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A PHENOMENOLOGICAL QUALITATIVE STUDY INVESTIGATING THE SOCIAL AND ECOLOGICAL DETERMINANTS THAT INFLUENCE MILITARY CHILDHOOD OVERWEIGHT AND OBESITY BEHAVIORS

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ACRONYMS AND ABBREVIATIONS

BMI	Body Mass Index
CDC	Center for Disease Control and Prevention
DHHS	Department of Health and Human Services
DOD	Department of Defense
NHANES	National Health and Nutrition Examination Survey
PCS	Permanent Change of Station
USDA	United States Department of Agriculture
WHO	World Health Organization

ABSTRACT

The purpose of this phenomenological study was to gain insight into the behavioral factors that influence military childhood overweight and obesity. The study identified and examined where the greatest influences lie in to proactively target those behaviors with health prevention strategies within military communities where services can make positive change. The study examined the behavior influences - interpersonal, intrapersonal, institution, community, and policy - using the social-ecological model to analyze leverage points for health promotion strategies. Qualitative data was obtained from 1 hour interviews with 10 civilian spouses of active duty Army soldiers who have 18 school-age children, 6-17 years of age. The achieved goals were to (a) identify the social-ecological behavioral determinants that impact negative obesity habits in the military child, (b) examine the ecological exposures to understand their influence on military child obesity, and (c) analyze the significance of ecological influences associated with obesity among military children. Results revealed that the most significant determinant of military child overweight and obesity found was the military permanent change of station resulting in decreased healthy eating and physical fitness activities and increased sedentary behaviors during the 6-9 month pcs cycle. Another finding contradicted earlier studies citing deployments lasting longer than six months have a negative impact on physical fitness and emotional health of the military child. In this study the military child exhibited little to no negative and, in some cases, positive influence on military child overweight and obesity during deployments regardless of duration.

Keywords: overweight, obesity, military, youth, social-ecological, behavioral determinants

CHAPTER I

Background

Obesity is a predictor of mortality and morbidity (Abdelaal et al., 2017). The resultant health conditions associated with chronic weight gain is cardiovascular disease, Type II diabetes, various cancers, hypertension, musculoskeletal, and psychological disorders (Guh et al., 2009; Erickson et al., 2000). In addition to devastating individual, physical, and emotional health impacts, widespread obesity incurs direct and indirect costs to healthcare budgets as well as impacts to the overall economy (Dall et al., 2007). In the United States the statistics of overweight and obese are staggering, with 71.6% of the adult population being diagnosed as overweight and 39.7% as obese (Center for Disease Control & Prevention, 2018).

Researchers have been observing obesity rates since the 1960s; yet, they are unable to agree if rates rose over time as unhealthy habits became prevalent or happened as a more recent occurrence. Lobstein & Jackson-Leach (2007) noted that obesity has shown a gradual upward trend starting in the 1980's; yet, Hippel & Nahhas (2013) countered offering that prevalence was a new and swift occurrence thus providing hope of a quick rebound.

Even though obesity prevention strategies have been developed and implemented, the numbers diagnosed continue to be high (Pratt et al., 2008; Hedley et al., 2004). Intervention efforts in reducing overweight and obesity in adults have remained notably dismal (McKinnon et al., 2009). Ongoing research efforts support that the critical manifestation time is early childhood and continues into adulthood (Franks et al., 2010).

Children are our most vulnerable population. The United States Census Bureau (2018) reported that 73.8 million children aged 0-17 years live in America. Of this number the Center for Disease Control and Prevention (CDC) approximated that 12.7 million children and

adolescents are overweight or obese (Ogden et al., 2015). The prognosis for these children advancing into adolescence is sobering, with 71% reported as severely obese and 8% overweight (Lau et al., 2014). Moreover once diagnosed, the individual trend does not improve with 70% to 80% continuing to be overweight and obese over the course of their lives (Schaub & Marian, 2011). This epidemic shows no sign of waning as evidenced by the eleven-pound increase for the average child over the last thirty years (Lobstein et al., 2015), warranting much needed research to understand the complexities and develop new health prevention protocols to counter the lasting effects.

The problem has been a labeled a widespread epidemic and the military is included in the trend. Prevalence among the 1.3 million active duty military service members (DOD, 2018a) is similar to civilian rates (Smith et al., 2012). Despite physical fitness standard requirements active duty military personnel demonstrates higher levels of overweight diagnosis than their civilian counterparts; yet, the reverse was true with more civilians being diagnosed with obesity (Eilerman et al., 2014). This population witnessed a three-fold increase in overweight or obese diagnosis between 1998 and 2010: 86,186 active duty service members were noted to have at least one obesity related diagnosis (Armed Forces Health Surveillance Center, 2011). Therefore, the military as a whole has a massive stake in combating the problem as it impacts military readiness, recruitment, and budgetary resources.

Of the projected 73.8 million children ages 0-17 years living in American today, 1.2 million are dependent children of active duty service members (DOD, 2018b; United States Census Bureau, 2018). Military children are expected to learn resiliency early on as they deal with unique challenges, including consistent moves, parental separation, and living in a regimented military environment. In addition, deployments provide additional stress. Infrequent

contact and uncertainty of a parent's safety disrupt the normal battle rhythm of their everyday life (Davis & Treiber, 2007). In this population, the prevalence of overweight and obesity have yet to be determined. In fact, very few studies have been performed (Lamson et al., 2015).

Since the Army provides approximately half the total number of children compared to other services combined, the research focused on this particular service population (United States Department of Manpower Data Center, 2015). With long-term health-related consequences and costs of overweight and obesity in military children being more than one billion dollars annually (Dall et al., 2007), this population warranted special attention. An active duty service member's life and his/her family's life are impacted by the needs and policies of the military, including work location, familial separation, medical facilities, and community structure. An examination of the determinants of childhood obesity associated with military life needed to be studied. This grouping of children allowed for research into a microcosm of society and isolated specific variables in a controlled population.

According to the United States Department of Health and Human Services (DHHS), childhood overweight and obesity cannot be attributed to one single cause; but instead multiple factors, requiring a more holistic approach to health promotion and prevention (Bishop et al., 2005). Research into behavioral determinants aligned to interventions with positive outcomes need to be established to reduce the obesity problem (Dall et al., 2007). Since the social-ecological model has never been addressed with the military child overweight and obesity problem, this study was the first step in collecting significant data to address the problem in this unique population. This study used the social-ecological model to simplify the data received from the research. The model allowed the behavioral determinants associated with military child overweight and obesity to be broken down into specified categories to be analyzed and

quantified in a more simplified manner. Since behavioral, genetic, and environmental factors influence a child's predisposition to obesity, the military lifestyle was examined to determine how it shapes the behavioral and ecological elements of the nutritional health of the military child (Dall et al., 2007).

Current research utilizing the social-ecological model for child overweight and obesity was limited. Most importantly, investigators had not taken into account the uniqueness of the military children. This study was the first study of its kind using all determinant levels of the social-ecological model and the military child.

Qualitative research provided a large volume of information extrapolated from detailed transcripts during an in-depth look into the subject matter, in this case a complex social problem. This type of research enabled the investigator to capture detailed opinions, analyze language and explore the participant's personal experiences (Moustakas, 1994). The inquiry afforded the volunteer participant the opportunity to provide their views about obesity in a comfortable, natural environment (Creswell, 1998). For these reasons, a qualitative study was the best research methodology. The qualitative information was garnered from one-hour semi-structured, focused interviews. The data was obtained from the civilian parent of a military child ages 6-17 years.

Chapter 2 examined literature on childhood overweight and obesity. This review contained prevalence, measurements, trends, and consequences. As the overweight and obesity foundation was laid out, behavioral determinants facing the military child were exposed. By identifying these determinants, an accurate depiction of the life of the military child was gained and easily categorized into behavioral determinants - individual, intrapersonal, institutional, community, and policy - using the social-ecological model.

Purpose

The purpose of this study was to further the knowledge of the social-ecological determinants associated with military child overweight and obesity behavior. The results could allow development of policies to target specific risk factors with the most effective interventions. Taken to its ultimate, optimistic conclusion, this study could spare military children long-term health problems and save the Army and the American tax-payer precious financial resources.

The study was warranted due to several factors, including the upward trend of child overweight and obesity rates, long-term impact both medically and financially, and need for understanding within the military communities where services and programs can make positive change. The results demonstrated how obesity relates to specific behavioral predictors to develop strategies for the mitigation of those dependencies. The study contributes to the development of focused strategies to improve resiliency and support healthy intervention platforms for military families. It also serves as building blocks for future studies using the social-ecological model for health promotion intervention in the military environment. If successful, it could further be implemented in military communities, the Army as a whole, and potentially civilian communities.

Research Questions

The answers to the following research inquiries garnered empirical data to further knowledge of military child overweight and obesity.

1. Identify the social-ecological behavioral determinants that impact negative overweight and obesity habits in the military child.
2. Examine and compare the combined ecological exposures to understand their influence on military child overweight and obesity.

3. Analyze the significance of social-ecological influences associated with overweight and obesity among military children.

CHAPTER II

Literature Review

This study investigated and assessed the significance of behavioral determinants associated with overweight and obesity in the children of the active duty military population. During the comprehensive assessment, limited research was noted involving the target population. This review provided an overview of data in the United States focusing on variables which may cause differences specific to the military. The research was broken down by prevalence and incidence of overweight and obesity, social-ecological determinants, and the impacts from the military lifestyle. Operational definitions were included in Appendix A. The search criteria focused on articles utilizing PUBMED, CINAHL and Google Scholar with "overweight, obesity, military, youth (child and adolescent), dependents, social-ecological model, and behavioral determinants" being the key researched terms. Also, the review included relevant information from the United States Department of Agriculture (USDA), World Health Organization (WHO), CDC, and the DHHS and the United States Department of Defense (DOD).

Epidemiological Child Overweight and Obesity

Epidemiological Child Overweight and Obesity Overview

Child obesity is the most prevalent, chronic health problem in the United States and has reached epidemic numbers (Raychaudhuri & Sanyal, 2012). Of the 73.8 million children age 0-17 living in the United States (United States Census Bureau, 2018), 12.7 million have been diagnosed as overweight or obese (Ogden et al., 2015). The outlook for these children does not bode well for early onset of serious diseases if health conditions persist. For the first time in a

century, children today may live shorter and far less healthy and productive lives than their parents (Spruij-Metz, 2011).

Epidemiological Child Overweight and Obesity Measurements

Overweight and obesity refers to a category of individuals having more body weight than is considered healthy, making them more susceptible to health-related illnesses (WHO, 2020). The standard anthropometric measurement used to determine overweight and obesity is body mass cut points. Body mass is calculated by dividing a person's weight in kilograms by the height in meters squared (Freedman & Sherry, 2009). Although the body mass index (BMI) is not a precise measurement of body fat due to hormonal, genetic, and height fluctuations, it is the most expedient method (Bellizi & Dietz, 1999) and has long been the standard gauge for physical growth in children (Ogden et al, 2014, February; Lobstein et al., 2004; Kuczmarksi et al., 2002). These body mass classifications provide a health indicator for medical professionals and identifies children in need of additional weight related testing, closer evaluation, and medical monitoring (Freedman et al., 2009).

In 2000 the CDC established classification categories based on BMI index percentages of body growth curves adjusted for age and sex for children and adolescents ages 2 to 19 years old. The chart breakdown is a national representative based on race, gender, and age samples (Spruij-Metz, 2011). Shown in Table 1, BMI is classified into percentiles with overweight occurring between the 85th and 95th percentile and obese between the 95th and 119th percentile (Hamid et al., 2013).

Table 1: Classification of categories by body mass index (kg/m2) (CDC, 2020c)

Classification	Body Mass Index
Underweight	> 5th Percentile
Normal/Healthy Weight	5th - 84th Percentile

Overweight	85th - 94th Percentile
Obese	<95th -119 th Percentile
Severely Obese	≤ 120% Percentile

Epidemiological Child Overweight and Obesity Prevalence and Trends

Prevalence. In the United States one in every three school age children or adolescents are categorized as overweight or obese (Ogden et al., 2014, February). The body weight of children at every age and of every sex, race, and ethnic background has been impacted and continues to rise (Hamid et al., 2013). As shown in Table 2, pre-school children have the lowest prevalence numbers, 22.8% overweight and 8.4% obese, compared to other school age children and adolescents. School age children, 6-11 years of age, have been diagnosed as overweight at a rate of 34.2% and obese at 17.7%. Adolescents, 12-19 years of age, are the largest excess weight grouping at 34.5% being diagnosed as overweight and 20.5% obese (Ogden et al., 2014, February).

Table 2: Classification of overweight and obese by age (Ogden et al., 2014, February)

Ages	Overweight	Obese
Preschool: *2-5 years*	22.8%	8.4%
School Age: *6-11 years*	34.2%	17.7%
Adolescents: *12-19 years*	34.5%	20.5%

Trends. In 1963 a nationwide survey was released investigating children's weight in the United States. This survey was the first direct investigation of its kind and provided a benchmark for future longitudinal weight tracking (Hamill et al., 1973). Before the aforementioned and follow-on annual surveys, the most comprehensive height and weight information was garnered from military conscript records. Lack of historical data has proved challenging for researchers

determining obesity prevalence and longitudinal trends before 1963. Due to this record deficiency researchers have been unable to agree on the timing of the rise in obesity. Some researchers feel that obesity rates in the United States rose gradually over decades and others think it escalated sharply in recent years. The hope is that if the epidemic rose quickly then it can be eradicated just as swiftly (Hippel & Nahhas, 2013).

Utilizing available information garnered from military records and the 1963 survey, a study by Costa and Steckel (1997) supported the belief that the weight increases happened gradually over time. In their study weight escalations were well documented between the Civil War and World War I and World War II and the 1963 survey and showed steady increases. Komlos & Brabec (2010) also drew the same conclusion. Their study used national surveys, older participant's BMI, and BMI estimates using growth assumptions to deduce that BMI had risen steadily starting in 1883.

Countering the gradual weight increase opinion, Lobstein & Jackson-Leach (2007) used national surveys and concluded that BMI among children remained stable throughout the 1960s and 1970s and rose dramatically from the 1980s into the 2000s. Hippel & Nahhas (2013) analyzed longitudinal data from children born between 1930 and 1993 near Dayton Ohio and concluded that BMI among males remained relatively stable until 1970, then began a swift rise. Interestingly, female participants in this study showed the same rapid increase, but demonstrated it at earlier ages.

Although the healthcare community has been aware of adult obesity since the 1960s, child obesity did not raise alarm until the 1980s (Lobstein & Jackson-Leach, 2007; Stamatakis et al., 2005; Okosun et al., 2004). Multi-factored efforts were made by medical professionals to curb the problem's rise, but the trends continued to be no less alarming. Significant surges in

obesity rates were noted in both school-aged children, ages 6-11, with an 11.5% increase from 6.5% to 18% in adolescents, ages 12-19, with an 13.4% increase from 5.0% to 18.4% between 1976 and 1980 and 2009 and 2010 respectively (Fryar et al., 2010). Two years later researchers reviewing National Health and Nutrition Examination Survey (NHANES) data from 2003-2004 and 2011-2012 found that child obesity prevalence, although high, had plateaued and in one category, 2 to 5 years old, even declined from 13.9% to 8.4% (Ogden et al., 2014). To further support this optimistic finding the Pediatric Nutrition Surveillance System (PedNSS) reported obesity reductions in 2-4 year old children in 18 states (May et al., 2013).

Despite these hopeful findings, researchers in a new study discovered prevalence increases in each age category between 1999 and 2014 (Skinner et al., 2016) finding no evidence of child obesity prevalence reductions in any age category between 1999 and 2016. Even more disheartening, the study showed a rise in severe obesity in ages 2-5 following the 2013-2014 review (Skinner et al., 2018). Overall child obesity in all other school-aged children age groups continued to be unusually high, with one in five children ages 6 to 19 diagnosed with obesity (Centers for Disease Control, 2017) and 5.9% diagnosed with severe obesity (Skinner & Skelton, 2014).

Age Progression. Childhood obesity is a predictor of adult obesity (Wilson et al., 2008). Although longitudinal study research is limited, statistics show a significant number of school-age children continue to be obese throughout their lifetime (Guo et al., 1994). Earlier studies reported that 50% of children diagnosed with overweight and obesity will remain into adulthood (Vogels et al., 2006; Freedman et al., 2005), while later research placed the rate at an even higher rate of 77%-92% (Finkelstein et al., 2014; Schaub & Marian, 2011). The findings supported a

correlation between obesity in adolescence and adulthood concluding that adolescents will experience the health consequences over the next 20-30 years.

Critical Ages. In an effort to slow down the progression, researchers tried to pinpoint vulnerable periods in childhood and adolescent development that cause increased susceptibility to weight gain. Identification of critical periods is key to understanding the obesity problem and determining when strategic interventions need to occur. All children, girls and boys, progress in similar developmental patterns making it easier to determine the timeline for needed interference of health promotion protocols (Cole, 2004; Rolland-Cachera et al., 1984).

During the first year of a child's life their BMI increases then decreases for a time only to rise again (Rolland-Cachera et al., 1984). Although this adiposity rebound often occurs at age 6, it can occur anytime between ages 3-7. (Cole, 2004; Lobstein et al., 2004; Rolland-Cachera et al., 1984). Research showed that an early adiposity rebound between ages 3 and 7 is a significant indicator for later overweight or obesity diagnosis (Taylor et al., 2005; Cole, 2004). Studies suggested that the early adiposity rebound correlate up to 30% of obesity in adults (Kroke et al., 2006; Dietz, 2000; Whitaker et al., 1998). One supporting study garnering particular attention is the Early Childhood Longitudinal Study which tracked annual weight of 7,738 students from age 5 entering kindergarten to age 14 in eighth grade. The results showed overweight 5 year olds were 4 times more likely to be obese at age 14 than healthy weight kindergarteners. This study suggested that obesity incidence occurs more overweight kindergarteners reinforcing that weight problems are pre-determined before age 5 (Cunningham et al., 2014).

Epidemiological Child Overweight and Obesity Causes

According to the CDC, overweight and obesity occur due to an energy imbalance between calories consumed and expended. Causes for obesity cannot be attributed to just one factor

(2020a) and have been attributed to excessive consumption of caloric intake, lack of physical activity, poor eating habits, or a combination of these behaviors (Fuemmeler et al., 2011; DDHS, 2000). In addition to these behaviors, DHHS (2000b) recognized genetic and social factors, including social-economic status, race/ethnicity, media and marketing, and physical environment, as having a significant impact on energy consumption and expenditure.

Epidemiological Child Overweight and Obesity Consequences

Obesity is the second leading cause of preventable death in America (Mokdad et al., 2001) and poised soon to move into the number one spot overtaking tobacco use (Mokdad et al., 2005). Medical professionals agree that obesity is easy to diagnose due to its physical presentation; yet, challenging to treat due to inflicting massive internal chaos (Glavin et al., 2014; Flynn, 2013). Obesity targets every organ in the body and manifests into unpredictable long-term disorders and comorbidities (Domingo & Scheimann, 2012). Even more disheartening, childhood obesity is a predictor of morbidity and mortality in adulthood (Abdelaal et al., 2017). The CDC (2013) reported that children for the first time are showing precursor conditions unheard of in previous years. Studies suggest that these resultant medical conditions are developing earlier causing grave concern among medical professionals (Hamid et al., 2013). Table 3 provides a summary of physical, psychological, and societal consequences associated with the overweight and obesity in children.

Table 3: Summary of overweight and obese consequences (Khatod, 2017; adapted from Ogden et al., 2014, February; Schwartz & Puhl, 2003; Cossrow et al., 2001; Erickson et al., 2000; Strauss, 2000)

Physical	Psychological	Societal
Diabetes	Low Self-Esteem	Medical Costs
Menstrual Irregularities	Depression	Morbidity Costs
Cancer	Peer Rejection	Mortality Costs

Cardiovascular Disease	Shame and Guilt	School Costs
Stroke	Discrimination	
Gallbladder Disease	Stigmatization	
Arthritis		
Asthma		
Sleep Apnea		
Bone and Joint Problems		

Physical Costs. A diagnosis of overweight and obesity serves as a precursor to serious long-term health problems, including diabetes, menstrual irregularities, hypertension, cancer, bone and joint problems, and cognitive dysfunction (Lakshman et al., 2012; Mitchell et al., 2011). The likelihood of contracting a serious illnesses among the obese population is significant with 1.72 in males and 3.10 in females for cardiovascular disease, 1.72 in males and 2.42 in females for hypertension, 6.74 in males and 12.41 in females for type 2 diabetes, 1.82 in males and 2.64 in females for kidney cancer and 4.20 in males and 1.96 in females for osteoarthritis (Guh et al., 2009). In the case of type II diabetes this disorder usually occurs in adults, even being called adult-onset diabetes. Now, type II diabetes in children is growing in conjunction with the increased rates of overweight and obesity. In this case the increase in fatty tissue in a child's body, especially around the mid-section, increases the body's resistance to insulin leading to significant risk for disease. Obese children are four times more likely to develop type II diabetes than children within the healthy weight limits (Abassi, 2017). In a Bogalusa Heart Study researchers found that overweight children, ages 5-7, are 60% more likely to have one and 11% to have three or more risk factors, including high triglycerides, high LDL cholesterol, low HDL cholesterol, high fasting insulin, or high blood pressure, for cardiovascular disease (Freedman et

al., 1999). These risk factors support the mounting evidence supporting a link between the rise in obesity and the lifetime threat of cardiovascular disease (Ayer et al., 2015).

Psychological Costs. In addition to the physical problems, children with weight problems experience psychological problems, including low self-esteem, high levels of depression, social marginalization, peer rejection, discrimination, stigmatization, and negative body image (Daniels et al., 2009). Researchers reported a link between overweight and obesity and depression, low self-esteem, and negative temperament (Rankin et al., 2016; Goodman & Whitaker, 2002; Pine et al., 2001). Stigma, teasing, and bullying are prevalent among these children and result in negative long term consequences to a child's physical and emotional well-being (Tang-Peronard & Heitmann, 2008; Neumark-Sztainer et al., 2007) resulting in psychiatric disorders and psychological problems into adulthood. These disorders are increasing as the rate of overweight and obesity rises. It is unknown whether these psychiatric disorders and psychological problems are a source or consequence to overweight and obesity. Therefore, the challenge continues to be understanding the multifaceted factors involving child obesity and its impact on psychosocial and psychological health (Rankin et al., 2016).

Societal Costs. Finally, resultant health problems associated with overweight and obesity place a financial drain on society with direct and indirect costs. The total cost of obesity in America was $147 billion. Nationwide, hospital costs associated with child obesity increased $111.1 million from $125.9 to $237.6 million between 2001 and 2005 (Finkelstein et al., 2009) and raised significantly to $149.4 billion between 2008 and 2010 (Kim & Anirban, 2016). Hospital discharges related to obesity among youth ages 6-17 rose from 1979-1981 to 1997-1999 with increases in diabetes from 1.43 to 2.36, gallbladder diseases from 0.18 to .59%, and sleep apnea from 1.43 to 2.36% (Wang & Dietz, 2002). This massive financial burden ultimately

plagues taxpayer dollars as hospitalizations with underlying conditions of obesity tend to be covered under Medicaid (Trasande et al., 2009).

Epidemiological Military Child Overweight and Obesity

Epidemiological Military Child Overweight and Obesity Overview

The DOD consists of 1.3 million active duty military members (DOD Defense Manpower Data Center, 2018) and the United States Army, the largest of the three services, provides 471,990 active duty soldiers to the fighting force. Of the 471,990 soldiers noted, 57,300 are deployed and 102,200 are forward stationed living on bases outside the continental United States (DOD, 2018). Of the approximate 1.0 million active duty dependent children worldwide, 554,782 are school age with 329,547 age 6-11 and 225,241 age 12-18 (DOD, 2018a). The Army makes up half the total of number of children of active duty service members (DOD, 2018a; Department of Manpower Data Center, 2015; Davis & Treiber, 2007) at 409,862 (DOD, 2018a). Due to the large population base, the children of Army service members were chosen as the focal point in this study.

The military impacts every aspect of a soldier and their family's lives, including pay, work location, housing options, familial separation, and medical facilities. Since behavioral, genetic, and environmental factors influence a child's predisposition to obesity, the military lifestyle plays a significant role in health behaviors. Military families and civilian families share similarities; yet, military families face distinct challenges (Tanofsky-Kraff et al., 2013).

Epidemiological Military Child Overweight and Obesity Prevalence and Trends

Studies suggest that the military do not escape the increasing trend, as overweight or obese diagnoses are closely approaching civilian rates (Smith et al., 2012, July; McLaughlin & Wittert, 2009). Seventy percent of Military Health System beneficiaries, including active duty

members, military spouses, dependent children, retirees, and reservists, have been diagnosed as overweight or obese (Kress et al., 2005). The key difference is that active duty and their family members present higher rates of overweight diagnoses and lower rates in obesity than their civilian counterparts (Eilerman et al., 2014, May). A further breakdown showed an imbalance of obesity rates between men and women serving with 60% of male and 40% of female active duty members were diagnosed as overweight and 13% total being obese (Armed Forces Health Surveillance Center, 2011; Bray et al., 2009). This statistic is surprising due to the stringent height and weight requirements enacted by the DOD for all active duty service members.

There are approximately 1.0 million active duty dependent children worldwide (DOD, 2018a). Military children demonstrated lower rates of overweight and obesity than civilian children. Overweight and obesity rates for male military children ages 12-17 years were slightly lower (15.0%) compared to (15.2%) civilian and female military children were moderately lower (12.4%) than (17.1%) than civilian female counterparts (Eilerman et al., 2014).

Research garnered a robust number of individual studies in the civilian population; yet, minimal research, including prevalence, weight-related behaviors, and interventions, have been performed in the military setting (Lamson et al., 2015; Tanofsky-Kraff et al., 2013; Sanderson et al., 2011). Studies involving military members and their families have been completed using medical chart reviews (Duarte et al., 2010; Podraza, & Roberts, 2008; Tiwary & Holquin, 1992), small samples (Canty, 2003), and outdated studies (Arluck et al., 2003; Canty, 2003; Tiwary & Holquin, 1992) and have been deficient in delivering quality assessments for comparisons or consistency of data. The most populous military service, the Army, with half the total number of children compared to the other services combined, yielded only one study related to weight status and weight-related behaviors (Department of Manpower Data Center, 2015; Davis &

Treiber, 2007), making it a prime target group for gaining new and unprecedented knowledge of the overweight and obesity problem in that population.

Although limited by age and content using only medical chart reviews, the Tiwary & Holquin (1992) study produced thought-provoking questions which prompted this dissertation interest. The study conducted at two military hospitals, Walter Reed Army Medical Center and Brooke Army Medical Center, used a study sample of medical data from 1,715 children. Researchers concluded that prevalence among overweight and obesity in military children had almost doubled over the course of the 8 to 12 year study, with subjects increasing to 14.8% overweight, 10.8% obese, and 7.7% grossly obese. Adolescents less than 12 years of age had a higher prevalence of severe obesity at 10.1% than children less than 6 years of age at 3.3%. An interesting discovery was made in regards to parental military rank. Children of senior enlisted non-commissioned officers (sergeants) had a higher rate of obesity (25.9%) than junior or senior officers (15.8%), with dependents of retirees (23%) having the highest prevalence of obesity of any other military dependent groupings. However, this research is considered outdated and does not differentiate between the different services causing a need for additional confirmation studies.

Epidemiological Military Child Overweight and Obesity Consequences

Medical Costs. Costs associated with excess weight and the sequelae of associated medical conditions exceed $1 billion annually creating a significant financial burden to the DOD Military Health System (Cawley & MacLean, 2010; Dall et al., 2007; Kress et al., 2005). In 2011, the United States Government General Accounting Office (GAO) reported that medical spending per active duty service member annually had tripled, rising from $6,600 to $19,600 within 5 years. In order to cover expenditure, the 2011 budget proposal requested a 5.8%

increase raising alarm to military leaders. Since current estimates placed the cost of obesity-related illnesses far more than alcohol and tobacco-related treatments combined, no one is sure of the long-term financial ramifications the government will incur for those soldiers and their families (Cawley & MacLean, 2010). This burden impacts recruit medical bills as well as increases the cost to insure the approximate 1.0 million military children worldwide (DOD, 2018a). This statistic is especially concerning given that children of these service members receive treatment at the DOD health clinics or 100% coverage under the DOD Military Health System supplemental insurance, Tricare, until age 21 or 26 if in college (Tricare, 2018).

Program Costs. The DOD spent over $1.1 billion on programs assisting service members with required height and weight standards along with reducing weight-related health costs from work productivity losses (Smith et al., 2012, July). The programs also assisted in meeting physical fitness benchmarks. Even with the additional support, 15% men and 20% women of all services self-reported that they had difficulty meeting weight standards (Bray et al., 2009).

National Security Threat. Overweight and obesity prevalence threatens national security (Christenson et al., 2010). Ninety percent of military recruits are under the age of 25. The number of ineligible candidates due to being overweight has placed a glaring spotlight on youth overweight and obesity problem in America (DOD, 2011a). Studies show that 1 in 4 or roughly 9 million potential military recruits ages 17 to 24 are ineligible for service due to health related concerns. The number one reason is weight excess (DOD, 2011a; Christenson et al., 2010). Of those recruits many are children of active duty service members. Children of active duty military members are more likely to join the armed forces than children of civilian parents (Poling, 2012; Kleykamp, 2006). High obesity rates in military families diminish the eligibility

of military service volunteers placing a heavy burden on overall accession numbers (Kleykamp, 2006).

Relaxed Entry Standards. With recruitment and retention numbers being down during wartime, the DOD relaxed fitness standards to bolster their fighting numbers. This change led recruits turned active duty service members to get fit and assimilate quickly without healthy behavioral patterns in place. Every six months these same active duty service members continued to struggle to meet weight and physical checks. This cyclical weight loss followed by gain led to inconsistent healthy eating patterns of active duty service members and their families (Christenson et al., 2010).

Stress to the Organization. The goal of the DOD is to maintain a fit and ready military force. Individuals who meet the entry requirements but struggle with weight excess set themselves up for possible administrative actions or forced exit from the military later if weight control is not a priority. This action places a great deal of stress on the organization in a variety of ways: the loss of competent service members who have been trained, effort placing members in remedial physical fitness training, the cost of technically proficient individuals and training dollars, and the time and money the military will have to spend to recruit and train a replacement (Tanofsky-Kraff et al., 2013). The Accession Medical Standards Analysis and Research Activity (2012) estimates the average spending for recruitment, screening, and initial training per soldier is $75,000. The average total cost of active duty service members failing to adhere to weight standards is approximately $183 million per year (Gattis, 2011). Thirty percent of service members exit the armed services prior to the end of their first tour (2012), making it very costly.

Theoretical Framework of the Study

In order to fully understand the complexities associated with this widespread disorder researchers need to investigate the full range of factors that place individuals at risk. Although the attention has been placed on reducing overweight and obesity since the 1980s, improvement efforts yielded poor results. This continued surge in child overweight and obesity rates gave rise to significant paradigm shifts in ways to tackle this significant health problem (Bacon & Aphramor, 2011).

Past Explanations of Child Overweight and Obesity

In the past, researchers concentrated on an individual risk factor, such as diet. The disorder spanning from disease prevention to treatment makes it difficult to tackle (Osei-Assibey et al., 2012). This singular approach focused only on education, behavior, and pharmaceuticals as ways to combat the increasing health problem leading to only minor improvements (Garner & Wooley, 1991; Kayman et al., 1990).

Additionally, prevention efforts focused primarily on population approach, while treatment interventions concentrated on individual needs (Daniels et al., 2005). The Institute of Medicine (2003) warned against this common past research mistake - the focus on individual outcomes without looking at the broader context that created them. Although these preventive efforts are crucial to healthier outcomes for individuals, the key to widespread population obesity control and reduction is to systematically investigate environments that support healthy choices. Therefore, new studies increasingly moved beyond individual behavior and into a wide range of factors, including the environment, that influence health outcomes (Swinburn et al., 1999; Gill, 1997; Kikbusch, 1997; Cheadle et al., 1992). This new approach focused on multi-faceted behaviour which led to the development of the ecological approach.

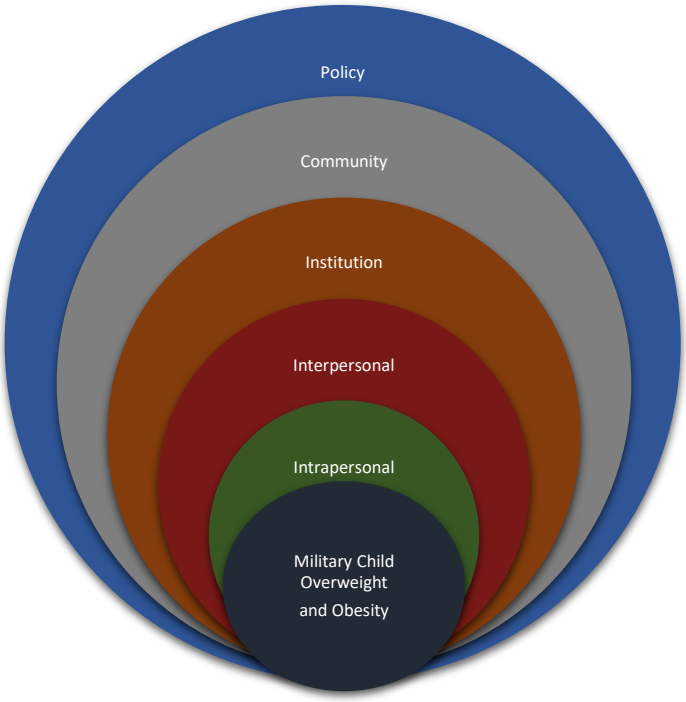
Ecological Theory of Health

According to the Ecological Theory of Health, health manifests from daily interactions between individuals and their environment (Institute of Medicine, 2003). These interactions between individuals and family members, as well as their community, impact each person differently and provides the foundation for individual health beliefs and behaviors (Hawkins et al., 2009). The ecological model "emphasizes the linkages and relationships among multiple factors (or determinants) affecting health" (Gebbie et al., 2003 p. 32). Since health issues are complex and tend to overlap due to reciprocal causation into other determinants, this particular model provided a roadmap to understand the interactions of personal and environmental determinants and their impact on health behaviors (Davison et al., 2013, October).

Social-Ecological Model

Although the origin of the social-ecological approach emerged from disappointing results in past one-dimensional health promotion interventions, (Marmont & Wilkinson, 2006; Susser, 1999; Susser, 1995) the social-ecological model established the most effective framework to capture all behavioral determinants (Sallis et al., 2008; Egger & Swinburn, 1997). Based on Brofenbrenner's (1979) ecological systems theory, the model supplied a simple depiction of how determinants, including intrapersonal, interpersonal, community, institutional, community, and policy, impacted health behaviors. This model served as the perfect approach to investigate determinants individually on multiple levels and how determinants interacted between those levels (McLeroy et al., 1988).

Figure 1: Social-ecological model of child overweight and obesity (Sallis et al., 2006)



The social-ecological model, presented in Figure 1, is a simple depiction showing the five different determinant levels ranging from the most to least direct influence, starting left at the micro (direct influence) level and moving right to the macro (indirect influence) level: Individual, Interpersonal, Institutional, Community, and Policy. The model shows how an individual's health status and behavior is identified, categorized, and more easily investigated.

Once the behavioral determinants are determined using the five determinant levels and prioritized based on influence, the most strategic interventions can be aligned to reduce their negative influence on overweight and obesity (Lytle, 2009). Since the issue is multi-factorial and thus complex, the treatment interventions are challenging (Kothandan, 2014). The social-ecological approach allowed the researcher to apply educated comprehensive intervention methods across multiple layers of influences making it more effective. The Ottawa Charter for Health Promotion stated that "behavior change is expected to be maximized when environments and policies support healthful choices, when social norms and social support for healthful

choices are strong, and when individuals are motivated and educated to make those choices" (Sallis et al., 2008, p. 467).

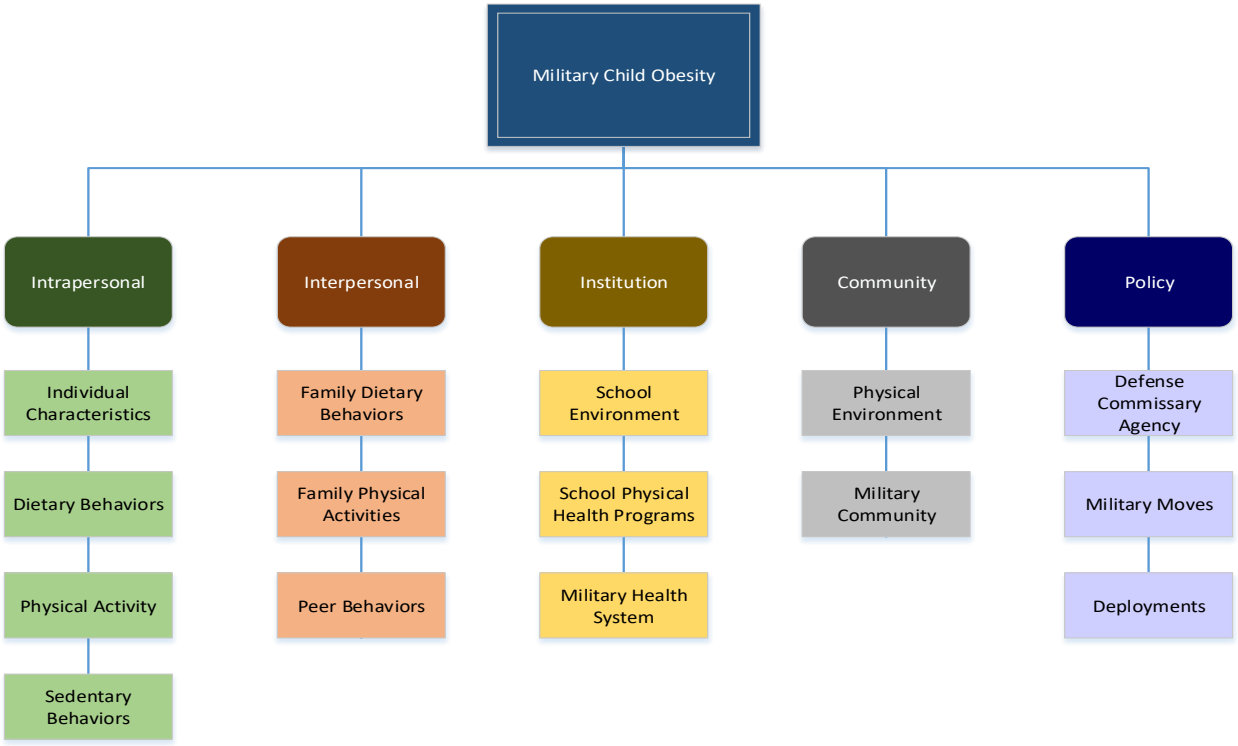
Ecological Approach to Child Overweight and Obesity.

A review of the literature focused on studies using the social-ecological model to determine the behavioral risk factors associated with child obesity. Out of 975 results only 10 studies combined all five levels, including the sometimes excluded policy level, of the social-ecological model. This finding was unexpected given that researchers agree on past achievements using the social-ecological model to address global health issues and the appropriateness of its use investigating child obesity determinants. Even more surprising, no study involving all levels of the social-ecological model jointly or the policy level risk factors alone were found (Pereira, Padez, Silva, & Nogueria, 2019, October). Therefore, this study was the first of its kind in three areas. The study investigated determinants from all social-ecological determinant levels, including policy, examined them jointly across multiple determinant levels, and examined risk factors associated with a population rarely studied-the military child.

A social-ecological study within the military environment is attractive. It is somewhat self-contained having less variables to consider than in other settings. Every active duty service member and their families have, in essence, universal healthcare, access to recreational activities, and standard community layouts, consisting of safe and active neighborhoods, a robust cadre of recreational activities and community center access. Most importantly, one parent has to maintain a certain height weight standard and physical fitness level per DOD which has lasting impact on the family. This reduction in variables allows the researcher to extrapolate more information by honing in on specific behavioral determinants.

In this study the social-ecological model was customized to evaluate the behavioral determinants of overweight and obesity associated with the military child. The determinants affecting health were broken down into different categories or tiers. In Figure 2 the tiers were tailored to display military child overweight and obesity health behavior based on current literature. The first of the five domains utilized in this study was the interpersonal construct. This determinant included the most direct and personal level, including the child's genetics and diet, physical fitness, and sedentary behavior preferences. The intrapersonal determinant focused on primary relationships or persons closest to the child, such as the family members and peer groups. Institutional determinants explore the school environment, physical education, and extra-curricular activities the child was exposed to. Community determinant consisted of the child's physical environment, religious environment and the military community. Finally, the policy determinant focuses on overarching DOD policies, including the Defense Commissary Agency, permanent change of station (pcs) moves, and deployments, which inadvertently impact the military child. The model's purpose was to organize child overweight and obesity by determinant levels for increased understanding of the health problem and the interaction between determinants for outcome evaluation and future intervention focus (McLaren & Hawe, 2005).

Figure 2: Social-ecological model of military child overweight and obesity by behavioral determinant (Khatod, 2017; Adapted from Sallis et al., 2006)



Intrapersonal Determinants

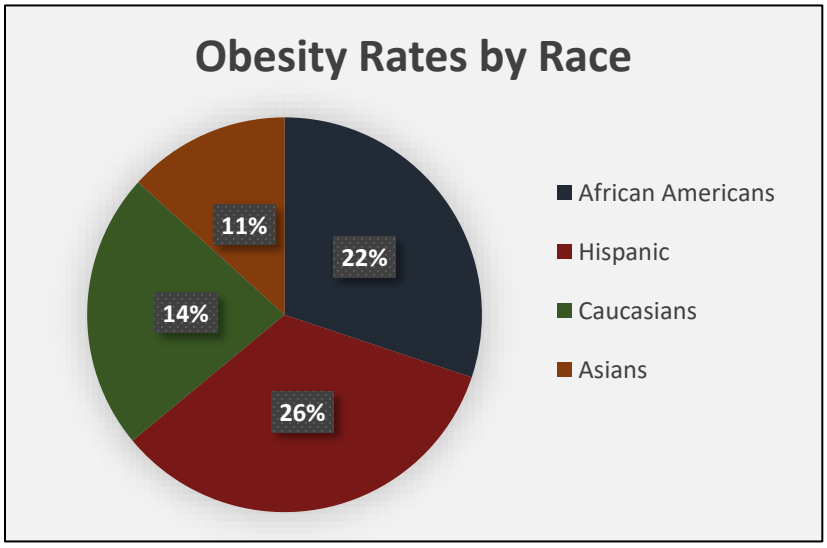
The first determinant level of the social-ecological model was the most personal level of the model and bore the most direct influence over an individual's health behavior (Institute of Medicine, 2003). This determinant includes individual characteristics, such as a person's genetics, race, and gender, as well as attitudes, beliefs and personal preferences of food, exercise, and health (Sarrafzadegan, et al., 2013). This determinant provided a wealth of information because it is visible, diagnosed and therefore easily analyzed (Fox et al., 2009). The intrapersonal level had many non-modifiable factors, including genetics, sex, race, age, height, and parental obesity (Sharma & Ickes, 2008).

Genetics. Over 240 genes have been found to balance a person's body weight and adiposity. Of these only three genes, glutamate decarboxylase 2 (GAD2), ectonucleotide

pyrophosphatase/phosphodiesterase 1 (ENPP1) and solute career family 6 (amino acid transporter), member 14 (SLC6A14) were directly related to obesity (Walley et al., 2009). Although genetic predisposition poses a risk to obesity development, researchers are unable to agree on their actual contribution to the health problem (Marginean et al., 2018; Herrera et al., 2011). Therefore, genetics were not investigated further.

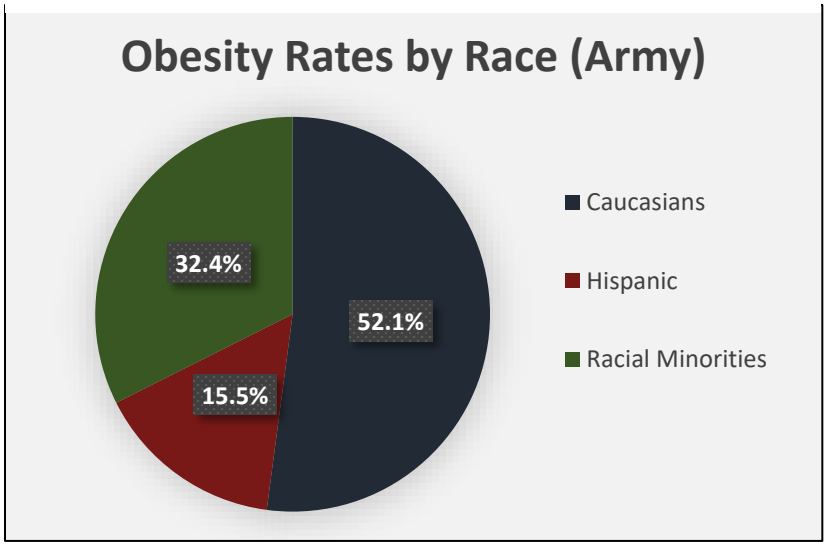
Race. Although overweight and obesity has been rising in girls and boys of all ages and race, national survey data, shown in Figure 3, revealed race and ethnicity differences. African Americans and Hispanics youth were more likely to be overweight and obese than any other race. Caucasians and Asian youth have had the lowest rates of child overweight and obesity (Ogden et al., 2018). Significant differences have not been found between African Americans and Hispanic youth or between boys or girls of any race with only one exception. Asian males (11.8%) are more likely to be overweight or obese than Asian females (5.3%) (Ogden et al., 2014).

Figure 3: Obesity youth rates by race (Hales et al., 2017)



The United States military is more racially and culturally diverse than ever before. Although Caucasians historically comprised the majority of the active duty force, black and Hispanics joining the military have been growing steadily in recent years (Barroso, 2019). Hispanics are joining at the fastest rate and is in line with the demographic trend facing the country as a whole. Overall, minority groups represented 36% of our current military population and are more likely to become overweight causing the military to have a vested interest in studying and combating racial and cultural predisposition to weight related issues (Davis et al., 2012; Bray et al., 2006; Sanderson et al., 2011).

Figure 4: Obesity rates by race (DoD, 2018a)



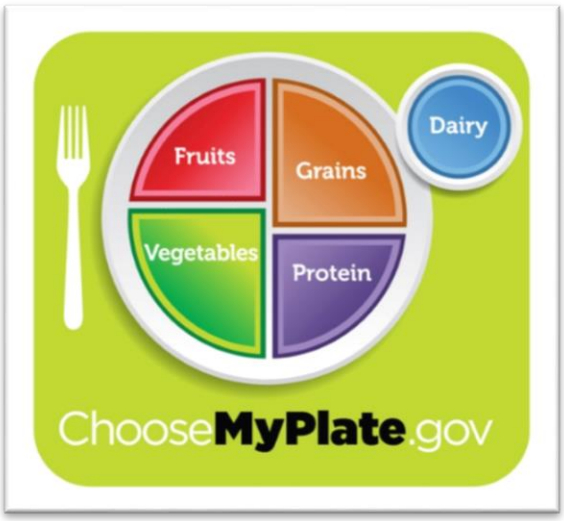
The largest service, Army, consists of 52.1% Caucasian, 32.4% racial minorities, and 15.5% Hispanic or Latino members as shown in Figure 4. Of those numbers 19.6% are officers and 80.4% are enlisted soldiers. Additionally, 83.9% completed high school and some college with 53.8% of Army soldiers being married (DOD, 2018a).

Birth Weight Rate. Birth weight rate was the focus of initial research efforts and found to be a significant predictor of weight excess. Specifically, malnutrition caused permanent changes in utero resulting in the likelihood of acquiring chronic diseases later in life (Barker, 1998). Further research results supplanted that the low birth weight rate theory followed by the rate of weight gain after was a primary predictor of disease. The rapid weight gain ("catch up

rate") and resultant increased appetite of a low birth weight infant increased the chance of overweight and obesity (Signhal & Lucas, 2004). This discovery led to the belief that there is a connection between genetic and postnatal environmental factors (Stettler et al., 2002). Additional studies revealed that children with rapid weight gain following low birth weight were more likely to be obese later in life making it plausible that appetite may drive the increasing obesity trend (Cole, 2007).

Dietary Behaviors and Consumption Patterns. Obesity is defined by an imbalance of caloric intake and energy output. Therefore, diet, a precursor to obesity, became an initial focal point for research (Campbell, & Hesketh, 2007). Nutritional eating habits and diet are important for healthy development and growth and reduce the risk of short and long term health problems (Bruening et al., 2012; USDA & USDHHS, 2010). The USDA (2017) established the Dietary Guidelines for Americans. The "food plate" in Figure 5 provided a framework for healthy eating that promotes good health and reduces the risk of illness and disease. The "food plate" depicts the most recent recommended portions of grains (30%), protein (20%), vegetables (40%), fruits (10%) and dairy (glass) needed for a healthy meal (2010). These nutrients are critical to positive growth and development (USDA & USDHHS, 2010; Lytle, 2009).

Figure 5: U.S. dietary guidelines (USDA, 2017; USDA & USDHHS, 2010)



Even though the government pushed dietary guidelines nationwide, studies continued to show that our youth typically do not adhere to these recommendations (Krebs-Smith et al., 2010; USDA & USDHHS, 2010; Story et al., 2009). American children habitually eat too few servings of fruits and vegetables instead consuming nutrient poor foods high in sugar and fat (Leech et al., 2014). A national study on vegetable and fruit consumption reported that only 40% of children and adolescents consumed the recommended daily fruit servings. More troubling is that 93% ate less than the suggested vegetable servings per day (Kim et al., 2014). Recent dietary concerns have been on an increase caloric intake from sugar-sweetened drinks, fast foods, larger portion sizes, and sugary foods, leading to weight excesses (Malik et al., 2013).

Sweetened Beverage Consumption. The rise in sweetened beverage intake has been particularly troubling. A positive link exists between sugar sweetened beverage consumption and obesity (Lytle, 2009; Ludwig et al., 2001). America youth frequently drink sugar sweetened beverages, including soft drinks and energy and fruit drinks (Lugar et al., 2017). The caloric intake of sugar-sweetened beverages provides empty calories and does not satiate hunger (Malik & Schulze, 2006; DiMeglio & Mattes, 2000). The sweetened beverage consumption rate increased 300% over the last 20 years with 56-85% of 5-18 year-old youth consuming one beverage or more per day (Harrington, 2008). These beverages were found to provide children with 10%-15% or 270 kcal/id of their daily calorie intake (Wang et al., 2008). Moreover, researchers cannot agree whether the calories from sugar-sweetened beverages are as bad as other foods for your health (Ludwig, 2016; Slavin, 2012).

Fast Food Consumption. According to research, fast-food consumption has also been shown to be a significant contributor to the obesity problem (Mancino et al., 2014; Lytle, 2009). Studies showed that individuals who eat fast food demonstrated a high energy caloric, fat intake

and a lower infusion of healthy nutrients (Paeratakul et al., 2003). On average 183.91 more kcal/day were shown in the children who ate fast food. Bowman et al. (2004) reported that children eating fast food showed lower vegetable and fruit consumption with higher energy level and fat intake and gained 5.0 pounds annually more than other non-fast food eating children.

Physical Activity Behaviors. Additionally, physical inactivity has also been shown to be a major contributor to the crisis (Rahman et al., 2011). Regular physical activity supports an active lifestyle, establishes healthy bones and muscles and improves motor skill development, academic achievement, self-esteem, and concentration (Fitzgerald et al., 2012). For this reason the USDHSS established physical activity standards for children. The agency concluded that children should engage in at least 60 minutes of moderate to vigorous physical activity per day (2018). Research showed that children and adolescents widely failed to meet these standards (Carson et al., 2014; Dunton et al., 2012) reporting only 25% of children ages 6-17 years adhering to these standards (Katzmarzyk, 2018). In one study found that physical activity dropped considerably between ages 9 to 15 (Nader et al., 2008). Stanford University (2007) confirmed that study by reporting adolescents between 10-16 years old engaged in only 12.6 minutes of vigorous physical activity per day.

Sedentary Behaviors. As outdoor recreation has transitioned into indoor entertainment, sedentary behaviors have increased, replacing physical activity with low activity entertainment (Raychaudhuri & Sanyal, 2012). American children and adolescents are spending more than 7.5 hours per day engaging in sedentary behaviors, such as watching television, playing video games, or utilizing the computer (Rideout, 2010), increasing one hour per day over the last five years (Laningham-Foster et al., 2006). Cell phones are adding to this complex problem becoming a prominent feature of contemporary America. Kenny et al. (2016) found that 20% of high

school students self-reported that they spend more than 5 hours per day on smart phones, tablets, computers, and video games. 95% of all families own a smart phone and 42% of children have their own computer tablet (Kuther, 2019). The inactive nature and limited opportunities for physical movement during screen time has led to decreased metabolism and increased caloric intake among children and adolescents (Robinson, 2001). Seen as the most modifiable risk factor for obesity (Robinson, 2001), the American Academy of Pediatric recommended children engage in less than 2 hours daily screen time (Schmidt et al., 2012).

Television viewing is the most prevalent sedentary behavior among American youth (Pearson et al., 2011). Falbe et al. (2013) found a direct link between obesity prevalence and the amount of time a child spent watching television. During the same study the researchers also found children had a .09 increase in BMI associated with each hour of television viewing. Children who watched television more than 2 hours daily were found to be twice as likely to be overweight than children who watch only 1 hour of television per day (Dubois et al., 2008). Researchers also found a positive link between television viewing and low physical activity in children with overweight and obesity diagnosis lasting throughout their lifetime (Tahir et al., 2019).

Impact on the Military Child. In limited studies researcher found similar dietary, similar interpersonal determinant level - dietary, physical activity, and sedentary behaviors as their civilian counterparts. Military children had a significant relationship between obesity rates and sedentary behaviors, including computer usage, television watching, and total sedentary hours. Physical activity, calorie intake, and demographic variables showed no significance (Arluck et al., 2003).

Interpersonal Determinants

The interpersonal determinant focuses on the people closest and those who hold significance to the child. Family, friends, and peers provide role definition, support, and social identity and, thus, influence health behaviors of the child (Fuemmeler et al., 2011; Institute of Medicine, 2003). This level contains the strongest influencers that will guide a child into adulthood.

Family Health Behaviors. Family provides the most significant influence on the development and shaping of health behaviors as a child grows (Formisano et al., 2013; Lazarou et al., 2008). Parents are the gatekeepers of development and change (Faith, et al., 2012) and ultimately provide family food choices, physical fitness opportunities, and socioeconomic status associated with health behaviors (Lopez, et al., 2012; Cole, 2006; Lindsay et al., 2006). By encouraging, participating, and modeling positive behavior parents inadvertently provide a roadmap to health behavior for their children (Edwardson & Gorely, 2010). Parental behaviors have been found to be directly impact their child's physical activity (Fuemmeler et al., 2011) along with their sedentary behaviors (Gubbels et al., 2011). The first teachings of health come from a parent, so it is essential that the father and/or mother have the proper intellectual understanding, behaviors, and attitudes to promote a healthy lifestyle (Kaplan et al., 2005). Campbell & Hesketh (2007) found parents who supported healthy behaviors have a positive impact on childhood overweight and obesity rates.

Family Food Environment. During the early stages of infancy, babies take nutritional cues from internal signals and biological instincts. As a child matures, their initial food preferences change based on learned behavior from their parents (Wyse et al., 2011), which leads to new nutritional attitudes and beliefs which they carry on into adulthood (Marviscin & Danford, 2013; Tabacchi et al., 2007). Scaglioni et al. (2008) supported that a child's diet is

strongly influenced by their parents. Children consume foods that they are exposed to; and therefore, gravitate toward food choices of their parent's preferences (Westenhoefer, 2002). Therefore, the exposure of food by the parents directly influenced future nutritional behaviors and habits (Marvascin & Danford, 2013). Roblin (2007) found that families who eat more processed, high caloric food and dine outside of the home have frequent problems with food consumption and diet (Roblin, 2007, August).

Maternal Obesity. Parental obesity is directly linked to obesity in their children (Gibson et al., 2007; Parsons et al., 1999; Lake et al., 1997). Children under the age of 10 are twice as likely to be obese if one of his/her parents are obese (Whitaker et al., 1997) due to shared genetic make-up and familial environment where physical activity and eating patterns are developed. These findings supported a transgenerational gap where childhood obesity identification lagged behind adult obesity classification (Cole, 2007). Adult obesity was identified to be a problem during the 1960s while child obesity did not raise concern until the 1980s. This lag led researchers' awareness to a correlation between adults gaining weight and their children becoming overweight and obesity (Stamatakis et al., 2005; Okosun et al., 2004).

Parental Health Education. Studies found significant links between parent and child and household variables, including parental attitudes toward eating habits, nutrition, available foods, and proclivity for physical activities at home. Children eat high fat, high sugar, and junk foods if available in the home (Birch & Fisher, 1995) validating that families with poor health behaviors pose serious health risks to developing children (Anderson, 1995; Tara et al., 1989). This insight provided valuable understanding into the progression of obesity in children. Research showed that obese parents lack proper education regarding child nutrition. Gable & Lutz (2000, p. 297) found that parents of obese children responded positively to statements like "it doesn't matter

which foods my child eats. As long as they eat enough, they will grow properly" (Gable & Lutz, 2000, p 297).

Family Structure. Family structure is a predictor of obesity (Hunsberger, 2014). Significant changes to family structures have been established over the last few decades in America. More children are born to families where both parents work leaving little time for meal planning and preparation. In addition, the number of single parent families has risen significantly creating stress and busier schedules (Formisano et al., 2013). Children and adolescents living with a single parent displayed unhealthy dietary behaviors (Stewart, 2007), such as eating fewer fruits and vegetables, leading to the likelihood of obesity (Formisano et al., 2013; Byrne, et al., 2011).

Military Family Structure. DOD reported that there are 641,639 military spouses of active duty service members. 92% of all military spouses are female (2018a) with 62% being between the ages of 25 and 34. Of those military female spouses 41% have dependent children (Corry et al., 2019) making this population rich for this particular study inquest.

Education Levels. A direct link exists between education and better health outcomes (Corry et al., 2019). Military spouses achieve higher education levels (DOD, 2018a) and report a lower overweight and obesity rate (45%) (Harrison et al., 1998) than civilian spouses (66.9%). Contradicting that research, military spouses were found less likely to meet their weight, exercise, and healthy diet goals (Kress et al., 2005), which places them at a higher risk for unhealthy behavior (Taylor et al., 2008; Christakis & Fowler, 2007). Further research found better health intervention outcomes when military spouses have a strong support network (Corry et al., 2019). Complicating this matter is the difficulty maintaining the support and structure

given consistent relocations, changes in environment, deployments, and other family separation challenges (Taylor et al., 2008; Christakis & Fowler, 2007).

Military Family Stress. Military families experience unique stressors, including frequent moves, war zone deployments, and fear of casualties, uncommon to normal civilians. Stress places a unique burden on the physical and psychological health of the entire military family (Maguen et al., 2011; Wells et al., 2010; Renshaw et al., 2009; Pflaz & Sonnek, 2002). Studies show that stress is linked to the likelihood of obesity (Young-Hyman et al., 2006; Goodman & Whitaker, 2002). In this population disordered eating has become a common psychiatric problem and food has been shown as a means to cope with the pressures of the military lifestyle (Waasdorp et al., 2007).

Research linked excessive food consumption and sedentary lifestyles with environmental changes (French et al., 2001). The average military family moves three times more often than their civilian counterpart (Department of Defense Educational Activity, 2018). On average military families move every 2 to 3 years domestically or internationally (Guzman, 2014). Such moves frequently occur in the middle of a school year, separate children from their friends, uproot families into temporary housing situations for potentially extended periods of time, and radically change routines. This stress faced by the military family challenges the healthy physical and eating routine of the family unit (Department of Defense Educational Activity, 2018).

Service Member Stress. Service members experience increased rates of depression, anxiety, and acute stress synonymous with long deployments and the short time periods in between deployments (Mental Health Advisory Team VI, 2009). High rates of depression have been shown in soldiers who have experienced deployments involving direct combat (Wells et al.,

2010). Prolonged periods of stress are associated with excess body weight (Chandola et al., 2006), making the military environment conducive to unique physical and psychological issues.

Military Spouse Stress. Military spouses deal with distinct challenges, including the aforementioned moves, familial separations, stringent requirements, learning a new culture, and regulations associated with military life; not to mention, spouse absence due to training and combat (Burrell et al., 2006; Ursano et al., 1989). A study reported that military spouses displayed the same levels of anxiety disorder and depression rates as their returning combat worn spouses (Eaton et al., 2008). While the active duty member is deployed or away on training assignments, the military spouse is left to be the head of the household and deal with increased home responsibilities. Away from family, friends, and social support military spouses are subjected to a substantial amount of stress. It is even more challenging for more vulnerable spouses, especially those new to the military and pregnant spouses (Haas & Pazdernik, 2006). New military spouses experience stress being unfamiliar with the rules and regulations of military life, support services provided to them, and indoctrination into a new culture (Tanofsky-Kraff et al., 2013). Deployments are longer and far more dangerous than in the past due to the nature of the wars in Iraq and Afghanistan and often come with physical and psychological trauma even after reintegration (Karney & Crown, 2007).

Military Child Stress. Approximately, two million service members were deployed between 2001 and 2009 (Institute of Medicine, 2010). Several studies suggested that children of a deployed parent have increased behavioral issues (Davis et al., 2012; Jensen et al., 1996; Flake et al., 2009; Chartrand et al., 2008) and elevated levels of depression, most notably in children with pre-existing psychological issues (Jensen et al., 1996). In a parent-reported assessment the survey placed 32% of children of a deployed parent compared to 13% in the high risk category

for psychosocial morbidity (Flake et al., 2009). This stress has a strong link to child obesity (Gunderson et al., 2010).

Military Parent Fitness Requirements. A positive health benefit of the military is that one parent, the service member, has to maintain a certain height and weight standard and physical fitness levels throughout the duration of his/her career. The purpose of the ongoing weight and fitness requirements is to ensure that active duty service members are adequately prepared to meet the physical demands of service. This conformity promotes a healthy fitness and body weight leading to an increase in combat readiness and reduction in training battle injuries and mortality (DOD Directive, 2005, February; DOD Instruction, 2002, November).

Prior to joining the military the perspective recruit must meet weight and fitness requirements to apply for entry. Once the recruit is placed on active duty, he or she will continue to be tested throughout their career. The minimal requirement is a BMI of 27.5 or less (DOD Instruction, 2002, November) and meeting physical fitness standards shown in Table 4.

Table 4: Army physical fitness assessment minimum standards (ages 22-26) and height/weight standards (ages 21-27) (DOD Directive, 2005)

Frequency	Fitness Assessment Description	Standards	
		Male	Female
Semi-Annual Requirement	Height Weight, Body Fat	22% max body fat	32% max body fat
	2 mile time run in light running gear	16:36 minutes	19:35 minutes
	Number of push-ups completed within 2 minutes	40	40
	Number of sit-ups completed within 2 minutes	50	50
	May complete an alternate bike, swim, or walk cardio assessment	6.2 mile bike, 800 yard swim, or 2.5 mile walk test	

The DOD Directive (2005, February) outlines weight control programs, fitness training, and physical fitness tests across the services for all active duty service members. Upon failure of these tests members are placed on weight management programs with timelines and milestones until passage of the test. Continued failure results in mandatory separation from military service. Each service has different requirements, but all promote healthy diet and physical activity to allow passage of various fitness requirements (Armed Forces Health Surveillance Center, 2011; DOD Directive 2005, February). Even with the required physical fitness standards and weight requirements more than 4,500 active duty service members were discharged from service for not meeting weight requirements. Training, recruitment to replace these soldiers and other sunk expenses cost the military an additional $183 million per year (Gattis, 2011).

Eating Disorders. The pressures of weight loss to maintain standards around physical fitness testing intervals may result in extreme unhealthy behaviors, including dieting and high levels of activity, by the military person. Extreme dieting or purging behavior counters health behaviors and can lead to severe weight gain. These learned and adopted unhealthy weight control habits may make their children susceptible and places them at risk for excessive weight gain equivalent to those children with problems of emotional discord or stress (Stice et al., 1999).

Inconsistent health patterns are particularly troublesome due to higher prevalence of eating disorders among military members and their families than their civilian counterparts (Antczak & Brininger, 2008; Lauder et al., 1999; Peterson et al., 1995). Study data exposed similar eating disorder rates among military members and elite athletes (Peterson et al., 1995). Extreme cyclical eating patterns, including fasting, extreme exercising, purging, and self-induced dehydration as well as laxative, diet pills, and diuretics usage (Peterson et al., 1995; McNutty,

2001), have the opposite of the desired effect, increasing the likelihood of weight gain (Tanofsky-Kraff & Yanovski, 2004; Stice et al., 1999).

The link between psychological distress and obesity is apparent (Young-Hyman et al., 2006; Goodman & Whitaker, 2002). These stresses cause the military family to utilize food as a coping mechanism (Tanofsky-Kraff et al., 2013). Evidence suggested that eating disorders rates are higher among military families than their civilian counterparts (Antczak & Brininger, 2008; Lauder et al., 1999; Peterson et al., 1995) and is recognized to be the most common psychiatric problem associated in a military family (Waasdorp et al., 2007).

A plausible connection exists between active duty service members with a high rate of poor eating habits and their children's overweight or obesity. Extreme weight loss by the active duty service member, during annual fitness and weight tests, and subsequent weight gain thereafter provides a negative model for potential unhealthy dieting in their children (Tanofsky-Kraff et al., 2004; Stice et al., 1999). Military children who model their active duty parent's extreme weight control behaviors may be at a higher risk for excessive weight gain than those who overeat as a result of emotional instability or stress (Tanofsky-Kraff et al., 2013). Due to limited research only one study investigated parental disordered eating and child eating behaviors in the military. The self-reported study found 21% of adolescents and 26% of military spouses were at risk for an eating disorder, a rate 7-9% higher than their civilian counterparts (Waasdorp et al., 2007).

Institutional Determinants

Institutional determinants provide organizational rules, policies, and informal structures that support or constrain healthy habits. Included in this level are school food options, opportunities for physical activities, hospitals, and wellness clinics. As rising rates of child

obesity continue, schools have become important settings to learn, grow, and shape health habits offering new dietary options, physical fitness activities, and social environment experiences (Lumeng et al., 2010). Other than home the school setting has the greatest influence on a child's eating behavior. Children, on average, spend nearly two decades of their life there (Story et al., 2009). Hospital and wellness clinics also provides a place for widespread public education and individual health and support continued overall approach to health for the military family.

School Environment. With more than 95% of children and adolescents attending school in the United States (CDC, 2013), the school environment plays a vital role in a child's growth and development. American children spend approximately 6.64 hours per day and 180 days per year in school, making it the most continuous environment a child spends ages 5-17 (Fox et al., 2009). During this time, children and adolescents consume almost half their daily caloric intake (Story et al., 2009). Guillame & Lissau (2002) found a direct correlation between overweight children and low scholastic achievement lasting throughout their lifetime. In 2012 the USDA outlined new nutritional standards for school meals. These standards required an increase in fruits, vegetables and whole grain offerings along with a reduction in calories, sodium and saturated fat levels in all school cafeterias. In addition to school meals, the Smart Snacks in School program required for all foods and beverages sold on campus to meet the appropriate nutritional standards (USDA, 2014). These changes reinforced healthy eating principles with opportunities for healthy food and beverage consumption (CDC, 2020d).

Bullying and Peer Victimization. A school is an essential place for individual learning and growth and can be the first place that healthy behaviors are presented to a child outside of the home. It is also where unhealthy physical and psychosocial issues tend to originate. Peers can have a positive or negative impact to a child, especially one more vulnerable. Bullying and

alienation is common practice among vulnerable children who become stigmatized as lazy, unintelligent, or unmotivated. This representation can lead to harmful effects lasting throughout their lifetime (Zeller et al., 2008). In addition to peers, teachers are not immune to biases against their overweight and obese students (Greenleaf et al., 2008; Greenleaf & Weiler, 2005) causing some to shy away from physical fitness activities (Faith et al., 2002) or physical education classes (Kamtsois & Digelidis, 2008). In addition this stress parlays into a lack of desire to attend school. Pan et al. (2013) found that overweight and obese students have 36% more absences due to illness than healthy weight students negatively impacting their academic achievement and social integration.

School Physical Education Programs. State requirements established a wide range of physical activities, including recess, intramural sports, and physical education classes, as part of the school curriculum (CDC, 2020d) to support obesity prevention and intervention efforts (Anzman-Fransca et al., 2013; USDHHS, 2000; 1996). These requirements vary by state (Brenner et al, 2013) and have been declining over the last two decades (Scaglioni et al., 2008). High school students receive physical education lessons 51.7% on a weekly basis and 29.9% daily (CDC, 2020d). When these programs are not offered or reduced, children do not receive the recommended 60 minutes of moderate to vigorous physical activity per day (Berschwinger & Brusseau, 2012). This reduction does not afford these vulnerable students the necessary time to stay physically active (Wallhead, 2007). Even with these physical activities, it is common for this population to get excluded (Li & Rukavina, 2012; Trout & Graber, 2009; Curtis, 2008; Fox & Edmunds, 2000). The challenge for educators is to create learning environments where overweight and obese children feel secure, supported, and focused on personal growth and improvement rather than on peer comparisons (Standage & Ntoumanis, 2005).

Military Healthcare System. The DOD Military Health System (MHS) is an extensive healthcare program delivering quality healthcare to the military family. MHS is a one of the largest healthcare organizations in the United States providing medical care to active duty members, military spouses, dependent children, and retirees and reserves (Dall et al., 2007). This $50 billion federal healthcare organization services over 9.3 million beneficiaries worldwide (DOD, 2011a). MHS is responsible for direct patient care in inpatient military hospitals and health clinics as well as external civilian providers through purchased care options. In 2010, MHS completed over outpatient encounters over 42 million and 265,000 inpatient admissions at military medical facilities across the globe (DOD, 2011a). The medical system provides on-base healthcare facilities to identify medical problems and maintains universal electronic medical records to track all beneficiaries and intervene with medical resources.

Child Weight Management Resources. Promoting an active and healthy lifestyle for active duty service members and their families has long been a consistent goal of the DOD. The DOD Directive (2014) emphasized health promotion and prevention with the enactment of the Health Promotion and Disease Prevention directive, establishing health guidance for military health professionals, and outlining healthy living goals for active duty service members and their families. Based on this emphasis the military has enacted several policies and programs to support military child overweight and obesity prevention and spawned multiple resources.

The DOD/VA Clinical Practice Guideline on Management of Overweight and Obesity (2014) is one such resources and a joint venture designed to provide evidenced based protocols for medical professionals throughout the DOD and VAMC. The Resource Center for the Prevention of Military Child Obesity is an interactive website designed to assist military healthcare professionals identify and address obesity (Penn State, 2018). Table 5 provides a

catchment of programs established for obesity prevention and management through the online portal.

Table 5: Listing of military family readiness programs – Resource Center for Obesity Prevention (Penn State, 2018)

Program	Overview
Healthy Eating, Activity, and Lifestyle Training Headquarters (HEALTH)	Online program delivers nutritional and exercise information to promote nutritional health and fitness.
Triple Play: A Game Plan for the Mind, Body and Soul	Provides children and adolescents from military families with nutritional, fitness and social skills building education for the maintenance of health weight and eating behaviors.
Up for the Challenge: Lifetime Fitness, Health Decisions	Promotes healthy lifestyle and behaviors among children and adolescents from military families through nutrition and physical activity education.
SMART Girls	Offers support for female children and adolescents from military families through pubertal changes, nutrition, fitness and social skills building education and emphasis on maintaining self esteem.
Food Friends: Fun with New Food	Provides ages 3-5 years with fun, structured activities to increase child willingness to try new, healthier foods.
Food Friends: Get Movin' With Mighty Moves	Offers activities that aim to encourage physical activity and aid in the development of motor skills for ages 3-5.
Fit Factor	Delivers an online system to track healthy fitness behaviors and provide nutrition awareness for military children, teens, and parents.
Healthy Weighs	Promotes maintenance of healthy weight.

Although these programs have been implemented for many years, evidence for these program outcomes is limited and obesity rates continue to climb. Data collection is the problem with the information being maintained at the local level where individuals participating in weight management programs take a lower priority over other defense activities. Therefore, weight management research coupled with real world disruptions of deployments and training hindered these efforts (Tanofsky-Kraff et al., 2013).

Military Child Impacts. Overall, there is very little obesity research and relative few trials conducted within the military environment (Shams-White & Deuster, 2017; Sanderson et

al., 2011). The military has begun adjusting its efforts focusing; not only on individual initiatives, but also environmental factors that contribute to the rise in obesity. Various new and innovative programs have launched and researchers are hopeful for better data collection, analysis, and positive outcomes (Shams-White & Duester, 2017).

Community Determinants

The overweight and obesity explosion pushed researchers to investigate new areas - connections between physical environments and a child's health (Williams et al., 2014). These relationships focused on environmental, social, and geographic factors, including access and affordability to healthy food, neighborhood walkability, and safety of outdoor spaces, community norms of food choices, school hours, insufficient sleep, and recreation facilities (Giles-Corti et al., 2009). Over the years community layouts have transformed from sleepy neighborhoods into highly trafficked areas with abundant fast food franchises, less crowded recreational spaces. Traffic and expansive distances preclude children from walking or bicycling to their destinations; therefore, reducing exercise opportunities. These changes have impacted children's health behaviors and added to the overweight and obesity explosion (Giles-Corti et al., 2009).

Physical Environment. Rundle et al. (2013) focused on "built" environment as areas of opportunity to reduce the overweight and obesity problem. These "built" areas are comprised of physical structures, roads, green spaces, and sidewalks which promote or deter positive health behaviors (Tappe et al., 2013). Studies exposed an urban cities' lack of outdoor recreation space, inadequate lighting, unsafe neighborhoods, and high crime rates inhibit movement and outdoor activity. For suburban locales, busy traffic and expansive distances preclude families and children from walking or bicycling to their destinations reducing available exercise opportunities

(DHHS, 2011). Safety in neighborhoods is a significant factor in predicting physical activity (Moinar et al., 2004, May; CDC, 1996). Research showed that they safe walking access on sidewalks and to and from recreational facilities (Tappe et al., 2013) and when their communities provided physical fitness opportunities, such as parks, playgrounds, and sidewalks. (Kumanyika & Grier, 2006; Sallis & Glanz, 2006).

The social environment of the community is as important as the physical construct on health behaviors (Franzini et al., 2009, February). Communities with heightened social cohesion and easy integration have a strong positive impact on the health actions of their members (Maynard et al., 2009). When infrastructures are similar, the social environment of a community positively affects physical activity. In a study focusing on a community's physical and social environment among 5th graders, the communities with the most social environment portrayed an increase in physical activity (Franzini et al., 2009, February).

Military Community. Behind a secured fence line and patrolled by military police the military community resembles any small city in America and is overseen by a base commander acting as a mayor. The military base is self-contained and boasts its own public works, chapel, library, parks, post offices, community recreation center, housing, and shopping areas (USDOA, 2016, August; USDOA, 2009, June; USDOA, 2005, May). As in other cities in America, the DOD through the Healthy Base Initiative (2017) identified and implemented community improvements to promote healthy behaviors, including a more walkable and "bike-able" environment and improve healthy dining options. The research is limited with only one study being performed on neighborhoods and health outcomes. Rand Corporation (2016) noted very little evidence to support that military neighborhoods were making a positive impact on BMI or retention statistics. The study noted limitations and the need for additional studies.

Military communities have the same access to fast food, sugary drinks, and other unhealthy food choices as any civilian community (Anderson et al., 2006). The Army and Air Force Exchange Service (AAFES) Post Exchange (PX), similar to a civilian strip mall, is located on every military installation and provides goods at lower cost to military members (Siebert, 2009). Just as in civilian malls, military food courts are the central, communal area offering fast food options, including Burger King, Taco Bell, Dunkin' Doughnuts, Popeyes, and other restaurants (DOD, 2020). During deployments and moves, fast food provides a quick and convenient option for families who do not have the time for meal preparation or who are living in a hotel and may not have access to a traditional kitchen (Seibert, 2009).

Policy Determinants

To control the obesity explosion legislation from local, state, and national policymakers have been implemented to help curb the upward trend (Brennan et al., 2014; Dodson et al., 2009). These policies and laws regulate or support actions associated with disease prevention, early detection, control, and management of obesity. This determinant level enlists broad social and economic influences and legislation with the goal to strike a balance between personal rights and regulations (USDA, 2014).

Most policies today target school nutrition and wellness programs. Physical education and nutrition requirements were established by the USDA Food and Nutrition Service. The regulation outlined requirements for school administrators to provide annual assessments, monitoring, and reporting on physical activity and nutrition standards impacting students (USDA, 2014). New policies supported a reduction in unhealthy food and beverage choices and consumption (Chirqui et al., 2014). The research provided no conclusive results on the impact of these policies on overweight and obesity rates.

Military Moves. Military moves are a normal occurrence associated with military life and generally occur every 2-3 years. These changes in the environment disrupt healthy lifestyles and behavior patterns of the entire family unit. The National Military Family Association (2020) reported that military children leave more significant figures in their lives by age 18 than most people do in their lifetime. Taber et al. (2013) concluded that transitioning families eat more high caloric meals, demonstrate an increase in screen time, and reduce physical activity (Taber et al., 2013).

Military Family Separations and Deployments. Repeated and extended separations, including deployments, military school requirements, and field time, are common for military families. Since approximately two million military children have experienced parental deployment since 2001 (DOD, 2011), stress is consistent as children worry about the increased hazards, infrequent contact, and uncertainty of their parent's safety. Upon their return, the military family experiences re-establishment of family norms. These unique stressors contributed to a rise in childhood overweight and obesity rates among military children (Gunderson et al., 2010).

Only two studies have focused on military deployments and weight behaviors. The first study, Ternus (2008), studied military deployments and child risk and weight-related behaviors. A survey of deployed mothers revealed that their children experienced obesity-related risk behaviors 0% before and 75% after their return. These risk behaviors involved poor diet and physical fitness activities. One-third of school-age military children demonstrated psychosocial behaviors, such as increased anxiety, worrying often, or crying more frequently than usual, during parental deployment with the most significant predictor being parenting stress. To counter

these behaviors support from the military organization, family unit, and community was shown to mitigate psychosocial dysfunction during deployments (Flake et al., 2009).

The impact of parental deployment on their psychological and physical stress and weight status of military adolescents was addressed in a second study. The research measured heart rate, blood pressure, and self-reported measures of anxiety from adolescents. The study consisted of 121 adolescents, aged 14-17 years old, whose active duty parent was deployed, active duty but not deployed, or a civilian. The results showed that the BMI was higher (27.0) in adolescents with a deployed parent than those with a non-deployed (23.3) or a civilian parent (24.1). Additionally, children of the deployed parents were noted to have significantly higher heart rates (Davis & Treiber, 2007).

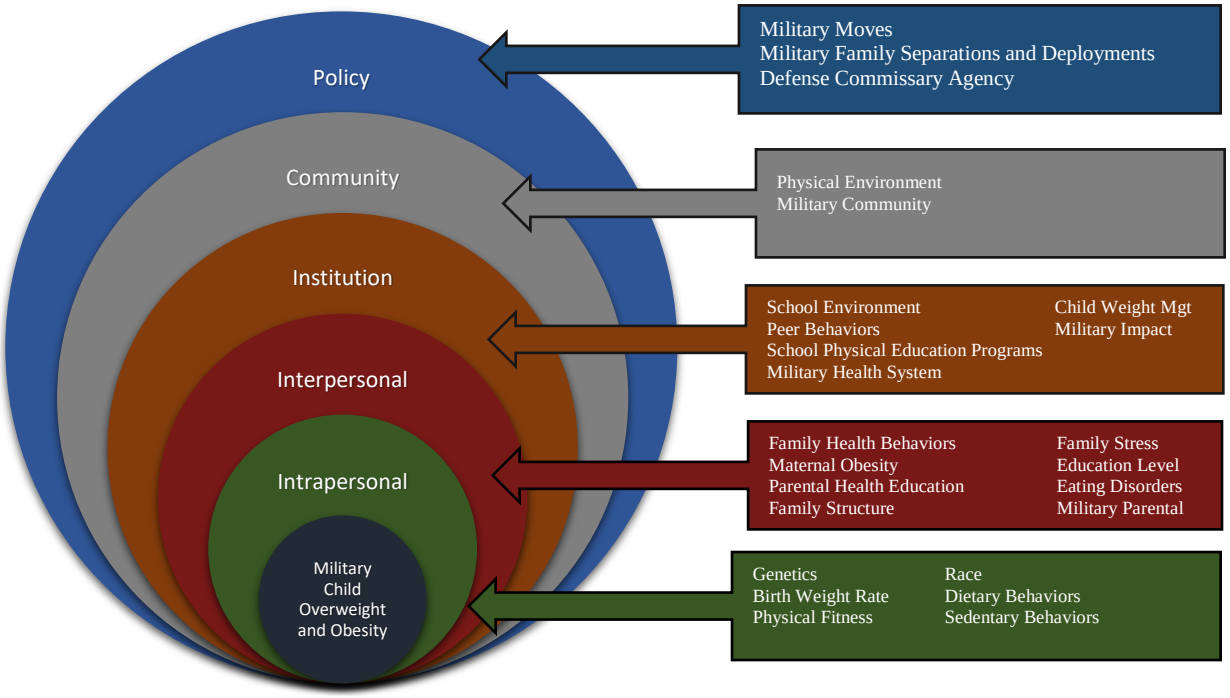
Defense Commissary Agency. The Defense Commissary Agency operates a chain of grocery stores serving military members, retirees and their families on military installations throughout the world. As part of the military service member's compensation package, the commissary provides a safe shopping environment and cheaper alternative to traditional civilian grocery stores. In 2019 the Defense Commissary Agency reported a 25.6 percent average worldwide savings for customers compared to civilian grocery stores (Defense Commissary Agency 2019 Financial Report, 2020; Jowers, 2020). Savings for goods include a 5% surcharge used to cover infrastructure cost. Surveys from service members confirm that commissary is a vital component to their benefit package. In high cost areas young service members and their families could not maintain a healthy food supply without this benefit (Defense Commissary Agency, 2020). The agency saves military families $3 billion annually. The DOD and Congress monitor these customer savings and assesses military family benefits for the Defense Commissary Agency (Defense Commissary Agency, 2020). Since the military provides

consistent incomes, available to support programs, and access to reduced food prices by the federally funded commissary, food insecurity with this population was not an area of concern.

Combining Levels of Social-Ecological Model

The Ecological Theory of Health concedes that daily interactions between an individual and their environment establishes an individual's health views and behaviors (Institute of Medicine, 2003). Therefore, it is imperative to understand the individual levels and their exposures between the different levels in order to obtain an accurate picture (Leroux et al., 2013). Figure 5 provides a snapshot of risk factors broken down by social-ecological determinant level associated with military child obesity. This study presented overall social and ecological interactions and their impact on military child's weight status. Fiese & Jones (2012) noted that an understanding of individual and multi-level determinants of the social-ecological model is necessary to establish effective health promotion and interventions to shrink rates.

Figure 5: Social-ecological model of military child overweight and obesity behavior indicators by level (Khatod, 2020; Adapted from Sallis et al., 2006)



Summary

Civilian and military children demonstrated paralleling obesity trends regarding childhood overweight and obesity rate increases and the physical, psychological, and economic impact that goes with the disease. The uniqueness of the military child lies in its various discriminative stresses, living conditions, access to healthcare, and extended separations between military family members as well as the impact on future recruits and risk to national security. Due to the impact, minimal research and significant opportunities, and risks involved with this subpopulation, this study will potentially have far reaching implications for the boarder population.

CHAPTER III

Methodology and Data Collection

Qualitative Research Design

Qualitative Criteria

The qualitative method was originally considered due to the highly subjective information being difficult to explain and understand (Patton, 2003; Lincoln and Guba, 2000; Creswell, 1998). Before choosing the qualitative methodology, eight fundamental criteria listed in Table 6 was reviewed to ensure compatibility with the research material and outcome needs (Creswell, 1998).

Table 6: Eight criteria of qualitative research method (Creswell, 1998)

Criteria	Explanations
"How" or "Why"	The qualitative outcome should answer "how" or "what" versus "why" which is used to address comparisons or treatments in qualitative research
Topic	The focused topic requires in-depth exploration due to lack of information, including not having identifiable variables or theories, to support an explanation of the problem.
Detailed	The social problem requires holistic, detailed overview of the various parts to understand the complete picture.
People	Informants are more open, receptive and accessible to research conducted in their natural setting.
Researcher	The nature of the research method allows the researcher to become personally interested and stimulated by the study material.
Laborious	The researcher should expect the method to be laborious in time and resources.
Engagement	The informant needs to be involved and actively engaged in the process.
Active	The researcher should be active and learn throughout the research process.

The qualitative method was chosen to extrapolate and interpret answers regarding the phenomenon, military child overweight and obesity, based on the depth of information and fact finding needed to assess and understand this complex social problem.

Phenomenology

Founded by Husserl the philosophical movement known as phenomenology seeks to acquire the pure essence of how a person's experiences a phenomenon (Patton, 2002; Husserl, 1967). Phenomenology was best suited for unstructured social problems and where little to no previous research has been performed. Although empirical investigations have been performed in the area of child overweight and obesity, lack of information still exists within the military population, in particular military children, and investigations using the structured social-ecological model. Therefore, the use of phenomenological methodology proved favorable.

Qualitative Data Collection

Recruitment and Research Protocol

Recruitment was important to the success of this study. Military members as well as their family members are commonly asked for information and feedback information regarding the military services. Participants associated with the military genuinely want to improve programs and processes they use within their military community. Therefore, trust was given freely and generously.

The study used a sample of civilian parents within the military population. Participants for the study were recruited using a participant request flyer located in Appendix B. The flyer was sent out in monthly newsletter and social media avenues of the Protestant Women of the Chapel, Young Men's Christian Association (YMCA), and Military Spouses and Mommies Clubs. Following the interviews flyers were provided to the participant to refer other possible

participants who meet the same criteria familiar to them. These participants were obtained using snowball sampling (Owens, 2005; Penrod et al., 2003). Since the study did not intentionally include military or civilian personnel from a Department of Defense component, this study did not require Department of Defense Institutional Review Board approval (DOD, 2011b).

Participants

Participants of the one-hour semi-structured interviews included 10 active duty Army spouses with 18 school-age children ages 6-17 years on various Army bases throughout the country. The inclusion age was based on the study correlating age with stress and the likelihood of obesity (Gundersen et al., 2008) and comparison opportunities based on average responses from the 2011-2012 National Survey of Children's Health. The civilian parent provided their child's height and weight, age, and gender. Based on this information, the CDC, BMI Percentile Calculator for Child and Teens (2020b) was used to determine BMI and percentile. Six participant inquiries did not meet the criteria and were not included in the study. Once notified, a date and time for a telephonic interview was scheduled for each of the 10 participants below in Table 7 with 60-90 minute time blocks.

Table 7: Participant Log (Khatod, 2020)

Alias	Meets Eligibility Criteria	Date Consented	Consent Given	Audio	Quoting
Joe March	Y	4/14/2020	Y	Y	Y
Diana Prince	Y	2/9/2020	Y	Y	Y
Kara Zorel	Y	4/17/2020	Y	Y	Y
Allie Calhoun	Y	4/20/2020	Y	Y	Y
Clark Kent	Y	4/20/2020	Y	Y	Y
Josephine Butler	Y	4/17/2020	Y	Y	Y
Ellen Ripley	Y	4/15/2020	Y	Y	Y
Angela B-Coutts	Y	4/16/2020	Y	Y	Y
Jane Austen	Y	4/18/2020	Y	Y	Y
Elle Woods	Y	4/14/2020	Y	Y	Y

A fictional name was given to each participant upon the start of the questionnaire. Institutional Review Board approved oral consent script forms located in Appendix C were read prior to the interview with an offer to send via email if desired. A monetary payment in the form of a gift certificate of $20 was discussed prior to the interview as compensation for their time and mailed following the interview.

Role of Researcher

The researcher's aim was to gain access to an informant's personal feelings and experiences (Fink, 2000). In order to share personal experiences, trust was an essential element for both the participant and researcher. Therefore, the researcher maintained transparency regarding personal experiences as a military spouse and government civilian employee with the study matter (Glesne, 1999). The researcher also divulged lack of experience with children and no practical knowledge of what it must be like to raise a child in such a unique environment making it easy to be ambiguous toward the content matter.

Interviews

Information using the qualitative process was obtained through open-ended interviews and written notes. This type of interview yielded the most in-depth information with direct quotes regarding personal experiences, perceptions, and feelings on the subject material. The format was flexible and fluid allowing the researcher to probe around areas of importance to the participant. The goal of the researcher was to maintain an ambiguous manner about the subject matter trusting that the process would yield the best inductive outcome (Patton, 2002).

This study required complexity and extensive detail to this critical health phenomenon. Therefore, 10 semi-structured focused in-depth interviews were employed. Open-ended questions used during the study were gleaned from the 2011-2012 National Survey of Children's

Health and 2014 National Health Interview Survey, along with inquiries specific to the military family and lifestyle. This instrument examined multi-layered social and ecological factors of a child's life, including physical, family, community, school environment, and policy, making it a perfect tool for this multi-level assessment.

During the semi-structured focused interview, the questionnaire in Appendix D was used to gain insight from each participant and aligned to the social-ecological model as shown in Appendix E. The first nine inquiries of the questionnaire requested basic information about age, education level, and race, as well as to military specific information. Most importantly, questions of the military spouse's rank and service and military child(ren)'s height and weight verified if the informant meet the research criteria. The children's gender, height, and weight were calculated using the CDC BMI calculator to determine weight classification (CDC, 2020b). Civilian mothers who had military children meeting the normal, overweight, or obese designation were included in the study.

The mother of the military child was asked to provide their perception of their own and their child's health status, their child's physical and sedentary behaviors, and peer group culture. It was important to include the environment where the child spends a large portion of their time. Therefore, questions regarding school, religious environment and neighborhood were posed. Finally, the military lifestyle has a significant impact on all members of the military family (Rand Corporation, 2016). Hence, inquiries into health programs, deployments, and moves were included. Study questions were also aligned where applicable to the National Survey of Children's Health (NSCH) and National Health Interview Survey (NHIS) to support future research. At the end of the interview the participant was afforded time to provide any additional information regarding their military child health behavior and ask questions. The answers

focused a spotlight on the behavioral determinants of the military child overweight and obesity phenomenon.

During the interview process answers from the original deployment questions were informative and unexpected. These emergent findings resulted in a need to "refine and expand the inquiry through reflexive, iterative, and dialogic process" (Agee, 2009, p. 433). Therefore, new sub-questions were added to obtain clarity and expand knowledge of health behaviors during deployments. Participants were contacted via telephone for a follow-up interview with 4 parents responding positively to an additional telephonic inquiry.

All interviews were audio-recorded. Along with field notes taken at the beginning and conclusion of the interviews, these audio-recordings made up the research information. Information gathered during a qualitative research process added complexity due to the difficulties managing large amounts of data (Creswell, 2007). To reduce problems, 10 interviews were transcribed into a password protected research computer using Microsoft Word. Electronic files were backed up utilizing an external hard drive in my secured office in a locked cabinet. All original notes and documents were shredded.

Saturation Point

During the eighth interview data received started becoming redundant. The researcher completed two more interviews to confirm that saturation had occurred. At that point interviews discontinued.

Institutional Review Board

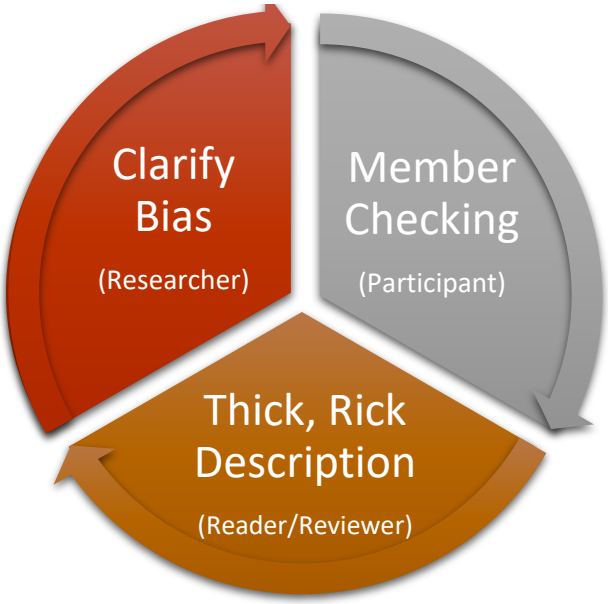
The study received an external review and approval by the Institutional Review Board (Erlandson, et al., 1993; Glesne & Peshkin, 1992; Lincoln & Guba, 1985; Merriam, 1988) located in Appendix F. The study required the protection of the rights and privacy of the

participants. A consent form, Appendix C, was reviewed with each civilian parent participant before the study began. The information was gathered using questionnaire to confirm applicability followed by face-to-face or telephonic in-depth interviews.

Validation Procedures

During this study the researcher employed a strategy utilizing three validation processes, including clarifying bias, member checking, and providing rich, thick description, to ensure a true representation of the study information. As shown in Figure 7 each of the three validation processes employed a different lens or perspective, i.e. from the researcher, participant, and reviewer/reader, to provide a complete analysis of study outcomes. This multi-lens method covered any gaps or questions impacting the credibility of the validation process (Creswell & Miller, 2009).

Figure 7: Multi-lens view of the study (Khatod, 2020; Adapted from Creswell & Miller, 2009)



Looking through the researcher's lens a section of the research paper addressed the researcher's past experiences associated with the subject material that may cause prejudice or bias to the study. Since the researcher spent 22 years living in the military environment, 20 years working within the military community, and 10 years in the military healthcare system, bias could occur; however, it also allowed the researcher to provide a breath of knowledge into the study. The culture of the military is unique and understood by the researcher. Member checking

was performed utilizing participant corroboration with the outcomes of the study. This validation procedure afforded the study to have a second lens ensuring that the information perceived by the researcher was accurate (Lincoln & Guba, 1985). Finally, rich, thick description of details during the interviews were included in the direct quotes of the participant in the analysis chapter giving a robust account of the feelings of the participants toward the subject matter (Denzin, 1989). With these three validation procedures distorted information introduced was easily ascertained and debunked giving way to increased validation and validity to the research.

CHAPTER IV

Results

After the researcher collected the data from the participant interviews, the challenge became how to make sense of the massive amount of interview material received. In Phenomenology the term, data analysis, is disparaged because it implies that the information is to be broken down into parts while overlooking the phenomenon. Therefore, explication of data is used in this study to reinforce that the interview material was "investigated by components while keeping the context as a whole" (Hycner, 1999, p. 161).

Explicitation of Data

The first step in the explicitation process to break down the data transcribed into useable material is called bracketing. Created by Husserl, phenomenological reduction refers to "bracketing" of the researcher's bias and preconceived beliefs and attitudes (Hycner; 1999; Creswell, 1998; Moustakas, 1994; Miller & Crabtree, 1992). At the beginning of the study the researcher assessed personal experiences associated with the phenomenon. One such example was the researcher's past experiences with military moves and deployments as well as witnessing unhealthy behaviors by parents of military children during commissary visits. Once these and other preconceptions were identified and isolated, they were suspended for the duration of the study allowing the researcher to remain neutral during the interviews and data explicitation process.

Once the phenomenological reduction occurred, the researcher reviewed the responses from the interviews. Using the manually transcribed interviews the researcher meticulously reviewed each interview and extracted meaningful and similar statements that most effectively illustrated the phenomenon. The statements were organized by grouping the statements together

to analyze different participant question response. Using inductive reasoning the researcher evaluated common ideas from the content by each participant and assign them to a theme to contextualize and clarify the phenomenon. Responses were grouped together to evaluate recurring themes. Open coding was used to compare the information and categorize them in the appropriate theme. Finally, names were given to specific themes.

Based on the information received during the interview process, three themes emerged (1) food choices, (2) physical fitness, and (3) military impacts. Subthemes were designated during content analysis. Meaningful, recurring words were exposed and placed under the appropriate theme categories. Under the theme, food choices, was broken down into three subthemes: health diet, culture, and family meals. The theme, physical fitness, displayed two subthemes: physical activities and sedentary behaviors. The final theme, military impacts, held four themes: food options, community support, military moves, and deployments.

Figure 8: Theme/Subtheme Clusters

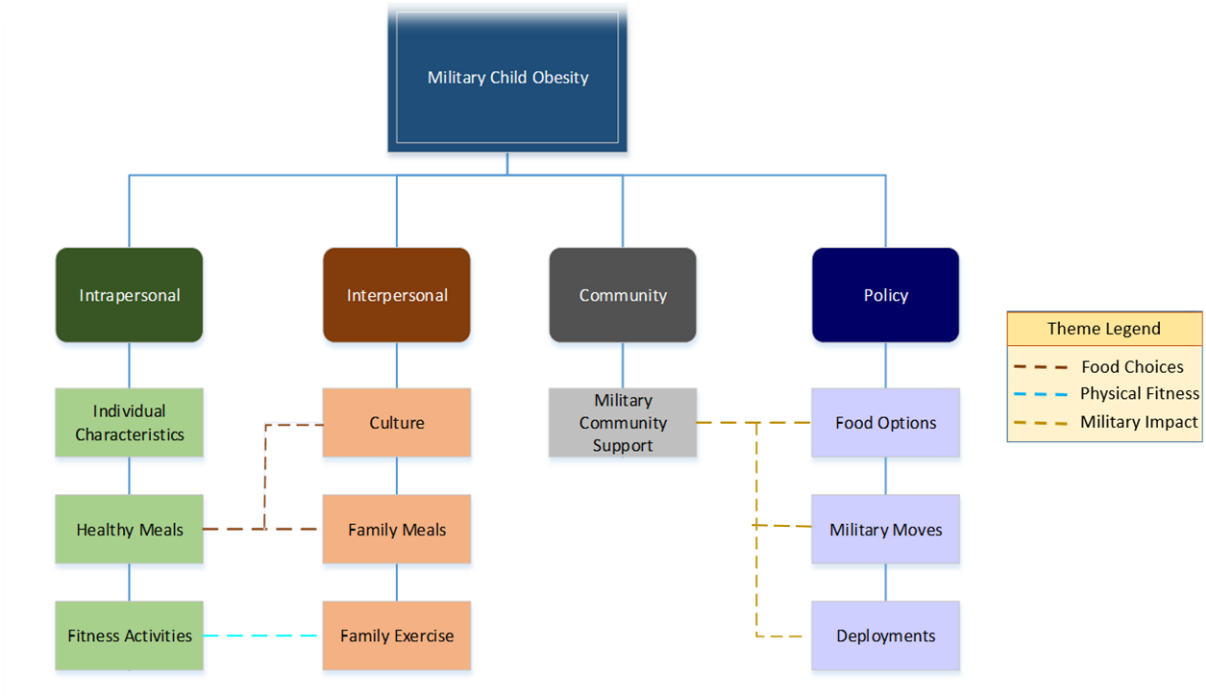
Themes	Subthemes
Food Choices	Healthy Meals
	Culture
	Family Meals
Physical Fitness	Fitness Activities
	Family Exercise
Military Impacts	Food Options
	Community Support
	Military Moves
	Deployments

Results

The study results were obtained from the interviews and organized using the social-ecological model. The study found determinants, barriers, and facilitators, at the theme and

subtheme levels depicted in Figure 9. Displaying exposures as part of a whole and together provided a good representation of multi-level interactions and their influence on the child obesity phenomenon.

Figure 9: Results broken down by behavioral determinant using the social-ecological model (Khatod, 2020)



Participant Characteristics

The participants of the interviews included 10 active duty Army spouses with 18 school-age children ages 6-17 years on various Army bases throughout the country. All participants reported college level achievements. The weight status breakdown of each military child of a civilian parent participant is shown in Table 8. The sequence listed is based on the date the participant volunteered. The height, weight, age, and sex of the military child were parent-reported and used to calculate BMI and percentile, using the CDC (2020b) healthy weight

assessment tool. The weight status (healthy weight, overweight, or obese) was determined based on BMI.

Table 8: Weight status breakdown of each military child of a parent participant (Khatod, 2020)

Weight Status	*BMI*	*Percentile*	*Sex*	*Age*	*Height*	*Weight*
Healthy Weight	17	6th	Girl	16	5‘5“	102 lbs
Healthy Weight	18.4	45th	Girl	13	5‘3“	104 lbs
Healthy Weight	13.8	6th	Boy	7	4‘3“	51 lbs
Healthy Weight	15.3	46th	Boy	6	4‘	50 lbs
Healthy Weight	20.8	49th	Girl	17	5‘10“	145 lbs
Overweight	21.9	85th	Boy	13	5‘7“	140 lbs
Overweight	19.5	94th	Girl	7	4‘3“	72 lbs
Obese	19.7	95th	Girl	7	4‘3“	73 lbs
Healthy Weight	16.6	75th	Boy	7	4‘4“	64 lbs
Healthy Weight	21	65th	Boy	15	5‘6“	130 lbs
Healthy Weight	21.2	67th	Boy	15	6‘2“	165 lbs
Obese	28.2	97th	Girl	13	5‘7“	180 lbs
Overweight	23.6	92th	Boy	13	5‘2“	129 lbs
Obese	23.4	95th	Boy	11	4‘4“	90 lbs
Obese	19	95th	Boy	7	4‘1“	65 lbs
Obese	22.5	96th	Girl	9	4‘2“	80 lbs
Obese	32.3	99th	Girl	13	5’6”	200 lbs
Healthy Weight	17.7	44th	Boy	12	4’2”	63 lbs

In the sample of 18 military children half of the parent participants reported their military child(ren) were within the CDC (2020c) healthy weight standards ranging from the 5th to 84th percentile. Six children within the obese range of 95th to 119th percentile were noted to be more prevalent compared to the 3 children within the overweight category of 85th to 94th percentile. Child race was reported by the parent. Categories included White, Black, Hispanic, and Other. The sample demonstrated an almost even distribution among male and female children as well as the age categories 6-11 and 12-17. Table 9 provides a data breakdown of the intrapersonal level, most non-modifiable risk factors associated with the military child(ren) of the participants.

Table 9: Descriptive data of most non-modifiable intrapersonal level risk factors (Khatod; 2020)

Characteristic			
Child Weight Status		**Child Race**	
Healthy Weight	52.631 (9/18)	*White*	29.412 (4/18)
Overweight	15.789 (3/18)	*Black*	23.529 (7/18)
Obese	31.579 (6/18)	*Hispanic*	5.882 (1/18)
Child Sex		*Other*	41.176 (6/18)
Male	52.631 (10/18)	**Child's Age**	
Female	47.368 (8/18)	*6-11*	47.058 (8/18)
		12-17	52.941 (10/18)

Themes

The analysis revealed 3 themes which influenced overweight and obesity in the military child: (1) food choices, (2) physical fitness, and (3) military impact. Subthemes were also captured to further categorize and analyze meaningful perspective descriptions and broken down under their perspective theme.

Food Choices. Food choices represented what motivated the military child to consume certain foods. During the interviews participants discussed their child's respective experiences making food choices. Upon review it became clear that subthemes were necessary to dissect more useful and accurate representations of the information received. Healthy diet, culture, and family meals, emerged as subthemes requiring further review.

Healthy Diet. All participants provided similar responses to feeding their military child(ren) daily meals. Participant #2 reported:

> "I'm obsessed with steak salad, so we do eat a lot of that. I will just run to the store on a whim and buy steaks and all the toppings I want on a salad…….I also feed the kids lots of fruits, yogurt, eggs, fresh veggies, salmon, chicken, grass-fed beef with rice, or potatoes, or veggie straws. Our dinners are usually really healthy".

Participant #4 with multiple children in the overweight category, stated, “we don’t eat fast food. We eat out minimally and don’t eat processed foods. We shop the perimeter of the store if we can’t get farm or grass-fed options. We eat clean 90% of the time”.

Participant #9 with multiple children in the overweight and obese categories added,

> “our children eat a healthy diet, full of healthy fats, carbs, and protein. Most of our diet comes from grass-fed meats and organic fruits, vegetables, and dairy sources. We do not eat fast food, very minimal processed foods, and eat out on occasions”.

In regards to drinks their children consume, participants did not verbalize any concerns regarding the consumption of sugary drinks. Two participants acknowledged the availability of sugary drinks as participant #8 responded that her family “serves Sprite, Dr Pepper, and sweetened iced tea occasionally during meal time”. Participant #1 shared that one parent shared that “soda is not purchased and only Crystal Light Iced Tea (sugar-free) is provided as an option to water at home”. Finally, participant #5 confided, “soda was allowed in her home but placed limitations of only one soda consumption per day”.

Culture. Food is an important expression of cultural identity. Two out of the 10 participants expressed that their food choices were influenced by their cultural experiences and exposures throughout their lifetime. Participant #6, part of the only Hispanic parent participants, said:

> “our health and our diet is more cultural. Our culture has more impact on our diet. In Puerto Rico, our normal dinner is rice, beans, and meat. I have a friend who is close and she is Caucasian, and their dinner is more meat, veggie, and side. Our culture has more impact than other cultures due to the rice. It’s what we were raised to eat”.

Participant #1 who also stated culture as having an impact on family meals shared:

"I cook and serve mostly Filipino food, but also Mexican food since my husband is Mexican. He actually told my mother he'd love to teach me how to cook Mexican food. I sometimes cook enchiladas, and beef soup with potatoes and carrots, and serve it with tortillas. Also, I cook my Filipino food and salad, mostly Caesar. We normally do not eat out. We try not to, but there are times when we might order pizza. But that is very rare…maybe once a month."

Family Meals. Consensus was met with all participants reporting family dinners together as a normal occurrence. Participant #7 reinforced, "my two children eat 2-3 meals a day and 1 snack. The children usually make their own breakfast, but the family always sits down to share their dinner together in the evenings. We always eat dinner together as a family." Participant #9 acknowledged, "we eat dinner together every night but usually during the day, everyone is in different directions, but for dinner we come together…..we all eat the same thing for dinner."

Physical Fitness. All participants responded that physical fitness was a common practice to supporting an active and healthy lifestyle. Physical activities performed both individually and within the family unit were discussed in detail with two subthemes, physical activities and sedentary behaviors, emerged requiring further review.

Physical Activities. A consensus was received regarding the amount of physical fitness activities their child(ren) engaged in and completed daily: all considered them healthy. All participants provided an understanding of the need for daily physical fitness activities and half typically exercised together as a family.

Participant #2 commented:

"my 7 year old will run straight outside after school and my oldest will ride bikes with her friend around the neighborhood. The oldest three have after school sports/activities

during the week. My husband and I will take the kids hiking or exploring if the weather is nice on the weekends. We also spend a few afternoons at our neighborhood park or walking trails with our dog".

Participant #5 reported:

"when school is done, he (her son) has to spend at least half an hour doing some type of activity to get out some energy. He loves jumping on the trampoline, riding his bike, or skating. He also will practice his kickboxing. My husband will take him for a run in the mornings or walks in the afternoons. My husband and son get up early every morning and go work out in our basement for about an half an hour or so. And, they usually go for a run as well. My son will ride his bike or use his roller skates to go with him".

All participants reported that both parents complete some form of physical activity throughout the week. As part of their job the military member is required to perform mandatory physical training. Participants stated that their children mimic their military parent's physical activities. Participant #5 noted, "my son wants to be like his dad and they tend work out together….my husband does more exercise on a routine basic because he's active duty. I tend to do less exercise, but I walk".

Participant #9 concurred:

"my kids want to be just like Dad. They see Dad working out and I guess it's just a nice sense of discipline. My kids will be third generation military. My Grandfather, my Dad, their Dad, and now my oldest son says he wants to go to the Army. So, they like it. They like to move…they like everything about the Army. They have a morning schedule. They have a routine. My husband does PT and they exercise with Dad sometimes before school".

Participant #10 reinforced by stating, “I think that because of the military mindset of being physically fit it brings the importance of that into our household. My husband encourages everyone in the family to be fit”.

Sedentary Behaviors. Sedentary behaviors among military children were a pronounced area of concern for 50% of participating parents. Participant #1 stated, “they spend so much time on the screen. My daughter’s phone is attached to her hand. My son plays video games. We do watch TV/movie together and that is my family time with them”.

Participant #6 commented that her son is:

> “allowed video game time during school days from 4 to 7:30pm (if all homework is completed), after he will watch a tv series or movie. During weekends he has free electronic times. He has cell phone, during school hours he is not allowed to use it. While he is home he typically uses his cell phone to contact a friend to connect on PS4 game”.

Participant #10 reported, “my girls spend 4-5 hours on the cell. They like to do tik-tok videos. I take their phones away at 9 pm during the school week. They also have a computer in their room for school activities for 2 hours per day. We watch a movie as a family”.

Military Impact. During the interview process the participants revealed the military made the most impact on their everyday lives. Further inquiry resulted in emerging themes. The military lifestyle contributed to the health behaviors of the military child and family through food option access, community support, permanent change of duty military moves, and deployments.

Food Options. Military service members and their families have access to the commissary for grocery shopping. All but one participant felt the commissary offered good quality food and utilized it for both convenience and value. Participant #2 viewed the commissary negatively reported that it is “does not have an abundant organic selection and I go

to grocery stores closer to my (off base) house". Participant #9 described the commissary as "convenient because it's on base and they have parking and a good selection of food that is more affordable". Participant #1 stated:

> "what I've noticed is that they've (commissary) changed a lot and have better healthy food options. They give you recipes and coupons on healthier items and they have recipes and posts hanging up by certain items to help you eat healthier".

In addition to the commissary, the military community provides a variety of dining options on the base. The restaurant options on the military bases are a general dietary concern for all participants. Participant #2 expressed concerns:

> "the military is trying to shape civilian recruits into healthy and strong soldiers; yet, the food court on base is filled with Burger King, pizza and other fast food options that counters readiness, physical fitness, and health (viability) for soldiers and their families".

Another participant #8 reported her family had "eaten Burger King 4 times in the last weeks because that was one of the only options where I didn't have to cook".

Community Support. Half the participants live on a military installation and reported optimal attributes conducive to maintaining healthy behaviors. Participant #7 described her life on the base:

> "it's a good neighborhood. We have a really good lay out and yard and green space. It is really nice. Behind our house we have a walking path that runs all the way from one end of the base to the other. You can walk along and look at the water and that backs up to the houses and there are sidewalks connecting the roads and apartments. We have playgrounds and basketball courts and a field for softball and thinks like that."

Participant #5 added:

> "The community is amazing! We really love it. We live up close to the gate and there are 6 houses in the row of homes and it's a dead-end street so the kids can ride their bikes out there. They will roller skate. There are a couple of kids right at the same age as our kids and they all run up and down the hill right behind our house and they play soccer together. There's not too many kids, but just enough to have some interaction. It's just a really great area that we are in".

The community recreational services on the base supports youth centers and other activities for the children. Participant #7 described her base as having "two youth buildings and one is for the younger like a daycare. And there is a youth center for a little older kids. It's from elementary school and up. It's pretty nice facility and it's free".

Participant #8 raved:

> "the youth and recreation center is great! My kids are both involved in the youth and teen center. I love their programs and they have been going since they were little…it's easy to let the kids go on their scooter. The community allows our children access to two free youth centers and day care with large amount of activities, including sports, ballet, and social activities as well as different events for children to participate during the weekdays and on the weekends".

Military Moves. There is an undeniable consensus regarding increased stress and anxiety before, during, and after permanent change of duty stations. All participates gave testimony that this event was the most impactful time on health behaviors of their military child(ren).

Participant #1 stated:

> "my child has moved 7 times in her young 16 years. The last move she went into depression and would not come out of her room for the first few months…….she hated

changing schools during her high school years and missing her old life and friends. It was a very emotional time and we both cried".

All participants found that they struggled with both healthy dietary and physical habits before and after any permanent change of duty move. Participant #2 recounted the difficulties associated with her 5 major military moves.

> "Once you get orders to move, you begin preparing, packing up your household goods, and getting things organized, you don't have time to go to the gym and perform normal workouts. The kids will usually get to a point where they'll just be playing Xbox or watching TV in order for my husband and I to focus on getting our stuff done compared to walking and hiking and the outdoor activities we would normally do on the weekend. Also as we are packing up our belongings, it's almost impossible and way too frustrating to add in grocery shopping and making full dinners and meals and that's when we'll start to order pizza or run to Wendy's and getting things that we normally wouldn't eat and then that creates a habit where we stop cooking and doing the things that we would normally do". "We usually get 4-5 month notice of a move and takes us 3 months to get settled".

Participant #7 added:

> "our lives are placed on pause getting ready to move. You can't take everything with you. At some point you have to stop going to the store. You start eating out more because you are getting ready to move. Once your stuff is packed, you are eating out more because you have nothing to cook with. You try to eat everything in the refrigerator, so you don't have to throw so much out. At the end all you have is green beans. Who wants to eat only green beans for dinner? So, let's just get McDonalds or just have pizza because of the

convenience. When you reach your destination, you eat out more because you don't have your household goods. It is like you do the same things just in reverse."

Participant #8 stated that the hardest time to maintain healthy habits is

> "when you are in a hotel room for 6 weeks and that's been our average, you are eating out all the time. We had a tiny little kitchenette where we'd do breakfast and lunch, but we tend to always eat out for dinner making it difficult to make a decent meal because you only have a few pots and pans".

Participant #2 also shared:

> "if you do not live on the military base, you have to sell your home which may require you to take cheaper offers and depletes your savings fund. By the time you get to your next duty station, you are financially drained and having to restock the pantry shelves. You end up eating peanut butter and jelly or $5 pizzas from Dominos or whatever just to survive until the next pay period".

Participant #3, a personal trainer, added:

> "if I have a difficult time getting back to a fitness routine and even making proper meals for my family. I can't even imagine what it's like for an overweight family or for someone who doesn't have an active fitness lifestyle or doesn't typically make healthy meals for their family".

Deployments. All families conveyed that deployments caused various levels of stress to their child(ren). Only 1 out of the 10 participants noted some changes to diet and physical fitness activities. Participant #9, who has underlying health conditions, stated:

"the kids don't work out as much because it's just me, but I let them play a lot…..when he leaves for deployment, my (younger) child gets a little depressed and he won't eat…..he worries a lot".

Four out of the 10 participants reported little to no change to diet or physical fitness activities among military families when their active duty service member was deployed. Participant #3 reported:

"my children see and hear stories about what the soldiers are doing. The older children worry if he (dad) is going to get killed or if he is in whatever news story they see on television. The middle children get emotional questioning why dad is not there and can't play with them. It is very emotional for all my children where they question why dad is not there and can't play with them".

Participant #1 shared:

"the deployment doesn't change the eating habits because I'm the cook. Nothing has changed when he left. The only changes that I could tell you are the kids being lonely. We tend to eat together and it's a different scene when dad is not around."

Participant #5 added:

"when dad's gone, he (son) doesn't work out unless dad's with him so that is a behavior change, but he does do kickboxing two days a week for an hour and a half a day for those two days. If dad's not home, he won't do his exercise, but he'll still play in the backyard, ride his bike, and run around with my daughter".

Although stress was noted, 5 of the 10 participants reported that their dietary and physical fitness habits improved during deployments. Participant #6 responded that even with 3 deployments (2 for 12 months and 1 for 6 months):

"my child's diet and physical fitness activities does not change. My son may even get more active when my husband is gone. We go walking and explore more. I try to get him engaged in more activities, so that it keeps him busy and not be sad".

Participant #2 shared that her military spouse:

"has deployed over 10 times….probably 10-15 in 14 years. When he is away, the family's physical activity does not change…..I don't want my children sitting around the house feeling bad that dad's not here. I take the kids more places. We take vacations and trips".

Participant #7 noted that her spouse who deployed to Iraq and Cuba for 6 months and Afghanistan and Iraq for 18 months and added:

"they eat healthier while he is away. I try to make sure I met my goals and got healthier while he was gone….that became something I could focus on while he was away. I get really involved in the gym and eating healthier. The children also want the same things……..the busier they stay, the faster time goes by".

Participant #10 shared whose husband has been in the military for 18 years:

"It's hard to keep up with the number of times he's been deployed. It was so many times that when my first child was born, I lost count. He's probably deployed 20 or maybe 16 times. I'm not even sure I can keep track of it but it has been a lot. During the deployments it does not impact our diet. I would say that I eat better. I cook smaller portions because I know I don't have to cook for him. I incorporate the things that the kids like, so I make sure they are eating healthy meals. I think we eat better and we work out more when he's not here".

CHAPTER V

Discussion and Conclusions

This qualitative study gained insight into the behavioral factors that influence military childhood overweight and obesity. These results revealed that military child overweight and obesity behaviors are affected by a daily onslaught of multi-level social-ecological factors. The three strongest influences, food choices, physical activities, and military impact, were identified based on the civilian parent perceptions of their military child(ren).

Food Choices

Findings indicate that military families are not doing anything unusual in their food choices with the exception of fast food consumption. All participants provided an understanding, need, and spoken execution of a well-balanced diet, including the integration of vegetables and proteins, during meal planning and mealtime in direct alignment with USDA Dietary Guidelines (USDA & USDHHS, 2010). In addition, participants rejected fast food franchises as a normal restaurant option with two participants reporting eating only as an occasional meal option. This particular result contradicted the NHANES Survey which reported 36.3% of children and adolescents consumed fast food on any given day (Fryer et al., 2020). Given that there is a direct link between education and better health behaviors (Corry et al., 2019), it is not surprising that military spouses with higher education achievements than civilians in this study and on average (DOD, 2018a) would vocalize and practice healthy behaviors. Therefore, the abundance of healthy responses in food choices may indicate significant health education among this particular population or a social desirability bias. Further studies are required to determine this distinction.

Physical Fitness

Results suggest that physical activity is a part of everyday life for the military child and the entire military family unit. Since a child's physical activities and sedentary actions are influenced through modeling (Edwardson & Gorely, 2010; Grimm et al., 2004), the promotion of an active lifestyle within the military environment and need to be like "dad" were consistently reported. Findings suggest that the physical fitness requirements placed on the active duty parent by the military outlined in DOD Directive (2005, February) and support mechanisms play a significant role in the physical fitness habits of, not only the active duty service member, but their military child(ren).

Military Impacts

This theme provided the most significant results. Policies impacting the active duty service member have a profound effect on their families. Military policies, including commissary, community layout, physical fitness emphasis, and military community resources, protect against while food court options, military moves, and frequent changes pose harmful influence on overweight and obesity in the military child.

Food Options

Results showed that the commissary provides healthy options at reasonable prices and eliminates food insecurity in this population while the food court disparages healthy eating. This study supports the findings in another study (Friedman School of Nutrition Science & Policy, 2019) where efforts to improve food provisions on military installations have achieved only minimal success. Although participants did not eat at the food court consistently, they reported a desire to have access to healthier options to improve dietary behaviors outside the home. The results from this study and past research show healthy food access and consistent messaging need to be improved to support healthy eating behaviors for the military child.

Military Moves

Results revealed that the most significant determinant of military child overweight and obesity found was the military permanent change of station resulting in decreased healthy eating and physical fitness activities and increased sedentary behaviors during the 6-9 month pcs cycle. The findings confirmed other studies who reported pcs cycle as the most critical period for overweight and obesity behavioral determinants (Morgan, 1991). Moving more times by age 18 than most people do in their lifetime, the military child moves every 2-3 years with 3-4 month notice (National Military Family Association, 2020). As in other studies (Morgan, 1991), the findings confirmed pcs moves significantly influences, making this 6-9 months the most harmful to their wellbeing and most critical period for overweight and obesity influence.

Deployments

Results showed that the military child exhibited little to no adverse reactions and, in some cases, positive changes on the deployment determinant of military child overweight and obesity regardless of deployment duration. These findings contradicted earlier studies citing deployments lasting longer than six months have a negative impact on the physical fitness and emotional health of the military child (Nansook, 2011). It also disagrees with studies showing children and adolescents living in single parent homes eat fewer fruits and vegetables servings and are more likely to be overweight or obese (Formisano et al., 2013; Byrne, et al., 2011; Stewart, 2007). Ranging from 6 to 15 months with operations in various unstable locations, including Iraq, Afghanistan, Cuba, Kosovo, and unknown, deployments noted by the participants were vast in numbers and considered such an ordinary occurrence that some participants lost track of deployment numbers. Responses suggest that deployments have become so common that the family members have honed their coping and resiliency skills with military community

resources to support, protect and create a solid, consistent family structure potentially negating this former predictor of overweight and obesity in the military child (Hunsberger, 2014).

Institutional Level

Finally, the study did not provide any significant information on the influences of the institution level of the social-ecological model on overweight and obesity in the military child. Interviews provided only simple responses to school and peer related questions. Parents were unable to demonstrate depth of knowledge or awareness of external health choices made by the military child. Therefore, an interview directly with the military child may have been a better practice to acquire valuable information not understood by the parent.

Delimitations

Delimitations for the study were as follows:

1. The study sample was delimited to civilian parents of Army children.
2. The sample population must be at their current duty station more than one year and not involved in a transition at the time of the study.
3. The age range for the study was civilian mothers of Army children 6-17 years of age.
4. The time frame for the study was February-October 2020.

Limitations

Similar to most epidemiological studies, limitations in research are common. The most notable limitation of the subject matter is the parent reported age, height and weight as well as the health behaviors of the military child. Shield et al. (2011) emphasized that height and weight data provided by a parent was less accurate with bias than information obtained in the clinical setting. This type of reporting was the only available option at the population level and has been proven useful in categorizing and creating meaningful associations.

Other limitations for the study were as follows:

1. The study was limited to Army families. *Other branches need to be explored.*
2. The study was a sampling. It is not a representative of all civilian mothers of a military child(ren). The consequence is no recommendations can be made from the results. Additional studies will need to be executed.
3. The study may have selection bias and may not be representative of the population intended to be analyzed.
4. The cross-sectional study may have bias.
5. The sample was self and parent reported data; therefore, the results may be biased or dishonest.
6. The length of the interviews may have been a deterrent for accurate and extensive answers.
7. The coronavirus pandemic happened during data collection. This change may or may not impact health behaviors.

Assumptions

Assumptions for the study were as follows:

1. Participants answered the interview questions with honest answers and accuracy.
2. Participants easily understood the interview questions.
3. The questionnaire was reliable and valid to obtain study results.
4. Participants adhered to the time at duty station restrictions.

Resonance and Usefulness

The goal of this research was to deepen knowledge to the health community and provide a catalyst and instrument for future research. By upholding the standards of the outlined

methodology the research provided usefulness and resonance to both the research and health communities. The study originated from an inquiry posed to the Strategic Studies Group at the Army War College in Carlisle, PA. The representative stated a study on the overweight and obesity behaviors of military children would be useful to the Army. Therefore, this study was deemed useful and would provide resonance within the healthcare and military communities.

Conclusion

The goal of this study was to expose and advance knowledge involving the multiple level behavioral determinants of military child overweight and obesity behavior. Military child overweight and obesity behaviors are impacted by consistent confrontation of multi-level social-ecological factors. The strongest influencers were food choices, physical fitness activities, and military impacts.

PCS military moves had the most significant influence on military child overweight and obese behavioral determinants. Results showed a reduction in healthy eating and physical fitness activities and an increase sedentary behaviors for the military child throughout the 6-9 month pcs cycle (preparation, execution, and reintegration). Clearly, this disruption is the most critical time period for the strongest influence for overweight and obesity in the military child. These interruptions in positive health behaviors occur despite the best community efforts. As moves to different duty stations are a way of life in the military, it behooves military leaders to seek out opportunities for improvements.

The most interesting outcome of the study was the little to no change, and in some cases, positive health behaviors of the military child and family unit during deployments, regardless of duration. This conclusion contradicts prior research and literature. In some cases, it propelled military spouses and their military child(ren) to set health goals and attain them while their

military member was away. In the words of one of the parents, “staying busy kept them (the military child(ren) resilient”.

In addition, the impact of physical fitness training by the military had a positive secondary effect on the military child by modeling the correct way to exercise and achieve physical fitness. The military, as an organization, supports the military child by providing and promoting supportive social and health policies and programs within a safe, walkable environment. This unique setting is conducive to creating and maintaining healthy behaviors for all military family members.

Although the research did not provide a straightforward cause and effect of military child overweight and obesity, it did provide the thoughts and perceptions from the involved participants at a moment in time, was recorded for posterity, and reported in hopes that further research can be supported. The focus was on investigating the main drivers of obesity and increasing the understanding of the associated social-ecological determinant levels, thus leading to targeting primary prevention options rather than just treating the disorder (Guh 2009; McKinnon, 2009, Pratt, 2008; Hedley, 2004; Wang & Patterson, 2002).

The results demonstrated how obesity relates to specific behavioral determinants that can be used to develop strategies. The study serves as a catalyst for the development of focused strategies and courses of action to enable our military leaders to improve resiliency and support healthy intervention platforms for military families. In an era where we have, as a nation, been deploying our servicemen and women for the last two decades, providing a stable, responsive environment for a soldier’s family left behind is one key to readiness. The knowledge gained provides building blocks for future studies using the multiple level of the social-ecological model

for health promotion within the military communities, the Army as a whole and potentially civilian communities.

CHAPTER VI

Future Research

As the child obesity epidemic shows no sign of diminishing, the child overweight and obesity phenomenon continues to require special attention to understand its complexities, provide rigorous program evaluations, and develop new multiple level interventions that counter the lasting effects (Leroux et al, 2013). As the literature review points out, the use of individual causes continues to receive most of the focus; yet, a multi-level approach would improve identification (Wieringa et al., 2008). The use of the social-ecological model provides an opportunity to target health behaviors on different levels (Simon et al., 2014) and address not only common individual behaviors but also how biological and environmental influences healthy behavior (Wieringa et al., 2008).

Studies involving military children are advantageous given the stable socioeconomic nature and diverse racial makeup of the military family. In addition, the research opportunities supported by the Military Health System have distinct advantages, such as universal healthcare, electronic medical records, and individualized patient centered care, for active duty members and their families (Terre, 2008). Even with all these advantages and published DOD costs associated with the treatment and interventions of military child obesity (Tanofsky-Kraff et al., 2013), significant gaps in prevalence, current weight management programs, and intervention research of overweight and obesity still exist and in need of further research (Lamson, 2015; Tanofsky-Kraff et al., 2013).

Although the military child population has similarities to their civilian counterparts, this unique group bears distinct differences, including stressors, living conditions, access to healthcare, and transient lifestyles. The stressors, especially maternal, due to the transient and

transitional military lifestyle are worth investigating and could have a profound effect on overweight and obesity. Research deemed efficacious for the military population will require adjustments for effectiveness among civilians. Researchers embedded and/or familiar within the military culture will prove more fruitful in navigating the challenges associated with working in this unique population and more competent in addressing their complex differences.

When researching weight management intervention, frequent personnel moves need to be considered when creating and administering weight management programs. Healthcare providers are fundamental to this support. Previous research supports the need for enhanced training in obesity prevention, interventions and evidence-based weight management programs of primary care physicians (Terre, 2008). The military healthcare system is strategically postured to examine child obesity and provide lessons to the wider civilian medical community.

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APPENDIX A

Operational Definitions

The operational definitions in this study are provided to explain terms used.

Acculturation: Psychological enslavement resulting from imposing one's culture to another

Adioposity: Fat

Adiposity Rebound: Increase in body mass index that occurs after it reaches its lowest point (indicator to predict obesity in adults) 5-7 years of age when body fatness normally declines to a minimum

Adolescent: An individual 12-19 years of age development from a child into an adult

Antropometric: Relationship between various body measurements (height, weight, percentage of body fat, et.) and medical outcomes.

Body Mass Index (BMI): Standard anthropometric measurement used to determine overweight and obesity in body mass cut points

Childhood obesity: Condition in which a child is significantly overweight for his or her own age and has a body mass index of over the 95th percentile

Elucidate: Explain or make clear

Epidemiological: Branch of medicine dealing with incidence, distribution, prevalence and control of disease in large populations

Physical activity: Any voluntary bodily movement that requires expending energy

Permanent change of station: Assignment, detail, or transfer of a Armed Forces member to a different duty station under competent orders which neither specify the duty as temporary

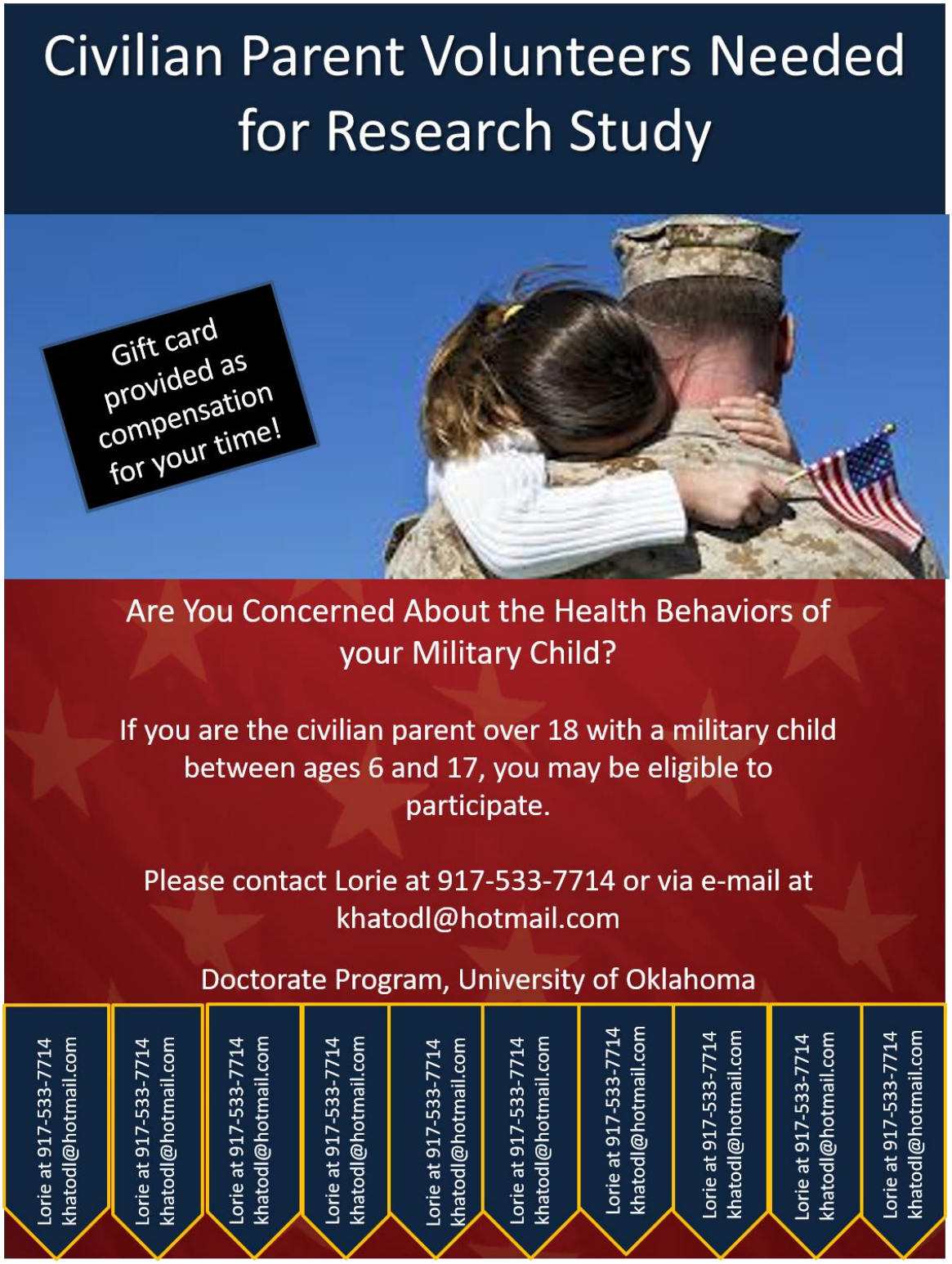
School age child: Individual 6-11 year of age development into adolescence

Sedentary: Little or no activity

Soldier: Active duty service member in the Army

APPENDIX B

Participant Request Flyer



APPENDIX C

Oral Consent Script

Good morning/afternoon/evening. Would you be interested in participating in a research project I/we are conducting at the University of Oklahoma? I'd like you to participate because you are a civilian parent over 18 years of age of a military child between the ages of 6 to 17. I am conducting this research project because I am hoping to learn more about the risk factors associated with military child overweight and obesity behavior. About 15 people will participate. If you agree to participate, I will be asking you to share your personal experiences and perceptions of military child overweight and obesity behavior. This interview should take about one hour to complete.

Your participation in this research doesn't involve any direct risks or benefits to you. I will be asking you several specific demographic questions. Your answers, when combined, may make it possible for someone to deductively re-identify you. If you are concerned about this possibility, you can decline answering any or all of these questions. As a way to mitigate deductive re-identification, I will use alias as well as aggregate ranks (Senior Officers, Junior Officers, Warrant Officers, Non-Commissioned Officers, and Junior Enlisted).

As a token of appreciation for your time, you will receive a one-time $20 PX voucher which will be given at the end of the interview.

All of the information I'm collecting will be kept secure and confidential, and only I or the University of Oklahoma – Norman Campus Institutional Review Board will be able to look at it. After removing all identifiers, we might share your data with other researchers or use it in future research without obtaining additional consent from you. If you have any questions about your rights as a participant or any concerns or complaints regarding your participation, you can contact me at 917-533-7714 or loriekhatod@gmail.com, Dr. Jorge Mendoza at 405-325-4568 or jmendoza@ou.edu or OU's IRB at 405-325-8110 or irb@ou.edu.

In order to preserve your responses, they will be recorded on an audio recording device.
Do you agree for your interview to be to audio recorded? _____ (note response)
Do you agree to being quoted directly? _____ (note response)
Do you agree to have your name reported with quoted material? _____ (note response)
May I contact you again to recruit you into this research or to gather additional information? _____ (note response)

Your participation is voluntary. Even if you choose to participate now, you may stop participating at any time and for any reason. Finally, if you would like a printed copy of the information I've just read to you, you are welcome to have this one. Paper information aggregate ranks.

APPENDIX D

Focused Interview Questionnaire

1. Name: Joe March (Female Fictional Characters)
2. Age
3. What is your and your spouse's race?
4. What is your and your spouse's highest education level?
5. What is your spouse's military rank and number of years in service?
6. How long have you lived in the current duty station?
7. Number of children, gender and ages living in your family home.
8. Has your child been diagnosed with any medical condition? Take medications?
9. Weight Status (NSCH Indicator 1.4): What is your child(ren)'s height and weight? (healthy weight 5th-84th, overweight 85th-94th, or obese <95th percentile)
10. Dietary Behaviors (NSCH Indicator: 6.8): Can you describe what your child(ren) normally eat and drink during an average day?
11. Physical Activity Behaviors (NSCH 1.5/ 5.3 Indicator): Can you describe your child's normal physical activity during an average day? Are you active with your child?
12. Sedentary Behaviors (NSCH Indicator 6.10b): Can you describe your child(ren)'s recreational use of computers, cell phones, video games, and other electronic devices?
13. Peers Behaviors: Can you describe your child(ren)'s peers behaviors regarding eating, physical fitness, and sedentary behaviors?
14. Schools (NSCH Indicator 7.3): Can you describe your child(ren)'s eating, physical education, health and extra-curricular activities at their school?
15. Religious Environment: Do you attend church/temple/etc.? Can you describe your child(ren)'s eating and physical activities at church/temple/etc.?

16. Child Health Status (NSCH Indicator 1.1): How would you describe your child's health? Are you concerned about your child(ren)'s health? health behaviors? weight?
17. Maternal/Paternal Physical Health Status (NSCH Indicator 6.1): Can you tell me about your and your spouse's diet? exercise regime?
18. Neighborhood (NSCH Indicator 7.1/ 7.2/ 7.4): Do you live on a military installation? How would you describe your neighborhood? (Probe for safety, supportive neighbors, amenities, including sidewalks, walking paths, parks, and recreation centers) Do you shop in the local commissary? Does your family eat in the food court?
19. Military Lifestyle: Can you describe how the military helps or hinders a healthy lifestyle for your child(ren)? How many times has this child moved to a new address since he or she was born? Can you describe how a move changes your family's health habits? How many times has your soldier deployed? (probe for child's dietary, physical activity and sedentary behaviors)

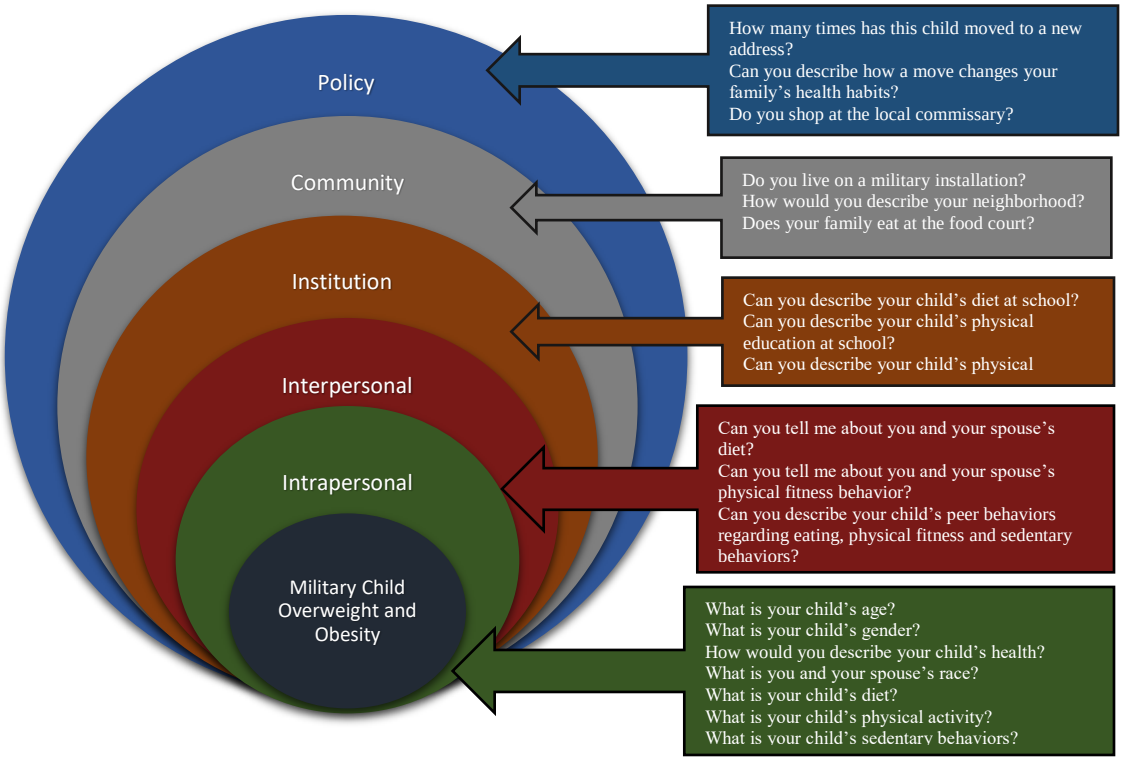
    *What was the duration of the deployment(s)? Does your or your child(ren)'s diet change? Does your or your child(ren)'s physical fitness activities change? If so, what is the reason for the change?
20. Are there factors in your child's life that would increase stress?
21. Is there anything that you would like to add regarding your child(ren)'s health before closing? (Probe for other factors that might lead to stress)

* *Additional questions resulted from emergent findings during the interview process*

  Some questions noted above were gleaned from the National Survey of Children's Health (NSCH) or National Health Interview Survey (NHIS) for review and future research.

APPENDIX E

Question Breakdown by Behavioral Determinant by Social Ecological Model



APPENDIX F

IRB Approval Letter



Institutional Review Board for the Protection of Human Subjects Approval of Initial Submission – Exempt from IRB Review – AP01

Date: May 08, 2019 **IRB#:** 10677

Principal Investigator: Lorie Khatod **Approval Date:** 05/08/2019

Exempt Category: 2

Study Title: A QUALITATIVE STUDY INVESTIGATING THE SOCIAL AND ECOLOGICAL DETERMINANTS THAT INFLUENCE MILITARY CHILDHOOD OVERWEIGHT AND OBESITY BEHAVIORS

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,



Ioana Cionea, Ph.D.
Vice Chair, Institutional Review Board