over time in the homes of immigrants. This was reflected by the dietary additions noted by the girls during focus group discussions compared to reported typical dietary intake in Somalia.

While Somali mothers were reported to primarily purchase and prepare traditional Somali foods they were comfortable with, it was clear from focus group discussions that girls were eager to expand their diets. Participants in all four cohorts sought variety in foods. They also reported having influence over grocery purchases and often accompanied their mothers when they went grocery shopping. Increased influence on grocery purchases by children of Liberian and Somali Bantu immigrants living in the U.S. has been reported in the literature as well (Patil et al. 2009). Contrary to the Patil study, girls in the current study, except for the older Owatonna cohort, reported they were not easily swayed by advertising. Most of the girls did not mention advertising as a determinant of dietary choices.

Somali girls in this study seem to be acculturating at a faster rate than their mothers in terms of dietary practices. However, as Dubowitz et al. (2006) and Patil et al. (2009) noted, the food additions in the U.S. are not always healthy. In the current study, Somali girls reported including fast foods, convenience foods and combination American foods in their diets more readily than did their parents. Unger et al (2004) noted that girls who rated higher acculturation scores when evaluated in 6th grade had increased intake of junk food and lower rates of physical activity in 7th grade. Among Somali girls in this study, however, dietary changes also had

potential to add foods such as vegetables and dairy to a diet that previously was lacking these foods.

Impact of acculturation on physical activity.

As noted, there appear to be some cultural beliefs in place in these Somali communities that act as barriers to participation in physical activities by adolescent girls and women. Some of these belief systems may be offset through school attendance, which requires girls to participate in gym class and recess. The opportunity to participate in activities not normally available to them may be why the Somali girls in the current study spoke positively of activities in school gym classes. It was evident from some of the girls in the older Minneapolis cohort that they were interested in becoming more active, but did not feel comfortable or supported in doing so in their community. In contrast, the local Girl Scout troop in Owatonna has organized a girls' soccer team for several years which has parent support from at least some of the girls' parents. This parental support represents a step toward acculturation.

However, studies indicate that immigrants become less physically active the longer they are in the U.S. or the more they acculturate (Unger et al., 2004). Somali girls in all of the cohorts indicated this was true of their mothers. They reported their mothers were likely to walk with other women and meet people in Somalia, but were less likely to go out in the U.S. In contrast, Evenson, Sarmiento, and Ayala (2004) reported that first generation Latina women in North Carolina who were more fluent in English or who arrived in the U.S. at an early age (before age 25 years) were more likely to be physically active. Similarly, Hosman, Klazinga, and Stronks (2007) reported that Turkish immigrants living in the Netherlands who were more acculturated were more physically active. However, physical activity was also affected by having children and by environment (i.e. work, neighborhood).

Acculturation and sunlight exposure.

All of the girls in the current study wore traditional dress and gave no indication that that would change. Traditional dress style was reported by the girls and co-facilitators in the current study to be changing in other parts of the county and among older girls. This movement away from traditional style of dress may result in increased sunlight exposure among some Somali girls and women. However, among the girls in these cohorts, there was no evidence of changing style of dress, so any efforts to enhance sunlight exposure will need to be made while accommodating current traditional style of dress. Fixed factors such as weather and latitude are not changeable; however increased education and awareness of the negative effect of these on sunlight and vitamin D could prompt changes in lifestyle practices that might offset some of the negative effect. The girls appeared to have only vague understanding of the relationship of sunlight to bone health, which could be modified by health education.

5.6 Strengths and Limitations

The study design used for this study was effective in gaining foundational information about lifestyle practices from the perspective of Somali early adolescent girls living in two communities in the U.S. Utilizing focus groups for data collection in this age group is supported by the literature (Brand, Abi, Couch, Vindigni, and Wark, 2008; Halcomb, Gholizadeh, DiGiacomo, Phillips, and Davidson, 2007; Peterson-Sweeney, 2005; Ruf, Alexander and McKie, 2005). Most of the cohorts were pre-established groups which facilitated interaction as the girls were already used to interacting with one another. Furthermore, utilizing a series of focus groups for each cohort proved to be helpful in eliciting information and in building trust with the girls. With repeated interactions, the girls became accustomed to the process of discussing and sharing information and appeared more comfortable over time discussing factors that shaped their lifestyle practices. Efforts were made to encourage participation by all girls within the cohorts and to value all comments made. Repeated interaction with the investigator also appeared to lead

to increased comfort over time in sharing thoughts within the focus groups. Having community co-facilitators who were informed about the focus group process and protocol present during each focus group discussion was useful to assist when understanding of questions or comments was not entirely clear due to language differences between the PI and the participants. Conducting a series of focus groups also allowed for more focused discussion and allowed the investigator to clarify findings from one session to the next. It was also helpful to observe group interactions and learn from the girls to develop a better sense of the experiences, interactions, and perceptions.

Overall, the findings in the current study revealed a high level of similarity in core findings across age and location. This suggests that data saturation was met. Additionally, many of the findings were consistent with literature related to the impact of developmental state on diet and physical activity practices in this age group. Findings from this study were consistent with previous research indicating that there are cultural risk factors for limited sunlight exposure among East African immigrants and adolescents.

Having several sources of data such as the focus group transcripts, the flip charts and numerous investigator memos as well as input from community liaisons and Somali co-facilitators during post focus group discussion debriefings proved to be very useful throughout data analysis as well. Data could be checked, compared, and triangulated among several data sources. This promoted accurate representation of participant responses and assisted in identifying commonalities and differences within and across groups, adding to the validity of study findings.

The flip charts also served as useful visual tools for the participants during the focus group sessions. Visual tools worked very well for this age group to focus discussion. They also helped the investigator to clarify, and check data and interpretations with participants. There was potential for bias if the co-facilitator did not record all relevant data on the flip charts and only chose to record some responses, but co-facilitators were careful to attend to all responses and to

clarify data as they were recorded. Similarly, involving participants in an activity such as creating food charts in the first focus group session in order assisted in engaging the girls in the subject. They enjoyed making posters and this activity helped to focus them on dietary practices in the second focus group discussion.

Involvement of the community liaisons and co-facilitators strongly enhanced recruitment and retention of study participants. Forming connections with key community partners proved to be essential in generating interest in the study and obtaining parental consent. Utilizing data collected from the preliminary pilot study (Benbenek, 2008) was helpful in developing age and culturally relevant questions for use in the focus group sessions in this study. Gaining Somali co-facilitator input in debriefing meetings after each focus group session was useful in checking perceptions and clarifying participant responses.

Despite these advantages, the study has limitations. The professional transcripts from focus group recordings were difficult to transcribe verbatim when participants often spoke simultaneously or excitedly. Repeated audits of the transcripts compared to the recorded audio files of the focus group sessions, as well as review of flip charts, co-facilitator field-notes, and memos were required to recapture the girls' perceptions related to lifestyle practices and their enablers and barriers when some words or phrases were missing.

The focus group participants were recruited from pre-existing community groups in two communities. Participants came from similar backgrounds and lived in Somali communities within the broader community. This resulted in fairly homogenous cohorts. According to the literature, homogeneity can be a boon to discussion (Peterson-Sweeney, 2005); however it also may require additional focus groups to enhance data collection. Conducting a series of focus groups addressed this potential problem. It should be noted that conducting focus groups among pre-established groups may also have potential to promote standing habits of interaction. There may be group leaders who dominate the discussion. In each group, there were girls who were

more likely to speak and those who were less likely to speak. However, the PI worked to see that each girl had a voice during the focus group discussion.

There were 39 participants in the study, but only 26 participated in all three focus group sessions across cohorts. Steps were taken to ensure that the nine girls who missed the first focus group session had an opportunity to review and add to the data compiled from the first focus group session. These included providing the girls an opportunity to add to the list of compiled food and beverage choices from the posters generated in session one during session two. Few participants in any cohort returned the worksheets they were given in session one to record reasons for dietary choices, but discussion in session two covered this topic in depth. Data collected on the worksheets echoed that elicited during discussion. In qualitative research, the overall intent is to elicit depth during focus group discussion in an effort to meet specific aims, which this study did. The number of participants in each cohort was in keeping with recommendations for focus group methodology with adolescents.

There is potential for selection bias, because participants were recruited from pre-existing groups. Girls in Minneapolis attended a charter school and the focus groups were held during health class, which was part of their school curriculum. While they were allowed a choice as to whether or not they participated, most girls in the class did participate. The focus group sessions were conducted during regular class time, so girls were more likely to participate in accordance with usual classroom behavior. Responding in a classroom setting may have the potential to bias participants responses.

It could also be argued that the girls in Owatonna may have been different from girls in Minneapolis, because their participation in the Girl Scout troop was voluntary, not part of meeting school requirements. While the cohorts were generally recruited from pre-existing groups, the older cohort in Owatonna was slightly different. Half of these girls joined Girl Scouts just before the study was conducted in order to participate in the study, and by their admission, to

obtain the Target gift card incentive. It followed that this cohort, in addition to being larger than the others, was also less cohesive with more side conversations occurring which made focusing the discussion more difficult. Additionally, girls who joined the Girl Scout troop purely to participate in the study may have been different from girls who were already established members, which could have reduced the influence of selection bias in this cohort. It is noteworthy that the findings that emerged during discussion in this cohort were similar to those reported in other cohorts.

While offering incentives is common and even recommended to decrease attrition when working with an adolescent age group (Ayala et al., 2006; Folta, Goldberg, Marcotte, and Economos; 2004; Garwick, Rhodes, Peterson-Hickey, and Hellerstadt, 2008), the possibility of introducing bias exists. Participants who receive incentives may elect to provide socially acceptable answers to researchers in order to assure that they will receive the incentive at the end of the focus group. Additionally, it is possible that girls who attended the focus groups primarily to receive the gift card incentive may be less invested in the process and the discussion. There is risk that answers given may not reflect true lifestyle practices. After the third focus group in the older Owatonna cohort, for example, the co-facilitators raised the question as to whether or not answers a few girls in this cohort gave regarding physical activity were accurate. The co-facilitators indicated that observed practices in the community regarding participation in physical activity differed from reported practices related to physical activity by a few vocal girls during the focus group discussion. The overall findings related to physical activity for this cohort, however, did not differ from the other cohorts. Indeed similar findings emerged independently from all cohorts.

Additionally, the age division by cohort was not as planned. The age group 11 to 14 years was the target population and the study included girls in this age range. However, due to differences in English language ability, girls were placed in school grades, not according to age,

but according to English language ability. In Minneapolis, girls were recruited from grades six through eight; while in Owatonna, because of differences in language fluency, girls were recruited from grades five through eight. Since cohorts were identified by school grades, there were a few older girls in the younger cohorts in both locations. This made age comparisons more difficult. While all girls were required to be fluent in English, it is possible that those girls who were less fluent were less vocal during focus group discussions. Having the Somali co-facilitators present throughout focus group discussions was helpful in facilitating discussion among girls with varied English fluency.

While this study was successful in adding to the body of knowledge relative to the lifestyle practices of groups of early adolescent Somali girls living in two communities in Minnesota, the transferability of findings is limited. Girls were recruited from just two communities in Minnesota, primarily from preexisting groups of Somali girls. Cohorts were relatively homogenous and the overall number of participants who participated in all sessions was small. The girls in both communities lived in high-density housing communities, reported similar free and reduced lunch status, and shared common experiences. Therefore, findings from this study cannot be construed to represent the experiences and perceptions of all early adolescent Somali girls living in the U.S., but must be interpreted within the context of the communities where the data were collected.

Indeed, the intent of the current study is to present a description of the socio-cultural and environmental factors that shape lifestyle practices that contribute to bone health and to identify the enablers and barriers to these lifestyle practices as perceived by four cohorts of early adolescent Somali girls living in two communities, Minneapolis and Owatonna, in Minnesota. While it is recognized the direct experiences and perceptions of these girls cannot be assumed to represent the experiences and perceptions of all early adolescent Somali girls, the overarching influence of the socio-cultural and environmental context on shaping lifestyle practices that

contribute to bone health of Somali girls is evident in the findings. Researchers and clinicians can use the framework and findings to determine whether similar lifestyle practices are contributing to bone health in Somali girls in other settings. The identification of factors, enablers, and barriers to bone health provides the foundation for future studies. Documentation of the methodology allows for replication of this study in other communities.

5.7 Implications and Future Research

Clinical and research implications for the current study will be identified in the following sections. From a clinician's standpoint, the findings suggest that lifestyle practices such as dietary intake of calcium and vitamin D rich foods, physical activity, and sunlight exposure may be suboptimal among four cohorts of Somali girls living in two communities in Minnesota. Further research is needed to objectively measure vitamin D status and bone density as well as dietary intake, and actual physical activity levels among Somali girls living in Minnesota in order to more accurately determine risk status for bone health. Meanwhile, the findings suggest that greater attention should be given by clinicians to health screening, healthy lifestyle promotion, and health education related to awareness of and practices contributing to bone health within these communities.

These findings are not directly transferrable to other groups of Somali girls. Common core findings of this study need to be interpreted within the context of the communities in which the data were collected. However, findings do raise issues to consider in similar communities. As shown in the background literature, girls who have dark pigmented skin and who wear traditional Muslim styles of dress with head covering and long skirts have inherent risk for vitamin D deficiency, even when living in sunny countries (Budak et al., 2004). Lifestyle practices and identified enablers and barriers to the intake of foods and beverages containing calcium and vitamin D, physical activity, and sunlight exposure as described by current study participants indicate that increased risk for diminished bone health may exist among early adolescents with

similar characteristics who live in similar communities. Study findings raise the question of whether screening questionnaires regarding dietary practices related to calcium and vitamin D intake, physical activity practices, and sunlight exposure practices should be developed for clinical use among Somali girls with similar characteristics living in similar communities. The availability of such tools would be helpful to assist in identifying girls at risk for diminished bone health in the short term as well as in the long term.. Obtaining information about the lifestyle practices of the Somali girls in two communities in Minnesota and identifying enablers and barriers to the practices that promote bone health assists in providing the groundwork needed to develop culturally and developmentally appropriate screening tools and health promotion campaigns within these communities.

This study adds to the body of knowledge regarding the lifestyle practices of groups of early adolescent Somali girls living in the U.S. and effectively identifies enablers and barriers to these practices relative to promoting bone health. It is interesting to note that many of the lifestyle practices these girls reported are consistent with trends seen among early adolescent girls in the broader U.S. culture. It appears that developmental stage plays a role in shaping lifestyle practice, regardless of culture. It was also interesting to note that even though the girls had received messages about what constituted healthy foods, and could verbalize the benefits of exercise and even link these two factors to bone health, few of them thought practicing healthy behaviors was applicable to them at this point in their lives. While acknowledged as a factor that could shape lifestyle practices, health was not identified as an enabler to factors contributing to bone health. Worrying about it later was a common attitude. It is recognized that motivating these girls to adopt healthier lifestyle practices while considering unique cultural factors will be an important clinical opportunity for health care providers and the broader community.

Working within the Somali community and cultural context to develop healthy eating campaigns as well as physical activity promotion will be necessary to minimize current barriers to

healthy lifestyle practices. The findings suggest that the school setting is especially effective in these cohorts for stimulating milk intake as well as for promoting physical activity participation. Furthermore, the findings suggest that working within the school environment with guidelines that are consistent with current federal recommendations is a way to promote healthy lifestyle practices. Working within Somali cultural groups will also be essential to promote physical activity within these communities. Providing girls (and women) with opportunities for participation in physical activities may overcome some of the existing barriers to physical activity within their communities and promote the development of older, physically active female role models within their communities.

Acculturation also played a role in shaping lifestyle practices that may, in turn, contribute to the phenomenon of behavior mirroring broader U.S. trends. Dietary additions and language fluency appear to be reflective of higher levels of acculturation among these cohorts of girls. Acculturation is a concept that has not been widely studied among Somali girls. The findings of this study are suggestive of rapid acculturation among first generation Somali girls with slower acculturation among their parents. While this study did not expressly measure acculturation, evidence of it was seen in the girls' discussion regarding dietary intake, exercise practices, competition from sedentary activities and language fluency. In many cases, the girls' responses were similar to other girls their ages in the U.S. Future studies measuring acculturation within youth in these communities would be valuable to better understand the role acculturation plays in shaping lifestyle practices.

There are also evolving generational differences in dietary preferences and beliefs about gender role and participation in physical activities that girls described between themselves and their parents. These generational differences in dietary choices and participation in physical activities were identified primarily with their mothers. Further study of the phenomenon of

acculturation within these communities, its impact on mother-daughter relationships, and its impact on dietary intake and physical activity practices is warranted.

The role of culture as a major factor in shaping lifestyle practices cannot be overlooked. Many of the lifestyle practices the girls reported are embedded in cultural tradition. Wearing traditional style of dress was an integral part of cultural identity which they did not see changing. The mainstay of dietary choices at home was traditional Somali food. Lack of exposure to foods rich in vitamin D and calcium in the home setting was common, although changing over time. There are informal beliefs in the culture that seem to act as barriers to participation in physical activity for Somali girls. A lack of acceptance of girls participating in physical activity beyond a certain age, as well as gender-based rules governing time outside of the home and home responsibilities were voiced by more than one cohort of girls. Additionally, parents were reported to receive peer pressure to comply with these cultural traditions in at least one cohort of girls. Exploring these beliefs, practices, and generational differences as Somalis in the U.S. adjust to American life over time needs further study. Replication of this study with mothers of girls in these communities would be helpful to better describe generational differences in perceptions of factors shaping lifestyle practices as well as enablers and barriers to these practices. Identifying factors that might increase the acceptance of female participation in physical activity as well as incentives to encourage female adults to act as role models for participation in physical activity within their communities needs to be explored. Exploring how and where parents and their daughters receive cultural messages about appropriate female behaviors related to physical activity and sunlight exposure in their communities is also of interest.

The findings related to family meals were surprising. Family meals were predominantly described as informal among study participants. The majority of participants reported that they were likely to eat together as a family only when there was a celebration or a holiday such as Ramadan. Watching T.V. appeared to be a common activity that occurred during meal time. As a

result, there was a fair amount of self-determination related to dietary choices that increased with increasing age. The large number of girls in this study who reported not eating family meals is contrary to findings presents in Child Trends Databank (2003), which reported that children of foreign born parents were more likely to eat together as a family than children of native born parents. The parents of study participants were foreign born. Additionally, finding from the Child Trends Databank indicated children in low income families (<100% of poverty level) were more likely to eat together as a family. Most of the girls in this study were recipients of free and reduced lunch, a marker for low income. Considering that there is research that studies the effects of family meals on overall youth resilience (Eisenberg , Neumark-Sztainer, Bearinger, 2004; Hawkins & Catalano, 1992; Videon & Manning, 2003) and in view of reports of youth violence at least within the Minneapolis Somali community (Yuen, 2010), further study of family meals among Somali families is recommended.

Another surprising finding was the girls' avoidance of sunlight because they did not want to get darker. This appeared to be a message they received within their communities. There was a sense that there was a negative connotation associated with darker skin color. Identification of the origins of this belief would be important to explore in relation to facilitating sunlight exposure among inhabitants of these communities.

Data from which these findings are reported were gathered through focus group discussions with early adolescent girls; therefore the final picture presented is based on group responses. A follow-up study using individual interviews over time would be useful in developing more detail about the lived experiences of Somali girls over time living in Minnesota to better understand the factors that shape lifestyle practices as well as the enablers and barriers to factors contributing to bone health as they age. Further exploration of the role of acculturation over time would be helpful to ascertain its effect in changing dietary practices and physical activity practices over time.

An area that was not addressed in this study is the weight status of early adolescent Somali girls living in the U.S. There were reports of increasing dietary self-determination described by participants in this study. Older girls in the current study reported eating whatever they wanted, when they wanted. Some of the older girls reported feeling that there were no controls placed on dietary intake. Further exploration into this phenomenon within these communities (given the rise in obesity nationally among children and adults) would be of interest. Additional studies focused on acculturation may provide groundwork for initial studies into factors shaping weight among these girls as well.

This study endeavored to discover whether differences existed in factors shaping lifestyle for girls residing in metropolitan versus non-metropolitan geographic locations. Few differences were noted between cohorts in this study, although subtle differences in outlook regarding community parental peer pressure and attitude relative to cultural traditions emerged, primarily among the older cohorts of early adolescents. It would be of interest to pursue study of the differing perspectives on cultural traditions and rules among older early adolescent girls in these two communities to better ascertain factors influencing these perceptions and to follow these girls as they transition into adulthood.

In a follow up study, I have conducted individual interviews addressing content similar to that covered in the focus group discussion guide with some of the girls in each cohort, so that some of the ideas and concepts identified in the current study can be explored in more depth. Additionally, conducting individual interviews with girls from each cohort may provide an opportunity for girls who were less vocal in the focus group discussions to articulate their thoughts. Conducting individual interviews with study participants provides an opportunity to further clarify study findings.

Obtaining quantitative data, in addition to the qualitative data, in future studies is recommended to better determine dietary practices, physical activity practices, and sunlight

exposure. The use and development of dietary intake tools as well as dietary recall would provide a more detailed picture of Somali girls' dietary practices. Similarly, collecting pedometer data may be useful to document Somali girls' activity levels. Utilizing recording devices that allow girls to record when they are outdoors or when they are active would provide other means of quantifying data.

Finally, the focus of this study was to identify factors shaping lifestyle practices as well as enablers and barriers to these practices that contribute to bone health. It would be useful, therefore, in a future study, to measure biomarkers relative to bone health. Obtaining vitamin D levels among Somali girls living in these two communities would provide useful information as to vitamin D status relative to lifestyle practices. Obtaining serial bone densitometry data would be useful to ascertain bone mineral density among these girls over time relative to lifestyle practices. This information could help determine the need for health promotion and health education programs within these communities. Further studies in other areas of the country are also needed to expand the state of knowledge relative to bone health among Somali youth living in the U.S.

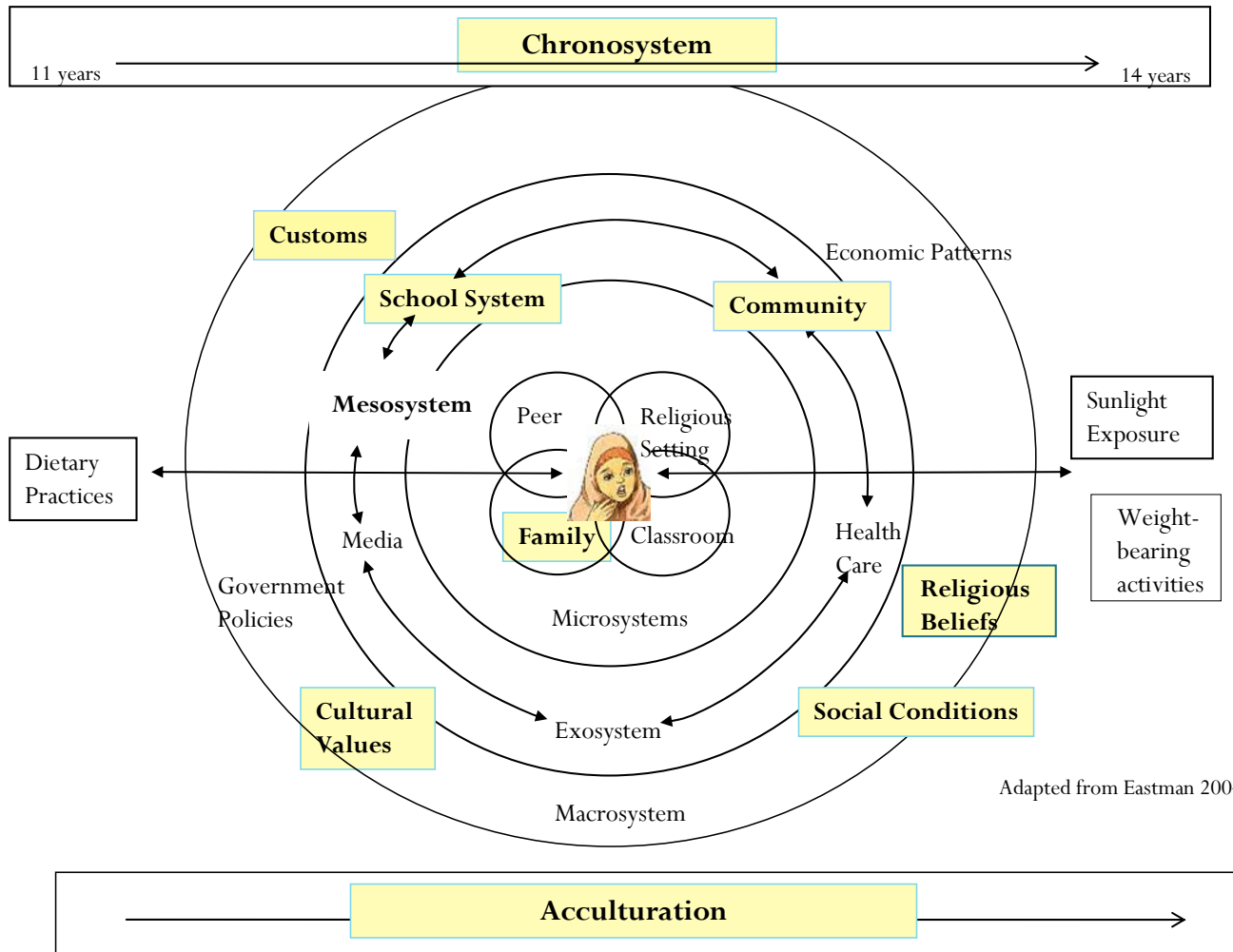
5.8 Conclusions

Early adolescent Somali girls living in two communities in Minnesota described similar lifestyle practices that contribute to bone health related to the dietary intake of calcium and vitamin D, participation in physical activities, and sunlight exposure. Differences among younger age groups (11 to 12 years) and older age groups (13 to 14 years) were found primarily in perceptions of gender role issues related to participation in physical activity. Enablers to factors contributing to bone health included: (a) school attendance, which positively impacts milk intake as well as participation in physical activity; (b) dietary acculturation which expands food and beverage options; and (c) individual curiosity that enhances variety in diet and activities. Barriers to factors contributing to bone health included: (a) cultural traditions related to the dietary intake

of primarily Somali foods at home with limited inclusion of sources rich in calcium or vitamin D; (b) lack of concern about eating unhealthy dietary choices; (c) adherence to and confusion about rules restricting the intake of foods containing pork products, (d) having and preferring alternate beverage options to milk; (e) complying with restrictive cultural beliefs regarding participation by girls of increasing age in physical activities (f) adherence to wearing traditional style of dress; (g) increasing gender-based role responsibilities over time which limits participation in physical activity and time spent outdoors; and (h) perceiving a negative cultural connotation about developing darker skin color. Personal preferences may act as either enablers or barriers to dietary practices, participation in physical activity, and sunlight exposure. Developmental stage, acculturation, environment, and cultural and family traditions are four overarching concepts that play predominant roles in factors shaping lifestyle practices and identified barriers to these practices among Somali girls living in two communities in Minnesota.

Consistent with the ecological model, early adolescent Somali girls appear to be nested within a system of interrelated networks including family, school, community, traditional Somali culture, religion, and mainstream U.S. culture which interact to shape lifestyle practices contributing to bone health. Figure 5 displays the incorporation of the major findings of this study related to factors shaping lifestyle practices among early adolescent Somali girls living in Minnesota.

Conceptual Model Incorporating Factors Shaping Bone Health



In the microsystem, family is bolded to reflect the importance of family in shaping lifestyle factors and enablers and barriers contributing to bone health. The mesosystem is important as it represents the relationships between microsystems. In this study, for example, girls in all cohorts described food availability at home and at school. Foods available to them at school expanded their diet at home by introducing more American foods at home. Similarly, parent or family beliefs about extracurricular physical activities shaped whether or not girls could or would participate in these.

At the exosystem level, community and school setting are both bolded to reflect their strong role in shaping lifestyle practices among these girls. For example, community beliefs related to physical activity was identified as a barrier to physical activity participation while the school setting was identified as an enabler to physical activity. These elements of the exosystem reflect the overarching concepts of cultural traditions and environment. Media, to a lesser extent, was identified by some girls to shape their dietary practices and is characteristic of developmental stage. Additionally, the chronosystem itself, reflective of age, is bolded as developmental stage emerged as a core concept that contributed to shaping dietary as well as physical activity practices.

Elements of the macrosystem that were identified as common core factors and enablers and barriers to bone health included customs, culture, religious beliefs, as well as social conditions. Cultural traditions and environment emerged as core concepts in this system level and permeated other levels as well in that cultural and religious tradition and environment shaped family and community traditions and practices. Finally, a bar to represent acculturation was added at the bottom of the figure to represent the role acculturation plays in shaping lifestyle practices. More study is needed to fully explore the role acculturation plays in shaping lifestyle practices as well as how quickly acculturation is evolving, but findings demonstrated that Somali

girls in this study displayed similar characteristics to youth in mainstream U.S. culture relative to dietary practices and physical activity practices.

The findings from this study suggest that girls in these cohorts may be at risk for diminished bone health over time due to current dietary practices, physical activity practices, and limited sunlight exposure. The identification of enablers and barriers to factors contributing to bone health can inform subsequent health promotion campaigns aimed at improving dietary, physical activity, and sunlight exposure practices. The planning and implementation of any future research and health promotion endeavors with early adolescent Somali girls must consider the environmental and socio-cultural forces at play in shaping lifestyle practices and enablers and barriers to these practices within their cultural context.

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Appendix A

Chapters 4 and 5 Tables (Tables 4-45)

Table 4

Summary of Dietary Intake Compiled from Posters Created by Participants in the Younger Minneapolis Cohort

Breakfast		Beverages	
Weekday	<i>Cereal</i> Fruit Loops Fiber One Cinnamon Toast Crunch Captain Crunch Honey Bunches of Oats	<i>Peanut Butter and Jelly</i> Cereal Bars <i>Pancakes</i> <i>Eggs</i>	<i>Milk</i> Apple Juice
Weekend	<i>Orange</i> <i>Egg</i> <i>Cereal (as above)</i>	Malaweh Anjera	<i>Milk</i> Orange juice Tea Water
Lunch		Beverages	
Weekday	Hamburger French Fries Chicken Pasta Stead	Fried Vegetables Rice and Meat Spaghetti Carrots <i>Grilled Cheese Sandwich</i>	Cola <i>Milk</i> Juice Mango Apple Fruit Punch
Weekend	Hamburger <i>Macaroni and Cheese</i> Salad Pasta <i>Lasagna</i>	Beans <i>Sandwich</i> <i>Tuna</i> <i>Peanut Butter</i> Spaghetti <i>Pizza</i>	Dr. Pepper Koolaid Juice Cranberry Raspberry
Dinner		Beverages	

Weekday	<i>Pizza</i> Salad Chicken Sandwich Fried Vegetables Tomato	Pasta <i>Egg</i> Hamburger Ramen Noodles Bread	<i>Milk</i> Juice Lemonade
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Weekend	<i>Pizza</i> <i>Macaroni and Cheese</i> Chicken	Pasta Rice Goat mean	<i>Milk</i> Juice
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Snacks			Beverages
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Weekday	<i>Ice Cream</i> <i>Peanut Butter & Jelly Sandwich</i> Cake Fruit Snacks Carrots	Candy (chocolate) Fruit (apple) <i>Cheese</i> Chips
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Weekend

Italicized words indicate foods and beverages participants identified as high in calcium and/or Vitamin D.

Table 5

Summary of Factors Shaping Dietary Intake Identified by Girls in the Younger Minneapolis Cohort

Factors	Examples
Individual Level	
Food Appeal	Liking or not liking the taste Liking or not liking how a food looks Craving a food
Seeking Variety	Wanting to try new foods Being bored with regularly served foods Being curious about new foods
Health	Having an awareness of which foods are considered healthy, but not being worried about eating healthy right now Eating healthy to lose weight
Ability to Cook	Being able to prepare certain foods
Influence on Food Purchases	Being able to influence mother to buy certain foods, like “American” foods
Freedom to Choose Foods/Beverages	Being able to determine snacks, meal choices
Family/Community Level	
Availability	Having foods/beverages high in calcium and Vitamin D available Having limited variety of foods and beverages at school and at home Eating what is prepared Having alternative beverages to milk Drinking milk at school because there is nothing else available
Maternal Influence	Mother buys and prepares most foods Mother most likely to buy and prepare foods that she knows how to prepare

Cultural Tradition

Mother most likely to prepare traditional Somali foods

Adhering to rules about not eating certain foods such as pork

Table 6

Summary of Enablers and Barriers to the Intake of Calcium/Vitamin D-Containing Foods and Beverages in the Younger Minneapolis Cohort

ENABLERS	Examples
Individual Level	
Positive Food Appeal (primarily taste)	Liking the taste and texture of melted cheese Liking the taste of cereal with milk Adding chocolate syrup to milk to improve the taste
Desire for Variety	Wanting to try “American” foods like pizza, ice cream
Teen’s Influence on Food Purchases	Influencing mother to buy ice cream
Family/Community Level	
Availability of Foods High in Calcium and Vitamin D	Eating combination foods like pizza, lasagna that contain cheese
Eating School Lunch	Having no alternative beverages to milk at school Availability of chocolate milk at school
BARRIERS	
Individual Level	
NEGATIVE Food Appeal	Not liking “cold” foods like “raw” cheese Not liking the taste of milk Preferring the taste of other beverages such as juice and soda over milk
Family/Community Level	
Food Availability	Not having foods high in calcium and Vitamin D at Home Having alternative beverages to milk at home and when eating out such as juice, soda, water, and tea

Cultural Tradition

Traditional Somali foods, mainstay of diet, are not inclusive of a lot of dairy foods

Table 7

Summary of Dietary Intake Compiled from Posters Created by Participants in the Older Minneapolis Cohort

Breakfast			Beverages
Weekday	Granola bar Cheese/Crackers	<i>Cereal</i> Honey Nut Cheerios Cookie Crisp	Juice (apple, orange) <i>Milk</i>
Weekend	<i>Cereal</i> Special K Chocolate Delight	Muffin <i>Waffles</i> No breakfast	<i>Milk</i> Juice (orange)
Lunch			Beverages
Weekday	Pasta Chicken wings Rice	Rice Fruit (apple, banana)	Water Juice
Weekend	Fish Pasta Chicken Bread	Sandwich (chicken, lettuce <i>cheese</i> , mayonnaise)	Soda Juice
Dinner			Beverages
Weekday	Pasta Chicken Rice <i>Salad</i> <i>Cheese sandwich</i>	Meat (? type) <i>Fish</i> Tuna fish <i>Nuts</i>	Water Juice
Weekend	Spaghetti with sauce <i>Salad</i> Rice <i>Cereal</i>	Fruit (apple, banana) Pasta Chicken	Water
Snacks			Beverages

Weekday	Cookies Chips Cake	Fruit (apple) Pie	None
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Weekend	Cookies Chips Honey bun	Pickles <i>Salad with Ranch dressing</i>	<i>Milk</i>
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Italicized words indicate foods and beverages participants identified as high in calcium and/or Vitamin D.

Table 8

Summary of Factors Shaping Dietary Intake Identified by Girls in the Older Minneapolis Cohort

Factors	Examples
Individual Level	
Characteristics of Food	Liking or not liking the taste (e.g. spicy, sour) Not liking the smell of some foods Not liking the texture of some foods Not liking how the food is prepared
Desire for Variety	Wanting to try new foods Being bored with regularly served foods Not wanting to try new foods Eating at restaurants
Healthy Foods	Identifying healthy foods, but being unconcerned about not eating them at this point in time Calcium and Vitamin D
Ability to Cook	Being able to prepare certain foods Not knowing how to cook or prepare foods
Influence on Food Purchases	Being able to influence mother to buy certain foods, like "American" foods
Freedom to Choose Foods/Beverages	Being able to determine snacks, meal choices
Time	Not having time to prepare food Not having time to wait for food to be prepared
Family/Community Level	
Availability	Having foods/beverages high in calcium and Vitamin D available Having limited variety of foods and beverages at school and at home Having alternative beverages to milk Drinking milk at school because there is nothing else available Having no previous exposure to some foods Eating the food that has been prepared at home or school

Maternal Influence	Mother buys and prepares most foods Mother most likely to buy and prepare foods that she knows how to prepare and is familiar with
Cultural Tradition	Traditional Somali foods comprise a large part of the diet in the home Adhering to rules about not eating certain foods such as pork
Advertising	Advertising makes the food look or sound good

Table 9

Summary of Enablers and Barriers to the Intake of Calcium/Vitamin D-Containing Foods and Beverages in the Older Minneapolis Cohort

ENABLERS	Examples
Individual Level	
Positive Food Appeal (primarily taste)	Eating foods that “go together” like cereal and milk Liking the taste of foods high in calcium e.g. yogurt
Desire for Variety Expands Options	Wanting to try new foods
Influencing Food Purchases	Influencing mother to buy new foods e.g. ice cream
Gaining Weight as Enabler to “healthy eating	Gaining a lot of weight might make me worry more about eating healthy
Family/Community Level	
Increased Availability of Foods High in Calcium and Vitamin D	Eating combination foods like pizza, lasagna that in contain cheese
Eating School Lunch	Having no alternative beverages to milk at school
BARRIERS	Examples
Individual Level	
Negative Food Appeal	Not liking cheese Not liking the taste of milk Preferring the taste of other beverages such as juice and soda over milk Not liking the texture of foods like fish
Having Freedom to Choose Foods	Choosing to eat “junk food”
Beverages Expands Diet to Include Non-nutritious Options	Lack of concern about eating unhealthy foods

Family/Community Level

Limited Food Availability	Not having foods high in calcium and Vitamin D at home Having alternative beverages to milk at home and when eating out such as juice, soda, water, and tea Feeling like there is a lack of control over which foods are eaten and how much
Cultural Tradition Mainstay of Diet at Home	Eating traditional Somali foods that do not include dairy foods
Maternal Influence on Food Purchase and Preparation	Mother buys and prepares foods she is familiar with which are typically traditional Somali foods
Few Family Meals	Having few formal family meals leads to increased dietary choice and greater intake of convenience foods

Table 10

Summary of Dietary Intake Compiled from Posters Created by Participants in the Younger Owatonna Cohort

Breakfast		Beverages	
Weekday	Cereal Cinnamon Toast Crunch Cocoa Puffs Fruit Loops <i>Peanut butter & jelly sandwich</i>	Cookies <i>Pancakes</i> Orange Banana bread	<i>Juice (orange, apple)</i> <i>Milk</i>
Weekend	Angera Cereal <i>Peanut butter & jelly sandwich</i> Fruit (apples, bananas, grapes)	Pancakes Eggs Sambusa	Water Tea
Lunch		Beverages	
Weekday	Pasta with chicken Chicken patty on a bun Fruit (pineapple, mandarin oranges) <i>Grilled cheese sandwich</i>	Popcorn chicken Pizza Hamburger Salad <i>Macaroni and cheese</i>	<i>Milk</i> Rootbeer
Weekend	Ramen noodles Fruit (banana, mango) Hamburger Angera	Rice Pasta Chicken Spaghetti	Pineapple juice Soda 7-Up®
Dinner		Beverages	
Weekday	Chicken on a bun <i>Macaroni and cheese</i> Ramen Noodles Pasta	<i>Lasagna</i> Hamburger Rice	Water Apple juice
Weekend	Pizza burger Chicken patty on a bun Fruit (watermelon)	Wild rice Rice Oatmeal	Water Soda 7-Up® <i>Milk</i>

	Ramen Noodles	<i>Lasagna</i>	
Snacks			Beverages
Weekday	Fruit (grapes, cherries, orange, pineapple, apple) French fries <i>String cheese</i>	Egg <i>Cheetos</i> [®] <i>Ice cream</i> Candy	Tea
Weekend	<i>Peanut butter & jelly</i> Candy (Gummi worms) Fruit (watermelon, strawberries)	PopTarts [®] <i>Cheese</i> <i>Pizza</i> Scrambled eggs	Juice (apple, <i>Juicy Juice</i> [®])

Italicized words indicate foods and beverages participants identified as high in calcium and/or Vitamin D.

Table 11

Summary of Factors Shaping Dietary Intake Identified by Girls in the Younger Owatonna Cohort

Factors	Examples
Individual Level	
Characteristics of Food (Food Appeal)	Liking or not liking the taste of foods/beverages Being hungry/thirsty or not hungry/thirsty
Seeking Variety	Being bored with usual foods Liking new foods
Ability to Cook	Being able to prepare food Not knowing how to make food
Freedom to Choose Foods/Beverages	Snack choices: Preferring quick convenient foods if getting it for self
Time	Not having time to make something Being too busy to wait for foods to be prepared
Influence on Food Purchases	Influencing mom to buy: "American foods", ice cream
Health	Eating/Drinking foods/beverages because they are "healthy" Eating sugary foods makes you tired
Family/Community Level	
Availability	Having foods/beverages high in calcium and Vitamin D available
Setting	Having limited variety of foods and beverages at school and at home Drinking milk at school because there is nothing else available Having alternative beverages to milk Having no previous exposure to some foods Eating the food that has been prepared at home or school
Peer Influence	Trying food because others are eating it

Maternal Influence

Mother buys and prepares most foods
Mother most likely to buy and prepare foods that she
knows how to prepare and is familiar with

Cultural Tradition

Traditional Somali foods comprise a large part of the
diet in the home
Adhering to rules about not eating certain foods such as
pork

Table 12

Summary of Enablers and Barriers to the Intake of Calcium/Vitamin D-Containing Foods and Beverages Identified by Girls in the Younger Owatonna Cohort

ENABLERS	Examples
Individual Level	
Positive Food Appeal (primarily taste)	Eating cereal with milk Liking the taste of foods high in calcium e.g. milk, melted cheese Liking chocolate milk
Desire for Variety Expands Options	Liking to try new foods Liking combination foods such as pizza, macaroni and cheese
Influencing Food Purchases	Influencing mother to buy new foods e.g. ice cream
Health as a Motivator	Drinking milk because it is healthy
Family/Community Level	
Increased Availability of Foods High in Calcium and Vitamin D	Eating combination foods like pizza, macaroni and cheese that contain cheese
Eating School Lunch	Having no alternative beverages to milk at school
BARRIERS	
Individual Level	
Negative Food Appeal	Not liking “raw” cheese Not liking the taste of milk Preferring the taste of other beverages such as juice and soda over milk
Feeling Sick	Avoiding milk because it makes her feel sick
Family/Community Level	

Limited Food Availability	Not having foods high in calcium and Vitamin D at home Having alternative beverages to milk at home and when eating out such as juice, soda, water, and tea
Cultural Tradition	Eating traditional Somali foods that do not include dairy foods Being worried about eating/drinking foods and beverages that might contain pork which is forbidden
Maternal Influence on Food Purchase and Preparation	Mother buys and prepares foods she is familiar with which are typically traditional Somali foods

Table 13

Summary of Dietary Intake Compiled from Posters Created by Participants in the Older Owatonna Cohort

Breakfast		Beverages	
Weekday	<i>Cereal</i> Frosted Flakes Fruit Loops Malloowaax (like pancake)	Cookies Waffles Ingera Donut (glazed or chocolate)	Juice (mango, orange, apple) <i>Milk</i>
Weekend	Ingera Cereal Peanut Butter & Jelly Sandwich	Malloowaax Eggs	Orange Juice <i>Tea with Milk & Sugar</i>
Lunch		Beverages	
Weekday	Pasta (meatballs, sauce) Biriis (rice) Spaghetti	<i>Spicy chicken salad</i> <i>Pizza</i>	Juice (orange, Minute Maid) Kool Aid
Weekend	Rice & Steak Rice & Chicken Pasta & Sauce Somali foods (blayo, biriis, sawayat iyo maroq Caanjaro & Morack)	Rice Pasta Subway	Juice Pop <i>Milk</i>
Dinner		Beverages	
Weekday	McDonalds <i>Macaroni & Cheese</i> Kentucky Fried Chicken Pasta/Sauce	Pizza Pasta Rice Malloowaax	Water Soda Mountain Dew® or Coca Cola®) <i>Milk</i> (chocolate & white)
Weekend	<i>Pizza</i> Steak & Rice Kentucky Fried Chicken Somali foods (Helep coscos,	<i>Macaroni & Cheese</i> McDonalds <i>Oatmeal</i> (Mashari)	Juice <i>Milk</i> Tea

Caanjaro & Morack)

Snacks		Beverages	
Weekday	Cake Peanut Butter & Jelly Ramen Noodles Blueberry Pancakes Donuts	Cereal Pretzels Chips Candy	Tea Water Soda
Weekend	Brownies Turkey Sandwich Chips <i>Macaroni & Cheese</i> Somali Food (sambusa, dolsho, Marak, soja, alwo, Reximar bagiyo)	PopTarts® Ramen Noodles Fruit (apple, orange, mango)	Juice (mango, other) Tea Kool Aid

Note. Italicized words indicate foods and beverages participants identified as high in calcium and/or Vitamin D.

Table 14

Summary of Factors Shaping Dietary Intake Identified by Girls in the Older Owatonna Cohort

Factors	Examples
Individual Level	
Characteristics of Food (Food Appeal)	Liking or not liking the taste of foods/beverages Being hungry/thirsty or not hungry/thirsty Liking the way it looks Food costs less than some other types of food Liking the sound of opening a can of soda Goes with the other food I am eating or an activity I am doing The type of food is filling The food is too oily The food is not cooked right Not liking “cold” foods
Seeking Variety	Being bored with usual foods Being curious about a food
Ability to Cook	Being able to prepare food Not knowing how to make a food
Freedom to Choose Foods/Beverages	Making snack or meal choices
Time	Not having enough time to eat or prepare foods
Influence on Food Purchases	Influencing mom to buy: “American foods”, ice cream
Health	Eating/Drinking foods/beverages because they are “healthy”
Family/Community Level	
Availability	Having foods/beverages high in calcium and Vitamin D available
Setting	Having limited variety of foods and beverages at school and at home Drinking milk at school because there is nothing else available Having alternative beverages to milk

	Eating the food that has been prepared at home or school
Maternal Influence	Mother buys and prepares most foods Mother most likely to buy and prepare foods that she knows how to prepare and is familiar with
Cultural Tradition	Traditional Somali foods comprise a large part of the diet in the home Adhering to rules about not eating certain foods such as pork or those containing pork products
Advertising	Liking the appearance of the box or the advertising gimmick

Table 15

Summary of Enablers and Barriers to the Intake of Calcium/Vitamin D-Containing Foods and Beverages in the Older Owatonna Cohort

ENABLERS	Examples
Individual Level	
Positive Food Appeal (primarily taste)	Eating foods that “go together” e.g. cereal with milk Liking the taste of foods high in calcium e.g. melted cheese Liking chocolate milk
Desire for Variety Expands Options	Liking to try new foods Liking combination foods such as pizza, macaroni and cheese
Influencing Food Purchases	Influencing mother to buy new foods: e.g. ice cream
Health as a motivator	Drinking milk because it is healthy
Family/Community Level	
Increased Availability of Foods High in Calcium and Vitamin D	Eating combination foods like pizza, macaroni and cheese that contain cheese
Eating School Lunch	Having no alternative beverages to milk at school
BARRIERS	Examples
Individual Level	
Negative Food Appeal	Not liking cold “raw” cheese Not liking the taste of milk Preferring the taste of other beverages such as juice and soda over milk
Concern About Other’s Opinion	People will think you are weird if you order milk when you are out to eat

Family/Community Level

Limited Food Availability

Not having foods high in calcium and Vitamin D at home

Having alternative beverages to milk at home and when eating out such as juice, soda, water, and tea

Cultural Tradition

Eating traditional Somali foods that do not include dairy foods

Being worried about eating/drinking foods and beverages that might contain pork which is forbidden

Maternal Influence on Food Purchase and Preparation

Mother buys and prepares foods she is familiar with which are typically traditional Somali foods

Table 16

List of Weight-Bearing Activities Identified by Girls in the Younger Minneapolis Cohort

Running	Basketball
Soccer	Softball
Football	Tag
Jump Rope	Ghosts in the Graveyard Game
Push-up	

Table 17

Summary of Factors Shaping Participation in Physical Activity Identified by Girls in the Younger Minneapolis Cohort

Factors	Examples
Individual Level	
Socialization	Being with friends Meeting friends Having nobody to do it with
Enjoyment	Having fun Enjoying the activity
Individual Characteristics	Feeling lazy Feeling tired Being injured Not feeling like it
Health	Doing it to be healthy Being unhealthy
Time	Schedule allows
Lack of Commitment	Not wanting to commit to playing on an organized sports team
Preferring Informal Activities	Not wanting to take direction from a coach
Age	Being less active with increasing age Feeling bored with usual activities as you get older
Family/Community Level	
Role Models	Wanting to emulate a well-known athlete
Access	Having a place to play Having a space to exercise Lacking organized sports teams
School Requirement	Having to go to gym class and recess
Health Promotion	Having it recommended by doctors or teachers

Weather	Being more likely to go outside and play if the weather is warm and sunny Being less likely to go outside and play if the weather is cold or wet
Safety	Feeling safe in environment Parents feeling child is safe
Cultural Tradition	Playing outside not as accepted when you get older Being able to participate in any physical activity without restrictions at this age Traditional style of dress doesn't affect activity
Variety	Having a variety of activities to choose from

Table 18

Summary of Enablers and Barriers to Participation in Physical Activity in the Younger Minneapolis Cohort

ENABLERS	Examples
Individual Level	
Having the Opportunity to Socialize	Having friends who participate
Experiencing Positive Feelings	Having fun Enjoying it
Having Time	Not having too many responsibilities
Family/Community Level	
Having the Right Environment	Having access to adequate space Having a part nearby Feeling safe Having sunny warm weather
Having the Freedom to Participate	Not having restrictions on activity
Attending School and Meeting School Requirements	Participating in gym class and recess
Role Models	Wanting to emulate role models
BARRIERS	Examples
Individual Level	
Individual Characteristics	Feeling tired, lazy, unmotivated, or not feeling like participating Not wanting to commit to an organized team Not wanting to take direction from anyone
Increasing Age	Having changing interests with increasing age
Having	

Family/Community Level

Inclement Weather

Not wanting to go out when it is cold or wet

Changing Cultural Female Role

Physical activity less accepted with increasing age of girls

Expectations with Increasing Age

Having other responsibilities, so no time to participate

Having a Lack of Time

Table 19

List of Weight-Bearing Activities Identified by Girls in the Older Minneapolis Cohort

Running	Basketball
Soccer	Baseball
Football	Walking
Volleyball	Lifting Weights

Table 20

Summary of Factors Shaping Participation in Physical Activity Identified by Girls in the Older Minneapolis Cohort

Factors	Examples
Individual Level	
Socialization	Being with friends Because friends participate Making new friends
Enjoyment	Enjoying the activity Having fun Having low or no expectation of enjoyment
Feeling Accepted	More likely to participate if it is an accepted thing to do
Fitting In	Feeling embarrassed Being the only one doing it Not feeling accepted Feeling like people are looking at you Wanting to fit in
Health	Feeling healthier Controlling weight
Gender	Being female
Family/Community Level	
Environment	Having access to space Not having access to a sufficient space to exercise Having a park nearby Feeling safe Feeling unsafe
Weather	Not wanting to go outside if the weather is extreme
Parental Attitudes	Parents feeling child is safe Parents giving permission
Cultural Tradition	Parents being influenced by peers about appropriateness of physical activity for girls

Physical activity being less accepted as you get older if
you are a girl
Wearing traditional dress style which sometimes makes
it hard to participate

Table 21

Summary of Enablers and Barriers to Participation in Physical Activity in the Older Minneapolis Cohort

ENABLERS	Examples
Individual Level	
Having the Opportunity to Socialize	Wanting to be with friends
Having an Incentive	Being more likely to participate if there was an incentive to participate
Fitting In	Wanting to fit in Being more likely to participate if others are doing activities as well Feeling accepted
Family/Community Level	
Having the Right Environment	Having adequate space Feeling safe Being in area/place where it is considered normal to participate in physical activities Having comfortable weather without extremes Being near a park Living close to friends
BARRIERS	Examples
Individual Level	
Individual Characteristics	Having a lack of interest in participating Having other things to do Changing interests
Feeling Self-Conscious	Feeling like not fitting in Feeling embarrassed Being the only one doing it Feeling like people are looking at you

Family/Community Level

Having Concerns about the Environment

Having no access to exercise space
Feeling unsafe

Inclement Weather

Not wanting to go outside in weather extremes: too hot, too cold, too wet

Lacking Parental Permission for Participation

Noting parental peer pressure advising against allowing daughter to participate in physical activity
Parent not granting permission to participate

Perception of Lack of Cultural Acceptance for Participation in Physical Activity by Older Girls

Receiving social message that physical activity is considered inappropriate for older girls within their Somali community
Lacking public acceptance for participation in physical activities

Different Cultural Gender Rules about Time Spent Away from Home

Feeling males in their community have few restrictions on activity and can leave home when they want to without parental permission

Lacking Community Role Models

Few adult women in their community engage in physical activity

Table 22

List of Weight-Bearing Activities Identified by Girls in the Younger Owatonna Cohort

Lacrosse	Tag
Soccer	Climbing Stairs
Football	Skateboarding
Tennis	Riding a Scooter
Four Square	Walk to the Store
Ding Dong Ditch	

Table 23

Summary of Factors Shaping Participation in Physical Activity Identified by Girls in the Younger Owatonna Cohort

Factors	Examples
Individual Level	
Socialization	Being with friends Meeting friends who live nearby
Enjoyment	Enjoying the activity Having fun
Health	Being healthy Getting energy Losing weight
Seeking Excitement	Liking the excitement Seeking action Liking to do new things
Having Abilities	Being good at it
Individual Characteristics	Feeling tired Feeling bored Being uncomfortable Not being in the mood
Having Other Interests	Having other activities to do e.g. T.V.
Not Having Time	Schedule doesn't allow Having to do homework
Age	Getting older and having changing interests
Having a Role Model	Wanting to emulate a role model
Family/Community Level	
Environment	Having adequate space close to home Feeling safe No opportunity for organized sports

Weather	Preferring to go outside in warm, dry weather
Cultural Tradition	Having home responsibilities Wearing traditional dress style which sometimes interferes with activity Requiring parental permission for participation
School Attendance	Meeting school requirements for gym class and recess Participating in Presidential Fitness Program

Table 24

Summary of Enablers and Barriers to Participation in Physical Activity in the Younger Owatonna Cohort

ENABLERS	Examples
Individual Level	
Having an Opportunity to Socialize	Playing with friends Meeting friends who live nearby to play
Pursuing Goals	Wanting to complete the Presidential Fitness Award
Emulating Role Models	Wanting to be good at sports
Having Athletic Abilities	Being good at it
Seeking Excitement	Liking the action Seeking action
Enjoying the Activity	Having fun
Family/Community Level	
Having the Right Environment	Adequate space accessible to home Feeling safe Having good weather that is not cold or wet
Attending School and Meeting School Requirements	Participating in gym class, recess, and other activities such as Track and Field Days, Presidential Fitness Award
Having Parental Support	Having parental permission to participate
BARRIERS	Examples
Individual Level	
Having Individual Negative Characteristics	Feeling tired Feeling bored Not being in the mood

	<ul style="list-style-type: none"> Feeling lazy Feeling the activity is too hard
Increasing Age	<ul style="list-style-type: none"> Having changing interests overtime Thinking they are too mature to engage in some activities
Having Other Interests	<ul style="list-style-type: none"> Preferring to watch T.V. or play on electronics
<hr/>	
Family/Community Level	
<hr/>	
Cultural Traditions	<ul style="list-style-type: none"> Wearing traditional dress style and perceiving it to be a barrier to participating for some Not having parental approval or permission for participation Physical activity less common among older girls within the culture Having few adult role models
Inclement Weather	<ul style="list-style-type: none"> Not wanting to go outside in the weather extremes
<hr/>	

Table 25

List of Weight-Bearing Activities Identified by Girls in the Older Owatonna Cohort

Basketball	Track
Soccer	Cheerleading
Football	Dancing
Kickball	Ride a Bike
Rapping	Boxing
Climbing Stairs	Jump Rope

Table 26

Summary of Factors Shaping Participation in Physical Activity Identified by Girls in the Older Owatonna Cohort

Factors	Examples
Individual Level	
Socialization	Being with friends Meeting friends
Enjoyment	Liking the excitement Having fun Getting rid of boredom
Awareness of Health Benefits	It provides weight control It improves appearance
Role Model	Emulating a role model
Living vicariously	Feeling satisfied watching someone else perform
Individual Characteristics	Feeling tired Feeling uncomfortable Feeling like it is too hard physically Not feeling accepted
Not Having Time	Schedule doesn't allow Having other activities to do
Having Older Interests	Engaging in electronic activities
Having Freedom of Choice	Being able to choose to participate or not
Family/Community Level	
Cultural Traditions	Wearing traditional style of dress seen as impediment to physical activity for few Having different gender rules about being away from home with boys having more freedom Wanting parental support No real cultural taboos against participation in physical activity Older girls and women less active within community

Environment	Having adequate space close to home Having necessary equipment Preferring to participate outdoors if weather not extreme
Cost	Cost to participate in activities might be prohibitive for some
Attending School	Complying with school requirements for participation in physical education classes

Table 27

Summary of Enablers and Barriers to Participation in Physical Activity in the Older Owatonna Cohort

ENABLERS	Examples
Individual Level	
Opportunity to Socialize	More likely to participate if friends involved Enjoying being with friends Provides a way to meet friends
Enjoying the Activity	Having fun Liking the excitement
Emulating a Role Model	Wanting to be as good as a local or national athlete Wanting the recognition and prestige that goes with being famous
Having Ability	Being good at it
Feeling Accepted	Feeling like fits in
Family/Community Level	
Having the Right Environment	Accessible space and equipment close to home Having nice weather that is not too extreme
Having Parental Support	Having parental support and permission to participate
Not Incurring Cost	Not having to pay any fees for participation
Attending School and Meeting School Requirements	Participating in physical education classes as required
BARRIERS	Examples
Individual Level	
Individual Negative Characteristics	Feeling tired Feeling uncomfortable

	Feeling like it is too hard physically Not feeling accepted
Living Vicariously	Feeling satisfied watching someone else perform
Not Having Time	Schedule doesn't allow Having other activities to do
Having Other Interests	Engaging in electronic activities such as T.V., computer
Increasing Age	Being less active as gets older
Having Freedom of Choice	Being able to choose to participate or not
Increasing Age	Being less active as gets older
<hr/>	
Family/Community Level	
<hr/>	
Cultural Tradition	Wearing traditional dress style seen as impediment to activity by very few Noting there are different rules about being away from home for girls and boys and feeling that girls' rules are more restrictive Older girls and women less active within community
Inclement Weather	Being too hot or too cold or too wet for outdoor activity
Unavailable Space or Equipment	Basketball courts near housing complexes being used by others
<hr/>	

Table 28

Summary of Factors Shaping Sunlight Exposure Identified by Girls in the Younger Minneapolis Cohort

Factors	Examples
Individual Level	
Engaging in Outdoor Physical Activities	Playing with friends outdoors Meeting friends outside
Health Concerns	It can cause cancer You can get a sunburn It hurts my eyes
Time	Not having the time to go outside
Family/Community Level	
Season	I like going out in the summer time
Temperature	It feels good to be outside It's best when it is warm I don't like to go out when it is too cold
Cultural Tradition	Wearing traditional dress and head covering blocks some sun
Having Access to Outdoor Facilities	Having a park nearby

Table 29

Summary of Factors Shaping Traditional Style of Dress Identified by Girls in the Younger Minneapolis Cohort

Factors	Examples
Family/Community Level	
Cultural Tradition	It is what we wear in our culture Not wanting people to see our hair It is what our religion says we should wear
Family Influence	My parents taught me what to wear Being in public versus at home

Table 30

Summary of Enablers and Barriers to Sunlight Exposure in the Younger Minneapolis Cohort

ENABLERS	Examples
Individual Level	
Warm Weather	Liking the feeling of warmth from the sun Liking to be out in the summer
Participating in Outdoor Activities	Going outside with friends Meeting friends outside
Family/Community Level	
Having Easy Access to An Outdoor Area	Having a park near housing
BARRIERS	Examples
Individual Level	
Lacking Time	Having too many other responsibilities and activities to do
Having Health Concerns	Not liking bright sunlight Worried about getting a sunburn Knowing it can cause cancer
Family/Community Level	
Traditional Style of Dress	Wearing long skirt and head covering blocks some sunlight
Inclement Weather	Not wanting to go out when it is too hot, too cold, or too wet

Table 31

Summary of Factors Shaping Sunlight Exposure Identified by Girls in the Older Minneapolis Cohort

Factors	Examples
Individual Level	
Socialization	Being with friends outside Meeting friends outside
Participating in Physical Activity	Being able to exercise
Health	Sunlight is a source of Vitamin D You can get skin cancer It makes your skin too dark
Not Having Time	Having to do other things, so no time to go out
Family Community Level	
Cultural Tradition	Wearing traditional dress with long skirt and head covering Being female, you are not outside as much Requiring parental permission to go outside Cultural gender rule differences about being able to go outside
Weather	It is warm It is too hot or too cold The sunlight is too bright

Table 32

Summary of Factors Shaping Style of Dress Identified by Girls in the Older Minneapolis Cohort

Factors	Examples
<hr/> Community/Family Level <hr/>	
Culture	It is what we wear in our culture It is appropriate
Social Influence	Our community and our family encourages us to wear traditional dress

Table 33

Summary of Enablers and Barriers to Sunlight Exposure in the Older Minneapolis Cohort

ENABLERS	Examples
Opportunity to Socialize	Wanting to be with friends Meeting friends outside
Sunlight as a Source of Vitamin D	Awareness of Sunlight as a Needed Source of Vitamin D
Liking to be Outside in the Summer	Liking the heat and warmth
Participating in Physical Activities	Physical activities are usually outdoor activities
Family/Community Level	
Accessible Outdoor Space	Having a park near housing
BARRIERS	Examples
Individual Level	
Individual Sensitivities	Thinking sunlight is too bright Thinking summer is too warm
Health Concerns	Aware of risk of developing skin cancer Not wanting to get too dark
Family/Community Level	
Weather Extremes	Not liking weather extremes, too hot or too cold, so stay inside
Cultural Tradition	Wearing traditional style of dress with long skirt and head covering blocks some sunlight Being female, you are not outside as much: Having few adult role models in community Requiring parental permission to go outside Cultural gender rule differences about being able to go outside

Table 34

Summary of Factors Shaping Sunlight Exposure Identified by Girls in the Younger Owatonna Cohort

Factors	Examples
Individual Level	
Health	Sunlight is healthy It is not healthy I don't want my skin to get too dark
Being Outdoors	Participating in physical activities outdoors It is fun to be outdoors Meeting friends outdoors There is nothing else to do
Characteristics of Sunlight	It is too warm It is too bright
Time	Not having enough time
Engaging in Indoor Activities	Watching T.V., playing electronics
Age	Getting older, you don't go out as much
Family/Community Level	
Responsibilities	Having too many responsibilities
Cultural Traditions	Wearing traditional style of dress
Requiring Parent Supervision/Permission	Not having a parent to watch you or not having permission
Weather	Preferring to be outside in nice weather

Table 35

Summary of Factors Shaping Style of Dress Identified by Girls in the Younger Owatonna Cohort

Factors	Examples
Comfort	It [traditional dress] is comfortable
Family/Community Level	
Cultural Tradition	It is what we wear in our culture It is tradition

Table 36

Summary of Enablers and Barriers to Sunlight Exposure in the Younger Owatonna Cohort

ENABLERS	Examples
Individual Level	
Liking to Be Outside	Having fun Having nothing else to do Participating in physical activities
Family/Community Level	
Nice Weather	Preferring to go outside in nice weather and in summer
Living in High Density Housing	Socialization occurs outside in nice weather
BARRIERS	Examples
Disliking Characteristics of Sunlight	Feeling sunlight is too bright Not feeling sunlight is healthy
Health Concerns	Not wanting to get darker Feeling dark is ugly
Engaging in Indoor Activities	Watching T.V., playing electronic games
Increasing Age	You don't go outside as much
Not Having Time	Having too many responsibilities
Family/Community Level	
Cultural Tradition	Wearing traditional style of dress with long skirt and head covering blocks some sunlight Not having a parent to watch you and requiring supervision and/or permission
Having Increased Responsibilities	Being unable to go outside until later in the day due to responsibilities

Weather

Not wanting to go out in weather extremes

Maternal Attitude About Sunlight

Receiving social message from mother that sunlight is not good for you because you will get darker

Table 37

Summary of Factors Shaping Sunlight Exposure Identified by Girls in the Older Owatonna Cohort

Factors	Examples
Individual Level	
Being Outdoors	It's an opportunity to be with friends You can exercise outdoors It provides a chance to escape from family It's fun to play outside
Health	Sunlight is a source of Vitamin D It causes cancer
Appearance	It makes your skin too dark People will make fun of you if you're too dark
Sunlight Characteristics	It's too sunny It's too hot It causes body odor
Family/Community Level	
Cultural Tradition	Wearing traditional style of dress with long skirt and head covering Gender differences in opportunity to go outside
Having Too Many Responsibilities	Not being able to go out until later in the day due to responsibilities
Weather	Liking to be outside in nice weather

Table 38

Summary of Factors Shaping Style of Dress Identified by Girls in the Older Owatonna Cohort

Factors	Examples
Comfort	It [traditional dress] is comfortable
Choice	Because I want to wear it
Family/Community Level	
Cultural Tradition	It is what we wear in our culture

Table 39

Summary of Enablers and Barriers to Sunlight Exposure in the Older Owatonna Cohort

ENABLERS	Examples
Individual Level	
Having Opportunities Outdoors	Able to hang out with friends It's a chance to escape from family You can exercise outdoors It's fun to play outside
Awareness of Health Advantages	It's a source of Vitamin D and that's good for your bones
Family/Community Level	
Living in High Density Housing	Basketball courts outside are a common place to meet friends
Having Access to Outdoor Space	Having parks nearby and basketball courts Participating in outdoor games in the community
Weather	Liking to go outside when the weather is nice
BARRIERS	Examples
Individual Level	
Disliking Sunlight Characteristics	It is too hot It is too sunny It causes body odor
Being Worried About Appearance	It makes your skin too dark People will make fun of you if you're too dark
Health Concerns	It causes cancer
Not Having Time	Being too busy

Family/Community Level

Cultural Tradition	Wearing traditional style of dress with long skirt and head covering which blocks some sunlight
Gender Differences in Time Outdoors	Boys within community fewer restrictions and responsibilities
Having Household Responsibilities	Not being able to go out until later in the day due to responsibilities
Inclement Weather	Less likely to go outside in wet or cold weather or weather considered too hot

Table 40

Common Core Factors Shaping Dietary Intake Across Cohorts

Factors	Examples
Individual Level	
Characteristics of Food (Food Appeal)	Liking or not liking the taste Liking or not liking how a food looks
Seeking Variety	Wanting to try new foods Being bored with regularly served foods Being curious about new foods
Age (Developmental Stage)	Follow trends for decreasing milk intake with increasing age Increasing inclusion of junk foods Increasing self-determination of dietary choices
Family/Community Level	
Availability of Foods and Beverages	Having foods/beverages high in calcium and Vitamin D available Having limited variety of foods and beverages at school and at home Eating what is prepared Having alternative beverages to milk Drinking milk at school because there is nothing else available
Maternal Influence	Mother buys and prepares most foods Mother most likely to buy and prepare foods that she knows how to prepare
Cultural Tradition	Mother most likely to prepare traditional Somali foods Adhering to rules about not eating certain foods such as pork
Dietary Acculturation	Adapting to host country's dietary patterns Incorporating convenience foods into dietary choices Influencing maternal food purchases Being influenced by advertising

Table 41

Common Core Factors Shaping Physical Activity Practices Across Cohorts

Individual Level Factors	Examples
Seeking Socialization	Being with friends Meeting new friends
Enjoying Physical Activity	Liking the excitement Having fun Relieving boredom
Individual Characteristics	Feeling tired Feeling uncomfortable Feeling like it is too hard physically
Improving Health	Getting energy Losing or maintaining weight
Not Having Time	Schedule doesn't allow Having other activities to do Not wanting to make time commitment
Having Competing Interests	Engaging in electronic activities or watching T.V.
Developmental Stage	Being less active with increasing age due to changing interests Feeling lazier Not feeling accepted
<hr/>	
Family/Community Level Factors	
Cultural Traditions	Wearing traditional style of dress seen as impediment to physical activity for few Perceiving different cultural gender rules about being away from home; boys perceived as having more freedom Wanting or requiring parental support/permission for participation Perceiving cultural beliefs regarding inappropriateness of participation in physical activity by girls of increasing age Having few role models for physical activity within the community Having increasing home responsibilities over time

Environment

Having adequate space close to home
Having necessary equipment
Having acceptable weather conditions for outdoor activities
Feeling safe

Attending School

Complying with school requirements for participation in physical education classes

Table 42

Common Core Factors Shaping Sunlight Exposure Practices

Individual Level Factors	Examples
Individual Preferences Related to Sunlight Characteristics	Liking or not liking the heat Not liking the brightness of sunlight
Recognizing Benefits and Risks of Sunlight Exposure	Being outdoors provides an opportunity to socialize with friends Being able to exercise outdoors Obtaining a chance to escape from family Having fun Having an awareness of health risks of sun exposure such as sunburn, cancer Limited awareness of connection of sunlight to Vitamin D
Developmental Stage: Concern About Appearance	Perceiving darker skin color as unattractive Being made fun of if skin is too dark Being worried about developing body odor in the heat
Declining Physical Activity Levels	Decreasing time spent outdoors in physical activities
<hr/> Family/Community Level <hr/>	
Cultural Tradition	Wearing traditional style of dress with long skirt and head covering limits sunlight exposure Perceived differences in gender rules about going outside and/or participating in physical activities Increasing home responsibilities with age restricts opportunity to go outside
Participating in Physical Activities	Most physical activities occurred outside in both of these communities
Having Too Many Responsibilities	Not being able to go out until later in the day due to responsibilities
Environment: Setting Weather	Having access to safe outdoor setting Liking to be outside only in nice weather

Table 43

Common Core Enablers and Barriers to Dietary Practices Related to the Dietary Intake of Foods Containing Calcium/Vitamin D Across Cohorts

ENABLERS	
Individual Level Enablers	Examples
Positive Food Appeal (Primarily Taste)	Eating foods that “go together” like cereal and milk Liking the taste of foods high in calcium e.g. yogurt, ice cream
Desire for Variety Expands Options	Wanting to try new foods
Family/Community Level Barriers	
Dietary Acculturation	Adding combination foods like pizza, lasagna that contain cheese (sources of calcium/Vitamin D) to diet Influencing maternal food choices which adds foods ice cream and cereal to diet
Eating School Lunch	Having no alternative beverages to milk at school
BARRIERS	
Individual Level Barriers	Examples
Negative Food Appeal	Not liking un-melted cheese Not liking the taste of milk Preferring the taste of other beverages such as juice and soda over milk Not liking the texture of foods like fish
Developmental Stage	Having freedom to choose foods/beverages Choosing to eat “junk food” and convenience food Lack of concern about eating unhealthy foods
Family/Community Level Barriers	

Availability and/or Unavailability
of Foods/Beverages

Not having foods high in calcium and Vitamin D at home
Having alternative beverages to milk at home and when eating out such as juice, soda, water, and tea
Having increasing autonomy over food choices at home without restrictions on what or how much is eaten

Cultural Tradition:

Maternal Influence on Food
Purchase and Preparation
Compliance with Cultural Rules
that Forbid Consumption of Pork
or Pork Products

Eating traditional Somali foods that do not include dairy foods is mainstay of dietary practices at home
Mother buys and prepares foods she is familiar with which are typically traditional Somali foods
Confusion about which foods contain pork leads to potential restriction of calcium-rich sources

Dietary Acculturation:

Irregular Family Meal Patterns

Having few formal family meals promotes increased dietary choice and greater intake of convenience foods

Table 44

Common Core Enablers and Barriers to Participation in Physical Activities Across Cohorts

ENABLERS	Examples
Individual Level Enablers	
Opportunity to Socialize	More likely to participate if friends involved Enjoying being with friends Provides a way to meet friends
Enjoying the Activity	Having fun Liking the excitement
Developmental Stage	Feeling accepted (more important for older girls than for younger girls)
Family/Community Level Enablers	
Having the Right Environment	Having accessible space and equipment close to home Having nice weather that is not too extreme Feeling safe (more important in Minneapolis than in Owatonna)
Having Parental Support	Having parental support and permission to participate
Attending School and Meeting School Requirements	Participating in physical education classes as required
BARRIERS	Examples
Individual Level Barriers	
Individual Negative Characteristics	Feeling tired Feeling uncomfortable Feeling like it is too hard physically
Developmental Stage	Not feeling accepted Developing other interests

	<p>Competition from engaging in electronic activities or watching T.V.</p> <p>Being less active with increasing age</p>
Not Having Time	<p>Schedule doesn't allow</p> <p>Having other activities to do</p> <p>Not wanting to make time commitment</p>
Having Freedom of Choice	<p>Being able to choose to participate or not</p>
<hr/>	
Family/Community Level Barriers	
<hr/>	
Cultural Tradition	<p>Wearing traditional dress style seen as impediment to activity by very few</p> <p>Perceiving that there are different more restrictive rules for girls in their culture governing when and how long they can be away from home</p> <p>Perceiving that girls' participation in physical activity is less appropriate with increasing age and not culturally accepted</p> <p>Having increasing household responsibilities which limit participation in physical activity</p> <p>Having few older girl and adult woman role models that participate in physical activities in the community</p>
Environment Not Conducive to Physical Activity	<p>Inclement Weather: Being too hot or too cold or too wet for outdoor activity</p> <p>Unavailable Space or Equipment: Basketball courts near housing complexes being used by others</p> <p>Usual area where activity takes place feels unsafe</p>
<hr/>	

Table 45

Common Core Enablers and Barriers to Sunlight Exposure Across Cohorts

ENABLERS	Examples
Individual Level Enablers	
Individual Preferences	Liking the warmth of the sun
Recognizing Benefits of Being Outdoors	Socializing with friends Exercising outdoors Being able to get away from family Having fun playing outside
Family/Community Level Enablers	
Participating in Physical Activities	Most physical activities occurred outside in both of these communities so sunlight exposure is directly related to participation in physical activity
Environment: Having Access to Outdoor Space	Having parks nearby and basketball courts facilitates outdoor activities
Weather	Liking to go outside when the weather is nice
BARRIERS	Examples
Individual Level Barriers	
Disliking Sunlight Characteristics	Disliking heat Disliking bright sunlight
Health Concerns (weakly stated)	Awareness of health risks such as cancer and sunburn, but little concern expressed
Development Stage: Being Worried About Appearance	Getting skin that is too dark Being made fun of because skin is too dark Developing body odor due to the heat

Not Having Time

Being too busy to go outdoors

Family/Community Level Barriers

Cultural Tradition:

Wearing traditional style of dress with long skirt and head covering limits exposure to UV light

Cultural Message About Getting Darker

Negative perception of having darker skin color

Gender Differences in Time Outdoors

Boys perceived to have more freedom to leave home and fewer home responsibilities so they are able to spend more time outside

Having Household Responsibilities

Not being able to go out until later in the day when sunlight is weaker due to responsibilities

Environment:

Northern Latitude

Living in Minnesota where sunlight is weaker

Inclement Weather

Less likely to go outside in wet or cold weather or weather considered too hot so seasons of sunlight exposure limited

Unsafe Environment

Staying indoors when environment is perceived by parents to be unsafe

Appendix B

Age	Calcium Intake mg/dl (mmol/d)
0 – 6 months	210 (5.3)
7 – 12 months	270 (6.8)
1 – 3 years	500 (12.5)
4 – 8 years	800 (20)
9 – 18 years	1300 (32.5)
19 – 50 years	1000 (25)
50 – >70 years	1200 (30)

Table 2: Recommendations for Adequate Dietary Calcium Intake in the United States. Adapted from Greer et al., 2006, p. 580.

Appendix C

Focus Group Discussion Guide

Focus Group 1: Dietary Intake Poster

(The core questions are numbered with probes listed underneath.)

1. Now, let's get started. Write your first name on the card in front of you and then we will go around the room and introduce ourselves. Tell us your first name and what your favorite food is.

[Each participant will have a placard in front of her that she can write her first name on.]

Probe: What do you like about it? [Go around the table and allow each girl to answer.]

2. Next, I am going to give each of you a poster board. Let's spend some time remembering what foods and beverages you ate yesterday for breakfast, lunch, dinner, and snacks. Use the pictures in front of you to glue on your board or use the markers to write or draw what you ate or drank if there are no pictures. You may talk about it with each other while you are working or ask me any questions you might have.

[Pass out supplies and monitor work, moving participants along as needed. Continue audiotaping as this revealed very informative conversation during the pilot study conducted in the summer of 2008.]

3. Now, I want you to think back to the most recent weekend day (a Saturday or Sunday) and glue the pictures or write down what you ate and drank on that day.
4. Now, I am going to give you a double-sided sheet of paper labeled Yesterday and Weekend and divided into sections for breakfast, lunch, dinner, and snacks. Look at your poster. Think about why you chose to eat those foods or drink those beverages. What were the reasons you choose those things? Write down your reasons on the paper under each section.

Probe: Think about how it tasted, where you were, who you were with, the amount of time you had, who prepared it, what you heard about the food or beverage, whether or not it is a typical food for you to eat (this will be written at the top of the paper under instructions).

Tell me some of those things now and I will write them down.

[Record on a flipchart.]

5. Checking accuracy.

So, today, you made posters about the foods you eat and the beverages you drink. You also write down some reasons why you made those choices. Let's look at the flip charts and summarize what you said. Is the information correct? Do you have anything to add? To change? We will look at your poster and papers over the next 2 weeks and summarize what you said on flip charts, so we can all look at them next time and talk more about them. We will collect your name cards, so that you can use them again next week.

Focus Group 2: Factors affecting the Intake of Calcium and Vitamin D Rich Foods and
Identification of Enablers and Barriers

(The core questions are numbered with probes listed underneath each question.)

1. Let's take a look at what we did the last time we met. Remember, we made posters about the food you ate and the beverages you drank. Well, we reviewed all of those and made lists of the categories of common foods and beverages that you listed. They are listed here on these flip charts. Let's take a minute to look at these again.

[Allow time for the girls to read the summary charts.]

2. Now let us look at the reasons you gave for eating and drinking the things that you do. Sometimes people eat things because of family traditions or cultural traditions or the setting they are in like home, school, or social settings or because of taste. Here is a list of the reasons you wrote down.

[Show flip chart compiled from participant responses in Week 1.]

Let's talk more about each one of these.

[Go through list line by line.]

Probe about factors influencing food choices:

Tell me how _____ (first reason listed) influences what you eat? Many of you indicated that _____ buys the food you eat and makes the meals at home.

Which of the foods you listed is he/she likely to buy and make? What foods/meals are you most likely to eat at home? School? Out with friends?

What are the reasons you might eat differently at home than at school? Out with friends?

What do you think of as Somali foods versus American foods?

What are some similarities and differences between Somali foods and American foods?

What do you think about the taste of food at home? School? Out with friends?

3. What kinds of foods or beverages do you think help build healthy bones?

[Record them on a flip chart and hang it on the wall with tape.]

Probes: Where did you learn about these?

The foods and beverages that help build strong bones contain calcium and Vitamin D.

What have you heard about Calcium and Vitamin D?

Where did you hear about these?

4. Let's see if you included any of these foods or beverages on your charts.

[Show the flip chart on which their choices were recorded and circle the foods and beverages that contain calcium and/or Vitamin D.]

Probe: How likely are you to eat or drink these foods and beverages?

(May expand by asking specifically about milk, yogurt, cheese, calcium fortified breads and juices, nuts, greens, oily fish; all sources of calcium and some contain Vitamin D)

[Record responses on flip chart.]

Let's look at your list of reasons for food and beverage choices again.

[Show flip chart listing reasons for food and beverage choices.]

Which of those reasons influence whether you are likely to eat foods and beverages that contain calcium and Vitamin D? What makes you more likely to eat or drink them? Less likely to eat or drink them?

Probe about setting (home, school, social), culture, people present when eating, availability, alternates, taste, religion, duty.

5. Now think about what you eat compared to what your moms or dads eat. Are your food and beverage choices different from or the same as your parents? What do you think brought about these changes?
6. Checking accuracy.

So, today, we reviewed the foods you eat and the beverages you drink. You told us that the things that make you choose what you eat and drink are . . . [state their reasons]. We also looked to see how many calcium rich and Vitamin D rich foods you eat and drink. You told us that the reasons you eat calcium and Vitamin D rich foods are . . . [state reasons] and the reasons you don't are . . . [state reasons]. You said you think you eat the same/different foods than your parents and you think your preferences have changed because . . . Is this correct? Do you have anything to add? Change?

7. What do you think would encourage you to eat and drink more calcium and Vitamin D rich foods?

[Record responses.]

We will collect your name cards, so that we can use them again next week.

Focus Group 3: Factors Affecting Weight-bearing Physical Activities and Sunlight Exposure

(Core questions are numbered and probes are listed underneath each question.)

1. Tell me what your favorite sport is to either play or watch.

Probe: What do you like about that?

If you don't have one, what activity do you like to do in your free time?

2. The last two times we met we talked about bone health and we talked a lot about foods and beverages that might affect bone health. What are some other things you think might affect bone health?

[Record them on a flip chart.]

Probe: What kinds of activities, if any, do you think might affect bone health?

3. Have you ever heard of weight-bearing activities? What do you think weight bearing activities are?

Probe: What does that mean?

[May give some examples if they cannot think of any and ask them if they can think of others.]

Why do you think it would be good or not good to participate in these?

What effect do you think these activities might have on bones?

[Keep this simple.]

How important do you think participating in weight-bearing activities is? Why do you think it is important or unimportant?

4. How likely are you to participate in weight-bearing activities?

Probe: What things do you think make it more likely for you to participate in weight bearing activities?

Probe for setting (home, school, social, community), people you are with, age, role, culture, religion).

What things do you think make it less likely that you will participate in weight-bearing activities?

Probe: As above.

[Record responses on flip chart.]

5. When are you more likely to participate in outdoor activities?

Probe: What things do you think make it more likely for you to participate in outdoor activities?

Probe for setting (home, school, social, community), people you are with, age, role, culture.

What things do you think make it less likely that you will participate in outdoor activities?

Probe: As above.

[Record responses on flip chart.]

6. How important do you think it is for you to be out in the sunlight every day?

Probe: What have you heard about being out in the sun?

What good things have you heard? What bad things have you heard?

7. How likely is it for you to spend time in the sun every day?

Probe: What things do you think make it more likely for you to be out in the sunlight?

Probe for setting (home, school, social, community), people you are with, age, role, culture).

What things do you think make it less likely that you will be in the sunlight?

Probe: As above.

[Record responses on flip chart.]

8. What kinds of clothes do you wear?

Probe: What influences what you wear?

Probe for setting (home, school, social, community), people you are with, age, role, culture).

Think about the clothes you wear and how much sunlight you get regularly. Tell me whether you think you are getting enough sunlight or not enough. How do you think the amount of sunlight you get might affect the health of your bones?

9. Checking accuracy.

So, what you've told me today about your activity level is . . . You also indicated that you are likely/unlikely to spend much time outdoors because of . . .

10. Now that you have learned that some activities and sunlight can help improve the health of your bones, what do you think would help encourage Somali girls to participate in weight-bearing activities and outdoor activities?

Appendix D

Demographic Survey (If you don't know the answer to a question, write I don't know.)

ID Number _____

1. What is your date of birth date? _____ Your age? _____
2. How long have you lived in the United States? _____ years _____ months _____
3. Where were you born? _____
4. In what country(s) were your parents born? _____
In what country(s) were your grandparents born? _____
5. Who do you live with? (example, mom, dad, brother, sister, cousin, grandmother, friend, aunt, uncle, etc.)

6. Do you receive free or reduced lunch at school? Yes _____ No _____ Don't know _____
7. What city do you live in? _____
8. What is your zip code (in you know it)? _____
9. Language most often spoken at home _____
10. Live in an: (check one)
Apartment _____
House _____
Other (write in) _____
11. How long have you lived in your current home? _____ Years _____ Months
12. How many times have you moved? _____

Appendix E

Record of Reasons for Food and Beverage Choices

Instructions: Think about why you chose to eat the foods or drink the beverages you put on your posters. What made you choose these things? Write down your reasons on the paper under each section. (Think about how it tasted, where you were, who you were with, the amount of time you had, who prepared it, what you heard about the food or beverage in the past, whether or not it is a typical food for you to eat).

Yesterday's Choices

ID number _____

Breakfast

Food Choice Reasons

Beverage Choice Reasons

Lunch

Food Choice Reasons

Beverage Choice Reasons

Dinner

Food Choice Reasons

Beverage Choice Reasons

Snacks

Food Choice Reasons

Beverage Choice Reasons

Appendix E (Continued)

Weekend Choices

ID number _____

Breakfast

Food Choice Reasons

Beverage Choice Reasons

Lunch

Food Choice Reasons

Beverage Choice Reasons

Dinner

Food Choice Reasons

Beverage Choice Reasons

Snacks

Food Choice Reasons

Beverage Choice Reasons

Appendix F

The Krueger and Casey Systematic Analysis Process

(Adapted from Richard Krueger Analysis, 2008)

1. Start analysis while still in the group.
 - a. Clarify inconsistent comments and probe for understanding
2. Post focus group activities
 - a. Diagram the seating arrangement of the focus group
 - b. Debrief with the co-facilitator and label all materials and tapes
 - c. Memo hunches, interpretations, ideas or themes that emerged during the group
3. Within hours of the focus group
 - a. Make back up copies of the tape and send to transcriptionist
 - b. Listen to tape, reviews, field notes, and transcript if available
 - c. Report on individual focus group in question-by-question format with amplifying participant quotes
 - d. Verify with co-facilitator
4. Within days of the focus groups
 - a. Compare and contrast results by category across cohorts
 - b. Identify emergent themes
 - c. Describe findings using quotes to support
5. Prepare the report
 - a. Use a few quotes to illustrate
 - b. Sequence could be question-by-question or by theme
 - c. Share report for verification with co-facilitator
 - d. Revise and finalize the report

Appendix G

Table 3

Free and Reduced Price Meal Eligibility

Use the chart below to determine if you qualify for the free or reduced price meal program. These income guidelines are effective for July 1, 2009 – June 30, 2010.

Household Size	Total Household Income – Maximum				
	Per Year	Per Month	Twice Per Month	Per 2 Weeks	Per Week
1	\$20,036	\$1,670	\$835	\$771	\$386
2	\$26,955	\$2,247	\$1,124	\$1,037	\$519
3	\$33,874	\$2,823	\$1,412	\$1,303	\$652
4	\$40,793	\$3,400	\$1,700	\$1,569	\$785
5	\$47,712	\$3,976	\$1,988	\$1,836	\$918
6	\$54,631	\$4,553	\$2,277	\$2,102	\$1,051
7	\$61,550	\$5,130	\$2,565	\$2,368	\$1,184
8	\$68,469	\$5,706	\$2,853	\$2,634	\$1,317
For each additional Household member Add	\$6,919	\$577	\$289	\$267	\$134

Appendix H

Somali Foods Reported to be Eaten by Girls in the Cohorts in Minneapolis and Owatonna

Shaax	Tea
Injera, Anjera, Caanjera	Pancake
Morack, Morak, Marak	Soup
Sambusa	Meat or vegetable filled pie
Sawayat	Hard flat bread thicker than a cracker, may be sweet
Biriis	Rice
Maloowex, Maloowax	Pancake
Alwo	Candy
