

EXAMINING THE AMOUNT OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR  
AMONG ADOLESCENTS IN AL-JAHRA CITY, KUWAIT

By

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To my late valuable and precious father, Matroud Dawai Al-Shammari, may Allah accept you among the forgiven, my dear beloved mother whom I shall always be grateful to for her relentless support and supplication, my dear Bader for his support as well as my brothers: Bandar, Dabous, Humoud, Naser, Mansour, Nasaar, Mane, and Sulaiman. I want to dedicate this to all my dear sisters as well: Seeta, Wadhha, Shqhah, Fatemah, Shekhah, and Moudi who supported me and encourage me to succeed. I want to dedicate this to dear wife Layla Alshammari for being there for me at all times, my child Salman, my precious nephew Naser and beloved friends Musaad Alenzi and Mohammed Altaisi.

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## ABSTRACT

Being active has been shown to improve physical ability and health. Greater health benefits accompany physical activity (PA), and being active has been proven to help address many diseases that adolescents face as they grow and develop (U.S. Department of Health and Human Services [USDHHS], 2008). The purpose of this study was to examine the physical activity and sedentary behavior levels of the adolescents in Al-Jahra City, Kuwait. Specifically, this study examined the relationship between gender, physical activity, sedentary behaviors, and BMI using particular conceptual frameworks, as well as brought attention to certain behaviors based on Theory of Planned Behavior (Fishbein & Azjen, 1975). A 20-item International Physical Activity Questionnaire Questionnaires (IPAQ-S) and National Youth Risk Behavior Questionnaires (NYRB-S) questionnaires was used to identify Kuwaiti's adolescents physical activity and sedentary behavior levels. The sample consisted of 682 participants (89 control group and 593 experimental group) , in 10<sup>th</sup>, 11<sup>th</sup>, and 12<sup>th</sup> graders, in the age range from 15 to 19 years, from 8 high schools in Al-Jahra City, Kuwait. The total number of participants was 1,145 high school students divided into two groups; the control group there was 165 students and the experimental group there was 980 students.

Results indicated that for both genders, more than 50% had a low level of physical activity and males tended to have higher levels of activity than females. In addition, the study found that the time spent daily for both genders in sedentary behaviors was greater than 7.6 hours, and more than 60% of the adolescents were sedentary for more than 4 hours a day. Moreover, the study showed sedentary behavior, time spent watching television, and time spent on the computer, were not significantly related to BMI in males or females, but this should be studied further. This research was framed within the context of the Theory of Planned Behavior in order to elaborate on the relationship between survey responses for the last seven days and the

plans for following seven days. The results indicated only one significant variance between the control group and the experimental group. There was a substantial difference on only one of the ten questionnaires questions: the question that concerned plans for attending physical education classes. This could be due to the limited spaces of practicing or engaging in physical activity in Al-Jahra City (Al-Kandari, 2006). Therefore, adolescents' need for physical activity during their free time has been particularly important in Kuwait. There have been many changes in the culture and social life, some of which led to the sedentary lifestyle of Kuwaiti adolescents.

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## CHAPTER I: INTRODUCTION

Being active has been shown to improve physical ability and health. Greater health benefits accompany physical activity (PA), and being active has been proven to help address many diseases that adolescents face as they grow and develop (U.S. Department of Health and Human Services [USDHHS], 2008). In the last two decades, there has been an increase in the incidence of both overweight young people and diabetes; many countries are now looking for solutions to help young people achieve well-being (Centers for Disease Control and Prevention, 2011). Two countries in particular, the United States and Kuwait, have each seen dramatic increases in the rate of obesity and diabetes in young people (Al-Isa, Campbell, & Desapriys, 2010; Centers for Disease Control and Prevention, 2011). Past studies have shown that physical inactivity and the prevalence of sedentary lifestyles were leading contributors to this epidemic. Sedentary behavior and physical activity are two independent behaviors. Recently, more research has been done to hypothesize that sedentary behavior correlates with a lack of physical activity or a single behavior (Gorely, Marshall, & Biddle 2004; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011). Al- Isa *et al.* (2010) and the Center for Disease Control and Prevention (2011) recommended increasing the level of physical activity, which can play a vital role in reducing sedentary behavior, and consequently, the risk of contracting diseases caused by a lack of physical activity.

The major goal of regular physical activity has been to develop health and wellness, provide health benefits, and to be pleasurable for the participant (USDHHS, 2008). A secondary goal has been to create an atmosphere that will encourage young people to engage in activities and keep them active in attempt to make them healthier. Many young people have participated in physical activity when they were encouraged to join in activities such as competitive team sports

or culturally respected games. These activities ensured participation among young people because that age group is more apt to repeat actions. At that age, adolescents' observance at individual levels is low and group culture influences their participation and overall commitment to physical activity.

An extensive review of the literature on physical activity levels and sedentary behavior indicated that regular physical activity is imperative to maintain health. The review covered the definitions of physical activity and sedentary behavior. Physical activity, according to the U.S. Department of Health and Human Services (USDHHS, 2008), can include any bodily movement that can help reduce risks of chronic diseases, and incorporates the three components of volume, intensity, and frequency. Conversely, sedentary behavior as defined by Mark, (2009) includes activities, such as reading or screen viewing, in which little energy is being expended and the body remains close to resting levels.

These definitions led us to identify the importance of physical activity, particularly for adolescents, who, according to the American Heart Association guideline (2013), need to participate in physical activity for a minimum of 60 minutes of moderate and vigorous intensity daily in order to obtain full health benefits. Regular physical activity can help adolescents prevent diseases they could face once they get older (USDHHS, 2008). It became evident that adolescents and youth needed to be encouraged to increase the amount of physical activity in which they participate. Healthy People (2010) claimed that an increase in physical activity was needed in order to help adolescents establish healthy lifestyles. Health and fitness patterns can play a vital role during the course of an individual's life by lasting through adulthood.

The world's current status of physical activity showed that the majority of people worldwide do not follow Healthy People's (2010) and the World Health Organization's (WHO,

2013) recommendation of 60 minutes of moderate to vigorous intensity physical activity a day. This has dramatically impacted the health status of people around the world, as 1.9 million preventable deaths happen each year due to insufficient physical activity (WHO, 2013). A cross-cultural analysis of the current status of physical activity showed evidence of physical activity levels among countries, such as the United States, the United Kingdom (U.K.) and Europe, countries in the Middle East, and finally, Kuwait. Kuwait was explored in more depth because it is the central focus of this study, and the cultural issues of gender differences and physical activity rate among adolescents have been explained.

Focusing on physical activity and sedentary behavior in Kuwait showed a conspicuous lack of information on Kuwaiti physical activity levels among adolescents. No studies have been conducted to examine the levels associated with Kuwaiti adolescent physical activity, which left gaps to be filled in determining overall health in adolescents. As shown by Kuwait's Ministry of Health report in 2008, no data exists on the activity levels of Kuwaiti youth. There are currently very few studies that have examined the amount of sedentary behavior among Kuwaiti adolescents (Al-Haifi, Al-Fayez, Al-Athari, Al-Ajmi, Allafi, Al-Hazzaa, & Musaiger, 2013). This particular study helped to guide our research needs and recommended further research concerning correlations between sedentary behaviors and health risks.

Using the Theory of Planned Behavior as the framework, the designer of this study has examined the extent to which Kuwaiti adolescents engage in regular physical activity as opposed to sedentary activities, such as watching television and using the internet. This study has additionally helped address how adolescents spend their time in physical activity. The Theory of Planned Behavior was chosen due to its effectiveness at raising participants' individual awareness to their behaviors. This study sought to understand how adolescents spend their time

during physical activity in Kuwait as recommended by several previous studies (Al-Haifi, *et al.*, 2013; Al-Isa, Campbell, & Desapriys, 2010; Al-Kandari, 2006). Furthermore, gender has been explored as a possible predictor of physical activity level or participation in sedentary behavior, and particular behaviors based on age were identified. Central to this study was the connection between physical activity and sedentary behavior, as well as an examination of the effect of sedentary behavior on BMI in adolescents.

Due to Kuwait's lack of data on physical activity based on the Kuwait Ministry of Health report in 2006, this study has provided the foundation of information on the amount of physical activity among adolescents in Kuwait. The purpose of this study was to identify the levels of physical activity and sedentary behavior Kuwaiti adolescents engage in each day. The research instrument combined the International Physical Activity Questionnaire Questionnaires (IPAQ-S) short form and the National Youth Risk Behavior Questionnaires (NYRB-S) (10 questions). Seven questions were taken from the IPAQ-S, and three questions were taken from the NYRB-S. The reliability and validity of the NYRB-S questionnaire has been assessed by several studies (Lee Paul, Macfarlane Duncan, Lam, & Stewart Sunita, 2011; Al-Hazzaa, 2007). Furthermore, using the IPAQ-S and the NYRB-S has enabled the researcher to get accurate information about adolescents' levels of both physical activity and sedentary behavior, and the IPAQ-S has likewise proven to have high validity and reliability levels (Marmeleira, Laranjo, Marques, & Batalha, 2013). Self-reporting methods have often been used to establish behaviors and understand the subjective norm for certain demographics and was particularly helpful for finding the foundation of normative health behaviors among adolescents in Kuwait. The participants answered 10 questions about their levels of physical activity during the last seven days and ten more about how they planned to spend time in physical activity and sedentary behavior in the

next seven days. This study used a sample of Kuwaiti adolescents in high schools from the district of Al-Jahra City, segregated by gender, to determine physical activity levels and time spent in sedentary behavior. In each school there were eight classes. There were two groups in each school, a control group and seven experimental groups. The experimental group received a fact sheet in between the two sets of questions on global and Kuwaiti health issues to determine if it encouraged them to change their behaviors.

## CHAPTER II: LITERATURE REVIEW

The literature reviewed in this section has first defined physical activity and sedentary behavior. A further review of the literature addressed the importance of being physically active, as well as the importance of increasing physical activity to improve health and fitness and the current status of physical activity. The current status of physical activity has been expanded on to include a cross-cultural analysis of physical activity levels. This was followed by identifying the impact of sedentary behavior. Finally, this study has examined Kuwait's relationship with physical activity and sedentary behavior, with an emphasis on adolescents, gender differences, and cultural issues among physical activity.

### **Physical Activity Definition**

Physical activity (PA) encompasses any bodily movement that can aid in reducing the risk of chronic diseases, such as diabetes and cardiovascular disease, and can lower the individual's chances of becoming obese (USDHHS, 2008). Promotion of health and well-being through physical activity can be defined in terms of any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above basal level, enhances health, and produces health benefits (USDHHS, 2008).

The definition of physical activity further embraces three components: volume, intensity, and frequency. By utilizing all three components of physical activity, the body will become healthier and stronger. According to the USDHHS (2008), the first component, volume, was determined by the lowest number of minutes individuals should spend in engaging in physical activity in every day, which happens to be 60 minutes. In accordance with the USDHHS, The American Heart Association guideline (2013) also recommended that children, adolescents, and

adults participate in at least 60 minutes of physical activity daily. Frequency was described by the number of times per day or week that people should engage in physical activity. Intensity referred to a person's energy expenditure in physical activity, such as low, moderate, or vigorous physical activity. Physical activity can be analyzed by mechanical, physiological, and behavioral aspects. The mechanical aspect of physical activity is measured by the work, power, force acceleration, and velocity that the body employs while in activity. The physiological aspect refers to the body's energy expenditure. Behaviorists examine types and context of physical activity (Malina Bouchard, Bar-Or, 2004).

Moreover, investigating physical activity can reveal the relationship between preventative care for obesity-related diseases and different environments for health behaviors. All individuals can benefit from physical activity despite their demographic, but it is especially imperative to examine physical activity behaviors in adolescents so that they can transfer physical activity behaviors into adulthood. According to De Bourdeaudhuij (1998), investigating the impact of physical activity among adolescents from a public health perspective is not a new practice. In addition, De Bourdeaudhuij (1998) found that the main justification for emphasizing physical activity patterns in children and adolescents are:

Not all children exercise enough for health (Armstrong, Balding, Gentle, & Kirby, 1990; Davies, 1992; Kemper, 1994); an awareness that diseases related to sedentariness in adults, such as obesity, cardiovascular problems, osteoporosis and some types of cancer, originate in childhood (Frerich, Webber, Voors, Srinivasan, & Berenson, 1979; Sallis *et al.* 1992); the increase in prevalence of childhood obesity, due to a likely imbalance between energy expenditure and energy intake (Craig, Goldberg, & Dietz, 1996); and the widespread assumption that health-enhancing physical activity patterns in

adults are established in youth (Blair, Clark, Cureton, & Powell, 1988; Simons-Morton *et al.*, 1990; Stucky-Ropp & Delorenzo, 1993). (p.98).

This information provided an incentive to correct childhood obesity and sedentary behavior, as well as increase physical activity among children and adolescents.

Physical activity practices need to be established in adolescents and children. The increasing obesity rate in youth has become rather obvious and calls for immediate attention. Possible solutions have focused on perseverance in life, motivation, and public health promotion, performance quality, and preventive care according to O'Rourke (2011) in order to rectify childhood obesity. On the other hand, researchers in some countries such as Kuwait have distinguished that there are obstacles in showing evidence for clear health-enhancing effects of physical activity. The levels of physical activity in this age group are unknown, which encourages these countries emphasize the importance of knowing about the factors or level physical activity that adolescents engage in. For example, in Kuwait, little is known about how adolescents choose to spend their time or if they participate in physical activity regularly (Kuwait's Ministry of Health, 2008). To date, no studies have been done on the predictors of adolescents' physical activity, which led to lack of information and demanded an investigation on how physical activity affects a substantial portion of the Kuwaitis' youth population.

Finally, the definition of physical activity led us to many pathways connecting with how children's, adolescents', and adults' physical activity progresses throughout their lives. This process has firmly established health outcomes (Malina, 2001). Being physically active in adolescence affects not only immediate health and fitness but also later health in adulthood by establishing patterns of healthy behavior that follows the adolescent as they grow and by decreasing their risk for chronic diseases (Hallal, Victora, Azevedo, & Wells, 2006). There have

been hypotheses on the direct effects of adolescent physical activity correlating to adult health (Malina, 2001), but they have yet to be researched (Sacker & Cable, 2005). In addition, defining physical activity and its components validated adolescents' perspective and the imperative necessity to understand how

physical activity affects physical fitness. By participating in physical activity, adolescents can achieve fitness, health, and wellness (Corbin & Lindsay, 2005).

### **Sedentary Behavior (TV/Internet) Definition**

In the current literature on health and physical activity, sedentary behavior patterns in adolescents have become a primary focus. So much so, that Healthy People 2020 set forth the goal to increase “the proportion of children who view television two or fewer hours per day to 75%” (Healthy People, 2011). The American Academy of Pediatrics had a similar objective, recommending that adolescents should limit time to watch television to two hours or less daily (Baker, 2013). To clarify, sedentary behaviors are activities in which there is little energy expenditure and the body remains close to resting levels (Mark, 2009). These activities include reading, screen viewing, listening to music, and talking on the phone. So, the definition of sedentary behavior in study focusing only in the two categories time spent watching TV and using internet.

Dietz (1996) observed that negative effects of sedentary behavior got less public attention than the positive effects of vigorous physical activity, despite the fact that they are equally important aspects of health. However, merely identifying “sedentary” behavior has been difficult due to the many uses of the word. Saunders (2014) explained that the definition of the word “sedentary” has historically undergone transformations to be applicable to certain circumstances. Saunders (2014) further explained that at its conception, the Latin root of the word “sedentary”

denotes sitting. In accordance with that behavior, the word has traditionally been used by many health organizations, researchers, and articles to identify an individual who is not adequately physically active.

Likewise, using the term sedentary has influenced individual peoples' lifestyle which is characterized by individuals who participate in physical activity infrequently or not at all. As a result, researchers frequently classified individuals as sedentary by their physical inactivity as opposed to time spent literally sitting. Nonetheless, contemporary research (Carson & Janssen, 2011; Colley, Garriguet, Janssen, Saunders, Carson, Wong, *et al.* 2013; Taleb, 2012) determined that sedentary behavior ("sitting too much") and not engaging in physical activity are isolated but equally significant risk factors for chronic illness, such as cardiovascular disease, diabetes, and obesity. Moreover, an adolescent can simply meet physical activity guideline recommendations (60 minutes of vigorous intensity physical activity a day) while still seated for the majority of the day. Saunders (2014) described the relationship between sedentary behavior and physical activity (Figure 1). The shifting parameters of physical activity and sedentary behavior have mandated consideration of using "sedentary" to only discuss those activities that are done while seated or reclined and require little energy expenditure.

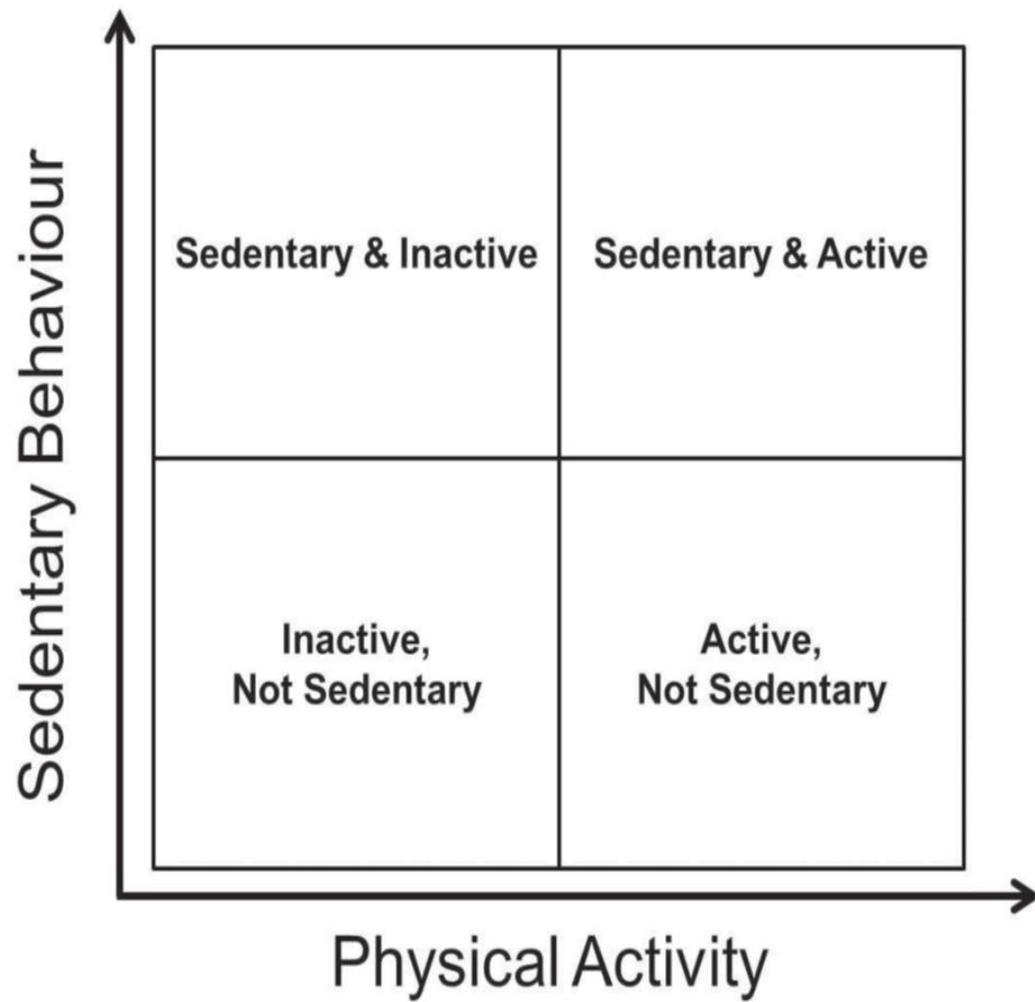


Figure 1: Sedentary Behavior and Physical Activity as Distinct Constructs (Saunders, 2014)

Finally, the word “inactive” in the instrumentation was used to determine individual adolescents who did not follow the guidelines and were insufficiently physically active in order to refer to the levels of sedentary adolescents engaged in. Al-Nakeeb *et al.* (2012), identified almost the same findings of the relationship between physical activity and using the computer in their cross-cultural study between Saudi and British adolescents. An adolescent who chooses to spend leisure time in physical activity conversely spends less time using the computer. Lancet Physical Activity Series Reports (2012); predicted that physical activity will be a decreasing trend in contrast to an increasing trend in using technology in correlation to global technological progress. Because many adolescents do choose to spend their leisure time screen viewing, sedentary behavior has become one of the largest barriers to physical activity (Al-Nakeeb, *et al.* 2012).

### **Importance of Physical Activity: Benefit Exercise of Physical Activity**

There are numerous benefits to physical activity. The U.S. Department of Health and Human Services (2008), reported that physical activity helps reduce the risk of developing obesity and chronic diseases such as diabetes and cardiovascular disease. According to the Center for Disease Control and Prevention (2010), during the past 20 years there has been a dramatic increase in obesity in the United States. Thirty-three states had a prevalence of obesity equal to or greater than 25%; nine of these states (e.g. Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Missouri, Oklahoma, Tennessee, and West Virginia) have seen obesity levels equal to or greater than 30%. This result coincided with Kuwait's study that showed 40- 46% of Kuwaiti adolescents aged 10–19 years old are overweight or obese, which was recorded as the highest prevalence in the world (Ng, Zaghoul, Ali, Harrison, & Popkin, 2011). These results indicated the need and importance of physical activity in society.

Engaging in physical activity can enhance the benefits to adolescents and society as a whole. For example, exercise as a form of physical activity has given young people an opportunity to be active, control their weight, and teach them the skills they need to be active throughout their lifetime. Exercise also helped teach adolescents about the importance of daily physical activity and how it can help prevent heart disease and stroke by strengthening their heart muscle. They can learn about their bodies and exercise through activities that can help them grow to be healthy adults (U.S. Department of Health and Human Services, 2008).

Since the last two decades, the benefits of an active lifestyle for the health of individuals and nations have been increasingly emphasized (Healthy People, 2010; Malina, 2001). Many researchers have discussed the importance of increasing and encouraging young people to practice physical activity because that will help them address many diseases that they face as

they grow older (USDHHS, 2008). In addition, The American Heart Association guideline (2013) recommended that young people participate in physical activity at the moderate or vigorous intensity level every day for at least an hour. The rationale behind the 60 minutes of exercise was that physical activity prevents them from having the major risk factor for rising coronary artery disease and becoming overweight. Also, increased physical activity has been connected with an increased life expectancy and decreased risk of cardiovascular disease. Physical activity has produced overall physical, psychological, and social benefits. Physically active adolescents have been likely to become physically active adults.

The USDHHS (2008) discussed the importance of participating in regular physical activity for adolescents. They found a positive relationship between regular physical activity and health among adolescents. The National Association for Sports and Physical Education (NASPE) & the American Heart Association (2010) provided an excellent example about correlation between regular physical activity and health among adolescents, claiming that “adolescents who are physically active have vigorous cardiopulmonary and respiratory systems: strong hearts and lungs. They have less body fat. And they have strong bones and muscles” (p.3).

According to The American Heart Association (2010), physical activity has had many benefits for adolescents that carry on into adulthood. First and foremost, it helped with controlling weight and reducing blood pressure. In addition to these benefits, it played a critical role in reducing the risk of diabetes and some kinds of cancer. Lastly, physical activity improved psychological wellbeing, including gaining more self-confidence and higher self-esteem. All these benefits are indicated by Malina, (2001) who showed that the importance of engaging in regular physical activity during, “adolescence, which continues into and throughout adulthood,

for the health and well-being of the individual and the population,” (p.170) is a learned behavior and helps the individual maintain a healthy lifestyle.

### **The Importance of Increasing Physical Activity to Improve Fitness and Health**

Increasing the amount of physical activity has been one of the most important ways that helped youth and adults have a healthy lifestyle while decreasing the prevalence of weight gain and obesity (Centers for Disease Control and Prevention, 2011). Increasing physical activity has improved fitness and health for all ages, especially adolescents. Adolescent health is particularly relevant, because not only do these patterns carry on into adulthood, they can also create a new generation of health-conscious individuals. Healthy People (2010) promoted that an increase in physical activity can play a vital role in helping adolescents establish healthy lifestyles.

Establishing health-related physical activity habits early in life is important for increased lifetime fitness (i.e., aerobic capacity, body composition, muscular strength and endurance, and flexibility), especially during adolescence, as mentioned in Morrow, Tucker, Jackson, & *et al.* (2013). A focus on health enables the growing adolescent population to not only establish healthy habits, but to indoctrinate the next generation with values on healthy lifestyles and construct a healthier society in the future.

The youth’s need to be healthy has recently increased the importance of physical activity. Physical activity has typically not been a component of the adolescent’s day due to engaging in many sedentary behaviors (e.g. video games, computer, and watching movies) that tended to capture the adolescent’s interests as opposed to regularly engaging in sports or exercise (Papastergiou, 2009). These factors can cause many health problems in the long run. From that, the necessity of making adolescents participate in regular physical activity and increasing the

physical activity to prevent them from any health problems in the future has been understood to be imperative.

The U.S. Department of Health and Human Services, (2010) noted that a physically active lifestyle is vital for health and wellness, along with maintaining physical activity. That indicated how regular physical activity and exercise are fundamentally important for the health and wellbeing of people of all ages. In the last two decades, many researchers have noted that the physical inactivity is a key causal factor related to the prevalence of obesity (Pangrazi, 2004). The recent perspective on physical activity was that it decreased the risk of mounting obesity and chronic diseases such as diabetes and cardiovascular disease, which also offered opportunities to ensure that fitness becomes part of regular healthy behavioral patterns. Therefore, increasing physical activity for adolescents promoted strength and flexibility. These benefits are particularly important for adolescents because physical activity may protect them against many diseases and encourage them to incorporate in regular exercise. A good quality of life means being able to effectively perform the activities of daily living, and these habits can transfer into adulthood.

Additionally, increasing physical activity has many benefits for adolescents in developing physical and mental health, but recent research from Carlson, Fulton, Lee, Maynard, Brown, Kohl III, & Dietz, (2008) suggested that it may help the adolescent develop motor skills more effectively, as well as may lead them to spend more time actively, which will develop their physical capabilities and increase knowledge about health. Increasing physical activity can impact adolescents' health by keeping them active, which prevents them from being obese. Furthermore, the USDHHS (2008), suggested that regular physical activity in children and adolescents promotes a healthy body weight and body composition. That means that regular physical activity can offer an excellent chance to reduce the obesity level around the world.

Obesity now is one of the biggest global problems and is prevalent in countries such as the USA and Kuwait. Studies called for a solution to the obesity epidemic through physical activity and propose that making exercise a societal priority can even contain obesity (Al-Isa, Campbell, & Desapriys, 2010).

### **Current Status of Physical Activity**

Investigations on physical activity patterns in adolescents are ongoing in many countries, including the United States and Kuwait. Recently there has been an increasing interest in adolescent health and health care services to determine how to improve overall wellbeing within that demographic (Al-Qallaf Al-Otaibi, & Heyam, 2012). This interest made participating physical activity in adolescents' free time essential to improving their health. Many organizations (e.g. Healthy People, U.S. Department of Health and Human Services, The American Heart Association, National Association for Sport and Physical Education) have asserted that there are challenges ahead in physical activity. One of these challenges was increasing the rate and frequency of physical activity among youth, adolescents, and adults.

In the United States and Kuwait, there have been many problems, such as obesity and chronic illnesses, to address in order to increase the amount of physical activity. One of these problems was the current level of physical inactivity. The lack of physical activity was partly due to insufficient participation in physical activity. According to the American Heart Association's and the American Stroke Association's -Statistical Fact Sheet (2013) 13.8% of adolescents in the United States "were inactive during the previous seven days, as indicated by their response that they did not participate in 60 minutes (as recommended in Healthy People, 2010) of any kind of physical activity that increased their heart rate and made them breathe hard on any 1 of the previous seven days."

In the last decade, many researchers and organizations (e.g. Al-Isa, Campbell, & Desapriys, 2010; American Heart Association, 2010; Malina, 2001; National Association for Sport and Physical Education, 2010; Pellegrini, & Smith, 1998) have studied both how young people spend their time in physical activity and the benefits of being physically active. There is no existing formal data that explains how much physical activity adolescents engage in. The Kuwait Ministry of Health-Nutrition Profile (2006) claims, “data on physical activity among adolescents are not available” (p. 26), and it was evident that more research needs to be done to determine physical activity levels among Kuwaiti adolescents. The Kuwait Ministry of Health-Administration of Food and Nutrition (2006) is lacking crucial data on the degree of physical activity practiced among adolescents.

### **Cross-Cultural Analysis of Physical Activity Levels**

Traditionally, physical activity has been mandatory in the individual’s daily routine by several factors and the demands of different cultures. Staying active and completing necessary tasks for survival were both beneficial for health and physical training. Physical activity played a vital role in reducing the risk of chronic illnesses. There have been more than 1.9 million preventable deaths recorded every year, due to insufficient physical activity (WHO, 2005).

The WHO (2013), asserted that people, regardless of which country they live in, can benefit from moderate-intensity physical activity, such as walking, doing sports, or cycling. Moreover, physical activity has been proven to provide health benefits to all ages when done regularly. Due to the evidence, the World Health Organization recommended that “children and adolescents participate at least 60 minutes of moderate to vigorous intensity activity per day, while adults ages 18 years and older to participate in 150 minutes of moderate-intensity activity per week.”

However, many studies and reports have shown that children, adolescents, and adults do not follow the recommendation and do not participate in physical activity for a sufficient amount of time (Al-Hazzaa, 2002; Centers for Disease Control and Prevention, 2011; Guthold, Cowan, Autenrieth, Kann, & Riley, 2010; Lancet Physical Activity Series reports, 2012; U.S. Department of Health and Human Services, 2012; World Health Organization, 2013). Furthermore, evidence indicated that the amount of physical activity among adolescents 13 years old to 15 in “105 countries” do not meet the World Health Organization’s standards of physical activity (Hallal, Andersen, Bull, Guthold, Haskell, & Ekelund, 2012). International data cited in the Lancet Physical Activity Series (2012) reports, claimed that 80% of 13 year olds and older do not meet the current physical activity recommendations of 60 minutes of moderate to vigorous physical activity per day. Likewise, a comparison study including schoolchildrens (72,845) lack of physical activity and sedentary behavior levels across 34 countries done by Guthold *et al.* (2010) reported that less than two thirds of the schoolchildren actually met public health standards. For example, Egypt had the lowest rate of physical activity with 3.7% of the students failing to participate, whereas China had the highest rates of physical activity, with 84.8% participating.

Moreover, WHO (2013) fact sheets described a decreasing trend in the levels of physical activity across the globe. Internationally, around 31% of adolescents in the age group of 15 and older did not participate in the regular physical activity in 2008, with 28% male adolescents not participating in physical activity and 34 % female adolescents not participating in physical activity as well. In economically wealthy countries, such as Kuwait, Qatar, Malaysia, and so on, 41% of men and 48% of women participated in insufficient amounts of physical activity, whereas only 18% of men and 21% of women in low-income countries were not physically

active. The trend towards low or decreasing physical activity levels typically, though not always, correlated to countries with a high gross national product and economic stability. Insufficient physical activity levels can be attributed in part to leisure time inactivity and sedentary behavior in most settings, such as work, or at home.

### **The United States (U.S.)**

The U.S. Centers for Disease Control and Prevention, Physical Activity Facts (2011) called for adolescents to participate in regular physical activity. The U.S. Department of Health and Human Services-Physical Activity Guidelines for Americans Midcourse Report (2012) claimed that more physical activity is necessary because current reports indicated that adolescents continue to have low levels of physical activity, and those levels significantly decline as adolescents get older. According to the report, levels of physical activity have been low because physical activity is not encouraged in the public school system, and “opportunities for regular physical activity are limited in many schools; daily PE is provided in only four % of elementary schools, eight % of middle schools, and two % of high schools” (2012). The National Youth Risk Behavior Questionnaires (2011), self-reported data showed that 61% of adolescents are not engaging in physical activity for 60 minutes each day and failing to meet the Guideline’s standards. Only 29 percent of high school students met the Guideline’s standards during the seven day questionnaires. The data showed a significant difference in physical activity along gender lines, with males more than twice as likely (38%) as females (19%) to meet the Guidelines. The data also showed that 14 percent of high school students were not involved in 60 or more minutes of physical activity in any capacity during the entire seven day questionnaires. Moreover, another study mentioned in the U.S. Department of Health and Human Services

(2012) research found that 42% of U.S. children and 8% of U.S. adolescents participated in moderate to vigorous intensity level physical activity only five out of seven days for 60 minutes.

### **The United Kingdom (UK) and Europe**

The UK Fact sheet (2011) set guidelines for children, adolescents, and adults to get all of the health benefits of practicing physical activity. The recommendation claimed that people need to participate in physical activity for a minimum of 60 minutes of moderate and vigorous intensity daily in order to obtain full health benefits. Three days each week should be appropriated to strength training and vigorous intensity physical activity, and all people should reduce sedentary behavior. These recommendations were supported by the UK Department of Health (2011), which claimed that young people should engage in physical activity daily.

A national trend in the UK has been the significant decrease in physical activity with age and the accompanying gender differences in that trend. Al-Nakeeb, Lyons, Collins, Al-Nuaim, Al-Hazzaa, Duncan, & Nevill, (2012) found that only “32% of boys and 24% of girls” met the recommended physical activity levels for youths. Furthermore, physical activities for youths decreased with both sex and age, but more noticeably in girls. Al-Nakeeb *et al.* (2012) identified a similarity in the UK Health Department and the UK Fact Sheet British children and adolescents did not sufficiently participate in physical activity or meet recommended guidelines.

As stated by the World Health Organization Regional Office for Europe (2013), epidemiological studies have shown a distinct rise of inactivity in children and adolescents, which has serious health ramifications. The final report from WHO on the Health Behavior in School-aged Children and Adolescents study, with pupils ages 11 and older around 35 countries of the WHO European Region and North America, again confirmed that over “two thirds of young people do not meet the current recommendation for physical activity of 60 minutes per

day, five or more days a week” (P. 4). Due to misunderstandings of the main role of physical activity, health benefits, and how to further effectively encourage youths to participate, physical activity levels in European youth decreased rapidly, especially during the ages of 11 to 15 years old.

### **Middle East**

Guthold *et al.* (2010) found that across all Middle Eastern countries, the majority of schoolchildren did not meet daily needs of physical activity. Frequency of physical activity was lowest for youths in countries such as Egypt (3.7%). Moreover, schoolchildren from Oman (63.3%) and in particular from the United Arab Emirates (81.6%) were not sufficiently active and did not follow recommended guidelines of physical activity. In this region, gender differences were especially noticeable, primarily due to culture (Guthold *et al.*, 2010). For example, “Only in these two countries, the difference between boys and girls was greater than 15%, and for most of the other countries, prevalence was only slightly higher for girls as compared with boys” (P. 46). Furthermore, Al-Hazzaa (2002) and Al-Hazzaa (2004), have investigated the amount of physical activity among Saudi youth and have seen significant changes in lifestyle in the last few decades that affect levels of physical activity. As a result, sedentary lifestyles were more common among Saudi children and youth. It was further recorded that Saudi children (60%) and young people (71%) did not participate in physical activity as often or for the period that is recommended.

Qatar’s Third National Human Development Report (2012) claimed the levels of physical activity in Qatari children have impacted the physical activity that they engage in as adults. It was evident that physical activity in youth establishes good habits: “Some 46% of adult Qataris reported undertaking sufficient “moderate” exercise (for example, taking a brisk walk) in a

typical week. Less than 16% reported that they undertake more than 150 minutes of vigorous exercise a week (for example, engaging in a strenuous sporting activity)” (p. 89). Their younger counterparts (ages 18-29) had slightly higher levels of physical activity, indicating that Qatari adolescents remain physically active well into adulthood. On the other hand, Qatari students reportedly had lower levels of physical activity, with only 11-17% engaging in regular exercise. Furthermore, Kamal and Kholi (2009) mentioned gender differences among males’ and females’ participation in sports. For example, 50% of males and less than 40% of females participated regularly in sports or physical activity.

### **The Impact of Sedentary Behavior (TV/Internet) on Physical Activity**

Sedentary behavior and physical activity may be two separate behaviors, but the two behaviors are dependent on one another, based on many studies (Gorely, Marshall, & Biddle 2009; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011). Studies have shown that sedentary behavior correlates with a lack of physical activity; usually television viewing and using the internet are examples provided to present common sedentary behaviors (Gorely, Marshall, & Biddle 2009; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011). Sedentary behavior has been defined as activity that does not increase energy exertion significantly above the resting level and includes activities such as sleeping, sitting, using the internet, and watching television along with other forms of screen-based entertainment (Pate, O’Neill, & Lobelo, 2008). This means having a high level of sedentary behavior negatively impacts youths’ health regardless of other reasons such as body weight, diet, and physical activity.

Sedentary behavior is becoming an important component of the rising need for exercise and participation in physical activity. There has been new evidence that extends this claim;

continuous sitting time was related to people's risk of obesity and Type 2 diabetes (Katzmarzyk, Church, Craig, & Bouchard, 2009). According to Katzmarzyk, *et al.* (2009), based on their investigation of 17,000 Canadian adults during a 12-year study, those who spent most of their time sitting were 50% more likely to die (a few years) earlier than those that sit less and have less sedentary lifestyles, even after controlling for age, smoking, and physical activity levels. This example showed the effect of sedentary behavior on adults' lives, which further extends to adolescents' lives.

Technological and social changes have extensively reduced overall regular physical activity levels and increased in some ways the time spent in sedentary behaviors in countries such as the United States (Brownson, Boehmer, & Luke, 2005). According to several studies, television, tablet use, smartphone use, and screen viewing in general presented the main means of engaging in sedentary behavior (Gorely, Marshall, & Biddle 2004; O'Neill, & Lobelo, 2008; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011). Recently the time spent watching TV and using tablets among adolescents has dramatically increased. Nelson, Neumark-Stzainer, Hannan, and Sirard (2006) found that the estimated time spent watching TV among adolescents was 2.5–3 hours per day and an additional 1.5–2 hours was spent using the computer and tablet in the U.S. and Kuwait. This investigation showed that adolescents spend at least five hours a day screen viewing which presents 32–56% of an adolescent's total sedentary time as mentioned in Gorely, Marshall, & Biddle (2004). On the other hand, these results showed that adolescents do not follow the recommendation of the American Academy of Pediatrics (2001) which suggested that adolescents must limit television and other screen time to no more than two hours per day. Limiting the time spent watching television or using the internet would give adolescents more time to engage in physical activity. However, these studies showed that

adolescents are prioritizing sedentary activities over physical activities (Gorely, Marshall, & Biddle 2009; Nelson, *et al.*, 2006).

The needs of the state of Kuwait mandated a focus on the two categories of sedentary behavior: television viewing and using the internet. Kuwaiti researchers, Al-Haifi *et al.* (2013) discussed and investigated the association between the two categories and weight gain and obesity among Kuwaitis' adolescents. Al-Haifi *et al.* (2013) found no association between sedentary behaviors such as watching television and using the internet, the aforementioned two categories, and weight gain, which called to the need for further investigation among these behaviors.

Overall, adolescent physical activity behavioral patterns have been vastly understudied. The objective of this literature review was to offer data on the amount of physical activity and patterns of sedentary behavior among Kuwaiti adolescents. An extensive review of literature has determined for Kuwaiti adolescents that there has been no research on either the physical activity level or how time is spent in a recreational setting in Kuwait. Adolescents' activity levels in free time need to be measured to determine the amount of physical activity adolescents engage in and to find room for improvement. All of these reasons showed how important it is to make adolescents physically active during their free time in Kuwait and how important it is to measure that time and determine if it is used appropriately.

## **Kuwait and Physical Activity**

### **Evidence of Physical Activity in Kuwait**

Little is known about how adolescents in Kuwait choose to spend their time or whether or not they are physically active. According to Kuwait's Ministry of Health (2008), no data exists on the activeness of Kuwaiti youth. There has been only one study published on sedentary

behavior among Kuwaiti adolescents (Al-Haifi, Al-Fayez, Al-Athari, Al-Ajmi, Allafi, Al-Hazzaa, & Musaiger, 2013). The results of this study found that, “With regard to sedentary behavior, time spent watching television and time spent on the computer were not significantly related to BMI in boys or girls” (p. 9), and needs to be examined further. The lack of information demanded an investigation on how physical activity affects a substantial portion of the Kuwaiti population. Additional research has been needed on sedentary behavior in adolescents to gather valid data and expand on the single previous study.

### **Physical Activity and BMI Rate in Kuwait**

In the wake of Kuwait’s modern economic expansion, there has been a greater interest and incentive for studying adult physical activity behaviors as opposed to an absence of study on adolescents and other critical age groups. Since 1961, Kuwait has witnessed deep and common societal changes, including massive economic development which led, to a decline in the amount of physical activity linked with work and daily living in adults (Ramadan, Vuori, Lankenau, Schmid, & Pratt, 2010). Shifting from a developing country over an extended period of time encouraged Kuwait to confront domestic issues, particularly the Kuwaitis’ needs for physical activity. Just two decades earlier, Kuwait was cited as the country with the highest rate of Type 2 diabetes and obesity in the Arab peninsula, and in 1995, 39.1% of all adult deaths in Kuwait were caused by cardiovascular disease (Moussa, Shaltout, Nkansa-Dwamena, Mourad, Al Sheikh, Agha, & Galal, 1999). The World Health Organization (2009) explained that deaths due to chronic illnesses in Kuwait have only increased since 1995. Recently Type 2 diabetes has been even more prevalent; in 2008, 21.4% of adults were reported as having Type 2 diabetes, and the World Health Organization predicted dramatic increase (by at least half) in that number by 2025.

According to Kuwait Ministry of Health (2006), several serious societal problems, such as Type 2 diabetes, obesity, and cardiovascular disease, in Kuwait were related to physical inactivity. This finding led the Kuwait Ministry of Health to investigate the level of physical activity among all adult population groups, which was low. The statistic's results showed that 67% of adult men do no recreational activity, and 72-78% of adult women do no recreational activity. As mentioned in Kuwait Ministry of Health (2006), the prevalence of weight gain and obesity between men rises progressively from 53% at ages 20–24 to 93% at ages 60–65. A more recent study done by the World Health Organization (2010), as shown on (<http://visual.ly/weight-world>), named Kuwait as the country with the highest BMI in the world, and found that men had an average BMI of 27.5, followed by Kuwaiti women who had an average BMI of 31.4. These findings have shown the obvious need for physical activity in Kuwait, given that the amounts for both overweight and obese people are at critically high levels, especially for the younger age group.

Kuwait must look to adolescents' needs for physical activity as a vital aspect in the reduction of obesity and weight gain. Kuwait recently began to view adolescence as a time of increased growth and development in which a greater need for physical activity has been called for. This included more frequent movement and addressing bodily needs. Due to differences in body type, physical activity, and rate of growth, every adolescent has different physical activity needs. That encouraged the Kuwait Ministry of Health to cooperate with many organizations to influence Kuwaiti adolescents' needs.

Kuwait Ministry of Health-Administration of Food and Nutrition (2006) believed that taking care of children and adolescent health by keeping them active will help reduce the risk of becoming obese adults. In addition, Kuwait Ministry of Health-Administration of Food and

Nutrition (2006) reported that “approximately 40% of adolescents are either overweight or obese” (p. 24). The dangerously high percentage of obesity among adolescents demanded an investigation of adolescents’ lifestyles, particularly the role of physical activity. However, Kuwait Ministry of Health-Administration of Food and Nutrition (2006) noted that “data on physical activity among adolescents is not available” (p.25). This illustrated the lack of information about the physical activity level among Kuwaitis’ adolescents.

### **Kuwait Physical Activity and Cultural Issues**

Adolescents’ need for physical activity during their free time has been particularly important in Kuwait. There have been many changes in the culture and social life, some of which will be further discussed. These changes have led to the sedentary lifestyle of Kuwaiti adolescents and the decline in physical activity since the discovery of oil in 1936 (Al-Kandari, 2006). Kuwaitis became more affluent, which has reduced the physical activity levels in their lives overall.

There are many reasons that physical activity has declined in Kuwait society (Al-Isa, Campbell, & Desapriys, 2010; Al-Kandari, 2006). First, residential areas have limited activity space, and that results in most of the young people staying indoors and using video games or networking tools such as Play Station, tablets, and social media. Second, parents and caregivers have primary control over their children’s activity choices (Al-Isa, Campbell, & Desapriys, 2010). Consequently children and adolescents have traditionally had largely sedentary lifestyles and have engaged in too little physical activity because parents and guardians are protective and want to keep their children close in order to prevent them from harm. Third, the lifestyle in Kuwait has been different because children and adolescents are influenced by familial culture that prioritized communication and inactivity and put unhealthy food at the center of events. For

example, some Kuwaiti adolescents like to hang out in Diwaniahs, which is a gathering place in a house where male adolescents and adults gather and discuss issues about life, culture, and sports. Females host receptions to discuss feminized aspects of culture such as fashions, wedding ceremonies, or occasionally politics, and often there is a broader variety and bigger quantity of food. On average, a Kuwaiti adolescent attends at least two Diwaniahs a week. The frequencies of receptions for women are dependent upon certain events taking place at a given time. Al-Kandari (2006) contended that Diwaniahs and receptions are very common in the Kuwait society. Fourth, the increase in wealth has enabled many families to hire domestic help to cook and clean and has led to a further reduction in child and adolescent physical activity even within the home. The children have relied on the help to retrieve beverages or food for them and do domestic housework, which firmly established a sedentary lifestyle.

Kuwait has been taking notice of the increasing amount of obesity among adolescents, which was due in part to the cultural disinterest in health and the dominance of sedentary lifestyles. Al-Qallaf Al-Otaibi, & Heyam, (2012) have shown that physical activity was on the top of the list that Kuwaiti adolescents were willing to discuss. One reason for that could be attributed to the high prevalence of weight gain and obesity in the adolescent population in Kuwait. This has been problematic because Kuwaiti adolescents have not been taught about physical activity or health, so they have little concept of the importance of physical activity as it relates individual wellness. Because little emphasis has been placed on health, adolescents are fearful of and more susceptible to diseases such as diabetes and obesity. In addition, Al-Isa, Campbell, and Desapriys (2010), gave validity to the claim that adolescents were more prone to health-related issues by showing that Kuwait has one of the highest levels of obesity in the world. They recommended increasing the amount of physical activity in the schools and society

as one of the solutions that will affect obesity and reduce early-onset diabetes and weight gain. The Center for Disease Control and Prevention (2010) complemented the research done by Al-Isa, Campbell, and Desapriys by agreeing that physical activity was one way to solve this problem. This premise was explored throughout the remainder of this study in order to examine physical activity and its role in decreasing obesity, as well as sedentary behavior's impact on current adolescent health risks.

### **Kuwait Gender Differences and Activity Level**

The influences of society and religion have given males more opportunities to engage in physical activity than females, and the Kuwaiti culture tends to give precedence to male health. Facilities, sports clubs, water parks, beaches, and other public institutions designated for males have been maintained better and have been open more often, giving males more chances to be physically active. Schools have similarly been segregated by gender, placing the males completely separately from the females. Boys have been encouraged to participate more frequently in physical education classes. Kuwait's public sports club system segregated boys and girls as well, creating a variety of different activity levels between boys and girls in their physical training. Girls are trained by female trainers, and male trainers cannot supervise or be involved in female sports clubs. Furthermore, male trainers have typically not been allowed to use music or encourage boys to dance in public sports classes, with the exception of ceremonies. Conversely, female trainers can use music recreationally (Elizabeth, 2004; Al-Kandari, 2006).

Obesity and weight gain in Kuwait has been encouraged by the cultural and gender issues that limit or affect the amount of physical activity adolescents participate in. Many researchers have tried to provide a solution for both cultural and gendered obstacles that foster sedentary lifestyles. Al-Kandari, (2006) and Ramadan, Vuori, Lankenau, *et al.* (2010) claimed that one

solution for reducing obesity in Kuwait is using physical activity during adolescents' free time. However, there has been little information about Kuwaiti adolescents and their time spent in physical activity and sedentary behavior. It is essential to address Kuwaiti adolescents' physical activity patterns before focusing specifically on gender.

## **Conceptual Framework**

### **The Theory of Planned Behavior as a Component of the Conceptual Framework**

The Theory of Planned Behavior has been chosen as the framework for this study (Fishbein & Ajzen, 1975). This theory was chosen particularly due to its ability to bring attention to certain behaviors on an individual basis. After learning more about their behaviors, participants were able to choose to adjust behaviors and provide them with the sense that they can control their fitness. It has further aided in establishing the subjective norm for Kuwaiti adolescents in regard to how physically active they are. The Theory of Planned Behavior framework has created a foundation for other researchers to more fully utilize the theory and enable them to predict the outcomes for physical activity levels and sedentary behavior based on intentions and the subjective norm in Kuwaiti adolescents.

### **Theory of Planned Behavior**

The Theory of Planned Behavior has been investigated for its role in physical activity and sedentary behavior, particularly in research. This study utilized the Theory of Planned Behavior to direct the study's hypotheses and help build the framework for this research. This theory has been used to explain participants' behavior and habits of sedentary behavior and physical activity. Fishbein and Ajzen (1975) first built the foundation for the theory of planned behavior with their own theory of reasoned action, which served as predictors of certain behaviors.

Both the Theory of Reasoned Action and the Theory of Planned Behavior were predicated on the assumption that a person will behave a certain way in a certain situation. The four main components of the Theory of Planned Behavior are attitude, perceived behavioral control, intention, and subjective norm. For the purpose of this model, we have looked at subjective norm. The subjective norm looks at social influence on behaviors and actions (Ajzen

& Fishbein, 1975; Dishman, 1994; Fisher, 2003). This study has investigated via self-reporting how adolescents participate in physical activity and sedentary behavior, in effect determining the subjective norm for Kuwaiti adolescents. Behavioral intention is the most significant predictor of actions in the Theory of Planned Behavior. In relation to health behaviors, intention has been considered to be the most effective predictor (Fisher, 2003). However, this study has merely identified behaviors, not the intention or motivation, and is meant to provide information for further study.

The Theory of Planned Behavior is an effective framework for determining behaviors and the rationales behind them, according to several studies (Fishbein, *et al.*, 1975; Dishman, 1994; Fisher, 2003). The full scope of this framework was not applicable in studying Kuwaiti adolescents' physical activity levels because very little information exists and patterns must first be identified. The next step in researching adolescents' levels of physical activity and planning interventions is outlined in the Theory of Planned Behavior. For example, a study by Dr. Rod Dishman (1994), who investigated exercise science, expressed the community's need to understand "knowledge, attitudes, behavioral, and social skills" (P. 1382) that correspond with participating in physical activity. Understanding the individual's response to physical activity is crucial for changing attitudes and physical activity levels. However, a basic knowledge of the subjective norm must be established before further research can be done.

### **Physical Activity as a Component of the Conceptual Framework**

As previously stated, physical activity has been defined as any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above basal level, enhances health, and produces health benefits (USDHHS, 2008). The term "physical activity" broadly defines any bodily movement and can, in this context, be related to planned

exercise and leisure time in physical activity. Physical activity encompasses four basic components. The first is frequency, or how often the individual engages in physical activity. Volume refers to the lowest duration that an individual can engage in physical activity while still benefitting from the physical activity. Types of physical activity is the third component, and intensity, which includes vigorous, moderate, and low amounts of physical activity is the fourth component. These four components comprise the principles of physical activity.

There have been speculations as to the minimum volume of physical activity that an individual can participate in while still receiving benefits, as well as types of physical activity and exercise. The type of physical activity can include any activity an individual participated in, such as walking, bicycling, jogging, or playing a sport. Exercise is a crucial component in physical activity types. Exercise as a form of physical activity can be categorized in variety of ways. This study defined exercising as a form of physical activity into two categories. According to Pate, Pratt, Heath, & *et al.* (1993) the first definition is structured and planned exercise that mandates the youth practice physical activities like playing on a sports team, taking an aerobics class, and lifting weights. The second definition of exercising is leisure time for physical activity, and can be subdivided into categories such as sports or backyard work, which means any physical activities or exercises the youth can do, such as running, calisthenics, golf, gardening, or walking in the previous month. While some choose to engage in physical activity behaviors during their leisure time due to enjoyment, others choose not to engage or only do so out of personal need. It is important to investigate the amount of physical activity along with the types of exercise and leisure time among adolescents. This study has provided an adequate understanding of these behaviors and how often they are involved in physical activity these days.

Frequency in relation to physical activity refers to “how often” a person engages in physical activity. For instance, a high school student may walk a mile to school every day, but then go running on the weekends for training for the track team, making their frequency of physical activity 7 times a week. In this case, the volume has referred to how long the student engaged in activity in the last seven days and how many minutes they were active during each session. Measuring physical activity by volume or minutes is beneficial because some activities do not lend themselves to measurement by distance.

Intensity in physical activity varies by the amount of energy an individual expends during participation in activity. Intensity is categorized by low-, moderate-, and vigorous- level physical activity. Physical activity may also vary by intensity (Marshall & Welk, 2008). This classification is put in place because measuring energy expenditure is difficult outside of what individuals perceive to be their activity level. At a moderate-level intensity, such as walking, light running, or bicycling, a person expended 3 to 6 times more energy than when not practicing physical activity (Sallis & Owen, 1999). At vigorous-level intensity, a person has expended 7 times or more energy than when not participating in physical activity (Sallis & Owen, 1999). Frequency, intensity, and volume were the key factors in the Center for Disease Control (CDC) suggestion for physical activity level that children and adolescents should participate in. The CDC suggested that youth must participate at least 60 minutes in moderate-intensity physical activity in the last seven days of the week, if possible. Healthy People 2020 had a similar goal, aiming to see more adolescents engage in moderate-intensity physical activity for at least 30 minutes five out of seven days of the week (USDHHS, 2011).

### **Sedentary Behavior (TV/Internet) as a Component of the Conceptual Framework**

Sedentary behavior included activities that involve little energy expenditure and was characterized by the individual remaining close to resting levels. These behaviors encompassed a myriad of activities, such as watching television, using tablets, and using smart phones (Mark, 2009). Adolescents in particular are involved in many sedentary behaviors, the majority involving screen viewing. Reading, studying, talking on the phone, instant messaging, playing video games, and using motorized transportation are other widespread sedentary behaviors. Youth should not engage in screen viewing, such as television, over two hours per day, according to the American Academy of Pediatrics (2001). This model has presented any evidence of the relationship between these common sedentary behaviors and physical activity by comparing time spent in physical activity with time spent in sedentary behavior. This model has also called attention to how much time is spent in sedentary behavior on an individual basis. However, Marshall and Welk (2008) hypothesized that it's easier to reduce sedentary behavior and more difficult to increase physical activity. A subset of this model, therefore, was to further collect evidence of the correlation between sedentary behavior and physical activity.

### **Summary**

The Theory of Planned Behavior was chosen as a theoretical foundation for this study based on its success in predicting physical activity behaviors in Kuwaiti adolescents. The author followed this theory because it provided the foundation for the study of activity patterns and showed physical activity levels among Kuwaiti adolescents. Theory of Planned Behavior helped the author to identify which category of the three (vigorous, moderate, low) Kuwaiti adolescents engaged in during physical activity and what level of sedentary behavior activity that they were

involved in daily. Through the theory, the author investigated theoretical frameworks that consistently demonstrated a relationship to physical activity and sedentary behaviors

## **Purpose of Study**

This study will provide information on the levels of physical activity and sedentary behavior Kuwaiti adolescents engage in daily. Adolescents in Kuwait are at risk of developing many diseases, primarily due to sedentary behavior, that encourage physical inactivity and are factors in adolescent weight gain and obesity (Al-Haifi, *et al.*, 2013). In addition, it is known that physical activity in Kuwaiti society is very important for adolescents' health and subsequently that there is a need to measure physical activity levels. This is a new area of study for Kuwait, as no one there has measured physical activity for adolescents to see how much they invest their time in physical activity. Specifically, there have been no published reports on the physical activity level among Kuwaiti's adolescents as referred to in the Kuwait Ministry of Health-Administration of Food and Nutrition (2006). The primary focus of this study will be to determine the amount of physical activity and sedentary behavior among adolescents in Kuwait. This study intends to determine

(1) when controlling for sex, what effect does the number of hours that Kuwaiti students spend in sedentary behaviors on a typical day have on Kuwaiti adolescents' physical activity level?

(2) What effect does time spent in sedentary behavior, watching television and using the computer, have on Kuwaiti adolescents' BMI?

(3) Finally, according to the Theory of Planned Behavior, does presenting the fact sheet to the experimental groups cause them to plan to increase their future physical activity level, compared to the control group?

## **Conceptual Models**

The following model addressed the investigation of the relationship between gender and physical activity level (intensity, frequency, and volume). Moreover, the purpose of the conceptual model was to examine the level of physical activity and sedentary behavior, as well as to investigate the relationship between gender and sedentary behavior. In addition, the model illuminated how all of the above criteria affect Kuwaiti adolescents' level of physical activity by providing information that showed how often Kuwaiti adolescents engage in regular physical activity. The model and hypotheses aimed to provide new information and a system for predicting the outcome of Kuwaiti adolescents' physical activity levels. The information collected for this model has presented a basic knowledge of Kuwaiti youths' activity levels and created the foundation for further study on this demographic.

### **Physical Activity and Sedentary Behavior (TV/Internet) Conceptual Model**

#### **(Hypotheses for the Physical Activity and Sedentary Behavior Model Pathways)**

This model was developed due to the need to investigate the physical activity and sedentary behavior among Kuwaiti adolescents. The model's objective was to test the proposed conceptual model of the physical health levels (intensity) of Kuwaiti adolescents' physical activity, the relationship and the negative effects of sedentary behavior on the level of physical activity as mediated through intrapersonal factors (gender, age, self-reporting) (Figure 2).

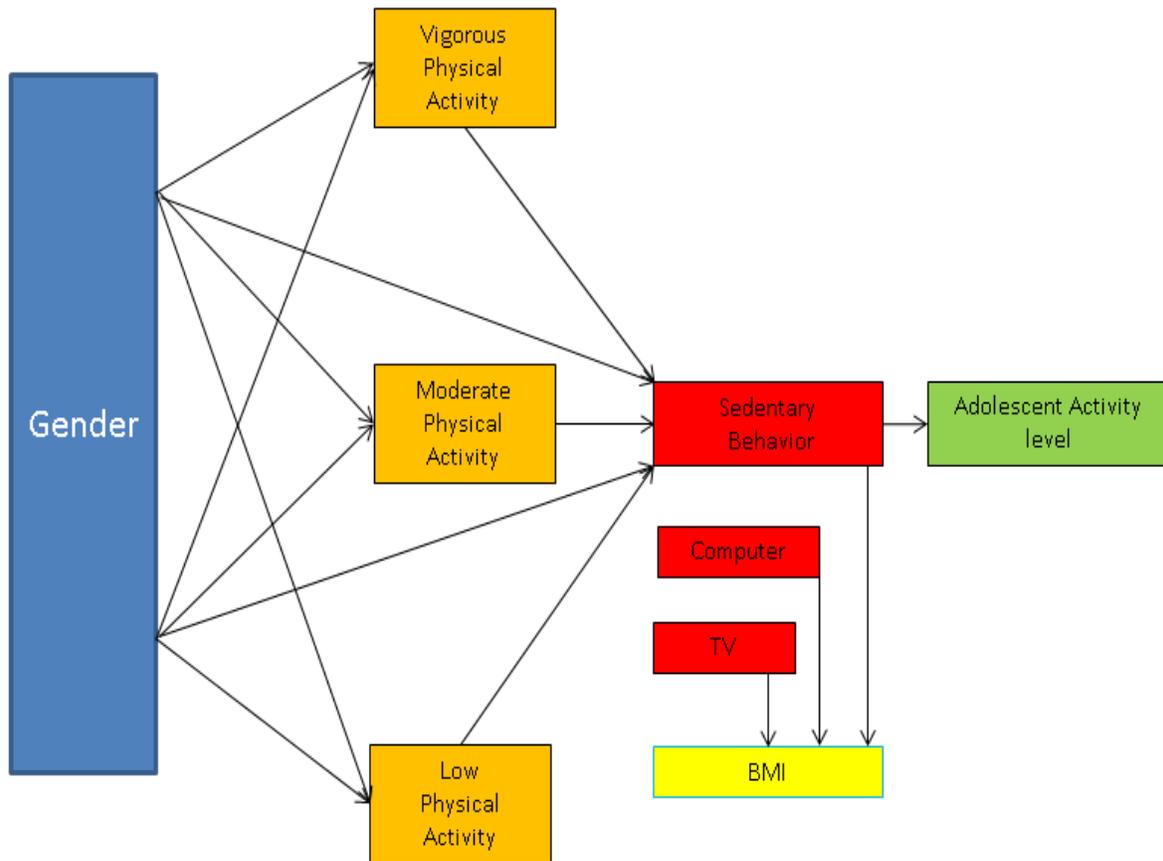


Figure 2: Hypotheses for the Physical Activity and Sedentary Behavior Model Pathways

1) The direct relationship between gender and physical activity

(Figure 3);

It was hypothesized that:

- For both genders, 50% or more of the participants will have low levels of physical activity rather than vigorous and moderate physical activity.
- Males will have higher levels of physical activity than females.

2) The direct relationship between gender and sedentary behaviors (TV/Internet)

(Figure 4).

It was hypothesized that:

- Both genders, 50% or more of the participants will spend more than four hour in sedentary behaviors.
- Females will have higher levels of sedentary behaviors than males.

3) There will be a direct relationship between vigorous, moderate, low physical activity and sedentary behaviors (Figure 5).

It was hypothesized that:

- There will be a negative relationship between vigorous physical activity and sedentary behavior.
- There will be a negative relationship between moderate physical activity and sedentary behavior.
- There will be a positive relationship between low physical activity and sedentary behavior.

- 4) There was a direct relationship between sedentary behavior, computer use, television viewing, and BMI (Figure 6);

It was hypothesized that:

- For both genders, there will be a positive relationship between sedentary behavior, computer use, television viewing, and BMI.
- For both genders, there will be a negative relationship between sedentary behavior, computer use, television viewing, and BMI.

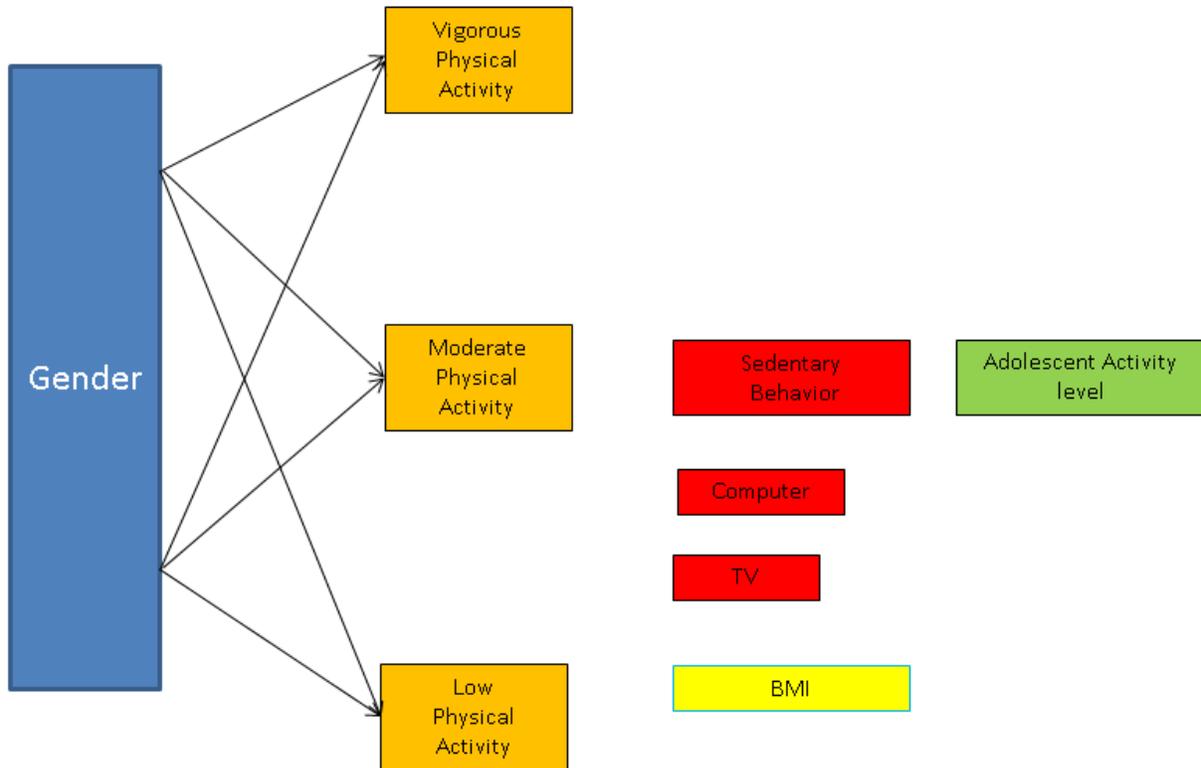


Figure 3: Activity Conceptual Model Hypothesis 1

1) The direct relationship between gender and physical activity.

It was hypothesized that:

- For both genders, 50% or more of the participants will have low levels of physical activity than vigorous and moderate physical activity.
- Males will have higher levels of physical activity than females.

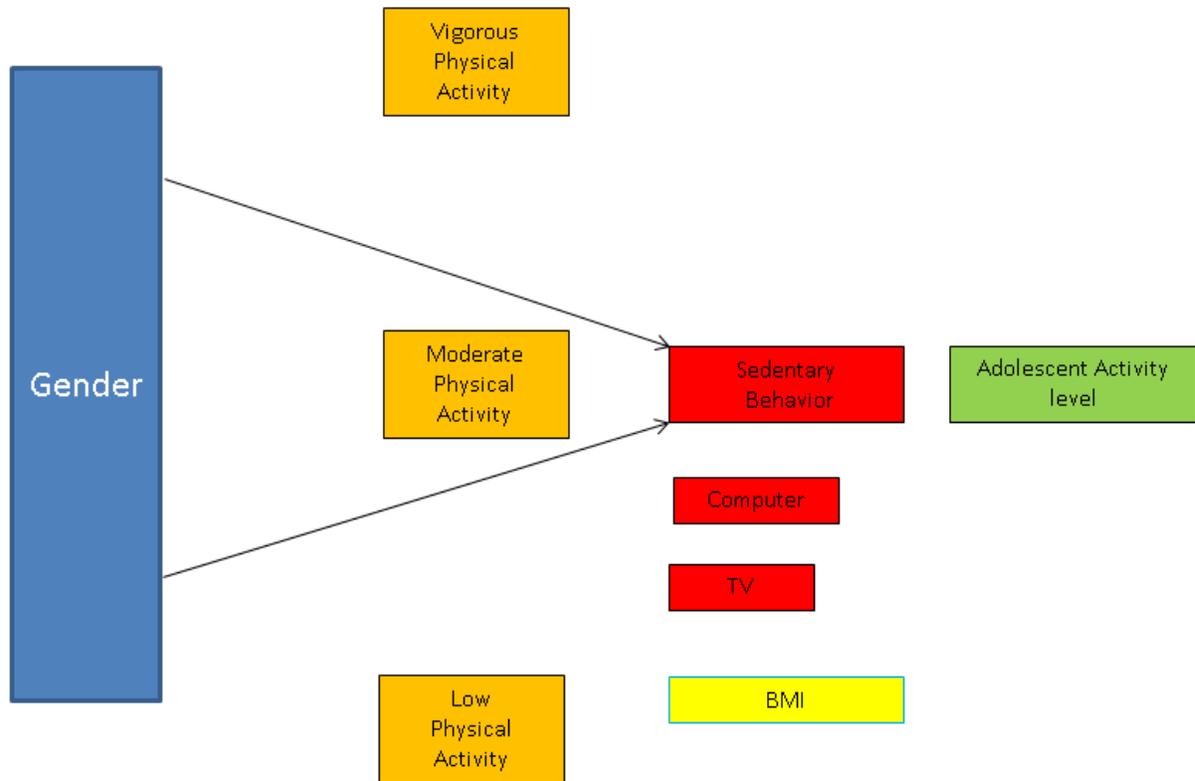


Figure 4: Physical Activity Conceptual Model Hypothesis 2

2) The direct relationship between gender and sedentary behaviors (TV/Internet).

It was hypothesized that:

- Both genders, 50% or more of the participants will spend more than four hour in sedentary behaviors.
- Females will have higher levels of sedentary behaviors than males.

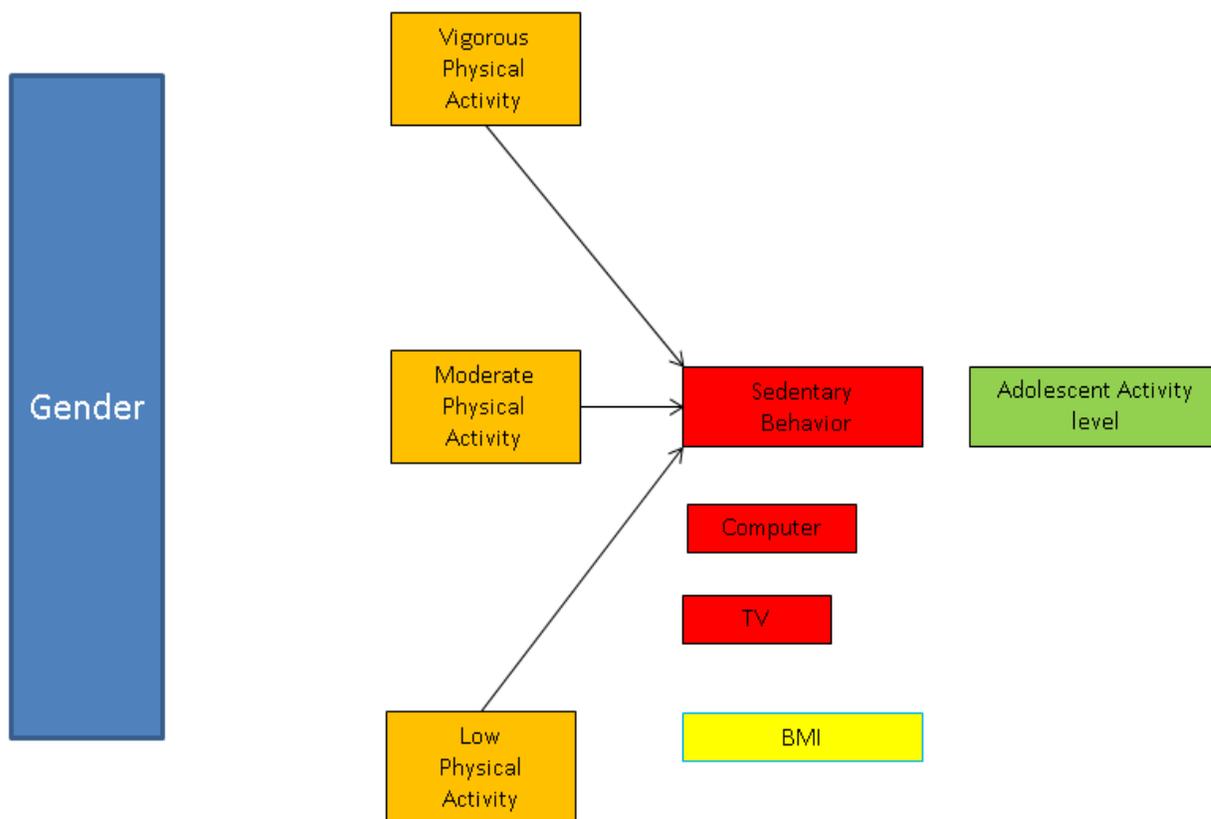


Figure 5: Physical Activity Conceptual Model Hypothesis 3

- 3) There will be a direct relationship between vigorous, moderate, low physical activity and sedentary behaviors.

It was hypothesized that:

- There will be a negative relationship between vigorous physical activity and sedentary behavior.
- There will be a negative relationship between moderate physical activity and sedentary behavior.
- There will be a positive relationship between low physical activity and sedentary behavior.

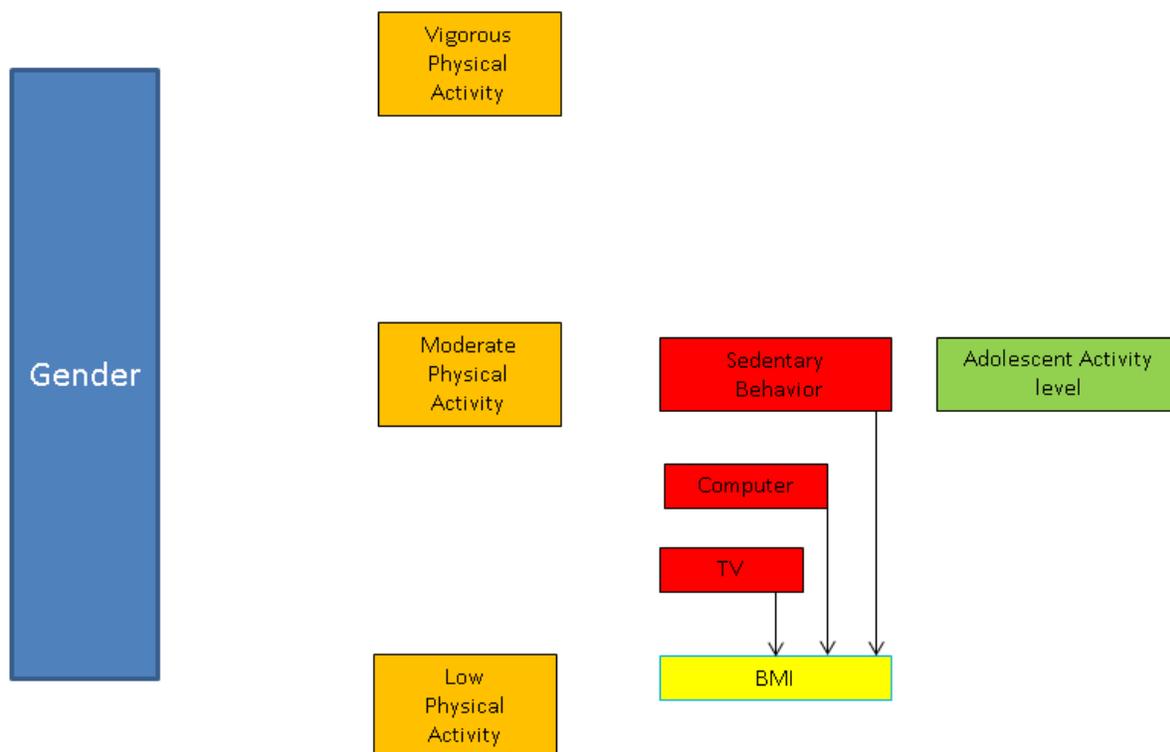


Figure 6: Physical Activity Conceptual Model Hypothesis 4

- 4) There will be a direct relationship between sedentary behavior, computer use, television viewing, and BMI.

It was hypothesized that:

- For both genders, there will be a positive relationship between sedentary behavior, computer use, television viewing, and BMI.
- For both genders, there will be a negative relationship between sedentary behavior, computer use, television viewing, and BMI.

## CHAPTER III: METHODS

### **Participants**

The sample subjects of this study consisted of 1,145 high school students, were collected from 55% ( $n = 633$ ) females and 45% ( $n = 512$ ) males, in the 10<sup>th</sup>, 11<sup>th</sup>, and 12<sup>th</sup> grades, with ages ranging from 15 to 19 years old. The participants were divided into two groups (165 in the control group; 980 in the experimental group). The participants were drawn from the Al-Jahra school district in Kuwait during the academic year of 2013-2014. Eight schools contributed in the study from Al-Jahra City. Because schools are separated by gender in Kuwait, four schools represented females, while the other four represented males.

The study focused on adolescents in this particular age range for four reasons: the first reason is because high school adolescents participate in more types of sedentary behavior, such as television viewing or computer use and physical activity, such as team sports. Secondly, this group of age shows a susceptibility towards decreasing physical activity levels (Brownson, Boehmer, & Luke, 2005; Sirard & Barr-Anderson, 2008). Conversely, sedentary behaviors in adolescents become more common in this age period (Gorely, Marshall, & Biddle, 2004; McElroy, 2008). Finally, adolescents are capable of self-reporting behaviors at this age.

The participants were chosen on a volunteer basis once Institutional Review Board (IRB) approval was obtained (Appendix A). The researcher has obtained permission from the Al-Jahra school district before conducting the study. In addition, the researcher has received one consent form from each school's principal during the study, which was required for the research (Appendix B). The questionnaires was done on a hardcopy and returned to the researcher during

physical education classes. Participants were promised full confidentiality, and no identifiable characteristics were revealed. All participants involved in the study were student volunteers.

## **Instruments**

### **International Physical Activity Questionnaire Questionnaires (IPAQ-S)**

Adolescents addressed their physical activity levels and sedentary behavior by using the IPAQ, 2013(Appendix C). The official Arabic short-version of IPAQ was used as a self-reporting measure to assist in determining physical activity and sedentary behavior, which is available at [www.ipaq.ki.se](http://www.ipaq.ki.se). For this particular study, the short form IPAQ questionnaires was adapted for Kuwaiti students' demographic. This questionnaire has been adapted to understand the gender, grade level, height, weight, and age of the participants by inserting questions on demographics.

### **Self-Reported Physical Activity**

The IPAQ questionnaires consisted of seven-day recall measure of physical activity that provided information on the time spent walking, the time spent in vigorous and moderate-intensity activity, and the time spent in sedentary activity. The total amount of physical activity minutes were converted to metabolic equivalents (MET minutes per week), where one metabolic equivalent was equal to the expenditure of energy while resting. The intensity of physical activity was determined to test hypothesis on the relationship between gender and level of physical activity among adolescents in Kuwait in the last seven days.

The IPAQ questionnaire was an especially useful tool in assessing physical activity practices. Moreover, the IPAQ is a common and inexpensive means to understand levels of physical activity because self-reporting measurement is easy and accurate, according to larger studies (Leenders, Sherman, & Nagaraja 2000). Therefore, self-reporting reveals common

physical activity patterns. In order for the self-method to be beneficial, the subjects are assumed to correctly recount their physical activity and this information must be synthesized correctly by the researcher. By showing the volume and intensity of physical activity that adolescents have engaged in during the last seven days, the IPAQ questionnaires revealed how physically active this demographic is. Once scored, the IPAQ questionnaires identified the metabolic value of the three categories of intensity. Low-intensity level physical activity was considered to be less than 600 MET minutes per week, moderate-intensity level physical activity was greater than 600 MET minutes per week, and vigorous-intensity level physical activity was greater than 1500 MET minutes per week.

#### **Self-Reported Sedentary Behaviors (TV/Internet)**

One question on the IPAQ questionnaires has addressed Kuwaiti adolescents' amount of daily time spent sitting. This question was used only to reveal the amount of sedentary behavior by completion of the questionnaires. The purpose of this question was to determine the prevalence of sedentary behavior among Kuwaiti adolescents between the ages of 12 and 20. The final question addressing sedentary behavior was general and asked the participant to account for time spent sitting in the past week. Time spent sitting was compared with time spent in physical activity and cross-examined with gender and intensity of physical activity.

#### **National Youth Risk Behavior Questionnaires (NYRB-S)**

Using only three questions, two of which asked about sedentary behavior and one of which asked about physical activity, from the National Youth Risk Behavior-Questionnaires is combined with the IPAQ-S. The first two questions asked participants about their time spent watching television and time spent using the computer and internet. The third question asked participants how many days per week they participated in physical education classes. These three

questions were taken from the (NYRB-S) because they are especially apt for determining sedentary behavior. The questions from the NYRB-S were not already translated in Arabic, so the researcher did a bilingual study in both Arabic and English, with two professors in Kuwait University. Professors Nawaf Majbel , and Abdullah Al-filakayi. The questions illuminated Kuwaiti adolescents' amount of daily time spent in sedentary activities, including television viewing, playing video and computer games, and internet use. These questions were used only to reveal the amount of sedentary behavior by completion of the questionnaires. A NYRB-S questionnaire was conducted in 2013 by the Center for Disease Control and Prevention (CDC). The purpose of this questionnaire was to determine the prevalence of sedentary behavior among Kuwaiti adolescents between the ages of fifteen and nineteen. The reliability and validity of the NYRB-S questionnaire has been assessed by several studies (Lee Paul, Macfarlane Duncan, Lam, & Stewart Sunita, 2011; Al-Hazzaa, 2007).

### **Procedure**

Institutional Review Board permission has been obtained. The researcher then received an agreement to collect data from the Al-Jahra school district during the academic year 2013-2014 in spring term. In total, eight high schools participated. In each school there were two groups: one control group and seven experimental groups. The control group received 20 questions. The first ten questions were used to establish the subjective norm for Kuwaiti adolescents and asked them about their time spent in physical activity and sedentary behavior, such as watching television, in the last seven days. The last ten questions were about the next seven days and what they planned to do for physical activity and sedentary behavior. The experimental group was given the same 20 questions, but in between the first ten and the second ten, they were given a fact sheet (Appendix D). This fact sheet included information related to

health around the world and in Kuwait. The purpose of this fact sheet was to get their attention, educate them about health issues that arise from physical inactivity, and ultimately change their behaviors. After reading the fact sheet, they were asked to answer the last ten questions about how they planned to spend their time in physical activity and sedentary behavior in the next seven days.

In addition, one week prior to data collection, the researcher met with several teachers of the participating classes in the study and acquired permission to help administer the questionnaires to their students. The researcher received consent forms from the schools' principals, which were required for the research. Over the course of four weeks, the researcher collected the data in the completed questionnaires. Within each class there was a range of 22 to 28 students. At the beginning of class, the participants were instructed on how to complete the questionnaires. The questionnaires were collected by the teacher and divided by file, including the grade and the class number, and finally labeled by the school's name and district name in order to organize the data.

### **Validity and Reliability**

The short form of the IPAQ-S has been recommended to evaluate patterns of physical activity that are relevant to health (WHO, 2007), and the reliability and validity have been previously tested (Marmeleira, Laranjo, Marques, & Batalha, 2013). In studying the validity of the IPAQ questionnaires, researchers found several positive correlations between the components of the instrument (Marmeleira, *et al.*, 2013). This makes the instrument more beneficial in determining the relationship between physical activity and sedentary behavior. Marmeleira, *et al.* (2013) found that:

“the statistically significant correlation coefficients that were found for the derived self-reported measures with objectively measured physical activity were similar to those obtained in the 12-country validity study of the IPAQ” (p. 378-379).

Therefore, this study utilized the IPAQ questionnaires because of its widespread use in health and human performance research and ability to gauge personal behaviors (WHO, 2007).

### **Data analysis**

Descriptive statistics were used to characterize the participants' questionnaires about the physical activity level, sedentary behavior, sex, and age. The analysis was conducted using IBM® SPSS® statistical software. Frequency distributions, means, and standard deviations were determined by data received by questionnaires questions about engaging in physical activity, watching television, and using the Internet. The questionnaires were used to calculate the weekly average amount of minutes that participants engaged in physical activity.

#### **First Research Question (presenting by hypotheses 1, 2, & 3)**

The distribution of physical activity scores had a strong positive skew with a conspicuous mode at the low end of the range. Consequently, physical activity scores were coded into three levels (high, moderate, and low) and used in a chi square analysis to test the first hypothesis, regarding the level of physical activity by males and females.

The distribution of sedentary behavior levels was approximately normal, allowing the second hypothesis, regarding the level of sedentary behavior by males and females, to be tested using parametric statistics. A 2 x 2 analysis of variance was employed to test whether sedentary behavior varied by gender or experimental group.

For the third hypothesis a Spearman rho correlation was used to test the relationship between physical activity and sedentary behavior. A 3 x 2 x 2 analysis of variance was used to test whether sedentary behavior was related to physical activity level, gender, or experimental group.

#### **Second Research Question (presenting by hypothesis 4)**

The fourth hypothesis concerned the relationship between sedentary behavior and BMI. A t-test was used to determine whether male and female subjects differed in BMI. Multiple linear regression was used to test whether time spent in sitting, using the computer, and viewing television could predict an individual's BMI.

#### **Third Research Question**

A final analysis compared the experimental and control groups regarding their plans for future physical activity. The Mann-Whitney U statistic was used to compare the two groups on each of the items on the follow up questionnaire. Potential differences between physical activity levels for the past seven days compared to planned future activities were assessed using the Wilcoxon Signed Rank test.

## CHAPTER IV: RESULTS

### **Introduction**

This chapter begins by summarizing the characteristics of the participants, and then presents the statistical evidence to test the stated hypotheses in the following sections (1) Relationship Between Gender and Physical Activity; (2) Relationship Between Gender and Sedentary Behaviors; and (3) Relationship between Physical Activity and Sedentary Behaviors and (4) Relationship between Body Mass Index (BMI) and Sedentary Behaviors and (5) Relationship Between the Responses for the Last seven Days and Plans for the Next seven Days. The statistical evidence was based on the responses to the International Physical Activity Questionnaire (IPAQ, 2005) and the last seven days and the next seven days (see Appendix C).

### **Characteristics of the Participants**

The total number of questionnaires received was 1145; however, a substantial proportion ( $n = 463$ , 40.4%) were found to be incomplete. After exclusion of all the missing values (as instructed by the Guidelines for Data Processing and Analysis of the IPAQ); the total number of participants were 682, giving a valid response rate of 59.6%. The control group ( $n = 89$ , 13.0%) were not supplied with important information related to health and participation in physical activity. The experimental group ( $n = 593$ , 87.00%) were supplied with this important information in the fact sheet (see Appendix D). The participants ranged in age from 12 to 20 years. The age distributions of the two groups were approximately normal, with over 50% of the participants aged between 16 and 17 years (see Figure 7). An independent samples  $t$ -test indicated no significant difference at the  $\alpha = .05$  significance level ( $t(680) = 0.292$ ,  $p = .770$ ) between the mean ages of the participants in the control group ( $M = 16.61$  years,  $SD = 0.75$ ) and

in the experimental group ( $M = 16.65$  years,  $SD = 1.08$ ). In the control group the proportions of males ( $n = 48, 53.9\%$ ) and females ( $n = 41, 46.1\%$ ) were approximately equal. The proportions of males ( $n = 302, 50.9\%$ ) and females ( $n = 291, 49.1\%$ ) were also approximately equal in the experimental group. Consequently, the control group and the experimental group were assumed to be equivalent with respect to their gender and age compositions.

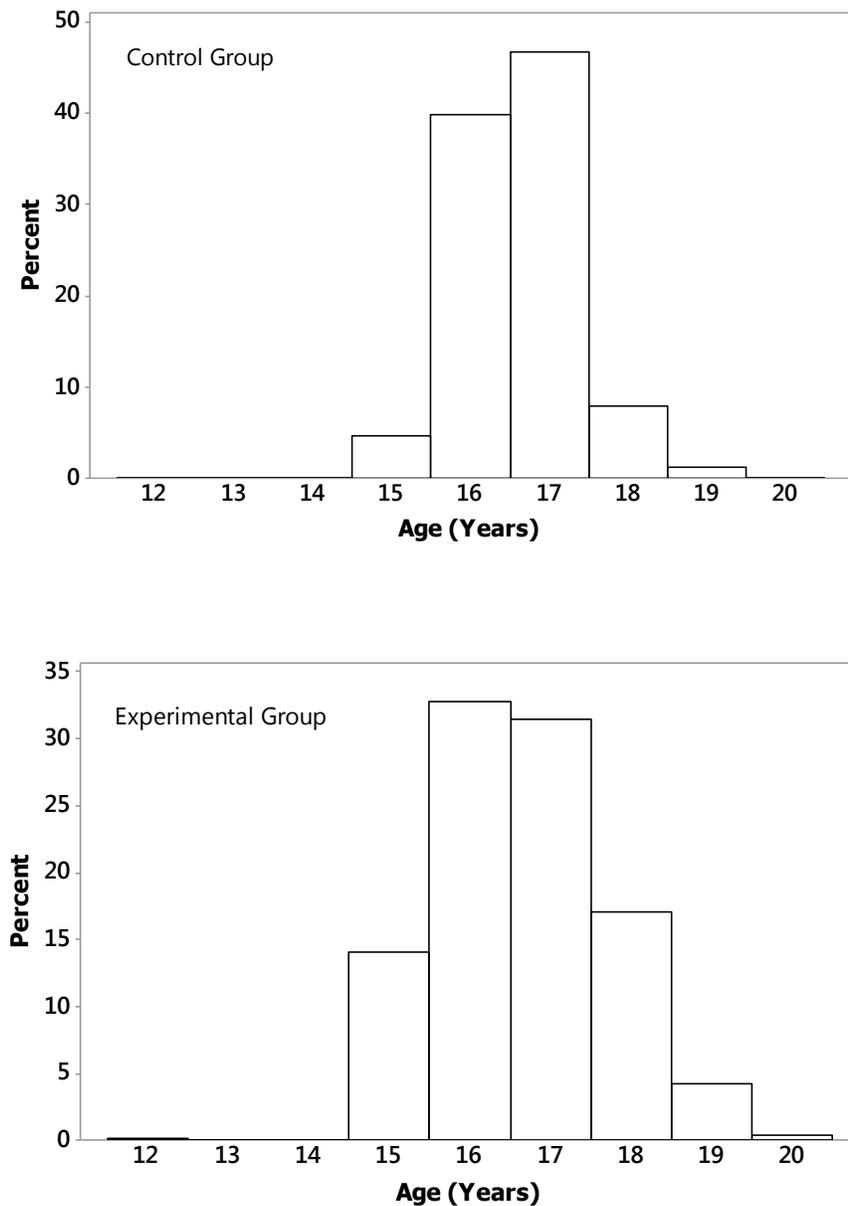


Figure 7: Age Distributions of the Participants in the Control and Experimental Groups

### **Relationship between Gender and Physical Activity**

Following the IPAQ guidelines, the physical activity of the participants in units of MET-minutes per week (reported for the last seven days) were calculated as follows: Walking MET-minutes/week =  $3.3 * \text{walking minutes} * \text{walking days}$ ; Moderate MET-minutes/week =  $4.0 * \text{moderate-intensity activity minutes} * \text{moderate days}$ ; Vigorous MET-minutes/week =  $8.0 * \text{vigorous-intensity activity minutes} * \text{vigorous-intensity days}$ ; Total physical activity MET-minutes/week = sum of Walking + Moderate + Vigorous MET minutes/ week scores. The three levels of categorical MET scores were computed as High = vigorous-intensity activity on at least 3 days achieving a minimum physical activity of at least 1500 MET-minutes/week or seven or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total physical activity of at least 3000 MET-minutes/week; Moderate = 3 or more days of vigorous-intensity activity of at least 20 minutes per day, or 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day, or 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET-minutes/week.

The MET scores for the last seven days are summarized using frequency distribution histograms in Figures 8 and 9, showing that the total physical activity MET scores (minutes/week) in the control and experimental groups were not normally distributed. The distributions were strongly skewed, with a conspicuous mode on the left hand side, corresponding to a low MET score of 0 to 500. Parametric descriptive statistics (e.g., means, standard deviations, t-tests, or ANOVA) which assumed normality were not justified to compare the MET scores between different groups of participants.

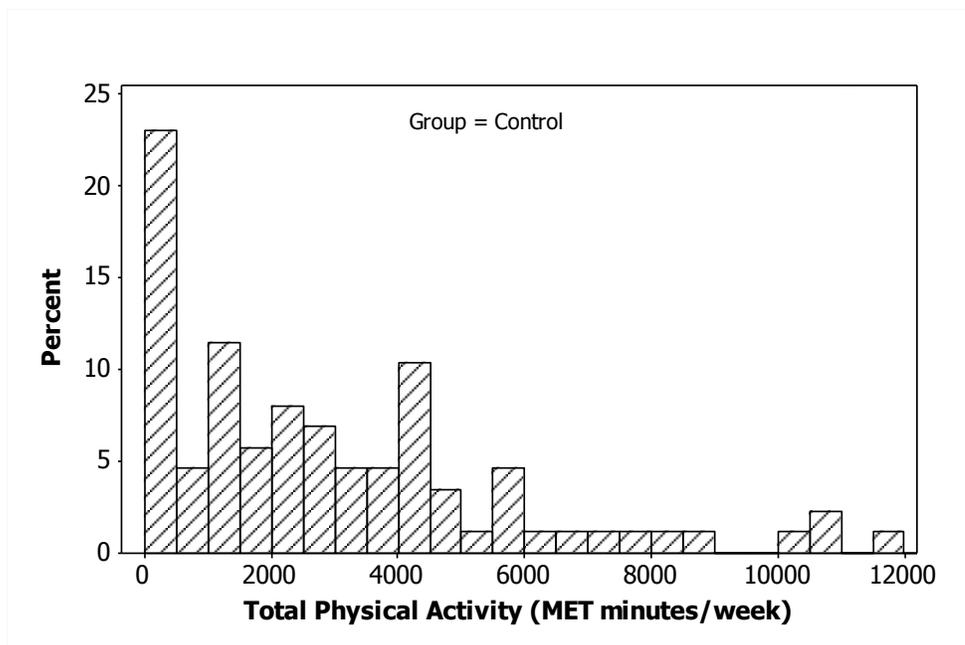


Figure 8: Distribution of Total Physical Activity MET Scores for the Control Group

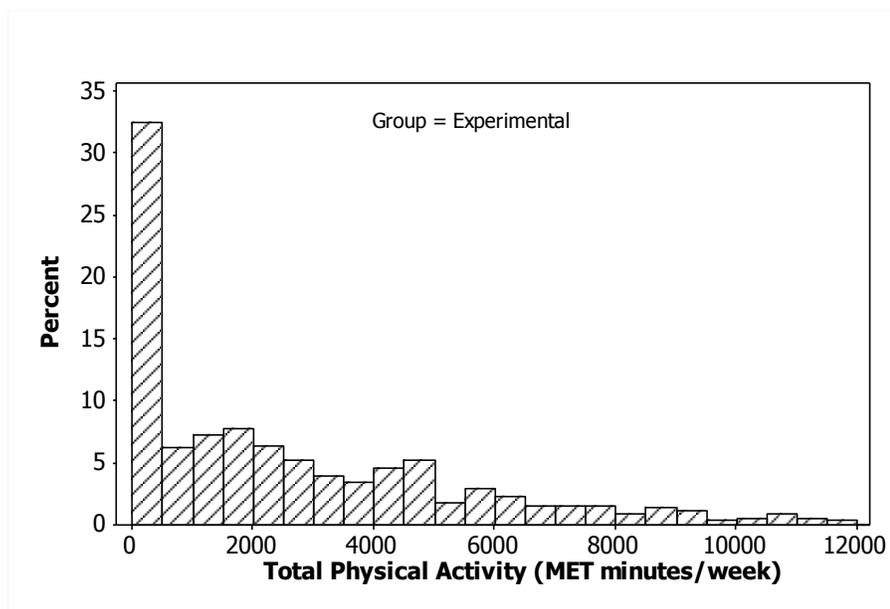


Figure 9: Distribution of Total Physical Activity MET Scores for the Experimental Group

Because the MET scores deviated from normality, the three categories of physical activity (low, moderate and high) proposed by the International Physical Activity Questionnaire (IPAQ, 2005) were used in the statistical analysis, not the raw MET scores (see Table 1).

Table 1

*Low, Moderate, and High MET Categories (from IPAQ, 2005).*

<b>1:Low</b>	This is the lowest level of physical activity. Those individuals who not meet criteria for categories 2 or 3 are considered low/inactive.
<b>2: Moderate</b>	Any one of the following 3 criteria: <ul style="list-style-type: none"> <li>• 3 or more days of vigorous activity of at least 20 minutes per day OR</li> <li>• 5 or more days of moderate-intensity activity or walking of at least 30 minutes per day OR</li> <li>• 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week.</li> </ul>
<b>3: High</b>	Any one of the following 2 criteria: <ul style="list-style-type: none"> <li>• Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week OR</li> <li>• 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week</li> </ul>

The frequency distributions (counts and percentages) of males and females in the control group and the experimental group, classified by the three physical activity MET categories (low, moderate, and high) are cross-tabulated in Table 2.

Table 2

*Relationship between Gender and Physical Activity*

Group	Gender		Physical Activity MET Category			Total
			Low	Moderate	High	
Control	Male	Count	32	1	15	48
		% within Gender	66.7%	2.1%	31.2%	100.0%
	Female	Count	34	1	6	41
		% within Gender	82.9%	2.4%	14.6%	100.0%
	Total	Count	66	2	21	89
		% within Gender	74.2%	2.2%	23.6%	100.0%
Experimental	Male	Count	186	21	95	302
		% within Gender	61.6%	7.0%	31.5%	100.0%
	Female	Count	228	16	47	291
		% within Gender	78.4%	5.5%	16.2%	100.0%
	Total	Count	414	37	142	593
		% within Gender	69.8%	6.2%	23.9%	100.0%

The proportions of males and females were consistently greater than 50% in the lowest Physical Activity MET category in the control and experimental groups. The proportions of females in the lowest Physical Activity MET category (78.9%) were greater than males (70.4%). The proportion of females in the highest Physical Activity MET category (16.0%) was less than males (31.4%). Pearson's Chi Square test indicated a significant association between gender and the three levels of physical activity in the experimental and control groups at  $\alpha = .001$  ( $\chi^2$  (1, N = 682) = 24.15,  $p < .001$ ).

The statistical evidence supported the hypothesis that in both genders, 50% of the participants will have low levels of physical activity rather than vigorous and moderate physical activity, and that males will have higher levels of physical activity than females.

**Relationship between Gender and Sedentary Behaviors (TV/Internet)**

For the purposes of this study sedentary behavior was operationalized as time spent engaged in television viewing and video/computer usage (by adding the scores for two NYRB-S

questions: “on an average school day, how many hours do you watch TV?”; and “on an average school day, how many hours do you play video or computer games or use a computer?”) Time spent sitting per day (measured in minutes) was not included because time spent sitting might also include watching TV, playing video or computer games, or using a computer. Each question was scored using 7-point scales: 1 = None; 2 = Less than 1 hour per day, 3 = 1 hour per day; 4 = 2 hours per day; 5 = 3 hours per day; 6 = 4 hours per day, 7 = 5 or more hours per day. The minimum total score should be 2 and the maximum score should be 14; however,  $n = 15$  participants did not respond to one or both of the questions concerning time spent in sedentary behaviors. Their scores were initially recorded as 0 or 1, but were subsequently classified as missing values. The frequency distribution of the total time spent in sedentary behaviors for all the participants (excluding the missing values) approximated a bell-shaped curve, reflecting a normal distribution (see Figure 10). Over half of the participants (67.0%) scored higher than 8, implying that they appeared to spend more than 4 hours per day engaged in sedentary behaviors.

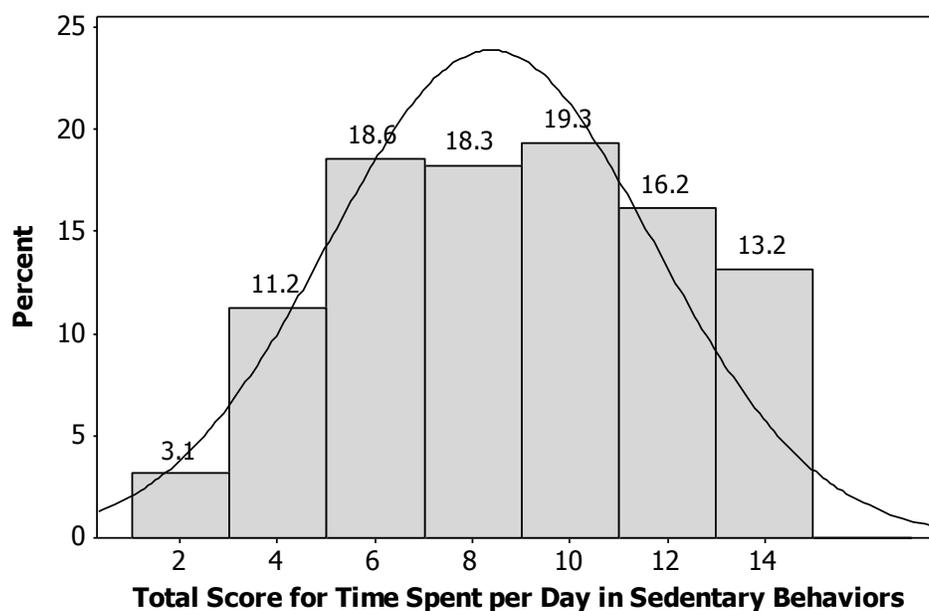


Figure 10: Distribution of Total Score for Time per Day Spent in Sedentary Behaviors

The mean scores for the total times spent per day  $\pm$  95% CI classified by gender and group are compared using an error bar chart in Figure 11. The mean scores for the females in the control group ( $M = 8.83$ ) and the experimental group ( $M = 8.72$ ) were greater than the mean scores for the males in the control group ( $M = 7.79$ ) and the experimental group ( $M = 7.66$ ).

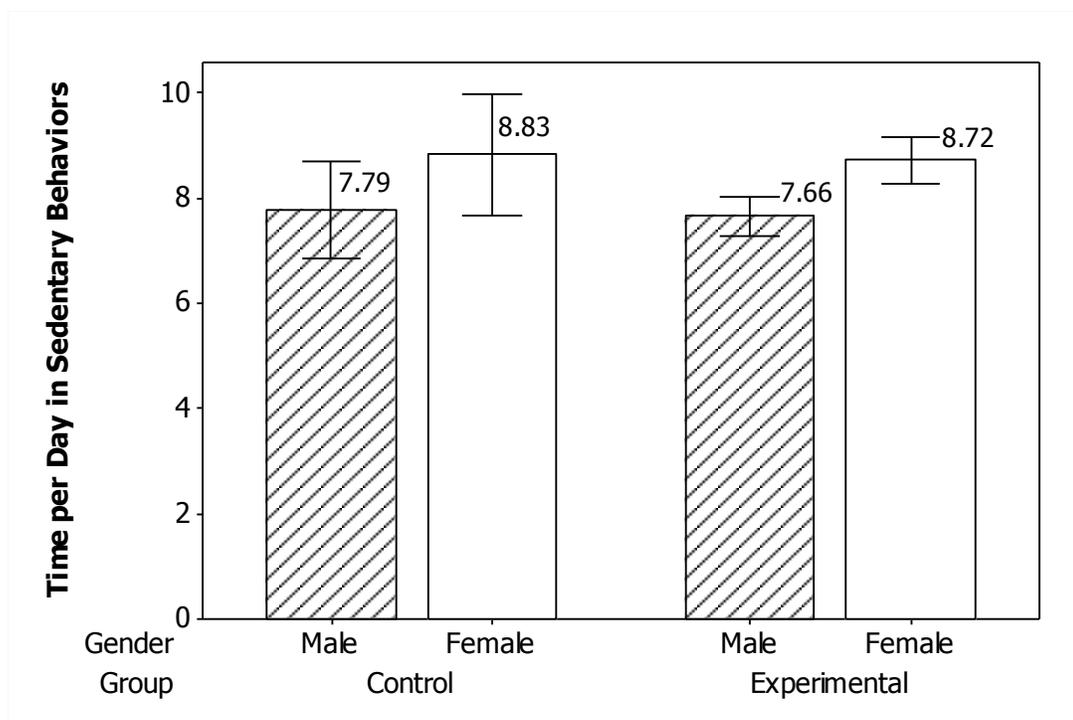


Figure 11: Mean Scores  $\pm$  95% CI for Time Spent per Day in Sedentary Behaviors by Gender and Group

Levene's test indicated that the variances were equal ( $F(3, 678) = 2.47, p = .060$ ) therefore this assumption of ANOVA was not violated. The results of Type III sum of squares ANOVA (see Table 3) indicated that there was a significant difference at  $\alpha = .05$  between the mean scores of the males and females ( $F(1, 678) = 6.96, p = .009$ ). There was no significant difference between the experimental and control groups, and there was no significant interaction between gender x group, indicated by  $p > .05$  for the  $F$  test statistics.

The statistical evidence supported the hypothesis that in both genders, 50% of the participants will spend more than four hours per day in sedentary behaviors, and that females will have higher levels of sedentary behaviors than males. The lack of interaction implied that the differences between the sedentary behaviors of the males and the females was parallel in both groups (i.e., irrespective of which group they were in, the mean scores for the females were consistently greater than the mean scores for the males).

Table 3

*ANOVA: Scores for Total Time per Day in Sedentary Behaviors vs. Gender and Group*

Source	Type III Sum of Squares	DF	Mean Squares	F	P
Corrected Model	190.73	3	63.57	6.23	.001
Intercept	20951.46	1	20951.46	1724.2	.000
Gender	84.60	1	84.60	6.96	.009*
Group	1.14	1	1.14	0.09	.759
Gender x Group Interaction	.009	1	.009	0.00	.978
Error	8238.48	678	12.15		
Total	54182.00	682			
Corrected Total	8429.22	681			

\* Note significant at  $\alpha = .05$

### **Relationship between Physical Activity and Sedentary Behaviors (TV/Internet)**

Because the distribution of the MET scores deviated strongly from normality (see Figures 8 and 9) Pearson's correlation analysis, which assumes normality, was not justified to analyze the correlation between physical activity and sedentary behaviors. Spearman's rank non-parametric correlation coefficient indicated a significant negative correlation at  $\alpha = .001$  between the total physical activity MET scores (minutes/week) and the scores for the total time spent per day in sedentary behaviors (Spearman's rho ( $N, 683$ ) =  $-.256, p < .001$ ). This relationship,

although relatively weak in magnitude, implied that the participants who were more sedentary tended also to be physically less active. The negative correlation is illustrated using a scatterplot with a linear trend line in Figure 12, showing a wide scatter of points, with many outliers.

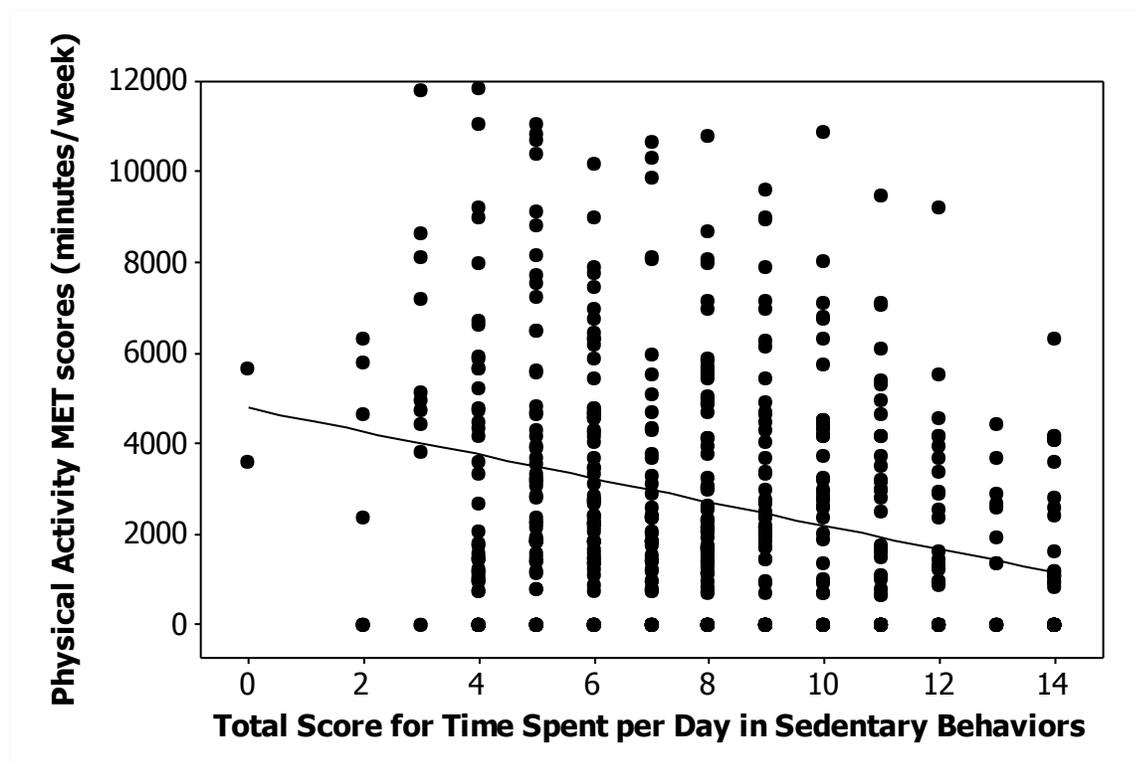


Figure 12: Relationship Between Physical Activity MET Score and Total Score for Time Spent in Sedentary Behaviors

The mean scores for the total times spent per day in sedentary behaviors  $\pm$  95% CI classified by the three Physical Activity MET categories (low, moderate and high), gender, and group are compared using an error bar chart in Figure 13. The mean scores for sedentary behaviors declined systematically with respect to an increase in physical activity (between the lowest and highest MET categories) for males and females in both the control and experimental groups. The highest mean time per day in sedentary behaviors ( $M = 9.50$ ) was for the females with the lowest level of physical activity in the experimental group. The lowest mean time per day in sedentary behaviors ( $M = 5.77$ ) was for the males with the highest level of physical

activity in the control group. Levene's test indicated that the variances were equal ( $F(10, 678) = 12.77, p = .062$ ) therefore Type III sum of squares ANOVA was justified to compare the mean scores between the MET categories, Gender, and Group (see Table 4)

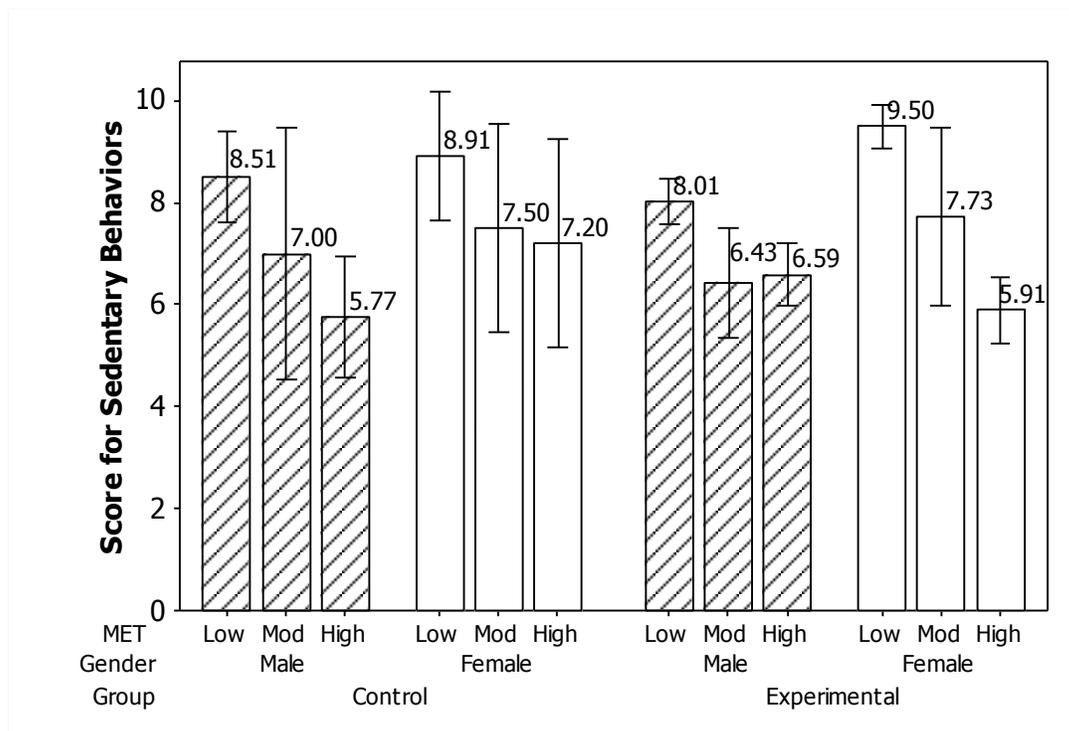


Figure 13: Mean Score  $\pm$  95% CI for Time Spent per Day in Sedentary Behaviors by MET Category, Gender and Group

The results of Type III sum of squares ANOVA (see Table 4) indicated a significant difference at  $\alpha = .05$  between the mean scores for the time spent per day in sedentary behaviors across the three MET categories ( $F(1, 678) = 5.84, p = .003$ ). The results confirmed the previously established significant difference in the sedentary behaviors between males and females ( $F(1, 678) = 5.22, p = .023$ ); and also that there were no significant differences between the experimental and control groups, and no significant interactions, indicated by  $p > .05$  for the  $F$  test statistics.

Table 4

*ANOVA: Time Spent per Day in Sedentary Behaviors vs. Physical Activity (MET categories), Gender, and Group*

Source	Type III Sum of Squares	DF	Mean Squares	F	P
Correction Model	849.84	10	84.98	9.85	.000
Intercept	2777.06	1	2777.06	3.05	.000
MET Category	100.64	2	50.32	5.84	.003*
Gender	44.97	1	44.97	5.22	.023*
Group	.831	1	.831	0.10	.756
MET Category x Gender Interaction	25.15	2	12.57	1.46	.233
MET Category x Group Interaction	5.50	2	2.75	0.32	.727
Gender x Group	7.40	1	7.40	0.86	.355
MET Category x Gender x Group	28.54	1	28.54	3.31	.069
Error	5027.18	678			
Total	46430.00	682			
Correction Total	5877.03	681			

Note: \* Significant at  $\alpha = .05$

The statistical evidence supported the hypotheses that (a) there will be a negative relationship between vigorous physical activity and sedentary behavior because the mean times spent in sedentary behaviors were consistently the lowest ( $M = 5.77$  to  $7.20$ ) when physical activity (MET minutes per week) was in the highest category (b) there will be a negative relationship between moderate physical activity and sedentary behavior because the mean times spent in sedentary behaviors were lower ( $M = 6.43$  to  $7.50$ ) when physical activity (MET minutes per week) was in the moderate category; and (c) there will be a positive relationship between low physical activity and sedentary behavior because the mean times spent in sedentary behaviors were the highest ( $M = 8.01$  to  $9.50$ ) when physical activity (MET minutes per week) was in the lowest category. The lack of interaction implied that the differences between the behaviors of the males and the females were consistent in both groups.

### Relationship between Sedentary Behaviors (TV/Internet) and Body Mass Index (BMI)

The frequency distributions (see Figures 14 and 15) indicated for both (experimental and control) that the BMI ( $\text{kg}/\text{m}^2$ ) was normally distributed in males and females, justifying the use of parametric statistics.

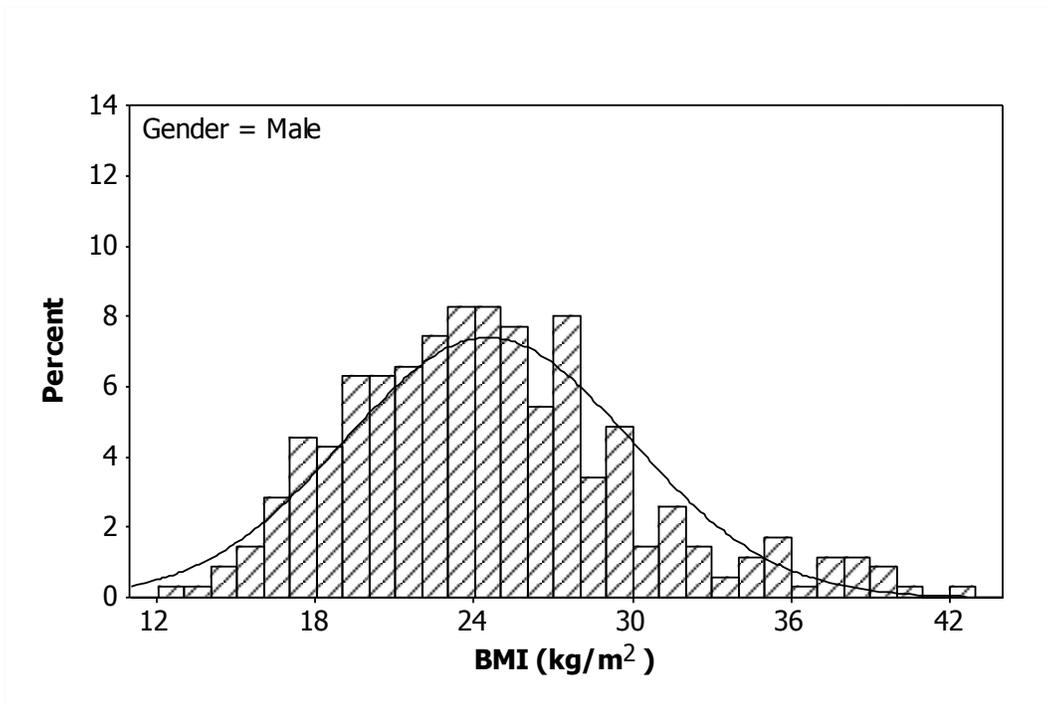


Figure 14: Distribution of BMI in Males

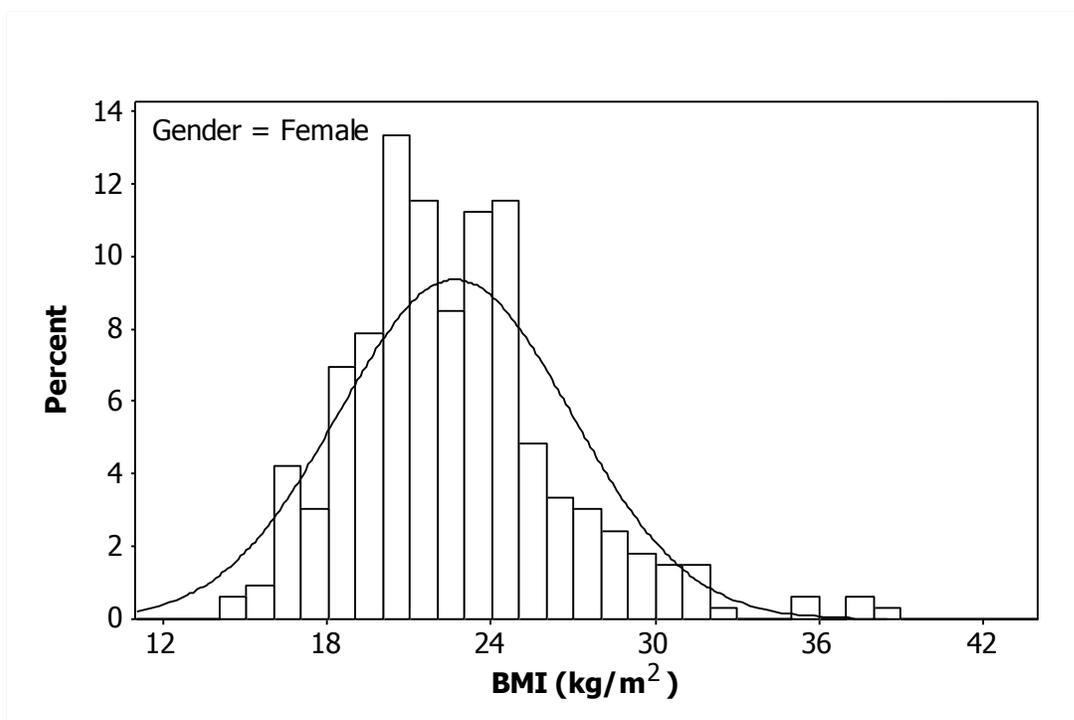


Figure 15: Distribution of BMI in Females

An independent samples *t*-test ( $t(640) = 4.99, p < .001$ ) indicated that the mean BMI of the males ( $M = 24.50 \text{ kg/m}^2, SD = 5.40$ ) was significantly greater than that of the females ( $M = 22.65 \text{ kg/m}^2, SD = 4.26$ ). Because of this difference, the relationships between gender, BMI, and physical activity in the control and experimental groups were analyzed separately for males and females.

The BMI of each participant was classified as underweight ( $<18.5$ ), normal range (18.5-24.99), overweight (25.00-29.99), or obese ( $\geq 30.00$ ). The cross-tabulations of the frequencies of the two groups versus each BMI category are presented in Table 5 (for males) and Table 6 (for females). Nearly half of the males ( $n = 159, 45.4\%$ ) were classified in the normal range, whereas over one quarter ( $n = 45, 29.4\%$ ) were classified as overweight, and a substantial proportion ( $n = 45, 12.9\%$ ) were classified as obese (see Table 5). A Chi-Square test indicated that there was no

significant association at  $\alpha = .05$  between the BMI categories and the both groups ( $\chi^2 (3) = 7.715$ ,  $p = .067$ ) implying that the frequency distribution of the BMI categories across the control and experimental groups was statistically equivalent among the 350 males.

Table 5

*Cross-Tabulation of BMI Categories vs. Group for Males*

BMI Category		Group		Total
		Control	Experimental	
Under Weight	Frequency	6	37	43
	% within Group	12.5%	12.3%	12.3%
Normal	Frequency	16	143	159
	% within Group	33.3%	47.4%	45.4%
Over Weight	Frequency	14	89	103
	% within Group	29.2%	29.5%	29.4%
Obese	Frequency	12	33	45
	% within Group	25.0%	10.9%	12.9%
Total	Frequency	48	302	350
	% within Group	100.0%	100.0%	100.0%

Table 6

*Cross-Tabulation of BMI Categories vs. Group for Females*

BMI Category		Group		Total
		Control	Experimental	
Under Weight	Frequency	6	32	38
	% within Group	14.6%	11.0%	11.4%
Normal	Frequency	25	201	226
	% within Group	61.0%	69.1%	68.1%
Over Weight	Frequency	10	41	51
	% within Group	24.4%	14.1%	15.4%
Obese	Frequency	0	17	17
	% within Group	0.0%	5.8%	5.1%
Total	Frequency	41	291	332
	% within Group	100.0%	100.0%	100.0%

Nearly two thirds of the females ( $n = 226$ , 68.1%) were classified in the normal range, and about one fifth were classified as overweight ( $n = 51$ , 15.4%) or obese ( $n = 17$ , 5.1%) (see Table 6). A Chi-Square test indicated that there was no significant association at  $\alpha = .05$

between the BMI categories and the groups ( $\chi^2 (3) = 7.383, p = .061$ ) implying that the frequency distributions of the BMI categories across the control and experimental groups was also equivalent among the 332 females.

The cross-tabulations of the frequencies of the three MET activity categories (low, moderate, and high) versus the four BMI categories (underweight, normal, overweight, and obese) are presented in Table 7 (for males) and Table 8 (for females). Within all four of the BMI categories, the highest proportion of males (46.5% to 76.7%) and females (77.0% to 86.8%) were classified in the low physical activity MET categories. Among the high physical MET activity category, the most frequent BMI categories were underweight (44.2%) and normal weight (35.2%) for the males, and normal weight (17.7%) for the females. The association between the BMI categories and the MET categories were analyzed using Chi-Square tests.

Table 7

*Cross-Tabulation of BMI Categories vs. MET Categories for Males*

BMI Category		Physical Activity MET Category			Total
		Low	Mod-Erate	High	
Under weight	Count	20	4	19	43
	% within BMI Category	46.5%	9.3%	44.2%	100.0%
Normal	Count	91	12	56	159
	% within BMI Category	57.2%	7.5%	35.2%	100.0%
Over weight	Count	79	3	21	103
	% within BMI Category	76.7%	2.9%	20.4%	100.0%
Obese	Count	29	3	13	45
	% within BMI Category	64.4%	6.7%	28.9%	100.0%
Total	Count	218	22	110	350
	% within BMI Category	62.3%	6.3%	31.4%	100.0%

Table 8

*Cross-Tabulation of BMI Categories vs. MET Categories for Females*

BMI Category		Physical Activity BMI Category			Total
		Low	Mod-Erate	High	
Under weight	Count	33	1	4	38
	% within BMI Category	86.8%	2.6%	10.5%	100.0%
Normal	Count	174	12	40	226
	% within BMI Category	77.0%	5.3%	17.7%	100.0%
Over weight	Count	41	3	7	51
	% within BMI Category	80.4%	5.9%	13.7%	100.0%
Obese	Count	14	1	2	17
	% within BMI Category	82.4%	5.9%	11.8%	100.0%
Total	Count	262	17	53	332
	% within BMI Category	78.9%	5.1%	16.0%	100.0%

Although there was a significant association between the BMI categories and the MET categories among the males at  $\alpha = .05$  ( $\chi^2(6) = 17.753, p = .007$ ) there was no evidence for a similar association among the females ( $\chi^2(6) = 2.676, p = .848$ )

Multiple linear regression analysis was also conducted. The dependent variable predicted by the multiple linear regression model was the BMI ( $\text{kg}/\text{m}^2$ ) of each participant because this method required the dependent variable to be measured at the interval level, and the four categories of BMI identified above were not appropriate. Prior to the analysis, cases with excessively high Mahalanobis  $D^2$  values (including the outliers of BMI  $< 16$  and  $> 35$ ) were excluded, because they compromised the results. The five predictor variables were (1) the two groups, coded as 0 = control and 1 = experimental (2) the three Physical Activity MET categories (low, moderate, and high, coded as 1, 2, and 3 respectively); (3) the responses to the question “During the last seven days, how much time did you spend sitting on a week day?” measured in minutes; (4) “On an average school day, how many hours do you watch TV?”

scored from 1 to 7, where 1 = none and 7 = 5 or more hours; and (6) the ordinal responses to the question “ On an average school day, how many hours do you play video or computer games or use a computer” scored from 1 to 7, where 1 = none and 7 = 5 or more hours. The multiple linear regression models for males are presented in Table 10 and Table 11 presents the model for the females. The variance inflation factors (VIF) were close to 1.0 implying that the statistical inferences were not compromised by multicollinearity (i.e., there was not a strong correlation between the predictor variables). The *t*-test statistics were used to determine if the regression coefficients were statistically significant from zero. The constants (intercepts) were significant ( $p < .001$ ) implying that when the predictors were zero, the BMI was significantly greater than zero.

Table 9

*Multiple Linear Regression Model to Predict BMI for the Males*

Predictor Variable	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	<i>p</i>	VIF
	<i>b</i>	SE	$\beta$			
Constant (Intercept)	29.215	1.038		28.15	<.001*	
Group	-1.036	.737	-.074	-1.41	.161	1.01
Physical Activity MET Category	-2.548	.304	-.448	-8.39	<.001*	1.04
Time much time spent sitting	-0.001	.001	-.054	-1.00	.318	1.08
Time watching TV	-0.001	.166	.000	-.006	.996	1.22
Time playing games/using computer	0.181	.145	.073	1.249	.213	1.25

Note: \* Significant at  $\alpha = .001$

Table 10

*Multiple Linear Regression Model to Predict BMI for the Females*

Predictor Variable	Unstandardized		Standardized	<i>t</i>	<i>P</i>	VIF
	Coefficients		Coefficients			
	<i>b</i>	SE	$\beta$			
Constant (Intercept)	24.702	.880		28.067	<.001*	
Group	-0.516	.637	-.047	-0.810	.418	1.00
Physical Activity MET Category	-1.021	.293	-.203	-3.488	.001*	1.00
Time spent sitting	0.000	.001	-.034	-0.572	.568	1.03
Time watching TV	0.068	.107	.039	0.634	.526	1.15
Time playing games/using computer	0.006	.099	.004	-0.058	.954	1.15

Note: \* Significant at  $\alpha = .001$

For both the males and females, the Physical Activity MET Category was a significant predictor of BMI at  $p \leq .001$ . In the males, the BMI decreased by  $-2.548 \text{ kg/m}^2$  (or  $-.304$  in standardized units) when the MET Category increased by 1.0 (i.e. when physical activity increased from low to moderate, or from moderate to high). In other words, physical activity level had a direct relationship with BMI, in a negative direction, such that males with a high BMI had a low level of physical activity, and males with a low BMI had a high level of physical activity. In the females the BMI decreased by  $-1.021 \text{ kg/m}^2$  (or  $-.203$  in standardized units) when the Category increased by 1.0. In other words, physical activity level had a direct relationship with BMI, in a negative direction, such that females with a high BMI had a low level of physical activity, and females with a low BMI had a high level of physical activity. The group, the time spent sitting, watching TV, playing video games, or using computers, however, were not significant predictors of BMI (indicated by  $p > .05$  for the *t*-test statistics).

The standard errors of the regression coefficients were high, as were the standard errors of the predicted BMI (SE = 4.52 for the males and 3.57 for the females). Consequently, the precision of the model to predict BMI was limited. The effect sizes were correspondingly low

(Adjusted  $R^2 = .02$  for the males and  $.03$  for the females) implying that  $\leq 3\%$  of the variance in the BMI could be explained by the predictor variables. The implications are that the two multiple regression models in Tables 10 and 11 have limited clinical significance as predictors of BMI.

The statistical evidence did not support the hypothesis that for both genders, there will be a relationship between sedentary behavior, computer use, television viewing, and BMI. The statistical evidence was, however, consistent with the conclusion the BMI of both genders can be predicted, but not very precisely, using the three Physical Activity MET Categories. An increase in physical activity from low to high, predicts a decrease in BMI.

### **Relationship between the Responses for the Last Seven Days and Plans for the Next Seven Days.**

The frequency distributions of the responses to the 20 questions in the Physical Activity Questionnaire presented in Appendix E. The 8 categories ranging from 1 to  $> 7$  are the times reported by the participants in days per week or hours per day. Times reported in minutes were converted to hours. The frequency distributions of the responses regarding reporting the times for vigorous physical activities (Q1 and Q2); moderate physical activities (Q3 and Q4) walking (Q5 and Q6) and physical education classes (Q10) were positively skewed, with the modes located at the lower ends of the time scales (i.e., 0 to 3 days per week or hours per day). The frequency distributions of the responses regarding plans for sedentary activities such as sitting (Q7) watching television (Q8), and playing video games/using a computer (Q9) also deviated from normality with modes towards the higher ends of the time scales (i.e., 3 to  $>7$  hours per day or 3 to 7 days per week). Consequently, parametric statistics assuming normality were not justified to analyze the responses to the Physical Activity Questionnaire.

A matrix of Spearman's rank non-parametric correlation coefficients ( $\rho$ ) between the

responses to Questions A1 to A10 (recording the activities in the last seven days) and the corresponding responses to Questions B1 to B10 (recording the planned activities for the next seven days) are presented in Appendix F. All the correlations were positively correlated at  $\alpha = .001$ . The implications are that the results of the hypothesis tests described above (based on the responses for the last seven days) may also apply to the results for the responses based on the plans for the next seven days.

The differences between the responses of the control group and the experimental group to the 20 questions in the International Physical Activity Questionnaire were analyzed. The median times reported for each of the 10 activities by the control and experimental groups, and the results of Mann-Whitney U tests, are presented in Table 12 (for activities in the last seven days) and Table 13 (for planned activities in the next seven days).

Table 11

*Comparison of Activities in the Last Seven Days between the Control and Experimental Groups*

Question	Grouped Median		Mann-Whitney U test	
	Control <i>n</i> = 89	Experimental <i>n</i> = 593	<i>U</i>	<i>p</i>
A1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	1.45	1.33	25684.0	.676
A2. How much time did you usually spend doing vigorous physical activities on one of those days?	1.32	1.10	23888.5	.152
A3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking	1.58	1.22	24061.5	.166
A4. How much time did you usually spend doing moderate physical activities on one of those days?	0.85	0.97	25098.0	.436
A5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?	3.65	2.26	23069.0	.054
A6. How much time did you usually spend walking on one of those days?	1.17	1.09	262056.5	.913
A7. During the last 7 days, how much time did you spend sitting on a week day?	2.06	2.02	25629.0	.653
A8. On an average school day, how many hours do you watch TV?	2.63	2.63	25936.0	.791
A9. On an average school day, how many hours do you play video or computer games or use a computer?	3.79	3.39	26027.5	.832
A10. In an average week when you are in school, on how many days do you go to physical education (PE) classes?	1.32	1.71	19808.5	<.001*

Note: \* Significant at  $\alpha = .05$

Table 12

*Comparison of Plans for Activities in the Next Seven Days in the Control and Experimental Groups*

Question	Grouped Median		Mann-Whitney U test	
	Control <i>n</i> = 89	Experimental <i>n</i> = 593	<i>U</i>	<i>p</i>
B1. During the next 7 days, how many days will you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	0.89	0.93	25475.0	.579
B2. How much time are you planning to spend doing vigorous physical activities on one of these days?	0.69	0.91	24352.0	.215
B3. During the next 7 days, on how many days are you planning to do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	0.89	0.86	26223.0	.919
B4. How much time are you planning to spend doing moderate physical activities on one of these days?	0.69	0.90	24041.0	.153
B5. During the next 7 days, on how many days do you plan on walking for at least 10 minutes at a time?	1.57	1.06	24244.0	.197
B6. How much time are you planning on walking on one of these days?	0.75	0.85	21590.0	.465
B7. During the next 7 days, how much time are you planning to spend sitting on a week day?	1.36	1.17	25007.5	.405
B8. On an average school day, how many hours do you plan watch TV?	3.42	3.05	24416.5	.250
B9. On an average school day, how many hours do you plan to play video or computer games or use a computer?	3.86	2.99	23830.5	.135
B10. In an average week when you are in school, on how many days do you plan to go to physical education (PE) classes?	2.16	2.46	22998.5	.047*

Note: \* Significant at  $\alpha = .05$

Mann-Whitney U tests were appropriate because they compare the median scores between two mutually exclusive groups of individuals. The results indicated only one significant difference at  $\alpha = .05$  between the control group and the experimental group. In an average week when the participants were in school, the median number of days that they went to physical education (PE) classes was significantly higher in the experimental group than in the control group, both in the last seven days ( $p < .001$ ) and in the next seven days ( $p = .047$ ). There were no significant differences between the experimental group and the control group with respect to the median times reported in the last week or planned in the next week for vigorous physical activities (Q1 and Q2); moderate physical activities (Q3 and Q4) walking (Q5 and Q6) or sedentary activities such as sitting (Q7) watching television (Q8), and playing video games/using a computer (Q9).

Table 14 shows the results of Wilcoxon's Signed Rank tests to determine if there were differences between the times for the planned activities in the next week and the times for the corresponding activities in the last week reported by members of the experimental group. Wilcoxon's Signed Rank tests were appropriate because they compare repeated measurements on a single group of individuals, to determine if the measurements are different (unlike the Mann-Whitney U test, which compares measurements between two mutually exclusive groups). No significant differences were found at  $\alpha = .05$  between the times reported for the activities by the experimental group in the last week and the times planned in the next week, with the exception of physical education classes ( $p < .001$ ).

Table 13

*Comparison of the Times for Activities Reported in the Last Seven Days and the Times for the Activities Planned in the Next Seven Days by the Experimental Group*

Activity	Wilcoxon Signed Rank Test	
	Z	p
1. Days doing vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling	1.555	.120
2. Hours doing vigorous physical activities on one of those days	0.201	.840
3. Days doing moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis	1.195	.232
4. Hours doing moderate physical activities on one of those days	1.354	.191
5. Days walking for at least 10 minutes at a time?	1.064	.285
6. Hours walking on one of those days	0.526	.599
7. Hours sitting on a week day	1.883	.090
8. Hours watching TV	1.992	.087
9. Hours playing video or computer games or use a computer	1.102	.301
10. Days going to physical education (PE) classes	9.550	<.001*

Note: \* Significant at  $\alpha = .05$

The results of the analysis in Tables 14 was based on the ten individual activities reported by  $n = 593$  participants in the experimental group. When the ten activities were converted into the three MET categories (low, moderate, and high), the frequency distribution of the activities planned by the experimental group during the next seven days were low ( $n = 398, 67.1\%$ ), moderate ( $n = 47, 7.9\%$ ) and high ( $n = 148, 24.9\%$ ). A McNemar test (similar to a Chi Square test, but for frequencies that are dependent on each other) indicated that there was no significant difference at  $\alpha = .05$  between the frequencies of the three MET categories for activities reported in the last seven days (recorded in Table 2) and the frequencies of the three MET categories planned for the next seven days ( $\chi^2 (2) = 4.873, p = .087$ ).

## CHAPTER V

### DISCUSSION

This chapter has addressed the findings that discussed the levels of adolescent physical activity and sedentary behaviors, as well as the relevant correlational findings in this study. Following a discussion of levels of physical activity and sedentary behavior (television viewing and computer usage), the significant results of the path models for physical activity and other components have been explored. The purpose of the study was to examine (1) Relationship Between Gender and Physical Activity; (2) Relationship Between Gender and Sedentary Behaviors; (3) Relationship between Physical Activity and Sedentary Behaviors; (4) Relationship between Body Mass Index (BMI) and Sedentary Behaviors; and (5) Relationship Between the Responses for the Last seven Days and Plans for the Next seven Days.

This study was designed to test the following hypotheses regarding the sedentary behaviors and physical activity level of Kuwaiti adolescents:

**H<sub>1a</sub>.** For both genders, 50% or more of participants will have low levels of physical activity.

**H<sub>1b</sub>.** Males will have higher levels of physical activity than females.

**H<sub>2a</sub>.** For both genders, 50% or more of participants will spend more than 4 hours daily in sedentary behavior.

**H<sub>2b</sub>.** Females will have higher levels of sedentary behaviors than males.

**H<sub>3a</sub>.** There will be a negative relationship between vigorous physical activity level and time spent in sedentary behaviors.

**H<sub>3b</sub>.** There will be a negative relationship between moderate physical activity level and time spent in sedentary behaviors.

**H3c.** There will be a positive relationship between low physical activity level and time spent in sedentary behaviors.

**H4a.** For both genders, BMI will have a positive relationship with sedentary behavior (computer use and television viewing).

**H4b.** For both genders, BMI will have a negative relationship with physical activity level.

**H5.** The experimental group, which will receive a fact sheet with information about the negative effects of physical inactivity, will plan more increases in future physical activity compared to the control group which will not receive the fact sheet.

The results supported hypotheses 1a through 3c. Hypothesis 4 was partially supported: for both genders, physical activity level had a significant negative relationship with BMI. Hypothesis 5 was partially supported: the experimental group had a greater increase in plans to attend physical education classes, compared to the control group. The strengths and weaknesses of this research have been evaluated. Finally, future directions and public policy implications for research in this area were discussed.

### **Relationship between Gender and Physical Activity**

The results of this study supported the first hypothesis in that both genders, 50% of the participants engaged in low levels of physical activity rather than vigorous and moderate physical activity, and males had higher levels of physical activity than females. Thus, females who reported in both groups were more likely to have significantly lower PA minutes than males. The results indicated a significant association between gender and the three levels of physical activity in the experimental and control groups. Specifically, the results showed positive relationships occurred between males and females and low levels of physical activity rather than vigorous and moderate physical activity. Greater than 50% of participants reported in both

control and experimental groups engaged in the lowest amount of physical activity in the last seven days. This finding showed that adolescents do not follow the American Heart Association guideline (2013) recommendation that young people need to participate in physical activity at the moderate or vigorous intensity level every day. This result further reflected the findings of previous studies such as the National Youth Risk Behavior Questionnaires (2011), in which self-reported data showed that 61% of adolescents were not engaging in physical activity each day and failing to meet the Guideline's standards. Moreover, the outcome on the same region conducted by Guthold *et al.* (2010) found that 63% of adolescents in Oman and 81% United Arab Emirates were not following recommended guidelines of physical activity.

In a separate finding, females who reported in both groups were more likely to have lower amounts of physical activity than males. In this sample, female participation in the highest (vigorous) physical activity MET category (16%) was significantly lower than male participation (31%), which indicated that males are more than twice as likely as females to meet the Guidelines (adolescents participate at least 60 minutes of moderate to vigorous intensity activity per day). The study mirrors the National Youth Risk Behavior Questionnaires (2011) data which showed males more than twice as likely (38%) as females (19%) to meet the Guidelines. The results specified how males and females in the experimental and control groups were spending their time engaging in vigorous and moderate physical activity. For instance, male adolescents engaged in less than 8% of moderate physical activity and less than 32% of vigorous in the last seven days. Female adolescents engaged in less than 6% of moderate physical activity and less than 17% of vigorous in the last seven days (refer to Table 1). These results have shown the differences that occur between males and females in practicing physical activity due to the

influences of society and religion, which have given males more opportunities to engage in physical activity than females (Al-Kandari, 2006).

Society and religion have offered many reasons, showing that males have had a priority to participate in physical activity more than females. First, males can go outside the home and engage in activity even though residential areas have limited activity space (Al-Kandari, 2006), which results in most of the females staying indoors and using video games or networking tools such as tablets and social media. Second, parents and caregivers have primary control over their children's activity choices (Al-Isa, Campbell, & Desapriys, 2010). Consequently children and adolescents have recently led largely sedentary lifestyles and have engaged in too little physical activity because parents and guardians are protective and want to keep their children close in order to prevent them from being harm. Third, the lifestyle in Kuwait has been different because children and adolescents are influenced by familial culture that prioritized communication and inactivity and put unhealthy food at the center of events (Al-Kandari, 2006).

The results also revealed the difficult process of quantifying physical activity levels in adolescents. Doing so demanded that researchers were particularly attentive to accuracy and practicality. Self-reporting measures can be done in many forms, such as interviews and questionnaires, but they depend on the individual participant's accuracy in remembering their physical activity level (Marshall, & Welk, 2008). Some of the participants did not take self-report seriously and did not provide more evidence about their amount of physical activity. It was noticeable that participants did not complete the questionnaires, and they would not give clear information about their amount of physical activity. However, the information that was obtained from students who fully completed the questionnaires was the data that examined for this study. Overall, the results helped to provide some evidence about the level of physical

activity among adolescents in Kuwait. The questionnaires has aided in establishing a foundation that addresses the lack of information on how physical activity affects a substantial portion of the Kuwaiti population.

### **Relationship between Gender and Sedentary Behaviors (TV/Internet)**

The second hypothesis, which discussed the relationship between gender and sedentary behaviors, was supported by evidence that showed in both genders, 50% of the participants spent more than four hours per day in sedentary behaviors, and females had higher levels of sedentary behaviors than males. Even though the females' scores in both the control group and the experimental groups were greater than males' scores in both the control group and experimental groups, that was due to the greater frequency of opportunities that males had to practice physical activity than females. The average time spent on sedentary activities was 7.6 hour/day, with females spending 8 hours/day and males spending 7 hours/day. On average, participants spent too much time sitting per day. More than 60% of the adolescents were sedentary for more than 4 hours a day. Females spent more time in sedentary behaviors than males. That indicates that adolescents in Al-Jahra City spend at least four hours a day on sedentary behavior which presents a significant amount of an adolescent's total day time. In addition, the results indicated that there was a gender difference in the both control and experimental groups in the overall number of hour of sedentary behavior reported; females had higher levels of sedentary behaviors than males. These numbers were higher than those reported in the American Academy of Pediatrics (2001) recommendation, which suggested that adolescents must limit television and other screen time to no more than two hours per day. This result reflected the findings of previous studies (Gorely, Marshall, & Biddle, 2004; Nelson, Neumark-Stzainer, Hannan, and

Sirard, 2006) which showed that adolescents spend at least five hours a day screen viewing, representing 32–56% of an adolescent's total day time.

The reported similarities between the findings from this investigation and the previous studies were due to the technological and social changes that have extensively reduced overall regular physical activity levels and increased the time spent in sedentary behaviors in countries such as the United States (Brownson, Boehmer, & Luke, 2005). Specifically for sedentary behaviors, there was a gender difference which helped to prove that the influences of society and religion in Al-Jahra City have given more opportunities for males to engage in physical activity than females (Al-Kandari, 2006). This could have caused the females to spend less time engaging in physical activity than males. The previous results that investigated the relationship between gender and physical activity supported the finding that adolescent males reported more time engaging in physical activity than adolescent females. Overall, the statistical evidence supported the hypothesis that in both genders, 50% of the participants will spend more than four hours per day in sedentary behaviors, and females will have higher levels of sedentary behaviors than males.

### **Relationship between Physical Activity and Sedentary Behaviors**

The results of this study explained the relationship between physical activity and sedentary behaviors and further supported the third hypotheses which stated (a) there will be a negative relationship between vigorous physical activity and sedentary behavior (because the mean times spent in sedentary behaviors was consistently the lowest when physical activity (MET minutes per week) were in the highest category); (b) there will be a negative relationship between moderate physical activity and sedentary behavior (because the mean times spent in sedentary behaviors were lower) when physical activity (MET minutes per week) was in the

moderate category; and (c) there will be a positive relationship between low physical activity and sedentary behavior (because the mean times spent in sedentary behaviors were the highest) when physical activity (MET minutes per week) was in the lowest category.  $H_{3a}$ ,  $H_{3b}$ , and  $H_{3c}$  examined the relationship between physical activity and sedentary behaviors. The results showed that, as expected, there was a negative relationship between level of physical activity and hours spent in sedentary behaviors. Adolescents who were more physically active tended to spend less time on computers and watching television. The results were also consistent with the previous analysis which showed that females spent more time in sedentary behaviors than males.

This dissertation aimed to determine whether or not physical activity and sedentary behaviors were two distinct sides of the spectrum. A secondary objective was to search for correlates and advisory models for physical activity and sedentary behavior. A negative correlation ( $-0.256$ ,  $p < .001$ ) was found between physical activity and sedentary behaviors. Moderate physical activity had a negative correlation with sedentary behavior in adolescents as well, which showed that adolescents who participated in vigorous or moderate physical activity were likely to have lower levels of sedentary behavior. Finally, the results supported how physical activity and sedentary behavior are correlated in different ways (refer to Figure 12). For instance, previous studies have shown that sedentary behavior correlates with a lack of physical activity (Gorely, Marshall, & Biddle 2009; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011). Furthermore, the results indicated that adolescents who engaged in low levels of physical activity had high levels of, or spent more time in, sedentary behaviors. That means the more sedentary behavior adolescents participated in, the less physical activity they got. However, physical activity was inversely correlated with sedentary behaviors and came to support many studies that previously investigated that issue. For instance, previous studies have shown that

sedentary behavior and physical activity may be two separate behaviors, but the two behaviors are dependent on one another (Gorely, Marshall, & Biddle 2009; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011).

It's worth stating that vigorous and moderate levels of physical activity had a significant negative correlation with sedentary behaviors; that is to say, health was negatively correlated with sedentary behavior. In other words, as a person's physical health increases, their level of sedentary behavior decreases. As a result, both moderate and vigorous levels of physical activity were expected to correlate with lower levels of sedentary behavior. The mean scores for sedentary behaviors declined systematically with respect to an increase in physical activity (between the three levels "low, moderate, vigorous" of physical activity) for males and females in both the control and experimental groups. Time spent in sedentary behavior peaked at ( $M = 9.50$ ) and for females, correlated with the lowest level of physical activity in the experimental group. Reported time spent in sedentary behavior, when at its lowest ( $M = 5.77$ ), correlated with higher levels of physical activity in the control group for males. As mentioned before, this could be due to the fact that males in Kuwait have more opportunities to be physically active than females.

Lastly, the full sample of correlations indicated a noticeable difference between the average scores for participants concerning the three levels (low, moderate, vigorous) of physical activity at  $\alpha = .05$ . These results confirmed differences in sedentary behaviors between males and females ( $F(1, 678) = 5.22, p = .023$ ), as previously noted. Results further confirmed that there are no substantial differences between the experimental and control groups. For the purposes of this sample, this meant that adolescents, regardless of grouping, showed a decrease in physical activity tied to an increase in their sedentary behavior. When looked at from the perspective of

intervention, this finding suggests that adolescents who had high levels of physical activity could be less sedentary than peers who engaged in average or low levels of physical activity. The relationship between physical activity and sedentary behavior has been previously studied (Gorely, Marshall, & Biddle 2009; Regan & Heary, 2013; Salmon, Tremblay, Marshall, & Hume, 2011).

### **Relationship between Sedentary Behaviors (TV/Internet) and Body Mass Index (BMI)**

For the fourth hypothesis, which examined the relationship between sedentary behaviors and body mass index (BMI), evidence did not support the hypothesis that stated in both genders there will be a relationship among sedentary behavior, computer use, television viewing, and BMI. The statistical evidence was, however, consistent with the conclusion that the BMI of both genders can be predicted, albeit imprecisely, using the three Physical Activity MET Categories. An increase in physical activity from low to high predicted a decrease in BMI.

Also, the results indicated that the mean BMI of the males ( $M = 24.50 \text{ kg/m}^2$ ,  $SD = 5.40$ ) was significantly greater than that of the females ( $M = 22.65 \text{ kg/m}^2$ ,  $SD = 4.26$ ). According to the WHO BMI-for-age cut-offs 2007 scores (See Appendix G ), scores in which a BMI of 24.5 for males were obese and 22.3 for females were markers for being overweight both Kuwait's males and females were considered to be overweight. That may due to the time that males spent sitting in Diwaniahs. Some Kuwaiti adolescents like to hang out in Diwaniahs. A Diwaniahi is a gathering place in the home where male adolescents and adults gather to discuss issues about life, culture and sports. However, these meetings perpetuate unhealthy eating habits. Unhealthy food is at the center of these events because familial culture, communication, and inactivity are practiced at Diwaniahis, according to Kandari (2006).

H<sub>4a</sub> predicted a positive relationship between sedentary behaviors and BMI, and H<sub>4b</sub> predicted a negative relationship between physical activities. The results supported H<sub>4b</sub> but did not support H<sub>4a</sub>. Thus, it appeared that BMI is related to physical activity but not to sedentary behaviors. This meant that adolescents who had a high body mass index did not effective by the time they spend sitting in this sample. This finding was important from an intervention perspective because it suggested that adolescents who had high BMI were perhaps engaged in more activity that was not related to sedentary behavior. This finding was consistent with another study (Al-Haifi, Al-Fayez, Al-Athari, Al-Ajmi, Allafi, Al-Hazzaa, & Musaiger, 2013) that showed , “With regard to sedentary behavior, time spent watching television and time spent on the computer were not significantly related to BMI in boys or girls,” (p. 9). In general, no relationships were found between the various sedentary behaviors and BMI that may be due to the massive economic development in Kuwait (Ramadan, Vuori, Lankenau, Schmid, & Pratt, 2010) that led many adolescents to engage in some activities that enhance body health. As noted recently in Kuwait, increases in BMIs offers public health and education authorities in Kuwait evidence of the benefits of physical activity and healthy eating habits on weight gain and obesity.

The lack of a relationship between sedentary behaviors and BMI suggested that there was not a direct connection between those two variables, even though both variables have a significant relationship with physical activity level. It is possible that physical activity level moderates the relationship between sedentary behaviors and BMI; in other words, in the conceptual model physical activity should be placed between sedentary behaviors and BMI. This would be one possible direction for future research. Moreover, it indicated that the relationship between sedentary behaviors and BMI is only true for people at certain levels of physical activity – especially, low levels of physical activity. That said, those who are more

physically active and practice physical activity at moderate and vigorous levels will not see a correlation between BMI and sedentary behavior, because they are not engaging in as much sedentary behavior as someone who practices low levels of physical activity.

### **Relationship between the Responses for the Last Seven Days and Plans for the Next Seven Days**

The implications of the results of the non-parametric statistical analyses on the responses to the Physical Activity Questionnaire are that the members of the experimental group showed little or no intention to change the times that they spent in physical and sedentary activities because of reading the important information sheet. The only significant difference between the experimental and control groups was for days going to PE classes. The number of PE classes in the last seven days was less than the planned number of PE classes in the next seven days. This implied that the only effect of reading the information sheet was that the participants planned to do more formal PE classes at school. The participants did not plan to do more informal physical activities such as lifting, digging, aerobics, bicycling, running, or walking. The information provided in the sheet did not appear to make the members of the experimental group think deeply about just how little activity they were doing and they were not shocked into the reality that they should do more. The information sheet did not appear to provide a strong enough message to change the behaviors of the participants, indicating a lack of treatment strength for the experimental group.

The study examined the relationship between the responses for the last seven days and plans for the next seven days and further framed the responses within the Theory of Planned Behavior. The Theory of Planned Behavior enabled the discovery of the subjective norm amongst Kuwaiti adolescents, and, perhaps, most importantly, brought their own health

behaviors to the participants' attention. The results indicated only one significant difference at  $\alpha = .05$  between the control group and the experimental group. In an average week when the participants were in school, the median number of days they went to physical education (PE) classes was significantly higher in the experimental group than in the control group, both in the last seven days and in the next seven days. On the other hand, there were no significant differences between the experimental group and the control group with regards to the median amount of time reported in the last week or planned in the next week for vigorous physical activities, moderate physical activities, walking, or sedentary activities such as sitting, watching television, and playing video games / using a computer.

As previously stated, the Theory of Planned Behavior has been investigated for its role in physical activity and sedentary behavior, particularly in research. It has also been used to show intention in behaviors, predict behaviors, examine social influences, and change behavioral patterns through participant awareness, which has been helpful in planning interventions that address low levels of physical activity. This theory has been used to explain participants' behavior and habits of sedentary behavior and physical activity. It was predicated on the assumption that a person will behave a certain way in a certain situation. For the purpose of this model, we have looked at subjective norm. The subjective norm looks at social influence on behaviors and actions (Ajzen & Fishbein, 1975; Dishman, 1994; Fisher, 2003). This study has investigated via self-reporting how adolescents participate in physical activity and sedentary behavior, in effect determining the subjective norm for Kuwaiti adolescents. Behavioral intention is the most significant predictor of actions in the Theory of Planned Behavior. In relation to health behaviors, intention has been considered to be the most effective predictor (Fisher, 2003). However, this result had merely identified behaviors and the subjective norm, the results also

brought some attention to the intentional and motivational aspects of the Theory of Planned Behavior, and were meant to provide foundational information for further study.

The results indicated only one significant difference at  $\alpha = .05$  between the control group and the experimental group due to many reasons. It appears that the fact sheet was not effective or not interesting for adolescents in Al-jahra City, because it only contained or provided negative information about the Kuwaitis' health. Perhaps the fact sheet did not contain information that seemed important to the students, or maybe they did not understand it. Perhaps some other medium would be more effective (a video or a group discussion). Perhaps the fact sheet did have an effect on them, but the questionnaires were not capable of measuring the effect. Also, the failure to show significant results caused by that the fact sheet is not a strong method to produce a subjective norm that would influence the students' decisions. It gives the kids information, but does it really create social influence on them, and were they interested in reading the fact sheet at all? The results indicate that the participants found the fact sheet relevant in physical education class where they received more instruction, but not in any other environment. Also, there are additional reasons that may be of significance when questioning why the median number of days the participants went to physical education (PE) classes was significantly higher in the experimental group than in the control group. Of course, that may be due to the school environment in which the questionnaires were taken. That may have led some participants to think the questionnaires only related to their health inside the school. The results may be influenced by the directions that were given to the participants by their teachers as well, because most of the school did not allow the researcher to give directions to the participants, especially in the females' school, and that was due to society and religion.

## **Contribution**

The conceptual framework was the primary strength of the current research, due to the design it employed. The influence of physical activity and sedentary behaviors were associated by using this design. The design helped to identify that physical activity and sedentary behavior are related and further impacted adolescents in Al-Jahra City. Ultimately, the relationship between physical activity and sedentary behavior was a foundation for this particular research. For both genders in Al-Jahra City, there was a noted impact by physical activity and sedentary behaviors. There is now an abundance of information about the time that adolescents spend in physical activity and sedentary behaviors in one particular city in Kuwait due to the study's results. This study provided evidence that fills in, to some degree, for the lack of information prior to the study. There was significant demand for an investigation of how physical activity affects a substantial portion of the Kuwaiti population, and the study's goal was to meet that demand. This study further helped test the Theory of Planned behavior in that results showed adolescents' physical activity and sedentary behaviors are potentially influenced by their school environment as well as intrapersonal aspects such as a subjective norm.

The sample size was large and accurately represented Al-Jahra city in general. The objective in Al-Jahra City was to reduce the chances of failing to discover the relationship between adolescent physical activity and sedentary behaviors. A larger sample size, therefore, was necessary for this study as it broadened the range of possible data and enabled the formation of a clearer picture for analysis. These results may not extend to children in different public schools or at different grade levels. Again, the catalyst for this research was the need to discover some evidence about the amount of physical activity for Kuwaiti adolescents. According to a statement made by Kuwait's Ministry of Health in 2008, no data exists on the activeness of

Kuwaiti youth, signifying a complete lack of information. That fact alone made this study vital for creating an excellent foundation to identify the level of physical activity among Kuwaiti adolescents. Moreover, the study identified correlates between physical activity levels and sedentary behaviors. The study's findings can be used to extend our understanding of how physical activity levels play a key role in reducing sedentary behaviors. Ultimately, the research that was conducted illuminated the relationship between physical activity and sedentary behaviors and attempted to better demonstrate how sedentary behaviors' direct effect on levels of physical activity.

### **Limitation**

This research study was not without methodological weaknesses. One weakness was the sample was taken from one city in Kuwait. It is possible the relationships examined do not apply or fit other cities in the Kuwait. It is also possible the environment in Al-Jahra City had some influence and adolescent supports would be different in another city sample. Another weakness of this study was incomplete questionnaires. A high percentage of questionnaires were incomplete, indicating that some of the participants did not understand the need for the questionnaires or chose not to complete the questionnaire because they could not accurately remember their physical activity or sedentary behavior. Due to that, the researcher found varying levels of difficulty communicating with all teachers in the schools' gym systems because of some societal and religious practices in the Al-Jahra City, Kuwait. If all participants' information had been included, the results might have been different. Another weakness of this research was using a self-report measure. When we rely on someone to describe their own behavior, we know there are many factors that could cause their answers to be inaccurate, such as a poor memory or a desire to make themselves look good. We don't know what their actual behavior was in the

past. Also, there is no way to know how deeply they thought about their plans for the future or if they will actually make the changes they predicted. Another weakness of this study was the ineffectiveness of the fact sheet, which needs to be modified or replaced with a more effective intervention.

### **Future Directions Studies**

Recommendations for future studies can be found in the results of the current study, along with their impact on BMI. It is important to consider if physical activity and sedentary behaviors do indeed affect each other. Further studies on the differing risks for BMI based on combinations of physical activity and sedentary behaviors will provide a more comprehensive look regarding the relationship between BMI and health behaviors. Additionally, using duration of sedentary behavior as a measurement would aid in assessing the effects of physical activity on BMI, and put those effects in a different perspective. In this study, physical activity and sedentary behavior were only measured by self-reporting for one week, and as a result it was impossible to determine the duration of a single session of physical activity and sedentary behavior. Furthermore, if sedentary behaviors and physical activity are measured in terms of time, as is the case with daily activity logs, it may inform researchers of specific activities that adolescents do more frequently while physical activity is decreasing. Next, future research should also include a multi-method multi-respondent design. Assessing physical activity and sedentary behaviors needs to be done by using methods other than self-report. Using more technology such as pedometers to assess how many steps per week participants engage in physical activity could help as well, and should be used with larger sample sizes.

This study should be replicated among other schools throughout Kuwait in the future in order to accurately generalize the findings in this study. This gives the next researcher an

opportunity to discover how consistent findings in other schools districts are with Al-Jahra's school participants. It is possible that participants in other cities present different data and the researcher has inconsistent findings. Examining the various environmental supports in Kuwait and discovering the impact in both males' and females' physical activity levels may also be of interest for future research. This leaves us with the question, "how do environmental supports affect levels of physical activity, and are these supports a function of knowledge for both genders?" Because this research did not assess any barriers or factors the students may have had in physical activity and sedentary behavior, future research should take factors and barriers into consideration. An understanding of factors and barriers, as well as their potential to inhibit physical activity and promote greater levels of sedentary behavior, is crucial. The ways in which parents and the cultural environment could encourage adolescents to engage in physical activity and reduce their sedentary behavior would also be interesting to address in future research.

Finally, it may be interesting to re-examine the relationship between Body Mass Index (BMI) and sedentary behaviors because the results of this study found that, with regard to sedentary behavior, time spent watching television and time spent on the computer were not significantly related to BMI in males or females and that was similar to another study's outcome (Al-Haifi, Al-Fayez, Al-Athari, Al-Ajmi, Allafi, Al-Hazzaa, & Musaiger, 2013). This needs to be re-examined further due to the lack of information demanded an investigation on how does sedentary behavior affects Kuwaiti BMI in a substantial portion of the Kuwaiti population. Additional research has been needed on sedentary behavior in adolescents to gather valid data and expand on the previous study.

## **Implications for Policy Solutions**

As the results suggested, increasing spending on public facilities and infrastructure designed for recreation should lead to an overall increase in physical activity among Kuwaitis. For example, physical activity rates among females in this sample were dependent on the amount of physical activity they got in home and school. Furthermore, renovating facilities or installing new facilities may improve attitudes toward physical activity for the males in this sample, thereby increasing their physical activity levels. The Kuwait Health Ministry could simultaneously increase physical activity and decrease sedentary behavior by designing health programs targeting adolescents. To start, parents' awareness of the impact that their own behaviors have on their children's physical activity and sedentary behavior habits should be taken into consideration during program development. An example of this would be informing parents that they or their household rules can encourage sedentary behavior and subsequently reduce their children's physical activity levels.

Finally, the Kuwait Ministry of Education needs to increase physical education classes in schools, and involved youth sport promotion should be focused on increasing engaging in physical activity, especially with the girls. These results showed that females were more likely to have lower amounts of physical activity than males, due to many reasons that showed males have a priority to participate in physical activity more than females. One reason is that males can go outside the home and engage in activity even though residential areas have limited activity space.

## Conclusion

This dissertation has tested physical activity and sedentary behavior levels of adolescents in Kuwait. That was accomplished by examining the relationship between gender, physical activity, sedentary behaviors, and BMI by using specific conceptual frameworks, as well as brought attention to certain behaviors based upon Theory of Planned Behavior. It was found that for both genders more than 50% had a low level of physical activity and that males tended to have higher levels of activity than females. In addition, the study found that the time spent daily for both genders in sedentary behaviors was greater than 7.6 hours, and more than 60% of the adolescents were sedentary for more than four hours a day. Females spent more time in sedentary behaviors than males. The relationship between physical activity and sedentary behaviors showed that there was a negative relationship between level of physical activity and hours spent in sedentary behaviors. Adolescents who were more physically active tended to spend less time on computers and watching television. Also, the study showed that females spent more time in sedentary behaviors than males. Moreover, the study showed sedentary behavior, time spent watching television, and time spent on the computer, were not significantly related to BMI in males or females. This relates to my earlier research in that it provided information about Kuwait society and physical activity levels among elementary school children in physical education classes.

In addition, using the Theory of Planned Behavior to bring attention to certain behaviors was examined by looking at the relationship between the responses for the last seven days and plans for the next seven days. The results indicated only one significant difference the control group and the experimental group. There was a significant difference on only one of the ten questionnaires questions: the question that concerned plans for attending physical education

classes. Studies on physical activity and sedentary behaviors should be guided by theory-based approaches that have been proven to be reliable and have strong statistical designs.

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APPENDICES

## Appendix A: MTSU IRB Approval Letter



4/30/2014

Investigator(s): Salem Alshammari, Don Belcher  
Department: Health and Human Performance  
Investigator(s) Email: sma4g@mtmail.mtsu.edu, Don.Belcher@mtsu.edu

Protocol Title: "Examining the Amount of Physical Activity and Sedentary Behavior among Adolescents in Kuwait"

Protocol Number: 14-345

Dear Investigator(s),

The MTSU Institutional Review Board, or a representative of the IRB, has reviewed the research proposal identified above. The MTSU IRB or its representative has determined that the study poses minimal risk to participants and qualifies for an expedited review under 45 CFR 46.110 and 21 CFR 56.110, and you have satisfactorily addressed all of the points brought up during the review.

Approval is granted for one (1) year from the date of this letter for 1400 participants.

Please note that any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918. Any change to the protocol must be submitted to the IRB before implementing this change.

You will need to submit an end-of-project form to the Office of Compliance upon completion of your research located on the IRB website. Complete research means that you have finished collecting and analyzing data. **Should you not finish your research within the one (1) year period, you must submit a Progress Report and request a continuation prior to the expiration date.** Please allow time for review and requested revisions. Failure to submit a Progress Report and request for continuation will automatically result in cancellation of your research study. Therefore, you will not be able to use any data and/or collect any data. Your study expires **4/30/2015**.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to complete the required training. **If you add researchers to an approved project, please forward an updated list of researchers to the Office of Compliance before they begin to work on the project.**

All research materials must be retained by the PI or faculty advisor (if the PI is a student) for at least three (3) years after study completion and then destroyed in a manner that maintains confidentiality and anonymity.

Sincerely,

Kellie Hilker  
Compliance Officer/ MTSU Institutional Review Board Member

## Appendix B: Letter of Approval from the Al-Jahra School District



To Middle Tennessee State University IRB  
 Emily Bom – Compliance Officer  
 Sam H. Ingram Bldg. 011 B  
 Murfreesboro, TN 37130

We give permission for Salem Alshammari to conduct his research study at eight high schools in the Al-Jahra school district as he requested. We are glad to let you know that the Al-Jahra Educational Area Administration has the right to give Mr. Alshammari the permission to measure the physical activity levels among adolescents in our schools. This permits Mr. Alshammari to use the instrument (IPAQ-S) with our high school students

If you have questions or concerns feel free to contact me,

Sincerely,

Ahmed Fayz  
 Chair  
 Physical Education Supervision  
 Al-Jahra Educational Area Administration  
[Tawoos2004@yahoo.com](mailto:Tawoos2004@yahoo.com)  
 (+965)6667-8131

الموجة الفني الأول للتربية البدنية بنين

أحمد فايز  
 منسقة الشؤون  
 موجه أول التربية البدنية  
 المنطقة الجهراء التعليمية



الإدارة العامة لمنطقة الجهراء التعليمية  
 التوجيه الفني للتربية البدنية / بنين



جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

**To:** Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at Amra Bint Rawahah - Highschool. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me ( \_\_\_\_\_ )

تم اعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا عمره بنت رباحه الثانوية. يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم اي أسئلة أو استفسارات لا تتردد في الاتصال بنا

Sincerely

مديرة المدرسة  
عبدالله العنزي  
٢٠١٤/٥/١٤

وزارة  
الإدارة العامة لبلدية الكويت  
ثانوية عمره بنت رباحه



جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

**To:** Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at Taima Secondary School. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me [taima.school@hotmail.com](mailto:taima.school@hotmail.com).

تم إعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا ثانوية تيماء بنات و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا

Sincerely





جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

**To:** Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at Ommabasher Secondary School. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me [ommbasherprincipal@yahoo.com](mailto:ommbasherprincipal@yahoo.com)

تم اعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا: أم مبشر الأنصاري. و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا

Sincerely

المدير المساعد  
مقام بنو علي الخويطر  
١٤٥٠ / ٢٧

وزارة التربية  
الإدارة العامة لمنطقة الجواء التعليمية  
ثانوية أم مبشر الأنصارية بنات



جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

To: Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at Alnawar bint Malek Sa School. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me (009652455 8648)

تم اعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا شأنوم النوار بنت مالك. و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة للسماح للسيد سالم الشمري بقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري باستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا Alnawarschool@yahoo.com

Sincerely

مديرة المدرسة  
مزنة الخزي





جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

**To:** Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at Sabah Al-Nasser AlSabah, high school. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me ( (+965) 5089-9870 )

تم إعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا سabah Al-Nasser AlSabah و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا 50 89 98 70

Sincerely





جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

To: Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

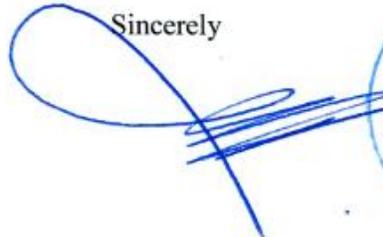
We give permission for Salem Alshammari to conduct his research study at Al-Waha, High school. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me ( 997-3384 )

تم إعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا الواحة و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا

Sincerely






جامعة الكويت  
كلية التربية

### Permission for Salem Alshammari

**To:** Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at جابر عبد الصبور للسيد. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me (009624555428)

تم إعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا \_\_\_\_\_ و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا

Sincerely



جامعة الكويت  
كلية التربية

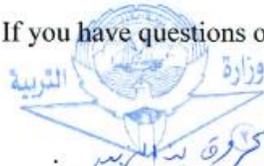
### Permission for Salem Alshammari

To: Middle Tennessee State University IRB

Emily Born – Compliance Officer  
Sam H. Ingram Bldg. 011B  
Murfreesboro, TN 37132

We give permission for Salem Alshammari to conduct his research study at Durrah Bin Al Zabar. We are glad to let you know that the school has the right to give Mr. Alshammari the permission to measure the physical activity level in our school. This permits Mr. Alshammari to use the IPAQ-S surveys in regular classes at our school.

If you have questions or concerns feel free to contact me (965) 2453-2483  
8485



تم إعطاء الموافقة لسيد سالم الشمري لإجراء البحث وعمل الدراسة في مدرستنا  
و يسرنا أن نخبركم أن المدرسة لديها الحق في إعطاء تلك الموافقة والسماح للسيد سالم الشمري لقياس مستوى  
النشاط البدني في مدرستنا. وهذا يسمح للسيد الشمري لاستخدام الاستبانة الدولية لقياس النشاط البدني في  
مدرستنا.

إذا كان لديكم أي أسئلة أو استفسارات لا تتردد في الاتصال بنا

Sincerely

المدير المساعد  
سليمان محمد الصريح

14

## Appendix C: IPAQ Survey

**INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE**

sex	age	grade	high	weight

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

\_\_\_\_\_ **days per week**

No vigorous physical activities



*Skip to question 3*

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

\_\_\_\_\_ **days per week**

No moderate physical activities → *Skip to question 5*

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

\_\_\_\_\_ **days per week**

No walking → *Skip to question 7*

6. How much time did you usually spend **walking** on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

8. On an average school day, how many hours do you **watch TV**?
- 1- I do not watch TV on an average school day
  - 2- Less than 1 hour per day
  - 3- 1 hour per day
  - 4- 2 hours per day
  - 5- 3 hours per day
  - 6- 4 hours per day
  - 7- 5 or more hours per day
9. On an average school day, how many hours do you **play video or computer** games or use a **computer** for something that is not school work? (Count time spent on things such as Xbox, PlayStation, an iPod, an iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the Internet.)
- 1- I do not play video or computer games or use a computer for something that is not school work
  - 2- Less than 1 hour per day
  - 3- 1 hour per day
  - 4- 2 hours per day
  - 5- 3 hours per day
  - 6- 4 hours per day
  - 7- 5 or more hours per day
10. In an average week when you are in school, on how many days do you go to **physical education (PE) classes**?
- 1- 0 days
  - 2- 1 day
  - 3- 2 days
  - 4- 3 days
  - 5- 4 days
  - 6- 5 days

Important Information Related to Your Health and Participation in Physical Activity

1. Did you know that 1.9 million people around the world die due to insufficient physical activity according to the World Health Organization (2010).

2. Did you know that participating in physical activity can play a vital role in reducing diabetes, obesity, and cardiovascular disease, according to the Centers for Disease Control and Prevention (2008).
3. Did you know that Kuwaiti people have the highest rate of obesity and diabetes in the world according to the World Health Organization (2010).
4. Did you know that 39% of deaths in Kuwait during 1995 were related to chronic illnesses such as obesity and diabetes according to the Kuwait Ministry of Health (1998).
5. Did you know that currently in Kuwait, 21% of people have Type 2 diabetes. This rate is expected to increase by 10% by 2025, according to the World Health Organization (2010).
6. Did you know that Kuwaitis have the highest BMI in the world for both males and females according to the World Health Organization (2013).
7. Did you know that 67% of males in Kuwait do not participate in any kind of physical activity, while 77-78% of females in Kuwait do not participate in any kind of physical activity according to the Kuwait Ministry of Health (2008).
8. Did you know that depending on what your age is, you need to participate in at least 60 minutes of moderate to vigorous intensity physical activity daily to prevent chronic illnesses such as diabetes and obesity, according to the World Health Organization (2010).
9. Did you know that sitting for a long time affects your health and can lower your body's physical performance according to the Centers for Disease Control and Prevention (2008).
10. Did you know that American Pediatric recommends that watching television for more than two hours a day can be bad for your health (2013).

Based on What You Have Read, Please Answer the Following 10 Questions

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **next 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you will do in the next **7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you will do for at least 10 minutes at a time.

11. During the **next 7 days**, how many days will you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

\_\_\_\_\_ **days per week**

No vigorous physical activities



*Skip to question 3*

12. How much time are you planning to spend doing **vigorous** physical activities on one of these days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you will do in the **next 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you will do for at least 10 minutes at a time.

13. During the **next 7 days**, on how many days are you planning to do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

\_\_\_\_\_ **days per week**

No moderate physical activities → *Skip to question 5*

14. How much time are you planning to spend doing **moderate** physical activities on one of these days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

Think about the time you are planning to spend **walking** in the **next 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you will do solely for recreation, sport, exercise, or leisure.

15. During the **next 7 days**, on how many days do you plan on **walking** for at least 10 minutes at a time?

\_\_\_\_\_ **days per week**

No walking → *Skip to question 7*

16. How much time are you planning on **walking** on one of these days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

The last question is about the time you plan to spend **sitting** on weekdays during the **next 7 days**. Include time you spend at work, at home, while doing course work and during leisure time. This may include time you spend sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

17. During the **next 7 days**, how much time are you planning to spend **sitting** on a **week day**?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

18. On an average school day, how many hours do you plan **watch TV**?

1. I will not watch TV on an average school day
2. Less than 1 hour per day
3. 1 hour per day
4. 2 hours per day
5. 3 hours per day
6. 4 hours per day
7. 5 or more hours per day

19. On an average school day, how many hours do you plan to **play video or computer** games or use a **computer** for something that is not school work? (Count time spent on things such as Xbox, PlayStation, an iPod, an iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the Internet.)

1. I will not play video or computer games or use a computer for something that is not school work
2. Less than 1 hour per day
3. 1 hour per day
4. 2 hours per day
5. 3 hours per day
6. 4 hours per day

7. 5 or more hours per day
20. In an average week when you are in school, on how many days do you plan to go to **physical education (PE) classes**?
1. 0 days
  2. 1 day
  3. 2 days
  4. 3 days
  5. 4 days
  6. 5 days

## Appendix D: Health Fact Sheet

### Important Information Related to Your Health and Participation in Physical Activity

1. Did you know that 1.9 million people around the world die due to insufficient physical activity according to the World Health Organization (2010).
2. Did you know that participating in physical activity can play a vital role in reducing diabetes, obesity, and cardiovascular disease, according to the Centers for Disease Control and Prevention (2008).
3. Did you know that Kuwaiti people have the highest rate of obesity and diabetes in the world according to the World Health Organization (2010).
4. Did you know that 39% of deaths in Kuwait during 1995 were related to chronic illnesses such as obesity and diabetes according to the Kuwait Ministry of Health (1998).
5. Did you know that currently in Kuwait, 21% of people have Type 2 diabetes. This rate is expected to increase by 10% by 2025, according to the World Health Organization (2010).
6. Did you know that Kuwaitis have the highest BMI in the world for both males and females according to the World Health Organization (2013).
7. Did you know that 67% of males in Kuwait do not participate in any kind of physical activity, while 77-78% of females in Kuwait do not participate in any kind of physical activity according to the Kuwait Ministry of Health (2008).
8. Did you know that depending on what your age is, you need to participate in at least 60 minutes of moderate to vigorous intensity physical activity daily to prevent chronic illnesses such as diabetes and obesity, according to the World Health Organization (2010).
9. Did you know that sitting for a long time affects your health and can lower your body's physical performance according to the Centers for Disease Control and Prevention (2008).
10. Did you know that American Pediatric recommends that watching television for more than two hours a day can be bad for your health (2013).

## Appendix E: IPAQ Responses

## Frequency Distributions of Responses in the International Physical Activity Questionnaire

Question	Time (Days or Hours)								
	0	1	2	3	4	5	6	7	>7
A1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	230	129	139	73	50	25	15	21	
A2. How much time did you usually spend doing vigorous physical activities on one of those days? (hours)	217	201	150	114					
A3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking	228	150	148	72	27	25	9	23	
A4. How much time did you usually spend doing moderate physical activities on one of those days? (hours)	253	197	130	102					
A5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?	174	99	80	53	42	63	19	151	
A6. How much time did you usually spend walking on one of those days? (hours)	242	166	134	140					
A7. During the last 7 days, how much time did you spend sitting on a week day? (hours)	240	60	79	53	45	32	32	25	116
A8. On an average school day, how many hours do you watch TV?		76	102	148	134	63	50	109	
A9. On an average school day, how many hours do you play video or computer games or use a computer?		82	87	106	68	77	60	202	
A10. In an average week when you are in school, on how many days do you go to physical education (PE) classes?	43	245	285	69	14	26			

Question	Time (Days or Hours)								
	0	1	2	3	4	5	6	7	> 7
B1. During the next 7 days, how many days will you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	305	103	87	73	33	35	13	33	
B2. How much time are you planning to spend doing vigorous physical activities on one of these days?(hours)	301	133	131	44	38	12	11	5	7
B3. During the next 7 days, on how many days are you planning to do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	322	94	94	65	38	33	28		
B4. How much time are you planning to spend doing moderate physical activities on one of these days? (hours)	304	132	127	48	29	15	14	7	6
B5. During the next 7 days, on how many days do you plan on walking for at least 10 minutes at a time?	288	89	64	60	39	35	14	93	
B6. How much time are you planning on walking on one of these days? (hours)	309	139	107	36	40	16	14	9	
B7. During the next 7 days, how much time are you planning to spend sitting on a week day?	294	62	109	31	51	25	32	19	59
B8. On an average school day, how many hours do you plan watch TV?	122	43	102	129	74	68	46	98	
B9. On an average school day, how many hours do you plan to play video or computer games or use a computer?	120	56	108	104	37	68	47	142	
B10. In an average week when you are in school, on how many days do you plan to go to physical education (PE) classes?	120	44	189	209	57	20			

## Appendix F: Correlations between IPAQ Responses

Correlations between the last 7 days and plans for the next 7 days in the Responses to the International Physical Activity Questionnaire

Question (last 7 days)	Question (plans for the next 7 days)	Spearman's rho	p
1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	1. During the next 7 days, how many days will you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	.433	<.001
2. How much time did you usually spend doing vigorous physical activities on one of those days?	2. How much time are you planning to spend doing vigorous physical activities on one of these days?	.349	<.001
3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking	3. During the next 7 days, on how many days are you planning to do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	.378	<.001
4. How much time did you usually spend doing moderate physical activities on one of those days?	4. How much time are you planning to spend doing moderate physical activities on one of these days?	.403	<.001
5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?	5. During the next 7 days, on how many days do you plan on walking for at least 10 minutes at a time?	.420	<.001
6. How much time did you usually spend walking on one of those days?	6. How much time are you planning on walking on one of these days?	.385	<.001
7. During the last 7 days, how much time did you spend sitting on a week day?	7. During the next 7 days, how much time are you planning to spend sitting on a week day?	.499	<.001
8. On an average school day, how many hours do you watch TV?	8. On an average school day, how many hours do you plan watch TV?	.475	<.001
9. On an average school day, how many hours do you play video or computer games or use a computer?	9. On an average school day, how many hours do you plan to play video or computer games or use a computer?	.482	<.001
10. In an average week when you are in school, on how many days do you go to physical education (PE) classes?	10. In an average week when you are in school, on how many days do you plan to go to physical education (PE) classes?	.370	<.001

## Appendix G: Adolescent BMI Cut-Off Scores

**Child Body Mass Index (BMI) Cut-off Scores**

Age (Years)	Boys		Girls	
	Overweight	Obese	Overweight	Obese
12.0	19.9	23.6	20.8	25.0
12.5	20.4	24.2	21.3	25.6
13.0	20.8	24.8	21.8	26.2
13.5	21.3	25.3	22.3	26.8
14.0	21.8	25.9	22.7	27.3
14.5	22.2	26.5	23.1	27.8
15.0	22.7	27.0	23.5	28.2
15.5	23.1	27.4	23.8	28.6
16.0	23.5	27.9	24.1	28.9
16.5	23.9	28.3	24.3	29.1
17.0	24.3	28.6	24.5	29.3
17.5	24.6	29.0	24.6	29.4

Adapted from the WHO BMI-for-age (5-19 years) tables available at  
[http://www.who.int/growthref/who2007\\_bmi\\_for\\_age/en/index.html](http://www.who.int/growthref/who2007_bmi_for_age/en/index.html)