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Differences in Adolescents' Psychological Well-Being Based on Levels of Mental Toughness and Physical Activity

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DIFFERENCES IN ADOLESCENTS' PSYCHOLOGICAL WELL-BEING BASED ON LEVELS OF MENTAL TOUGHNESS AND PHYSICAL ACTVITY

BY

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Abstract

The purpose of this study was to explore the differences in adolescents' psychological well-being based on levels of mental toughness and physical activity. Specifically, the aim of the study was to determine if the well-being of adolescents is associated with increased participation in physical activity and higher mental toughness. Therefore, the study examined several physical activity levels (e.g., inactive, minimally active, and HEPA active) as well as levels of mental toughness (e.g., sensitive, average, and mentally tough) to assess their impact on the psychological well-being of adolescents. Mental toughness (MT) was measured using the Mental Toughness Questionnaire 48 (MTQ-48) (Cough et al., 2002). Physical activity (PA) was measured using the International Physical Activity Questionnaire (IPAQ) (Craig, 2003) and adolescents' psychological well-being (PWB) was measured using the KIDSCREEN-27 (KS-27) (Ravens-Sieberger et al, 2005). A total of 156 participants (female = 79, male = 77) ages 14 to 18 (M=1.49, SD=.502), completed the parental consent/assent forms as well as the questionnaires to participate in the study. A Pearson product-moment correlation, T-tests, and 3 by 3-way ANOVA were used to examine gender differences and effects between the three variables. Correlation results indicated that there was not a significant positive relationship between MT and PWB, r = -.007, p = .928 nor between PA and PWB, r = .113, p = .162. The results of the t-tests showed no significant gender differences in any of the three variables. A 3 by 3-way ANOVA indicated that there was no significant interaction between MT level and PA level on psychological well-being, p < .862. The present study is both consistent and contradictory to previous research. Given

that this is the first study to investigate the relationship between these three variables, the results indicate many areas for future research.

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CHAPTER I

INTRODUCTION

Adolescence is an ideal development phase in which to study mental toughness because it is a period characterized by more maturational, educational, and interpersonal challenges and changes than any other stage of life (Montemayor, Adams, & Gullotta, 1990). At this stage adolescents are in search of social identity and satisfaction. Therefore, the purpose of the proposed study was to explore the relationships between mental toughness (MT) and physical activity (PA) on the psychological well-being of adolescents as well as the differences in adolescents' psychological well-being based on levels of MT and PA. Most adolescents are insufficiently active, and this inactivity tracks into adulthood, increasing the risk of diabetes, cancer, and mortality (Corder, Schiff, Kesten, & Sluijs, 2015). Individuals who accomplish recommended levels of physical activity reported high mental toughness (Gerber et al. 2012). Research shows that MT may buffer depressive symptoms because the related dysfunctional thoughts and maladaptive behavioral tendencies are incompatible with the control, challenge, commitment, and confidence attributes that characterize mental toughness (Maddi, 2006). Due to the limited research on adolescents, the aim of the present study was to illuminate how both PA and MT can affect psychological well-being in adolescents.

Regular PA is recommended for all healthy adolescents as well as for many individuals with specific medical conditions (American Academy of Pediatrics Committee on Sport Medicine and Fitness and Committee on School Health, 2000). PA is defined as any bodily movement produced by skeletal muscles that requires energy

expenditure, and exercise is a subcategory of PA that is planned, structured, and repetitive, aiming to improve one more components of physical fitness (Caspersen, Powell, & Christenson, 1985). Exercise and PA are thought to be among the most important lifestyle factors for the maintenance of health and prevention of premature disease and mortality (Windle, 2014).

Gerber et al. (2012) found that higher levels of PA can lead to increased MT. Jones, Hanton, and Connaughton (2002) defined MT as "the natural or developed psychological edge that enables you to generally cope better than the other person, so specifically, be more consistent and remain determined, focused, confident, and in control of pressure" (p 209). MT is a characteristic many believe to be important for success in PA (Gerber et al., 2012). Being mentally tough requires four different components: confidence, control, commitment, and challenge (Gerber et al., 2012). Various studies have shown that those who possess a high degree of MT perform better because they are more focused on the task at hand, rather than obsessing about failure and defeat (Jones et al., 2002). Some view MT as the most important psychological attribute it determining success (Gould et al., 1987). Furthermore, Crust and Keegan (2010) suggested that increased MT leads to improved psychological well-being.

The present study examined psychological well-being through the specific facet of quality of life (QoL) perceptions. Psychological well-being (PWB) represents "the achievement of one's full psychological potential" (Carr, 2004, p 36). The six-factor model of PWB identifies the following six distinct components: (1) self-acceptance, (2) personal growth, (3) purpose in life, (4) positive relations with others, (5) environmental mastery, and (6) autonomy (Gucciardi, Gordon, & Dimmock, 2009). Researchers suggest

that exercise and PA are associated with better quality of life and health outcomes (Windle, 2014). Subjective well-being is considered to be compromised by three interrelated but distinct factors, namely the relative presence of positive affect, the absence of negative effect, and perceived quality of life, or life satisfaction (Huebner et al., 2004). Life satisfaction is defined as a cognitive evaluation of one's life as a whole and/or specific life domains (Diener, 1995; Huebner et al., 2005).

Since adolescents are constantly adapting to a changing environment, stress may occur and if it is managed poorly it could result in negative physical and mental outcome. Stress is a risk factor of psychopathology and psychological dysfunction in adolescents, therefore researchers have examined the stress-buffering effect on physical activity (Gerber et al., 2012). While doing physical activity, you release numerous endorphins, which relaxes you and reduces the negative outcomes associated with high-perceived stress. Prior research has shown that physical activity results in improved mood after acute bouts of exercise (Ekkekakis & Acevedo, 2006).

There have been few attempts to link mental toughness with mental health or health related behaviors (Crust & Keegan, 2010). Individuals who are mentally tough have many advantages in several aspects of life. The toughness concept might be a value for exercise psychologists examining the relationships between physical activity and mental health (Gerber et al., 2012). Therefore, the purpose of this study was to investigate the differences in adolescent's psychological well-being based on MT and PA.

Statement of the Problem

Research has provided evidence for the relationships between physical activity and mental toughness, physical activity and psychological well-being, and mental

toughness and psychological well-being. However, the three variables have not been examined together to determine the relationships that may exist. Thus, there is a need for examining the relationships among physical activity, mental toughness, and psychological well-being.

The study examined the different PA levels (e.g. inactive, minimally active, and HEPA active) and the different MT levels (e.g. mentally sensitive, average, and mentally tough) to investigate which levels were related to an increase in the psychological well-being of adolescents. Because of the limited research in adolescents, the purpose of the present study was to determine whether there are differences in adolescents' psychological well-being based on MT and PA.

Clough, Early, and Sewell (2002) sought to establish links between mental toughness and hardiness that influences how people react to different stressors. It is therefore important for adolescents to have the components vital to attaining MT, which include: control, commitment, challenge, and confidence. PA is another influence on the well-being in adolescents. Thus MT attributes might be learned through regular exercise participation (Gerber et al., 2012). Despite all of the research conducted on mental toughness, there is a lack of research investigating the relationships of physical activity, mental toughness, and psychological well-being in adolescents. Understanding whether there is an impact of PA on psychological well-being, MT on psychological well-being, and combined impact of PA and MT on psychological well-being could affect the overall well-being of adolescents.

Purpose of the Study

The objective of this study was to examine whether there are differences in adolescents' psychological well-being based on PA and MT. Specifically, the aim of the study was to determine if the psychological well-being of adolescents is associated with increased participation in PA and higher MT.

Research Questions

1. Are mental toughness, physical activity, and psychological well-being correlated?
2. Are there differences in adolescents' psychological well-being based on levels of mental toughness and physical activity?
3. Are there gender differences among adolescents regarding their mental toughness, physical activity, and psychological well-being?

Hypotheses

1. There is a relationship between mental toughness and psychological well-being.
2. There is a relationship between physical activity and psychological well-being.
3. There is an interaction between levels of mental toughness and physical activity with regards to their impact on psychological well-being.
4. Gender differences exist with regards to the three variables (i.e. physical activity, mental toughness, and psychological well-being.)

Operational Definitions

Mental Toughness (MT): Jones et al., (2002) defined MT as "the natural or developed psychological edge that enabled you to generally cope better than the other person, so specifically, be more consistent and remain determined, focused, confident, and in

control of pressure" (p.209). MT emerged with the components of control, confidence, commitment, and challenge.

Physical Activity (PA): Any bodily movement produced by skeletal muscles that requires spending (Caspersen et al., 1985).

Control: Feeling and acting as if one is influential in the face of the varied contingencies of life (Gerber et al., 2012).

Commitment: Devoting oneself to, rather than experiencing alienation from whatever one is doing (Gerber et al., 2012).

Challenge: The belief that change, rather than stability, is normal in life and that the anticipation of change are interesting incentives to growth rather than threats of security (Gerber et al., 2012).

Psychological well-being: A state of well-being in which every individual realized his or her own potential, can cope with the normal stresses of life and how people evaluate their lives (GNH Research, 2015).

Life Satisfaction: A cognitive evaluation of one's life as a whole and/or of specific life domains (Huebner et al., 2005; Myers & Diener, 1995).

PA Self-efficacy: A Self-appraisal process that includes beliefs held by youth about their capability for PA (Voskuil & Robbins, 2015).

Exercise: A subcategory of physical activity that is planned, structured, repetitive, and aims to improve or maintain one more components of physical fitness (WHO, 2015).

Attitude: Represents a person's assessment of his or her beliefs regarding the target behavior's effectiveness in producing outcomes (Hagger et al., 2002).

Subjective Norm: Represents the person's evaluation of whether significant others want him or her to engage in the target behavior and in his or her motivation to comply with these others (Gerber et al., 2012).

Assumptions

The only assumption in this research study is that participants will be able to honestly and accurately answer the questions related to their perceptions about their engagement in PA, MT, and psychological well-being.

Limitations

The following limitations may have impacted the study: (1) a subjective rather than objective measure of PA engagement is being utilized and this may limit the accuracy of this information, (2) only adolescents in South Florida are being investigated and thus the results of the study may not be generalized to other groups of adolescents, and (3) the timing of the data collection may impact the results in terms of adolescents' responses to the questions and the lack of longitudinal investigation of the variables.

Delimitations

Two delimitations apply to this study. First, the study will be limited to adolescents living in South Florida. Second, data will be collected from adolescents ranging in ages 14-18. This is simply because of the different demands (e.g. time demands) and personal pursuits (e.g. the search for social identity in adolescents) characteristic of this life stage (Mahoney et al., 2014).

Significance

It has been suggested that adolescents do not engage in sufficient levels of physical activity and experience many challenges with regards to their mental health or other health related disorders. Developing a more in-depth understanding of the benefits of PA and increased MT may allow parents and adolescents to have a better understanding of the role these two factors have in the overall psychological well-being. Since adolescence is an ideal developmental phase in which to study MT (Montemayor, 1990), it is important to identify the factors that may restrict the individual from overcoming an obstacle or setback. Knowing that there is limited research in adolescents, the aim of the study was to increase knowledge of how both PA and MT may affect psychological well-being can potentially help coaches, and sport and exercise psychology practitioners to develop specific interventions to improve the overall well-being of adolescents.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents a review of the literature on physical activity (PA), mental toughness (MT), psychological well-being (PWB), adolescents, and the lack of literature that ultimately lead to the purpose of the study. The present study will specifically examine each theory.

Physical Activity

Individuals who exercise regularly are healthier, feel better, and are less likely to be overweight or obese as compared to individuals who maintain a sedentary lifestyle; however, it is apparent that the U.S., in particular, is getting less and less healthy due to an epidemic of obesity stemming from overeating and the lack of PA (Anshel, 2006). It has been estimated that 80% of adolescents worldwide fail to achieve PA guidelines (Laird et al., 2016). Children and adolescents between the ages of 15 and 17 should be accumulating at least 60 minutes of moderate-to-vigorous PA daily (World Health Organization, 2014). However, in a comparison of data from 85 countries, the percentage of adolescents achieving this recommended level was 50% or less in almost all countries with girls being less likely to achieve this recommendation (Patton et al., 2012). Physical inactivity (6% of deaths) is the fourth leading risk factor for global mortality and is the main cause for approximately 21-25% of breast and colon cancers, 27% of diabetes and 30% of ischemic heart disease (WHO 2014). It is vital to target young people because a decline in activity often occurs on leaving secondary school (Wengreen & Moncur, 2009).

Psychology of Physical Activity

Researchers, educators, and practitioners need insights into the psychological benefits of exercise; the reasons why some of us exercise while others choose to be inactive, the reasons why others begin an exercise program and then quit, what each of us can do to start and maintain a regular exercise regimen, and how mental skills can be used to improve exercise performance (Anshel, 2006). Because exercise can be difficult, it is vital that the right techniques are being taught and practiced. Getting involved in PA improves the overall mental health of an individual. There are many reasons why adolescents do not enjoy exercise which include: injury, lack of fitness knowledge, and unpleasant sensations from vigorous PA (Anshel, 2006). Past studies have shown that fitness, both aerobic and strength-related, improves stability around joints and enhances your overall quality of life (American College of Sports Medicine, 2015).

Theories of Behavior Change

The intention to exercise is determined by the individual's attitude toward the behavior. Individuals take account of the information that is given to them and consider the consequences from their actions. "The intentions can change over time; the longer the time interval, the greater the likelihood that unforeseen events will produce changes in intentions" (Ajzen, 1985 pg. 12). Strong empirical support has been found for the theories of reasoned action and planned behavior which has been employed in diverse areas of research (Park & Lee, 2009).

Hagger, Biddle, and Chatzisarantis (2002) conducted a meta-analytic review that examined the relationships between behavior, intentions, attitudes, subjective norms, perceived behavioral control, self-efficacy, and past behavior across studies using the

Theories of Reasoned Action (TRA) and Planned Behavior (TPB) in the PA context. The intentions to engage in PA has to do with the person's self-efficacy. Self-efficacy is defined as "people's beliefs about their capabilities to produce designated levels of performance that influence their lives" (Bandura, 1994). The beliefs then determine how people think, feel, and motivate themselves to behave.

The TRA hypothesized that an individual's stated intention to engage in a given behavior is the most immediate predictor of that behavior (Ajzen & Fishbein, 1980). Since each person has different attitudes, subjective norms, self-affirmations, and intentions, their motivation toward the specific behavior is reflected. Attitude represents a person's assessment of his or her beliefs regarding the target behavior's effectiveness in producing outcomes (Hagger et al., 2002). A subjective norm represent the person's evaluation of whether significant others want him or her to engage in the target behavior and in his or her motivation to comply with others (Gerber et al., 2012). Someone who possesses self-affirmations values one's individual self. Having stronger self-affirmations demonstrated stronger intentions and more positive attitudes (Cooke et al., 2014).

According to Sheeran and Orbell (1998), it is anticipated that age will moderate the intention-behavior relationship. The participants were divided into groups composed of adolescent and college university samples. Results found that there were strong correlations between the control and attitude constructs, which demonstrated that attitude (B = .40) was the best predictor of intentions (Sheeran & Orbell, 1998). The findings demonstrated moderate to strong, positive-corrected, average correlations between self-efficacy and TPB variables. The significant influence of self-efficacy on intentions supports the majority of findings in individual PA research that augmented the TPB to

include self-efficacy (Hagger et al., 2001). These results suggest that intervention for promoting increases in PA should focus on the promotion of positive attitude as well as on fostering a sense of control over PA situations, particularly internal perceptions of control or self-efficacy.

Physical Activity in Youth

Three groups have issued guidelines specifically for youth PA, and there is continuing debate over the amount and types of activity needed for health benefits (Sallis, Prochaska, & Taylor, 2000). Recommendations tend to emphasize daily PA and encourage young people to accumulate 30 to 60 minutes, ranging up to several hours per day, where moderate to vigorous PA has been recommended because it associated with specific health benefits (Sallis et al., 2000). For adolescents, since they are going through so many changes in their lives and learning to adapt to specific situations, being educated on the important of PA is vital for their mental health. Although about 80% of adolescents are estimated to spend at least 30 minutes being active, probably less than half are active and last 60 minutes (Sallis et al., 2000).

"Because physical activity has important health benefits in youth and many young people are not meeting established guidelines, improving the PA levels of youth is an important public health challenge" (Sallis et al, 2000). Since physical education (PE) classes are offered in numerous different high schools, there is a significant chance to promote the importance for youth PA and how it could improve one's health. Schools could become the central element in a community system that ensures that students participate in enough PA to develop healthy lifestyles (Pate et al., 2006). Not only does PE provide the opportunity for students to be active during the school day, but also helps

them develop the knowledge, attitudes, skills, behaviors, and confidence needed to be physically active for life (Centers for Disease Control, 2013).

Physical Activity and Gender

Globally, low participation in PA by adolescent young women is a major health concern (Brooks & Magnusson, 2007).Young people's lack of participation in sport and PA is directly equated with a dramatic rise in childhood obesity (Fruhbeck, 2016). "Among girls and young women, adolescence often marks a dramatic decrease in PA levels as the activities that girls participated in during childhood are abandoned" (Mulvihill, Rivers, & Aggleton, 2000; Rees et al., 2001; Williams, Bedward, & Woodhouse, 2000). When engaging in PA, boys are shown to be more competitive and feel less pressured to look a certain way than girls do. Also, engaging in PA provides many opportunities for enjoyment.

Research shows that participation in PA is higher among white adolescents compared with Black or Hispanics (Ickes & Sharma, 2012). Among Hispanic women, 74% report no PA and women were significantly less likely than men to participate in PA (Magoc et al., 2016). Parks and recreation services provide PA opportunities by offering close-to-home, free or low cost, readily available areas, facilities, programs and instruction (Active Living Research, 2012). Adolescents identify much of what is important to them as being located within their leisure pursuits (Kelly & Freysinger, 1999).

Mental Toughness

There are several reasons why MT should enhance individual's mental health (Gerber et al., 2012). As MT is characterized by feelings of control (Clough et al., 2002), it seems plausible that mentally tough adolescents perceived lower levels of stress. Circumstances involving stress are a part of everyday life. How stressful and threatening a situation is perceived depends on a person's appraisal of the situation and his or her ability to cope (Lazarus & Folkman, 1984). Something that may seem overwhelming for one person may be a manageable challenge for another one, leading to MT.

Research by Clough and colleagues (Clough et al., 2002 and Levy et al., 2006) using the Mental Toughness Questionnaire-48 (MTQ-48) and Mental Toughness-18 (MT-18) Questionnaires has already established various perceptual and behavioral differences between participants with self-reported varying levels of MT (Crust, 2007). It was hypothesized that MT is positively related to high levels of vigorous exercise and to a lesser degree to moderate PA. Participants included 284 male (n=99) and female (n=185) high school students living in the German-speaking, North-Western part of Switzerland. Each person was asked to complete the MTQ-48 (Clough et al., 2002). To assess exercise, participants were asked how many days per week they exercised or participated in (high intensity) activities and sports. They were also asked to indicate the average duration (per day) for the days they engaged in these activities. All items were taken from the International Physical Activity Questionnaire (IPAQ: Craig et al., 2003). Correlation analyses revealed no significant relationship between age and number of days/week of vigorous exercise and moderate PA.

Theoretical Foundations

Over the last decade, researchers have attempted to define and conceptualize mental toughness (MT). Jones, Hanton, and Connaughton (2002) used personal construct psychology in interviews with elite athletes, as well as elite-level coaches and sport psychologist, to arrive at the following definition of MT:

"Having the natural or developed psychological edge that enables you to: generally, cope better than your opponents with the many demands (competition, training, and lifestyle) that sport places on a performer, specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure." (p.209)

Gucciardo, Gordon, and Dimmock (2008) have proposed a different definition and framework of MT, based primarily on their work with Australian footballers, using personal construct psychology; they proposed the following definition of MT:

"Mental Toughness in Australian Football is a collection of values, attitudes, behaviors, and emotions that enable you to persevere and overcome any obstacle, adversity, or pressure experienced, but also to maintain concentration and motivation when things are going well to consistently achieve your goals." (p.278)

Clough and Earle (2002) proposed a model of MT, defining it more like a personality trait, which included four components: confidence, control, challenge, and commitment. Researchers agree that MT is characterized by an individual's natural or developed capacity to be consistently successful in coping with the stress and anxiety associated with competitive and stressful situations (Gerber et al., 2012). Thus MT is related to the ability to remain determined, focused, confident, and in control of stress and pressure (Crust, 2008). For each person, acquiring the different components of MT is

different such as the resources that are available. Individuals believe that some people may be more likely to change or develop (e.g., high socioeconomic status and therefore access to numerous resources) when compared with other individuals (e.g., low socioeconomic status and therefore little access to resources) (Gucciardi et al., 2015).

According to of Jones et al. (2002), MT is "the natural or developed psychological edge that enables you to generally cope better than your opponents with many demands." (p.209). Early attempts to define MT were based on opinion or anecdotal evidence rather than empirical studies, which resulted in definitions that were varied and inconsistent (Goldberg, 1998). Gould, Dieffenback, and Moffett (2002) have suggested that MT is one of the central psychological traits key to sustainment and attainment of performance standards. Since there are different levels of MT, it varies according to the person's genetic factors. Weinberg, Butt, and Culp (2011) have contested that the personal characteristic that compromise MT are developed through lived experiences. MT is considered to be crucial for those individuals who may be facing challenges and adversity.

Measures of Mental Toughness

Due to the popularity of MT in many different fields (e.g., academics, business, sport, exercise, etc.) many measures have been created to indicate MT competencies within an individual as well as MT levels. For example, researchers have attempted to assess MT through a variety of scales including Psychological Performance Inventory (PPI), the Mental Toughness Questionnaire (MTQ-48), and others (Clough, Earle, & Sewell, 2002). The MTQ-48 was used to measure four different components: (1) control (2) commitment (3) challenge (4) and confidence.

Psychological Performance Inventory (PPI)

The PPI created by Loehr (1986) assess MT domains of self-confidence, negative energy, attention control, visual and imagery control, motivation, positive energy, and attitude control. Although the 42-item survey is conceptually logical as a measure of an athlete's mental toughness, the PPI has been criticized for not providing solid evidence of construct validity. Middleton et al. (2004) failed to provide evidence that it was a valid a reliable measure. Since this measure did not show construct validity, there needed to be work to create another scale for MT. Golby, Sheard, and Wersch (2007) reevaluated the PPI by examining its factor structure. A new model was created, which was identified as the PPI-A, compromising of four factors: determination, self-belief, positive cognition, and visualization. This measure was shown to be psychometrically stronger than the original PPI and shorter (14 items).

Sports Mental Toughness Questionnaire (SMTQ)

The SMTQ is a 14-item global measure of MT consisting of three subscales of confidence, constancy, and control; however, no follow-up work has been conducted using the scale. Further construct validation of the SMTQ is recommended, including its used as an index evaluating the effect of intervention programs (Sheard et al., 2009). Sample questions include:

1. I interpret potential threats as positive opportunities
2. I give up in difficult situations
3. I am overcome by self-doubt

Mental, Emotional, and Bodily Toughness Inventory (MeBTough)

The MeBTough is a 43-item measure and showed results that the scale demonstrated good variability (Mack & Ragan, 2008). Although the measure showed good variability, the target population was for collegiate athletes and not for the adolescent population. There needed to be more work done on athletes of different levels, gender, and sports. Due to the limited work done on the scale and lack of conceptual framework, the MeBTough does not provide a solid assessment of MT for college athletes (Mack & Ragan, 2008).

Mental Toughness and Gender

Few Studies of MT have considered gender, but some research suggests possible gender differences (Madrigal, Hamill, & Gill, 2013). Previous research has shown that males reported higher MT (Nickolls, Polman, Levy, & Backhouse, 2009), although differences were not evident across all studies (Crust, 2009; Crust & Azadi, 2010). The findings showed that males score higher in psychological constructs such as self-esteem and optimism (Patton, Bartrum, & Creed, 2004). Nevertheless, the study contrasted with two other investigators, in which no differences occurred between male and female athletes (Crust, 2009; Crust & Azadi, 2010).

MT is considered a positive attribute for both female and male athletes (Gerber et al., 2012). The gender differences showed different results based on population, where for adolescents it was thought to be a critical period because they are going through the most changes and dealing with certain adversities. Nicholls et al. (2009) examined the difference in MT among athletes based on gender, achievement level, age, and sporting experience and found that male athletes had a high total score on MT and a high score on the confidence subscale than female athletes. In a sample of adolescent elite soccer

players, Findlay and Bowker (2009) found that boys had higher competitiveness, and desire to win.

Physical Activity and Mental Toughness

MT might be conceptualized by adolescents (approximately 11-18 years of age) because of the different demands (e.g., time demands) and personal pursuits (e.g., the search for social identity in adolescent's characteristic of this life stage (Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006). It was found that participants with high vigorous exercise and moderate PA levels were more mentally tough measured by the MTQ48 (Gerber et al., 2012). The Analysis of Variance (ANOVAs) were used as well as the Multivariate analysis of covariance (MANCOVA's) which yielded a significant overall effect of moderate PA on the various MT subscales. MANCOVA showed a tendency for a general significant relationship between the self-reported number of days/week of vigorous exercise and the various MT subscales, Wilk's, F (18,772) = 1.53, $p < .10$, n2 = .03.

Some individuals adapt while others fail to cope with stressful experiences (Gerber et al, 2013). Since at the adolescent years, there are different personal pursuits for each individual, stress may trigger an individual to become overwhelmed with the specific demands that may come his or her way. It is up to the individual to determine which coping methods to use. Resilience research explores protective factors and processes that result in positive outcomes despite elevated risk for maladjustment (Luther et al., 2006; Masten, 2004). MT attributes resemble those in resilience scales (Ahern, Kiehl, Sole, & Byers, 2006). Therefore, MT might facilitate resilience against perceived stress among non-clinical samples of adolescents and young adults (Gerber et al., 2013).

Individuals who regularly participate in exercise overcome barriers to doing so; thereby building their self-efficacy (BSE; Dwyer, Chulak, Maitland, Lysy, Failkner, & Sheeshka, 2012). Positive adaptations that result from successfully overcoming their exercise barriers foster individual's resiliency (Luthar & Cicchetti, 2000). Being resilient is a positive adaptation in any individual's life, even if he or she is dealing with a particular challenge or set back. It is even more effective for someone to be intrinsically motivated to change as opposed to being extrinsically motivated where one relies on others and objects to make one feel resilient.

Sport psychology researchers have spent considerable time studying what Richardson (2002) calls "first wave resiliency," which is the study of internal and external qualities of individuals related to positive outcomes despite the presence of risk or adversity. Using effective coping strategies (Thelwell, Weston, & Greenless, 2007), there was a display of MT (Bull, Shambrook, & James, 2005). Individuals are consistently adapting to different environments, which requires complete focus and the willingness to accept change. Results found that mentally tough athletes respond to adversity in a way that allows them to achieve personal growth.

Psychological Well-Being

The literature on psychological well-being has progressed rapidly since the emergence of the field over five decades ago (GNH Research, 2015). Psychological well-being refers to how people evaluate their lives. According to Diener (1997), these evaluations may be in the form of cognitions or the form of affect. The cognitive part is referred to when an individual is able to give conscious judgments about their satisfaction with life as a whole. The affective part is referred to when an individual is guided by

emotions and feelings. Further, people experience moods and emotions, which may have either a positive or negative effect on their overall well-being.

"Need satisfaction and identity formation are essential both to achieving a secure, healthy, adult psychological status in which the person is free from negative states such as depression and lack of self-esteem and to developing an adult identity" (Feather & O'Brien, 1986). The life satisfaction in adults differs with the life satisfaction in adolescents, mainly because adolescents are going through more changes than any other period of life. Few studies in children and adolescents have been conducted (Huebner, 1994; Park and Huebner, 2005). In general, most adolescents report positive global life satisfaction (Huebner et al., 2005).

Psychological Well-Being and Quality of Life

In this present study, the researcher will be examining psychological well-being through the specific facet of quality of life perceptions. In recent years, higher quality of life (HRQoL) is increasingly gaining importance in the health field (Ravens-Sieberer et al., 2005) and research has shown that including HRQol in a child and adolescent health surveys are feasible if instrument development takes into account the age, maturity, and cognitive development of the child. The KIDSCREEN project has developed this cross-cultural element to include the measurement of child and adolescent HRQoL. However, some difficulties have been noted, particularly doubts as to whether children are capable of reliably expressing opinions, attitudes, and feelings about their HRQoL (Herjanic et al., 1975).

Understanding the concept of HRQoL or valuing aspects of one's own health and well-being is determined by age, maturity, and cognitive development (Bullinger &

RavensSieberer, 1995). Children and adolescents have special needs that needs to be acknowledged. For most adolescents they value social relationships (family and friends) and general mood, as well as the "sense of self" feelings and need for growing independence (Edwards et al., 2002). When analyzing the results of public health surveys that include HRQoL measures for children and adolescents, important determinants to take into account include children's perceptions of health on the physical, cultural and social environment (Evans et al., 1994); on social stressors (Engel and Hurrelmann, 1989); on health behaviors (Ravens-Sieberer et al., 2001); and on psycho-social processes, such as coping and social support (Landgarf et al,, 1988).

Mental Toughness and Well-Being in Adolescents

Few attempts have been made to link MT with mental health or health-related behaviors (Crust & Keegan, 2010). Research regarding child and adolescents judgments of their life satisfaction has received increasing attention in a variety of areas, including regular and special education (Crocker, 2000). As early as 1986, Landesman noted that "quality of life and personal life satisfaction were the new buzz words in the field of mental disabilities." Objective measures focus on external conditions, such as income levels, access to medical resources, and recreational opportunities. Subjective measures focus on internal evaluations of life circumstance (e.g., satisfaction, judgments, and emotions). During the stage of adolescence, there is a limit on how much control they have over both the internal and external conditions that may occur in their lives, which may cause stress and hopelessness. Theoretically, MT has the potential to foster mental health either directly or through the promotion of resilient adaptation (Gerber et al., 2012).

One of the core philosophies of MT is that success and failure are up to the individual. MT operates as a stress resilience resource (Gerber, Brand, Feldmeth, Lang, Elliot, Holsboer-Trachsler, & Puhse, 2013). "Because mentally tough people tend to view their personal environment as controllable, it seems likely that they are less prone to report high stress" (Crust & Clough, 2005). One who is mentally tough is willing to accept the consequences of his or her actions: both good and bad.

Physical Activity and Well-Being in Adolescents

Adolescents who are engaging in regular PA display more desirable health outcomes across a variety of physical conditions (WHO, 2015). Most work suggests that exercise and PA are associated with better quality of life and health outcomes. Therefore, assessment and promotion of exercise and PA may be beneficial in achieving desired benefits across several populations (WHO, 2015). "Exercise and PA activity are thought to be among the most important lifestyle factors for maintenance of health and prevention of premature disease and mortality" (Windle, 2014).

Mechanic and Hansell (1987), hypothesized that young people assess their physical health regarding their competence in important areas of adolescent life and their sense of psychological well-being. Coleman (1961) suggests that when focusing on adolescents, the important areas are success in school and sport activities and involvement with peers in age-relevant social activities. Since a high number of adolescents perceive physical education to be important, it is a necessity to have PE available in schools, which then could be effective in one's mental health. In the study conducted by Mechanic and Hansell (1987), the findings of adolescents indicated that self-assessments of better health were influenced directly by higher levels of competence,

as measured by grades in school and participation in sports and exercise, and by greater psychological well-being, as indicated by lower levels of depressed mood. If we form attitudes about ourselves by observing our actions, as Bern (1972) suggested, then adolescents may conclude that they are healthy since they are active and competent.

Sports participation tends to be highly valued within the adolescent subculture (Coleman, 1961) and earns adolescents high status and visibility among their peers. For many adolescents, the approval of their peers is very important, so if an individual does not feel competent with themselves, it could cause them major distress. Activities such as achievement and sports provide the necessary feedback that the individual is an active, competent person. Once an individual begins to feel distress, it causes them to be in a depressed and hopeless mood which could reduce the feedback, allowing them to become less stable. It is vital that individuals engage in exercise and PA, which is proven to better their mood states.

Gender Differences and Well-Being in Adolescents

Recently there have been increased calls to apply positive psychology in schools and youth-oriented settings (Clonan, Chafouleas, McDougal, & Riley-Tillman, 2004). "Positive psychology has made important progress in the investigation of strength, well-being, and happiness (Diener, Lucas, & Scollon, 2006) with adults." It is not a time to extend the application of such knowledge to adolescents. There has been research done with adolescents from Hong Kong to investigate adolescents' well-being from perspectives of positive psychology, adopting the Ryff's (1989) psychological well-being. The use of this framework is applicable for investigating adolescents' positive functioning since one of the important themes at this stage is personal growth.

Adolescence is a stage during which specific risk factors for psychological well-being may emerge. This change makes them self-conscious, especially of their successes and setbacks (e.g., Rankin, Lane, Gibbons, & Gerrard, 2004). Since adolescents become more self-conscious, at times they cannot accept failure and it then results in self-criticism. The gender issue may become more complicated under a non-western cultural context. In particular, high level of interdependent self-construal (Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997) in Eastern culture may have differential implications for females and males regarding the relationships between self-compassion components and psychological well-being.

Several investigations report the greater prevalence of depressive symptoms in girls compared to boys during adolescence (Baron & Campbell, 1993; Cyranowski, Frank, Young, & Shear, 2000). Moreover, females show higher anxiety levels compared to males both in a clinical sample and the general population (Spence, 2001). In the study conducted by Galambos et al., 2006 and Goldbeck et al., 2007, girls show similar scores compared to boys in psychological well-being scales such as environmental mastery, autonomy, and positive relations. These findings may be a strength for adolescent girls who may act as protective factors against stress and future adversities, reducing their greater risk of experiencing depression and anxiety (Visani et al, 2011).

Summary

This chapter explored the theoretical development of MT, how it is defined, how it can be measured, and how based on levels of MT and PT, differences among adolescents' psychological well-being will be apparent. This chapter also explored the gender differences among MT, PA, and psychological well-being. Males are shown to

report higher scores than females in the MTQ-48. Aspects of PE in school and community leisure provision have been shown to reinforce reduced participation in PA for adolescent girls because of less access, hostile responses from boys, and the dominance of a competitive discourse within the schools that does not support the development of young women's physical skills (Vilhjalmsson et al., 1998).

Few attempts have been made to link MT with mental health or health-related behaviors (Crust & Keegan, 2010). In this present study, the researcher is examining the psychological well-being through the specific facet of quality of life perceptions. Quality of life is a broad multidimensional concept and is relevant on many levels to almost all levels of human function (Evans et al., 1994).

Despite sport psychologist showing great interest in the study of MT (Gucciardi & Gordon, 2011), the contribution of the different levels PA and MT on the psychological well-being of adolescents has yet to be considered. For this reason, it is vital that the adolescent population is aware of the health benefits of PA, being aware that the impact of MT could increase the likelihood of adolescents who may be faced with adversity. Therefore, developing a mindset of MT might provide an attractive starting point for preventive measures among non-clinical samples of adolescents and young adults.

CHAPTER III

METHODS

The purpose of this study is to investigate the relationship between mental toughness (MT), physical activity (PA), and psychological well-being (PWB) in adolescents and determine the effects of MT and PA on PWB. More specifically, differences in psychological well-being based on adolescents' mental toughness and physical activity levels were analyzed using questionnaires. This chapter will discuss in detail the methods of assessment that were used, the participants that were recruited for the study, and the procedures utilized for collecting and analyzing study data.

Participants

The study included random sampling based on individuals who are 14-18 years of age. Using power analysis to identify the number of participants needed given the nature of the study, at least 150 adolescents were needed. Participants received detailed information about the purpose of the study and the voluntary nature of their participation. The participants who chose to partake in the study were assured of the confidentiality of their responses and were given informed written consent prior to competing the questionnaires. Both, the parental/guardian consent form and the children's assent form were obtained from the participants. Once the consent forms were attained, then the participants were asked to complete a survey that included four sections.

Instruments

Demographic Questionnaire. Demographics were collected from all participants regarding age, gender, and ethnicity, what sport do you play, are you in any club or recreational team, and the amount of physical education (PE) from school.

Mental Toughness Questionnaire-48 (MTQ-48; Clough et al., 2002). The MTQ-48 is a 48-item scale that was developed to assess the 4C's model of MT, compromising four key dimensions or six subscales including: Control (emotion) (e.g., "Even when under considerable pressure I usually remain calm."), Control (life) (e.g., "I generally feel in control"), Commitment (e.g., "I don't usually give up under pressure."), Challenge (e.g., "Challenges usually bring out the best in me"), Confidence (abilities) (e.g., " I am generally confident in my own abilities"), and Confidence (interpersonal) (e.g., " I usually take charge of a situation when I feel it is appropriate"). Participants rate themselves on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

The MTQ-48 measures total MT and its six subcomponents. Horsburgh, Schermer, Veselka, and Vernon (2009) have shown that the MTQ-48 has appropriate psychometric properties. Perry, Clough, Crust, Earle, and Nicholls (2013) assessed the factorial validity of the MTQ-48 (Clough et al., 2002). Mental Toughness is categorized into three different levels (i.e., sensitive, average, and mentally tough), using the stern scale from 1-10, where 1 is the most sensitive and 10 being more mentally tough.

The International Physical Activity Questionnaire (IPAQ; Craig et al., 2003). The IPAQ has been developed and tested for us in adults (age range of 15-69 years). Physical activity (PA) will be assessed using the 27-item scale of the IPAQ (Craig et al., 2003). The IPAQ 27-item scale will ask about three specific types of activity undertaken in four domains. The domains will include school, transport, sport, and leisure time. For

studying the time spent in moderate to vigorous PA, participants report total minutes per week for the four domains. The variations of PA include low activity (e.g., walking to class, walking down the stairs, and walking to the park), moderate activity (e.g., brisk walking, hiking, gardening, and low intensity sports), and vigorous activity (e.g., running, fast cycling, circuit weight training, and high intensity sports).

The items in the 27-item scale will be structured to determine three levels including, inactive, minimally active, and HEPA active. Computation of the total score requires the summation of the duration (in minutes) and frequency (days) of low-intensity, moderate-intensity, and vigorous-intensity activities. Duration is multiplied by known METs per activity and the results for all items are summed for the overall PA score. Scores for low (walking) and for moderate and vigorous activities are sums of corresponding item scores. The responses should range from 0 to 7 days during a typical week.

The development of an international measure for PA commenced in Geneva in 1998 and was followed by extensive reliability and validity testing were undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many setting and different languages, and are suitable for national population-based prevalence studies of participation in PA.

KIDSCREEN-27 (KS-27; Ravens-Sieberger, Gosch, Rajmil, Erhart, Bruil, Duer, Auguier, Power, Abel, Czemy, Mazur, Czimbalmos, Tountas, Hagguist, Kilroe, & KIDSCREEN Group, 2005). Three different KIDSCREEN instruments were developed to assess health-related quality of life (HRQoL) in children and adolescents aged between 8-18 years (Ravens-Siberger et al., 2005). The KIDSCREZEN-27 is the shorter version,

merging the ten original dimensions into five dimensions. All items are measured using a five-point Likert scale. The items are scored as Rasch scales and summed into a single score. The scores are transformed into standardized values based on data from an international survey sample from twelve European countries, and range from -16.06 to 57.77 (Bouwmans et al., 2014).

The KIDSCREEN-27 has five Rasch scaled dimensions: Physical Well-Being (5 items) explored the level of the child's/adolescent's PA, energy, and fitness; Psychological Well-Being (7 items) includes items on positive emotions, satisfaction with life, and feeling emotionally balanced; Autonomy & Parents (7 items) examined relationships with parents, the atmosphere at home, and feelings of having enough age-appropriate freedom, as well as degree of satisfaction with financial resources; Peers & Social Support (4 items) examined the nature of the respondent's relationships with other children/adolescent's, and School Environment (4 items) explores the adolescent's perceptions of his/her cognitive capacity, learning and concentration, and their feelings about school.

Procedure

Data Collection. After approval from Barry University's institutional review board (IRB), the data collection process began. The demographic questionnaire, the MTQ-48, the IPAQ, and the KS-27 were presented to the adolescents' who chose to partake in the study (Appendix A). Both the parental consent (Appendix B) and the assent forms (Appendix C) were completed before completing the other measures, explaining the purpose of the study as well as the benefits (both indirect and direct) and the risks of participation. Information for the study included a cover letter (Appendix D),

which explained the purpose of the study as well as the benefits and the risks of participation.

The researcher proceeded by contacting local high schools, the boys and girls club, church groups, and recreational communities in South Florida, to access students to participate in the study. Information regarding the purpose of the study included via e-mail, by telephone, and in person (Appendix E) sent to high schools and the other groups mentioned. Another way of distributing the parental consent forms was by getting approval from the high schools/school board to come in to the teacher's classrooms so that the researcher could explain to the students the purpose of the study and ask that the students take the forms to their homes so that they parent/guardian could sign (Appendix F).

The parents and the students were told that the information they provided is anonymous and that by completing the parental and the assent forms they are acknowledging that they are below 18-years-old, and that they voluntarily agree to participate in the study. Another way of distributing the parental consent forms was by getting approval from the high schools/school board to come in to the teacher's classrooms so that the researcher could explain to the students the purpose of the study and ask that the students stake the forms to their homes so that their parent/guardian could sign. The researcher then came back into the classrooms the next day, asking for the parental consent forms, and then distributing the assent forms for the students to sign, and having them complete the four section survey.

The proposed research involved data collection through questionnaires, and the participants could not be identifies directly or through identifiers. Lastly, the disclosure of

the participants' responses outside of research would not reasonably place the participants at risk of criminal or civil liability or be damaging to the participants'' financial standing, employability, or reputation. In short, none of the information that could feasibly be obtained from the participants would be stigmatizing, embarrassing, sensitive in nature (drug use, illegal conduct, sexual behavior, use of alcohol, etc.) or poses a psychological risk of undue anxiety.

Design Analysis

The independent/predictor variables are mental toughness (sensitive, average, mentally tough), the level of engagement in physical activity (inactive, minimally active, HEPA active), and gender.

The dependent/outcome variable of the study is psychological well-being as measured by the KIDSCREEN-27 (KS-27).

Correlations. The current study analyzed possible correlations between the following variables.

1. The relationship between mental toughness and psychological well-being in adolescents'.
2. The relationships between physical activity and psychological well-being in adolescents'.

T-tests. The current study used t-tests to determine whether there are gender differences

in the three variables (mental toughness, physical activity, and psychological well-being).

Analysis of Variance (ANOVA). The descriptive statistics were recorded for each variable, including mental toughness, physical activity, and psychological well-being. A three by three-way ANOVA (mental toughness x physical activity) was used to determine the differences in psychological well-being based on levels of MT and PA. Main effects and interactions were analyzed. All statistical analyses were computed using SPSS, version 21.0. Using SPSS, data was screened for outliers, homogeneity of variance, and skewness.

CHAPTER IV

REFERENCES

Active Living Research (2012). Parks, Playgrounds, and Active Living. Available at: http://www.activelivingresearch.org/resourcesearch/summaries.

Anshel, M.H. (2006). *Applied Exercise Psychology*. New York, NY: Springer Publishing Company, Inc.

Ajzen, I. and Fishbeing, M. (1980) *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In Action control (pp. 11-39). Springer Berlin Heidelberg.

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health*. San Diego: Academic Press, 1998).

Baron, B., & Campbell, T. L. (1993). Gender differences in the expression of depressive symptoms in middle adolescence: An extension of earlier findings. *Adolescence, 28*, 903–911.

Bern, Daryl. (1972). Self-perception theory. in Berkowitz, L. (Ed). *Advances in experimental social psychology: Volume 6.* Pp. 2-62. New York: Academic Press.

Bouwmans, C., van der Kolk, A., Oppe, M., Schawo, S., Stolk, E., van Agthoven, M., & ... van Roijen, L. (2014). Validity and responsiveness of the EQ-5D and the

KIDSCREEN-10 in children with ADHD. *The European Journal Of Health Economics, 15*(9), 967-977. doi:10.1007/s10198-013-0540-x

Brooks. F., & Magnusson, J. (2006). Taking part counts: Adolescents experiences of the transition from inactivity to active participation in school based physical education. Health Education Research, Available on line May, 2006.

Bull, S. J., Shambrook, C. J., James, W., & Brooks, J. E. (2005). Towards an understanding of mental toughness in elite English cricketers. *Journal of Applied Sport Psychology, 17,* 209-027.

Bullinger, M., & Ravens-Sieberer, U. (1995). General principles, methods and areas of application of quality of life research in children. *Emotional Intelligence and Emancipation,44*(10), pp. 391-99.

Carr, A. (2004). *Positive psychology: The science of happiness and human strengths*. New York: Routledge.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Reports, 100(2), 126–131.

Centers for Disease Control. (2013). Make a difference at your school.

Clonan, S.M, Chafouleas, S.M., McDougal, J.L., & Riley-Tillman, T.C. (2004). Positive psychology goes to school: Are we there yet? *Psychology in the Schools, 41* (1), pp. 101–110.

Coleman, James. (1961). *The Adolescent Society*. New York: Free Press.

Corder, K., Schiff, A., Kesten, J. & van Slujus, E. (2015) Development of a universal approach to increase physical activity among adolescents: The GOActive intervention. *BMJ Open*, *5*(8), e008610. doi:10.1136/bmjopen-2015-008610

Cooke, R., Trebaczyk, H., Harris., & Wright, A.J. (2014). Self-affirmation promotes physical activity. *Journal of Sport & Exercise Psychology, 36(2),* 217-223.doi:10.1123/jsep.2013-0041

Clough, P., Earle, K., & Sewell, D. (2002). Mental toughness: The concept and its measurement. In I. Cockerill (Ed.), *Solutions in sport psychology* (pp. 32–46). London: Thomson Learning.

Craig, C.L., et al. (2003). "International physical activity questionnaire: 12-country reliability and validity. "Med Sci Sports Exerc 35:1381-95.

Crocker, A.C.(2000). Introduction: The happiness in all our lives. *American Journal on Mental Retardation 105*, pp. 319–325.

Crust, L., & Clough, P. (2005). Relationship between mental toughness and physical endurance. *Perceptual & Motor Skills*, 100, 192-194.

Crust, L. (2007). Mental toughness in sport: A review. *International Journal of Sport and Exercise Psychology*, *5*(3), 270-290.

Crust, L. (2008). A review and conceptual re-examination of mental toughness: Implications for future researchers. Lord Mayor's Walk, York, North Yorkshire.

Crust, L. (2008). A review and conceptual re-examination of mental toughness: Implications for future researchers. Personality and individual differences, 45 (7), 576-583.

Crust, L. (2009). The relationship between mental toughness and affect intensity. Personality and Individual Differences, 47, 959-963.

Crust, L., & Keegan, R. (2010). Mental toughness and attitudes to risk-taking. *Personality and Individual Differences, 49,* 164-168.

Crust, L., & Azadi, K. (2010). Mental toughness and athletes' use of psychological strategies. *European Journal of Sport Science, 10*(1), 43-51.

Cyranowski, J. M., Frank, E., Young, E., & Shear, M. K. (2000). Adolescent onset and the gender difference in lifetime rates of major depression. *Archives of General Psychiatry, 57*, 21- 27

Diener, E., M. Diener and C. Diener. (1995). 'Factors prediction the subjective wellbeing of nations', Journal of Personality and Social Psychology 49, pp. 851-864.

Diener, E., Suh, E. and Oishi, S. (1997). "Recent findings of subjective well-being. "Indian Journal of Clinical Psychology. Available at www.psych.uiuc.edu/~ediener/hottopic/paper1.htm.

Diener, E., Lucas, R.E., & Scollon C.N. (2006). Beyond the hedonic treadmill: Revising the adaptation theory of well-being *American Psychologist, 61* (4), pp. 305-314 http://dx.doi.org.ezproxy.barry.edu/10.1037/0003-066X.61.4.305

Dubow, E.F., Huesmann, L.R., Boxer, P., Pulkkinen, L., & Kokko, K. (2006). Middle childhood and adolescent contextual and personal predictors of adult educational and occupational outcomes: A mediational model in two countries. *Developmental Psychology, 42*, 937–949. PubMed doi:10.1037/0012-1649.42.5.937

Dwyer, J.J., Chulak, T., Maitland, S., Allison, K.R., Lysy, D.C., Faulkner, G.E., Sheeshka, J. (2012) Adolescents' self-efficacy to overcome barriers to Physical Activity Scale. *Res Q Exerc Sport, 83*(4) 513-21.

Edwards, T.; Huebner, C.; Connell, F. & Patrickm, D. (2002) Adolescent quality of life, Part I: Conceptual and measurement model. *Journal of Adolescence, 25 (3),* 275-286.

Ekkekakis, P., & Acevedo, E.O. (Eds). (2006). Affective responses to acute exercise: toward a psychobiological dose-response model. *Psychobiology of physical activity* (pp.91-110). Champaign: Human Kinetics.

Engel, U., & Hurrelmann, K. (1989) *Psychosoziale belastung im jugendalter: Empirische befunde zum einfluss von familie, schule und gleichaltrigengrugge* ('Psycho-social stress among youth: Empirical findings about the influence of family, school, and peer-group'). Berlin: De Gruyter.

Evans, R.G., Barer, M.L. & Marmor, T.R. (1994) *Why are some people healthy and others not? The determinants of health of populations*. New York: Aldine De Gruyter.

Feather, N.T., & O'Brien, G.E. (1986). A longitudinal study of effects of employment and unemployment on school-leavers. *Journal of Occupational Psychology, 59*, 121-144.

Fruhbeck, G. (2000). Childhood obesity: time for action, not complacency. Definitions are unclear, but effective interventions exist. British Medical Journal 320 (7231) (Feb 5), 328-329.

Findlay, L.C., & Bowker, A. (2009). The link between competitive sport participation and self-concept in early adolescence: A consideration of gender and sport orientation. Journal of Youth and Adolescence, 38, 29-40. doi: 10.1007/s10964-007-9244-9

Galambos, N. L., Barker, E. T., & Krahn, H. J. (2006). Depression, self-esteem and gender in emerging adulthood: Seven-year trajectories. *Developmental Psyhchology*, *42*, 350–365.

Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Pühse, U., Elliot, C., & Brand, S. (2012). Adolescents' exercise and physical activity are associated with mental toughness. Mental Health and Physical Activity, 5(1), 35-42.

Gerber, M., Brand, S., Feldmeth, A.K., Lang, C., Elliot, C., Holsboer-Trachsler, E., & Puhse, U. (2013). Adolescents with high mental toughness adapt better to perceived stress: A longitudinal study with Swiss vocational students. *Personality and Individual Differences*, *54*, 808-814.

Gerber, M., & Puhse, U. (2009). Do exercise and fitness protect against stress-induced health complaints? A review of literature. *Scandinavian Journal of Public Health*, 37, 801-819.

Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Perry, J. L., Pühse, U., & ... Brand, S. (2013). Are adolescents with high mental toughness levels more resilient against stress? *Stress And Health: Journal Of The International Society For The Investigation Of Stress, 29*(2), 164-171. doi:10.1002/smi.2447

Gucciardi, D.F., & Gordon, S. (2009). Towards an understanding of mental toughness in Australian football. Journal of Applied Sport Psychology, 20, 261-281. Doi:10.1080/10413200801998556

Gucciardi, D., Gordon, S., Dimmock, J. (2009). Advancing mental toughness research and theory using personal construct psychology. *International Review of Sport and Exercise Psychology, 2,* pp. 54–7.

Guccciardi, D.F., & Gordon, S. (Eds). (2011). Mental toughness in sport. Developments in theory and research. London: Taylor & Francis.

Gucciardi, D.F., Jackson, B., Hodge, K., Anthony, D.R., & Brooks, L.E. (2015) Implicit theories of mental toughness: Relations with cognitive, motivational, and behavioral correlates. Sport, Exercise, and performance Psychology, 4(2), 100-112. Doi:10.1037/spy0000024

Golby, J., Sheard, M., & Wersch, A. (2007). Evaulating the factor structure of the psychological performance inventory. Perceptual and Motor Skills, 105, 309-325.doi:10.1027/1016-9040.11.2.143

Goldbeck, L., Schmitz, T. G., Besier, T., Herschbach, P., & Henrich, G. (2007). Life satisfaction decreases during adolescence. *Quality of Life Research, 16,* 969–979

Goldberg, A. (1998). *Sports slump busting:10 steps to mental toughness and peak performance.* Champaign, Il: Human Kinetics.

Gould, D., Hodge, K., Peterson, K., & Petlichkoff, L. (1987). Psychological foundations of coaching: Similarities and differences among intercollegiate wrestling coaches. *The Sport Psychologist, 1,* 293–308.

Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological characteristics and their development in Olympic champions. *Journal of Applied Sport Psychology, 14*, 172–204. doi:10.1080/10413200290103482

Gross National Happiness Research- GNH (2015). Retrieved from http://www.grossnationalhappiness.com/9-domains/psychological-well-being/

Hagger, M., Chatzisarantis,N ., & Biddle, S. (2001) The influence of self-efficacy and past behavior on the physical activity intentions of young people. *Journal of Sports Sciences*, 19, 711-725.

Hagger, M. S., Chatzisarantis, N. L., & Biddle, S. J. (2002). A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal Of Sport & Exercise Psychology, 24*(1), 3-32.

Herjanic, B., Herjanic, M., Brown, F. & Wheatt, T. (1975). Are children reliable reporters? *Journal of Abnormal Child Psychology, 3*(1), pp. 41-48.

Horsburgh, V., Schermer, J., Veselka, L., & Vernon, P. (2009). A behavioral genetic study of mental toughness and personality. *Personality and Individual Differences*, 46 (2), 100-105.

Huebner, E. S. (1994), Preliminary development and validation of a multidimensional life satisfaction scale for children, *Psychological Assessment, 6* (2): 149-158.

Huebner, E. S., Suldo, S. M., Smith, L. C., & McKnight, C. G. (2004). Life satisfaction in children and youth: Empirical foundations and implications for school psychologists, *Psychology in the Schools, 41* (1): 81-93.

Huebner, E. S., Valois, R. F., Paxton, R. J., & Drane, J. W. (2005). Middle school student's perceptions of quality of life, *Journal of Happiness Studies, 6* (1), 15-24. International Journal of Sport and Exercise Psychology, 5 (3) (2007), pp. 27-290

Ickes, M. J., & Sharma, M. (2012). A systematic review of physical activity interventions in Hispanic adults. *Journal of Environmental and Public Health, 2012*, Article 156435. doi:10.1155/2012/156435

Jones, G., Hanton, S., & Connaughton, D. (2002). What is this thing called mental toughness? An investigation of elite sport performers. Journal of Applied Sport Psychology, 14, 205-218.

Kelly, J.R., & Freysinger, V. (1999). *21st Century Leisure: Current Issues*. New York: Benjamin-Cumming Publishing Company.

Kitayama, S., & Uchida, Y. (2003). Explicit self-criticism and implicit self-regard: Evaluating self and friend in two cultures. *Journal of Experimental Social Psychology, 39,* 476-482.

Laird, Y., Fawkner, S., Kelly, P., McNamee, L., & Niven, A. (2016). The role of social support on physical activity behaviour in adolescent girls: A systematic review and meta-analysis. The International Journal Of Behavioral Nutrition And Physical Activity, 13

Landesman, S.: 1986, 'Quality of life and personal life satisfaction: Definition and measurement issues', Mental Retardation 91 pp. 141-143.

Landgarf, J.M., Maunsell, E., Nixon, S., Bullinger, M., Campbell, S., Abetz, L., and Ware, J.E. (1988) 'Candian-French, German and United Kingdom versions of the Child Health Questionnaire: Methodology and preliminary item scaling results', *Quality of Life Research,* Vol. &, No. 5, pp.433-45.

Lazarus, R.S., & Folkman, S. (1984) Stress, appraisal, and coping. New York: Springer.

Levy, A.R., Polman, R.C.J., Clough, P.J., Marchant, D.C., & Earle, K. (2006) Mental toughness as a determinant of beliefs, pain, and adherence in sport injury rehabilitation. *Journal of Sports Rehabilitation, 15*, pp. 246–254

Loehr, J.E. (1986). *Mental toughness training for sports: Achieving athletic excellence.* New York, New York: Penguin Group.

Luthar, S.S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. *Development and Psychopathology, 12*, 857–885.

Mack, M., & Ragan, B. (2008). Development of the mental, emotional, and bodily toughness inventory in college athletes and nonathletes. *Journal of Athletic Training*, 43, 125-132. Doi: 10.4085/1062-6050-43.2.125

Maddi, S.R. (2006) Hardiness: The courage to grow from stresses. *Journal of Positive Psychology, 1*, pp. 160–168.

Madrigal, L., Gill, D.L., & Eskridge, K.L. (2016). Examining the Reliability, Validity and Factor Structure of the DRS-15 with College Athletes. *Psihologijske teme*, 25(2), 263-280.

Magoc, D., Tomaka, J., Shamaley, A.G., & Bridges, A. (2016). Gender differences in physical activity and related beliefs among Hispanic college students. Hispanic *Journal of Behavioral Sciences, 38*(2). 279-290. doi:10.1177/0739986316637355

Mahoney, J. W., Gucciardi, D. F., Mallett, C. J., & Ntoumanis, N. (2014). Adolescent performers' perspectives on mental toughness and its development: the utility of the bioecological model. Sport Psychologist, 28(3), 233-44.

Mechanic, D., & Hansell, S. (1987). Adolescent competence, psychological well-being, and self-assessed physical health. *Journal of Health and Social Behavior, 4*, 364-374.

Middleton, M.J., Gabriel, T.J., & Perkins, T.S. (1987). Psychological skills and exceptional athletic performance. *The Sport Psychologist*, 1, 181-199.

Montemayor, R., Adams, G.R., & Gullotta, T.P. (Eds.). (1990). *From childhood to adolescence: A transitional period*. Newbury Park, CA: Sage

Mulvihill, C., Rivers, K., & Aggleton, P. (2000). Views of young people towards physical activity: determinants and barriers to involvement. *Health Education, 100*(5), 190-199.

Nicholls, A.R., Polman, R.C., Levy, A.R., & Backhouse, S.H. (2008). Mental toughness, optimism, pessimism, and coping among athletes. Personality and Individual Differences, 644, 1182-1192 10.1016/j.paid.2007.11.011. doi:10.1016/j/paid.2007.11.011

Pate, J.F., Trost, S.G., Sallis, P.S. Freedson, W.C. Taylor, M. Dowda, and J. Sirard. Age and gender differences in objectively measures physical activity in youth. Med. Sci. Sports Exerc., Vol.34, No.2, pp.350-355, 2002

Patton, W., Bartrum, D.A, & Creed, P.A. (2004). Gender differences for optimism, self-esteem, expectations and goals in predicting career planning and exploration in adolescents. *International Journal for Educational and Vocational Guidance, 4,* 193-209.

Patton, G.C., Coffey, C., Cappa, C., Currie, D., Riley, L., Gore, F., Degenhardt, L., Richardson, D., Astone, N., Sangowawa, A.O., Mokdad, A. & Ferguson, J. (2012) Health of the world's adolescents: a synthesis of internationally comparable data. *The Lancet, 379*, 1665-1675.

Park, N., & Huebner, E. S. (2005), A cross-cultural study of the levels and correlates of life satisfaction among adolescents. *Journal of Cross- -Cultural Psychology, 36* (4), 444-456.

Park, H.S., & Lee, D. W. (2009). A test of theory of planned behavior in Korea: Participation in alcohol-related social gatherings. *International Journal of Psychology, 44*(6), 418-433.

Perry, J. L., Clough, P. J., Crust, L., Earle, K., & Nicholls, A. R. (2013). Factorial validity of the Mental Toughness Questionnaire-48. *Personality And Individual Differences, 54*(5), 587-592. doi:10.1016/j.paid.2012.11.020

Physical Fitness and Activity in Schools. *Committee on Sports Medicine and Fitness and Committee on School Health Pediatrics* May 2000, 105 (5) 1156-1157; DOI: 10.1542/peds.105.5.1156 Retrieved from: http://pediatrics.aappublications.org/content/105/5/1156

Rankin, J.L., Lane, D.J., Gibbons, F.X., & Gerrard, M. (2004). Adolescent self-consciousness: Longitudinal age changes and gender differences in two cohorts.

Journal of Research on Adolescence, 14 (1), pp. 1 – 21. Retrieved from: http://dx.doi.org.ezproxy.barry.edu/10.1111/j.1532-7795.2004.01401001.x

Ravens-Sieberer, U., Gosch, A., Rajmil, L., Erhart, M., Bruil, J., Duer, W., ..., Kilroe, J. and the European KIDSCREEN Group. (2005). KIDSCREEN-52 quality-of-life measure for children and adolescents. *Expert Review of Pharmacoeconomics & Outcomes Research, 5* (3), 353-364.

Ravens-Sieberer, U., Gosch, A., Abel, T., Auquier, P., Bellach, B.-M., Dut, W., Rajmil, L. and European KIDSCREEN Group (2001) 'Quality of life in children and adolescents: A European public health perspective', *Social and Preventive Medicine,* No. 46, pp. 297-302.

Rees, R., Harden, A., Shepard, J., Brunton, G., Oliver, S., & Oakley, A. (2001). *Young people and physical activity: A systematic review of research on barriers and facilitators.* London: EPPI-Centrem University of London.

Resistance training for health and fitness. American College of Sports Medicine. http://www.acsm.org/docs/brochures/resistance-training.pdf. Accessed Nov. 18, 2015.

Richardson, G.E. (2002). The metatheory of resilience and resiliency. *Journal of Clinical Psychology, 58,* 307–321.

Ryff, C.D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*, 1069-1081.

Sallis, J.F.,J.J. Prochaska, and W.C. Taylor. A review of correlates of physical activity of children and adolescents. Med. Sci. Sports Exerc., Vol. 32, No.5, pp. 963-975, 2000.

Sheard, M., Golby, J., & van Wersch, A. (2009). Sports Mental Toughness Questionnaire. *Psyctests*, doi:10.1037/t01346-000

Sheeran, P., & Orbell, S. (1998). Do intentions predict condom use? Meta-analysis and examination of six moderator variables. *British Journal of Social Psychology*, 37, 231-250.

Spence, S. H. (2001). Prevention strategies. In Vasey, M.W. & Dadds, M.R. (Eds.*), The developmental psychopathology of anxiety*. Oxford: Oxford University Press.

Thelwell, R.C., Weston, N.J.V., & Greenless, I.A. (2007). Batting on a sticky wicket: Identifying sources of stress and associated coping strategies for professional cricket batsmen. *Psychology of Sport and Exercise*, *8*, 219–232.

Visani, D., Albieri, E, Offidani, E., Ottolini, F, Tomba, E., & Ruinni, C. (2011). Gender Differences in Psychological Well-Being and distress during Adolescence. The Human Pursuit of well-being: A Cultural Approach, pg 65.

Vilhjalmsson, R., & Thorlindsson, T. (1998) Factors related to physical activity: a study of adolescents. *Social science & medicine, 47*(5), 665-675.

Wengreen, H.J., & Moncur, C. (2009). Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutrition Journal, 8*, 32. PubMed doi:10.1186/1475-2891-8-32

Weinberg, R., Butt, J., & Culp, B. (2011). Coaches' views of mental toughness and how it is built. *International Journal of Sport and Exercise Psychology, 9,* 156–172. doi:10.10 80/1612197X.2011.567106

Williams, A., Bedward, J., & Woodhouse, J. (2000). An inclusive curriculum? The experience of adolescent girls. *European Journal of Physical Education*, 5(1), 4-18.

Windle, G. (2014). Exercise, physical activity and mental well-being in later life. *Reviews In Clinical Gerontology, 24*(4), 319-325.

World Health Organization. (2014). Retrieved from: http://www.who.int/gho/publications/world_health_statistics/2014/en/

World Health Statistics. (2015). Retrieved from: http://www.who.int/gho/publications/world_health_statistics/2015/en/

CHAPTER V

MANUSCRIPT IN JOUNRAL ARTICLE FORMAT

Differences in Adolescents' Psychological Well-Being based on Levels of Mental Toughness and Physical Activity

ABSTRACT

The purpose of this study was to explore the differences in adolescents' psychological well-being based on levels of mental toughness and physical activity, since at this stage; they are in search of social identity and satisfaction. Specifically, the aim of the study was to determine if the well-being of adolescents is associated with increased participation in physical activity and higher mental toughness. Mental toughness was measured using the Mental Toughness Questionnaire-48 (MTQ-48) (Clough et al., 2002). Physical activity was measured using the International Physical Activity Questionnaire (IPAQ) (Craig, 2003) and adolescents' psychological well-being was measured using the KIDSCREEN-27 (KS-27) (Ravens-Sieberger et al., 2005). A total of 156 adolescents (female=79, male=77) ages 14 to 18 (M=1.49, SD=.502) participated in the study. Correlation results indicated that there was not a significant positive relationship between MT and PWB, r = -.007, p = .928, nor between PA and PWB, r = -.113, p = .162. The results of the t-tests showed no significant gender differences in any of the three variables. A 3 by 3-way ANOVA indicated that there was no significant interaction between MT level and PA level on psychological well-being, p < .862.The present study is both consistent and contradictory to previous research. Given that this is the first study to investigate

the relationship between these three variables, the results indicate many areas for future research.

Keywords: Mental toughness, Psychological well-being, adolescents, physical activity, attitude

Regular physical activity (PA) is recommended for all healthy adolescents as well as for many individuals with specific medical conditions. "PA is defined as any bodily movement produced by skeletal muscles that requires energy expenditure, and exercise is a subcategory of PA that is planned, structured, and repetitive, aiming to improve one or more components of physical fitness" (WHO, 2015). Research found that "Exercise and PA are thought to be among the most important lifestyle factors for the maintenance of health and prevention of premature disease and mortality" (Windle, 2014, p.319). However, most adolescents do not engage in sufficient amounts of physical activity leading to inactivity in adulthood, increasing the risk of diabetes, cancer, and mortality (Corder, Schiff, Kesten, & Slujis, 2015).

There are numerous people who live in a sedentary lifestyle, which later then becomes detrimental for the individual's well-being and their ability to cope with life. At times an individual may have a negative experience at school which could later influence inactivity in adulthood. The environment that a child or adolescent is raised in influences the way they grow up which is determined by families, schools, and neighbors. The overall quality of life within these environments could either establish a negative or positive experience which may motivate or unmotivate a child or adolescent even more, which then challenges the individual to implement an effective PA regimen into their lifestyle.

"Adolescence is an ideal development phase in which to study physical activity and mental toughness because it is a period characterized by more maturational, educational, and interpersonal challenges and changes than any other stage of life" (Motemayor, Adams, & Gullotta, 1990, p.234). At this stage they are in search of social

identity and satisfaction. Individuals who accomplish recommended levels of physical activity reported high mental toughness (Gerber et al. 2012). Since the components of MT consist of control, challenge, and confidence, it has been proven by research that the components may then buffer depressive symptoms because it is not compatible with the irrational thoughts and maladaptive behavioral tendencies (Maddi, 2006). Each child or adolescent faces different challenges in their lives, which may be stressful, resulting in depressive symptoms and affecting their overall psychological well-being (i.e., how people evaluate their lives). Psychological well-being refers to how people evaluate their lives.

Jones, Hanton, and Connaughton (2002) defined MT as "the natural or developed psychological edge that enables you to generally cope better than the other person, so specifically, be more consistent and remain determined, focused, confident, and in control of pressure" (p.209). MT is a characteristic many believe to be important for success in PA (Gerber et al., 2012). Being mentally tough requires four different components: confidence, control, commitment, and challenge (Gerber et al., 2012). Those who possess a high degree of MT perform better because they are more focused on the task at hand, rather than obsessing about failure and defeat (Jones et al., 2002). Some view MT as the most important psychological attribute in determining success (Gould et al., 1987). Furthermore, Crust and Keegan (2010) suggested that increased MT leads to improved psychological well-being.

Psychological well-being (PWB) represents "the achievement of one's full psychological potential" (Carr, 2004, p.36). Researchers suggest that exercise and PA are associated with better quality of life and health outcomes (Windle, 2014). Subjective

well-being is considered to be compromised of three interrelated but distinct factors, namely the relative presence of positive affect, the absence of negative affect, and perceived quality of life, or life satisfaction (Huebner et al., 2004). Life satisfaction is defined as a "cognitive evaluation of one's life as a whole and/or specific life domains" (Huebner et al., 2005 & Diener, 1995, p.548).

Since adolescents are constantly adapting to a changing environment, stress may occur and if it is managed poorly it could result in negative physical and mental outcomes. With the transition from the dependency of childhood to the independence of adulthood, the adolescent may have societal pressures, where they then may not be able to cope with the high levels of stress present in their lives. Increased levels of PA can neutralize or reduce the negative outcomes associated with negative life circumstances and high perceived stress (Geber & Pushe, 2009). "Few attempts have been made to link mental toughness with mental health or health-related behaviors" (Crust & Keegan, 2010, p.35). Prior research has shown that physical activity results in the improved mood after acute bouts of exercise (Ekkekakis & Acevedo, 2006). Therefore, the purpose of the proposed study is to explore the relationships between mental toughness (MT) and physical activity (PA) on the psychological well-being of adolescents as well the differences in adolescents' psychological well-being based on levels of MT and PA.

Methods

Participants

A total of 203 adolescents participated in the research project. However, only 156 participants (female=79, male=77) completed the questionnaire in its entirety; thus, the 156 participants' data were used to achieve the purpose (see Table A1). The participants

ranged between the ages of 14 to 18 (*M*=16.04, *SD*=1.42). Sixty-two Hispanics (39.2%), 27 Caucasians (17.1%), 59 African Americans (37.3%), 4 Asians (2.5%), and four Hawaiians (2.5%) were included in the sample.

Additionally, 64 participants engaged in physical education (PE) (40.5%) and 92 people did not engage in PE (58.2%). Thirty-three participants were part of a recreational team (20.9%), and 123 people were not (77.8%). Finally, 87 participants were affiliated with a sport (55.1%) and 69 people were not (43.7%) (shown in Table A2).

Instruments

Mental Toughness Questionnaire-48 (MTQ-48; Clough et al., 2002). The MTQ-48 is a 48-item scale that was developed to assess the 4C's model of MT, compromising four key dimensions or six subscales including: Control (emotion) (e.g., "Even when under considerable pressure I usually remain calm."), Control (life) (e.g., "I generally feel in control"), Commitment (e.g., "I don't usually give up under pressure."), Challenge (e.g., "Challenges usually bring out the best in me"), Confidence (abilities) (e.g., " I am generally confident in my own abilities"), and Confidence (interpersonal) (e.g., " I usually take charge of a situation when I feel it is appropriate"). Participants rate themselves on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

The MTQ-48 measures total MT and its six subcomponents. Horsburgh, Schermer, Veselka, and Vernon (2009) have shown that the MTQ-48 has appropriate psychometric properties. Perry, Clough, Crust, Earle, and Nicholls (2013) assessed the factorial validity of the MTQ-48 (Clough et al., 2002). Mental Toughness is categorized into three different levels (i.e., sensitive, average, and mentally tough), using the stern scale from 1-10, where 1 is the most sensitive and 10 being more mentally tough.

The International Physical Activity Questionnaire (IPAQ; Craig et al., 2003). The IPAQ was developed and tested for use in adults (age range of 15-69 years). In the present study, PA was assessed using the 27-item scale of the IPAQ (Craig et al., 2003). The IPAQ 27-item scale assesses three specific types of activity undertaken in four domains. The domains include school, transport, sport, and leisure time. For studying the time spent in moderate to vigorous PA, participants reported total minutes per week for the four domains. The variations of PA included low activity (e.g., walking to class, walking down the stairs, and walking to the park), moderate activity (e.g., brisk walking, hiking, gardening, and low intensity sports), and vigorous activity (e.g., running, fast cycling, circuit weight training, and high intensity sports).

Computation of the total score requires the summation of the duration (in minutes) and frequency (days) of low-intensity, moderate-intensity, and vigorous-intensity activities. Duration is multiplied by known METs per activity and the results for all items are summed for the overall PA score. Scores for low (walking) and for moderate and vigorous activities are sums of corresponding item scores. The responses should range from 0 to 7 days during a typical week.

The development of an international measure for PA commenced in Geneva in 1998 and was followed by extensive reliability and validity testing were undertaken across 12 countries (14 sites) during 2000. The final results suggested that these measures have acceptable measurement properties for use in many settings and different languages, and are suitable for national population-based prevalence studies of participation in PA.

KIDSCREEN-27 (KS-27; Ravens-Sieberger, et al., 2005). Three different KIDSCREEN instruments were developed to assess health-related quality of life

(HRQoL) in children and adolescents aged between 8-18 years (Ravens-Siberger et al., 2005). The KIDSCREZEN-27 is the shorter version, merging the ten original dimensions into five dimensions. All items are measured using a five-point Likert scale. The items are scored as Rasch scales and summed into a single score. The scores are transformed into standardized values based on data from an international survey sample from twelve European countries, and range from -16.06 to 57.77 (Bouwmans et al., 2014).

The KIDSCREEN-27 has five Rasch scaled dimensions: Physical Well-Being (5 items) explores the level of the child's/adolescent's PA, energy, and fitness; Psychological Well-Being (7 items) includes items on positive emotions, satisfaction with life, and feeling emotionally balanced; Autonomy & Parents (7 items) examines relationships with parents, the atmosphere at home, and feelings of having enough age-appropriate freedom, as well as degree of satisfaction with financial resources; Peers & Social Support (4 items) examines the nature of the respondent's relationships with other children/adolescent's, and School Environment (4 items) explores the adolescent's perceptions of his/her cognitive capacity, learning and concentration, and their feelings about school.

Procedures

After approval from Barry University's IRB was obtained, the researcher contacted high schools, boys and girls clubs, and recreational centers in South Florida to recruit adolescents to participate in the research project. Once the researcher was given permission to speak to the adolescents, teachers asked that a short presentation was given in order to facilitate the administration of the questionnaires. The parental/guardian consent forms and the assent forms for the adolescents were completed before

distributing the demographics items and three questionnaires related to mental toughness, physical activity, and psychological well-being. It was expected that participation in the study took approximately 20 to 30 minutes.

Data Analysis

The SPSS (Statistical Package for Social Science) data analysis program 22.0 was used to analyze all data for the study. Data screening was utilized to examine missing data, outliers, and normality in collected data using descriptive statistics. A Pearson product-moment correlation coefficient was computed to assess the relationships among mental toughness (overall mental toughness score), physical activity (overall physical activity score), and psychological well-being (overall well-being score). Independent sample T-tests were used to determine whether there were gender differences in the three variables (mental toughness, physical activity, and psychological well-being). A 3X3 ANOVA (Analysis of Variance) was conducted to determine the nature of any significant main effects and interactions between mental toughness (sensitive, average, and mentally tough), physical activity (inactive, minimally active, and HEPA active), and psychological well-being (overall well-being score)

Results

The objective of the present study was to determine if the psychological well-being of adolescents was associated with increased participation in physical activity and higher mental toughness. The hypotheses were as follows: (1) Adolescents with high mental toughness will rate themselves as having higher psychological well-being, (2) Adolescents who engage in more PA will have higher psychological well-being, (3), Adolescents who are more mentally tough and engage in more PA will have higher

psychological well-being, and (4) Gender differences will exist with regards to the three variable (i.e., physical activity, mental toughness, and psychological well-being).

Descriptive statistics were used to calculate mean scores and standard deviations for all scales (see Table A3). A total of three high schools agreed to make their students available to the researcher for this research project. For the missing values (total=11, N=145) from the IPAQ (physical activity scores), the data was imputed 15 times using maximum likelihood estimation (MLE) with iteration 1,000 using error reduction of .001. The physical activity scores were re-classified to be less than 11, 000 MET-minute/week.

Hypothesis 1 and 2: **Relationships among the Variables**

A Pearson Bivariate Correlation was computed to assess the relationship between mental toughness and psychological well-being in adolescents as well as physical activity and well-being (see table A4). There was no significant, positive correlation between mental toughness and psychological well-being, r = -.007, p = .928. There was no significant, positive correlation between physical activity and psychological well-being, r = -.113, p = .162.

Hypothesis 3: Impact of Mental Toughness and Physical Activity on Psychological Well-Being

Before running the analyses, mental toughness (MT) was categorized into three differences levels (i.e., sensitive, average, and mentally tough) and physical activity (PA) was categorized into three difference levels (i.e., inactive, minimally active, and HEPA active) (see Table A5). Participants with 3000 MET-minute/week were categorized of being High-efficiency particulate arrestance (HEPA) active (n = 86; 49.84% of

participants) while people between 600-3000 MET-minute/week were grouped as minimally active (n = 57; 26.5% of participants). Finally, participants between 1-599 MET-minute/week were categorized as being inactive (n = 13; 23.21% of participants).

For mental toughness, a sten scale 1-10 was used to display the results. Additionally, participants with a mental toughness score from 1-3 were categorized as being mentally sensitive (n = 41; 26.43% of participants) while people with a mental toughness score from 4-7 were categorized average (n = 101; 52.54% of participants). Finally, participants with a mental toughness score from 8-10 were grouped as mentally tough individuals (n = 14; 21.03% of participants) (AQR International 2016).

The effects of physical activity and mental toughness were investigated on the psychological well-being of adolescents (see Table A7). According to the well-being scores, the hypothesis that adolescents engaging in higher levels of physical activity and higher levels of mental toughness would have significantly higher well-being scores was not supported (see Table A6 for means and standard deviations). A 3 by 3 way ANOVA indicated that there was no significant interaction between the physical activity levels and the mental toughness levels on well-being, F (3,414) = .323, p < .862. The statistical analyses also revealed that there was no significant main effect of physical activity level on well-being, F (17,380) = 1.643, p < .197. Thus, the hypothesis that adolescents engaging in high levels of physical activity (M = 22.14, SD=2.79) would have higher well-being scores in comparison to students engaging in only moderate physical activity (M=22.36, SD=3.07) was also not supported. Also, according to the analyses there was no significant main effect for mental toughness on well-being, F (5,191) = .491, p <.613. Thus, the hypothesis that adolescents with high levels of mental toughness (M=22.14,

SD=3.48) have significantly higher well-being in comparison to those with a lower level of mental toughness (*M*= 22.51, *SD*=2.99) was also not supported.

Hypothesis 4: Gender Differences

An independent-samples t-test was used to investigate if there were gender differences among all of the variables being investigated in the study (i.e., mental toughness, physical activity, and psychological well-being in adolescents. The Bonferroni adjustment was used to negate any potential error of running three separate t-tests. The Levene's Test for Homogeneity of Variances was statistically insignificant. Therefore, equal variances were assumed.

Specifically (see tables A8 and A9), males (*M*=22.06, *SD*=3.38) were not significantly different from females (*M*=23.04, *SD*=3.01) in their engagement in psychological well-being, t (156) = 1.9, p = .35. There was also no significant differences in the scores for males (*M*=4.68, *SD*=2.01) and females (*M*=4.80, *SD*= 1.90) with regards to mental toughness, t (156) = .390, p = .42. In addition, males (*M*=4749.55, *SD*=3447.28) and females (*M*=4166.11, *SD*=3324.20) did not differ in their well-being, t (156) = -1.08, p = .46.

Discussion

Investigating the differences in adolescents' (ages 14-18) psychological well-being (PWB) based on levels of physical activity (PA) and mental toughness (MTQ) was the principal aim of the present study. The results indicated that there were no significant correlations between physical activity and psychological well-being or mental toughness and psychological well-being. Additionally, in contrast to some previous research, there

were no gender differences between physical activity, mental toughness, and psychological well-being. Lastly, there were no significant combined effects of physical activity and mental toughness on the well-being of adolescents.

Mechanic and Hensell (1987) hypothesized that young people assess their physical health regarding their competence in important areas of adolescent life and their sense of psychological well-being. Coleman (1961) suggested that when focusing on adolescents, the areas of greatest importance are success in school and sport activities as well as involvement with peers in age-relevant social activities. Sports participation tends to be highly valued within the adolescent subculture (Coleman, 1961) and earns adolescents high status and visibility among their peers. Since adolescents are faced with numerous interpersonal challenges such as their sense of "self", it may be difficult for them to cope resulting in higher levels of depression where it could then lead the individual to feel hopeless. Resilience factors operate across multiple levels of influence including the individual, the family, the community, and society (Cicchetti, 2010). Therefore, enhancing mental toughness in adolescents might prove useful in preventing many physical and mental challenges characteristic of this age period (Gerber et al., 2012).

In the present study, there was not a significant relationship between mental toughness and psychological well-being, but according to research (Gerber et al., 2012) mental toughness has the potential to enhance well-being directly as well as indirectly through enhancing other coping strategies. Gerber et al. (2012) found that mental toughness is related to general levels of perceived stress and depressive symptoms, and mental toughness is associated with stress resilience outside the realm of sport.

Specifically, it was found that participants with high vigorous exercise and moderate physical activity levels were more mentally tough independent of their gender and across mental toughness subscales measured by the MTQ-48 (Gerber et al., 2012). However, there has been limited research conducted regarding the relationship between mental toughness and psychological well-being (Clough et al., 2002), especially in populations that include athletes and non-athletes, where MT is tackled from a stress-resilience perspective (Luthar, Cicchetti, & Becker, 2000).

One of the core philosophies of MT is that success and failure are up to the individual. MT operates as a stress resilience resource (Gerber, Brand, Feldmeth, Lang, Elliot, Holsboer-Trachsler, & Puhse, 2013). Those who see their environment as controllable are less likely to report high levels of stress (Crust & Clough, 2005). One who is mentally tough is willing to accept the consequences of his or her actions: both good and bad. However, MT might be conceptualized differently by adolescents (approximately 11-18 years of age) because of the different demands (e.g., time demands) and personal pursuits (e.g., the search for social identity in adolescent's characteristic of this life stage) (Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006).

The examination of gender differences in previous research has produced contradictory findings, sometimes supporting and other times negating the role of gender. The results of the present study found no significant differences between gender and the three factors (i.e., physical activity, mental toughness, and psychological well-being) in adolescents (14-18 years of age). According to research, girls are at a higher risk for inactivity, especially throughout adolescence (Ward et al., 2006). It is found that girls' inactivity is as high as 75% among school years 10-12 (Pate et al., 2002). A reason for

this could be that some girls are not inclined to choose to participate in physical education class (PE) when it is not required (Grunbaum et al., 2004). Schools should be a central element in community where adolescents could participate in PA in order to improve their overall maintenance of health; however, if girls choose to not participate in PE when it is not required then it could lead them to have a less positive attitude in PA.

There is a necessity to gather more research in comparing obesity prevalence between adolescents from low-income families and higher SES families (Tate et a., 2015). Ogden, Lamb, Carroll, and Flegal (2010) discovered that adolescents from low-income households were more likely to be obese compared with adolescents from higher income households, although this finding was not consistent across racial and ethnic groups. In the study conducted by Tate and his colleagues (2015), the lower SES adolescents were more physically active than those with higher SES, whereas urban participants were less physically active than their suburban counterparts. One possible reason for this could be because adolescents with lower SES may have transportation issues, which requires them to walk long distances on a daily basis (Tate et al., 2015). Urban African American adolescents may be less active than those living in a suburban population because the neighborhoods are not as safe, as well as having limited recreational parks to engage in PA (Black and Macinko, 2008: Sallis&Galnz, 2009). Results showed that females were less physically active than the males; however, the differences did not approach significance.

The present study supported the results that differences in gender did not approach significance (t =1.36, p = .175). Since adolescents (males and females) come from a different socioeconomic status, it could affect the amount of PA that they engage

in, such as having transportation issues. Although girls report to being less active than males (Pate et al., 2002), in this present study gender differences did not approach significance, which could be because both genders come from different SES, displaying an equal opportunity for the adolescents to engage in PA. In this present study there were 59 (37.3%) African Americans who participated in the study. In the research conducted by Tate and his colleagues (2015), African American adolescents were recruited to examine gender, SES, and residential status related to obesity in American adolescents, and results showed that African Americans with a lower SES were more physically active than those with a higher SES. Since for this study there was a high percentage of African Americans, it could have then increased the chances of having no gender differences. Also, a possible reason that there were no gender differences could have been that adolescents come from a different residential status (urban and suburban). For this present study three schools were available to access adolescents (female= 79; male= 77), aiming to more private schools, where the location could have played a huge role in which allowed both genders to either have full or limited access to recreational parks and walking trails in their neighborhood or by the schools they attended.

In the present study, there was also no indication that there are significant gender differences in psychological well-being in adolescents, $t = 1.9$, $p = .35$. This is contradictory with previous research in which there are investigations that report a greater prevalence of depressive symptoms in girls compared to boys during adolescence (Baron & Campbell, 1993; Cyranowski, Frank, Young, & Shear, 2000). According to recent findings (Galambos, Barker, & Krahn, 2006; Goldbeck, Scchmitz, Besier, Herschbach, & Henrich, 2007), differences between boys and girls have been found both regarding

psychological well-being and distress. In this investigation, females report lower levels of psychological well-being and higher levels of distress than males. "Nowadays, there is still paucity of studies exploring levels of psychological well-being in youth and few psychometric instruments for measuring this concept in adolescence" (Visani et al., 2011, p. 65). There is limited information on how gender differences exist, although there are numerous instruments that attempt to measure psychological well-being (Roothman et al., 2003). Overall, the findings in the present study did not support other studies showing significant gender differences. The contradictory results in the research may be due to the subjective assessment of psychological well-being or the conceptualization of well-being.

While not all of the results in the present study were predicted, this research provides an important addition to the literature in this area. Specifically, the current study provides the first examination of all three variables (physical activity, mental toughness, and psychological well-being) in adolescents (14-18 year of age). Second, it is the first study to use the KIDSCREEN-27 scale with both the MTQ-48 and IPAQ questionnaire. Previous research has explored various facets of well-being (e.g., life satisfaction, quality of life, happiness), but the present study is the first to directly investigate psychological well-being utilizing the KIDSCREEN-27 scale, which consists of five dimensions, including psychological well-being. Third, gender differences were tested among adolescents while examining all three variables. Previous research showed that males report a higher mental toughness score, (Gerber et al., 2012), a higher physical activity score, (Trost et al., 2002), and a higher psychological well-being score compared to females, (Roothman et al., 2003). Thus, the present study may provide evidence that although adolescence is an ideal development phase in which to study mental toughness

because it is a period characterized by more maturational, educational, and interpersonal challenges and changed than any other stage of life (Motemayor, Adams, & Gullotta, 1990), there is no differences between males and females as far as having higher scores in either mental toughness, physical activity, and psychological well-being. Based on previous research, it was noted that the residential neighborhood, social economic status, and ethnicity may greatly influence adolescents, both males and females (Tate et al., 2015). Fourth, for this particular study, the physical activity numbers were higher when compared to other studies. A reason for this could be because the schools that were available in order to access participants are located in South Florida, there may have been a higher chance that the adolescents who participated in the study are more active than someone living more north given that that the climate is different.

Limitations

There were several limitations in the present study that may have impacted the results as well as the meaning that can be gleaned from them. Even though the G-power analysis estimated a total number of participants needed (*N*=150), the final number of participants and breakdown by levels of physical activity and mental toughness may have affected the results and limited the investigation that could be done specifically on the overall score of physical activity and mental toughness affecting the small sample size. Second, time of data collection may have played a role in the results for the three variables. The study was conducted in person during the spring and fall season (May-June; September-October); thus the time of data in terms of the time of the year where students were being tested in the spring season and the time of academic year could have affected the students' physical activity levels, mental toughness levels, and psychological

well-being. Since adolescents are consistently adapting to their environments and dealing with interpersonal challenges, it may have been difficult for them to balance both academic responsibilities with exercise resulting in more stress and anxiety. Third, all three variables in the study were assessed using subjective methods. Thus, there may have been some intentional or unintentional inaccuracies in the adolescents' reporting of their physical activity engagement, mental toughness outlook, and psychological well-being. In particular, physical activity level, though assessed using a well-documented and widely used questionnaire, was assessed by asking participants to think about their engagement in various forms of physical activity during a typical week. Thus, this may not be the most accurate method for assessing physical activity engagement. According to research 80% of adolescents fail to meet PA guidelines (Sallis et al., 2000); however, in the present study approximately 50% of adolescents reported high physical activity.

Fourth, the variable psychological well-being was used from the KIDSCREEN scale which measures the overall quality of life. Because in the present study, the aim was to see if the differences in adolescents' psychological well-being based on levels of mental toughness and physical activity then well-being was the only one dimension being observed from the scale as opposed to using all of the five dimensions, including psychological well-being. Fifth, since there were missing values from the IPAQ questionnaire, the study had to be imputed a total of fifteen times using maximum likelihood estimation (MLE) with iteration 1,000 using error reduction of .001. To ensure that this was the best procedure, the missing values were taken out and the analyses were tested; however, there was still no significance, so the MLE was the best method for this particular study which is an iteration process to guess what the missing values should be

minimizing the error. Sixth, since the researcher was asked to give a presentation to the students in order to facilitate the questionnaires, it may have skewed the results and how they answered the questionnaire. Lastly, because the study was not longitudinal, it cannot be assumed that positive psychological well-being in the short-term is indicative of positive psychological well-being in the long term.

Future Research

Future research considering the various limitations of the study suggests further research investigating these three variables suitable for this age and ethnicity according to gender, social economic status, and residential status. It would be useful to collect data that is representative of a broader range of physical activity engagement to determine for example whether there are differences in the impact of low versus high levels of physical activity on psychological well-being. Future research may also consider the time of data collection, which may affect the results.

Additionally, the problematic conceptualization of psychological well-being has also lead to different measures being used to assess the construct. For example, the present study utilized Ravens-Sierberer (2005) Kidscreen-27 scale which measures the overall quality of life for children and adolescents. Within this scale, there are five dimensions, including psychological well-being which was the only dimension used for the study. Thus, future research should clarify the construct being investigated as well as utilize more consistent methods of assessment to be able to fully understand well-being and its relationships to other variables, such as mental toughness and physical activity.

Addressing the findings and limitations of the current study, researchers and practitioners will likely be better placed to support adolescents in their coping strategies

and to better explore whether interventions aimed at improving social skills, stress-management, and assertiveness might prevent adolescents from experiencing depression or any psychological-related disorder. The findings may also be helpful for coaches, teachers, and sport psychologists since results showed that there was no significant gender differences among the three variables (i.e. physical activity, mental toughness, and psychological well-being), which may allow them to create better interventions equally for adolescent males and females, creating a more supportive and diverse collaboration which could increase the mental skills of each individual (e.g. confidence, focus, and goal-setting) without having the belief that a gender is significantly better than the other. Lastly, the findings and limitations of the current study may provide a better insight for parents of what their children may be facing during this time period. Thus, teachers, coaches, sport psychologists and parents all can benefit from this present study, which should encourage them to better educate themselves on adolescents and how the variables, including physical activity, mental toughness, and psychological well-being play a role in their lives.

REFERENCES

AQR International 2016. Retrieved from doi:htpp:// aqrinternational.co.uk/licensed-user training.

Baron, B., & Campbell, T.L. (1993). Gender differences in the expression of depressive symptoms in middle adolescence: An extension of earlier findings. Adolescence, 28, 903-911.

Black, J., and Macinko, J. (2008). Neighborhoods and obesity. Nutrition Reviews, 6(1), pp.2-20.

Bouwans, C., van der Kolk, A., Oppe, M., Schawo, S., Stolk, E., van Agthoven, M., & van Roijen, L. (2014). Validity and responsiveness of the EQ-5D and the KIDSCREEN-10 in children with ADHD. The European Journal of Health Economics, 15(9), 967-977. doi:10.1007/s10198-013-0540-x.

Carr, A. (2004). *Positive psychology: The science of happiness and human strengths*. New York: Routledge.

Cicchetti, D. (2010) Resilience under conditions of extreme stress: a multilevel perspective. *World Psychiatry, 9*, 145-154.

Clough, P., Earle, K., & Sewell, D. (2002). Mental toughness: The concept and its measurement. In I. Cockerill (Ed.), *Solutions in sport psychology* (pp. 32–46). London: Thomson Learning.

Coleman, James. (1961). *The Adolescent Society*. New York: Free Press.

Corder, K., Schiff, A., Kesten, J. & van Slujus, E. (2015) Development of a universal approach to increase physical activity among adolescents: The GOActive intervention. *BMJ Open*, *5*(8), e008610. doi:10.1136/bmjopen-2015-008610

Craig, C.L., et al. (2003). "International physical activity questionnaire: 12-country reliability and validity. "Med Sci Sports Exerc 35:1381-95.

Crust, L., & Keegan, R. (2010). Mental toughness and attitudes to risk-taking. *Personality and Individual Differences, 49,* 164-168.

Crust, L., & Clough, P. (2005). Relationship between mental toughness and physical endurance. *Perceptual & Motor Skills*, 100, 192-194.

Cyranowski, J.M., Frank, E., Young, E., Shear, M.K. (2000). Adolescent onset and the gender differences in lifetime of major depression. *Archives of General Psychiatry, 57,* 21-27.

Diener, E., M. Diener and C. Diener: 1995, 'Factors prediction the subjective wellbeing of nations', Journal of Personality and Social Psychology 49, pp. 851-864.

Diener, E., Suh, E. and Oishi, S. (1997). "Recent findings of subjective well-being. "Indian Journal of Clinical Psychology. Available at www.psych.uiuc.edu/~ediener/hottopic/paper1.htm.

Dubow, E.F., Huesmann, L.R., Boxer, P., Pulkkinen, L., &Kokko, K. (2006). Middle childhood and adolescent contextual and personal predictors of adult educational and occupational outcomes: A mediational model in two countries. Developmental Psychology, 42, 937–949. PubMed doi:10.1037/0012-1649.42.5.937

Ekkekakis, P., & Acevedo, E.O. (Eds). (2006). Affective responses to acute exercise: toward a psychobiological dose-response model. *Psychobiology of physical activity* (pp.91-110). Champaign: Human Kinetics.

Galambos, N. L., Barker, E. T., & Krahn, H. J. (2006). Depression, self-esteem and gender in emerging adulthood: Seven-year trajectories. *Developmental Psyhchology, 42*, 350–365.

Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Pühse, U., Elliot, C., & Brand, S. (2012). Adolescents' exercise and physical activity are associated with mental toughness. Mental Health and Physical Activity, 5(1), 35-42.

Gerber, M., & Puhse, U. (2009). Do exercise and fitness protect against stress-induced health complaints? A review of literature. *Scandinavian Journal of Public Health*, 37, 801-819.

Gerber, M., Brand, S., Feldmeth, A.K., Lang, C., Elliot, C., Holsboer-Trachsler, E., & Puhse, U. (2013). Adolescents with high mental toughness adapt better to perceived stress: A longitudinal study with Swiss vocational students. *Personality and Individual Differences, 54*, 808-814.

Goldbeck, L., Schmitz, T. G., Besier, T., Herschbach, P., & Henrich, G. (2007). Life satisfaction decreases during adolescence. *Quality of Life Research, 16*, 969–979

Gould, D., Hodge, K., Peterson, K., & Petlichkoff, L. (1987). Psychological foundations of coaching: Similarities and differences among intercollegiate wrestling coaches. *The Sport Psychologist, 1*, 293–308.

Grunbaum JA, Kann L, Kinchen S *et al.* Youth risk behavior surveillance-United States, 2003. *MMWR Surveil Summ* 2004; 53:1-96.

Horsburgh, V., Schermer, J., Veselka, L., & Vernon, P. (2009). A behavioral genetic study of mental toughness and personality. *Personality and Individual Differences*, 46 (2), 100-105.

Huebner, E. S., Valois, R. F., Paxton, R. J., & Drane, J. W. (2005). Middle school student's perceptions of quality of life, *Journal of Happiness Studies, 6* (1), 15-24.International Journal of Sport and Exercise Psychology, 5 (3) (2007), pp. 27-290

Jones, G., Hanton, S., & Connaughton, D. (2002). What is this thing called mental toughness? An investigation of elite sport performers. Journal of Applied Sport Psychology, 14, 205-218.

Luthar, S.S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. *Development and Psychopathology, 12*, 857–885.

Maddi, S.R. (2006) Hardiness: The courage to grow from stresses. *Journal of Positive Psychology, 1,* pp. 160–168.

Mechanic, D., & Hansell, S. (1987). Adolescent competence, psychological well-being, and self-assessed physical health. *Journal of Health and Social Behavior, 4*, 364-374.

Montemayor, R., Adams, G.R., & Gullotta, T.P. (Eds.). (1990). *From childhood to adolescence: A transitional period*. Newbury Park, CA: Sage

Ogden, C.L., Lamb, M.M., Carroll, M.D., Flegal, K.M. (2010). Obesity and socioeconomic status in children and adolescents: United States, 2005-2008. NCHS Data Brief, 51, pp.1-8.

Pate, J.F., Trost, S.G., Sallis, P.S. Freedson, W.C. Taylor, M. Dowda, and J. Sirard. Age and gender differences in objectively measures physical activity in youth. Med. Sci. Sports Exerc., Vol.34, No.2, pp.350-355, 2002.

Perry, J. L., Clough, P. J., Crust, L., Earle, K., & Nicholls, A. R. (2013). Factorial validity of the Mental Toughness Questionnaire-48. *Personality And Individual Differences, 54*(5), 587-592. doi:10.1016/j.paid.2012.11.020.

Ravens-Sieberer, U., Gosch, A., Rajmil, L., Erhart, M., Bruil, J., Duer, W., ..., Kilroe, J. and the European KIDSCREEN Group. (2005). KIDSCREEN-52 quality-of-life measure for children and adolescents. *Expert Review of Pharmacoeconomics & Outcomes Research, 5* (3), 353-364.

Roothman, B., Kirsten, D.K., & Wissing, M.P, (2003). Gender differences in aspects of psychological well-being. South African journal of psychology, 33(4), 212-218.

Sallis, J.F., and Glanz, K. (2009). Physical activity and food environments: Solutions to the obesity epidemic. Milbank Quaterly, 87(1), pp. 123-154.

Tate, N.H., Dillaway, H.E., Yarandi, H.N., Jones, L.M., & Wilson, F.L. (2015). An examination of eating behaviors, physical activity, and obesity in African American adolescents: Gender, socioeconomic status, and residential status differences. Journal of Pediatric Health Care, 29(3). 243-254. doi:10.1016/j.pedhc.2014.11.005

Trost, S.G., Pate, R.R., Sallis, J.F., Freedson, P.S., Taylor, W.C., Dowda, M., & Sirard, J. (2002). Age and gender differences in objectively measured physical activity in youth. *Medicine and science in sports and exercise, 34(2),* 350-355.

Visani, D., Albieri, E., Offidanim E., Ottolini, F., Tomba, E., & Ruini, C. (2011). Gender differences in psychological well-being and distress during adolescence. In the human pursuit of well-being (pp. 65-70). Springer Netherlands.

Ward, D.S., R. Saunders, G.M. Felton, E. Williams, J.N. Epping, and R.R. Pate. 2006. "Implementation of a school environment intervention to increase physical activity in high school girls. " Health Education Research 21, no. 6: 896-910.

World Health Statistics. (2015). Retrieved from: http://www.who.int/gho/publications/world_health_statistics/2015/en/

Windle, G. (2014). Exercise, physical activity and mental well-being in later life. *Reviews In Clinical Gerontology, 24*(4), 319-325.

APPENDIX A

Section I: DEMOGRAPHICS

What is your current age? _____

What is your gender?

- ○ Male
- ○ Female

How do you describe yourself? (Please check the one option that best describes you)

- ○ American Indian or Alaska Native
- ○ Hawaiian or Other Pacific Islander
- ○ Asian or Asian American
- ○ Black or African American
- ○ Hispanic or Latino
- ○ Non-Hispanic White

Do you play a sport? If so, what sport and how many times a week do you play? _____

Are you in any club or recreational team? If so state which one and how many times a week do you play? _____

How much physical education do you get at school (per week)? _____

APPENDIX B

Section II : INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ)

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 an average seven day period. 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 do in an average seven day period. **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.

In an average seven day period, how many days did you do **vigorous** physical activities like heavy lifting, aerobics, or fast bicycling?

_____ **days per week**

No vigorous physical activities ***Skip to question 3***

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 do in an average seven day period. **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.

In an average seven day period, 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***

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 spend walking in an average seven day period. This indicated at home, at school, walking to travel from place to place, and other walking that you have done solely for recreation, sport, exercise, and leisure.

In an average seven day period, how many days did you walk for at least 10 minutes at a time?

_____ **days per week**

No walking **Skip to question 7**

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

_____hours per day

_____minutes per day

The last question is about the time you spent sitting in an average seven day period. Include time spent at school, at home, and during leisure time. This may include time spend sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

In an average seven day period, how much time do spend sitting on a week day?

_____hours per day

_____minutes per day

APPENDIX C

Section III: MENTAL TOUGHNESS QUESTIONNAIRE-48 (MTQ-48)

Please indicate your response to the following items by **circling one** of the numbers, which have the following meaning;

1 = strongly disagree; **2** = disagree; **3** = neither agree nor disagree; **4** = agree; **5** =strongly agree

Please answer these items carefully, **thinking about how you are generally**. Do not spend too much time on any one item.

	Disagree				**Agree**
1) I usually find something to motivate me	1	2	3	4	5
2) I generally feel in control	1	2	3	4	5
3) I generally feel that I am a worthwhile person	1	2	3	4	5
4) Challenges usually bring out the best in me	1	2	3	4	5
5) When working with other people I am usually quite influential	1	2	3	4	5
6) Unexpected changes to my schedule generally throw me	1	2	3	4	5
7) I don't usually give up under pressure	1	2	3	4	5
8) I am generally confident in my own abilities	1	2	3	4	5
9) I usually find myself just going through the motions	1	2	3	4	5
10) At times I expect things to go wrong	1	2	3	4	5
11) "I just don't know where to begin" is a feeling I usually have when presented with several things to do at once	1	2	3	4	5
12) I generally feel that I am in control of what happens in my life	1	2	3	4	5
13)However bad things are, I usually feel they will work out positively in the end	1	2	3	4	5
14) I often wish my life was more predictable	1	2	3	4	5
15)Whenever I try to plan something, unforeseen factors usually seem to wreck it	1	2	3	4	5

16) I generally look on the bright side of life	1	2	3	4	5
17) I usually speak my mind when I have something to say	1	2	3	4	5
18) At times I feel completely useless	1	2	3	4	5
19) I can generally be relied upon to complete the tasks I am given	1	2	3	4	5
20) I usually take charge of a situation when I feel it is appropriate	1	2	3	4	5
21) I generally find it hard to relax	1	2	3	4	5
22) I am easily distracted from tasks that I am involved with	1	2	3	4	5
23) I generally cope well with any problems that occur	1	2	3	4	5
24)I do not usually criticize myself even when things go wrong	1	2	3	4	5
25) I generally try to give100%	1	2	3	4	5
26) When I am upset or annoyed I usually let others know	1	2	3	4	5
27) I tend to worry about things well before they actually happen	1	2	3	4	5
28) I often feel intimidated in social gatherings	1	2	3	4	5
29) When faced with difficulties I usually give up	1	2	3	4	5
30) I am generally able to react quickly when something unexpected happens	1	2	3	4	5
31) Even when under considerable pressure I usually remain calm	1	2	3	4	5
32) If something can go wrong, it usually will	1	2	3	4	5
33) Things just usually happen to me	1	2	3	4	5
34) I generally hide my emotion from others	1	2	3	4	5
35) I usually find it difficult to make a mental effort when I am tired	1	2	3	4	5
36) When I make mistakes I usually let it worry me for days after	1	2	3	4	5
37) When I am feeling tired I find it difficult to get going	1	2	3	4	5
38) I am comfortable telling people what to do	1	2	3	4	5
39) I can normally sustain high levels of mental effort for long periods	1	2	3	4	5
40) I usually look forward to changes in my routine	1	2	3	4	5
41) I feel that what I do tends to make no difference	1	2	3	4	5
42)I usually find It hard to sum on enthusiasm for the tasks I have to do	1	2	3	4	5

43) If I feel somebody is wrong, I am not afraid to argue with them	1	2	3	4	5
44) I usually enjoy a challenge	1	2	3	4	5
45) I can usually control my nervousness	1	2	3	4	5
46) In discussions, I tend to back-down even when I feel strongly about something	1	2	3	4	5
47) When I face setbacks I am often unable to persist with my goal	1	2	3	4	5
48) I can usually adapt myself to challenges that come my way	1	2	3	4	5

APPENDIX D

Section IV: KIDSCREEN-27 QUESTIONNAIRE (KS-27)

How are you? How do you feel? This is what we would like you to tell us. Please read every question carefully. What answer comes to your mind first? Choose the circle that fits your answer best and cross it.

Remember: This is not a test so there are no wrong answers. It is important that you answer all the questions and also that we can see you marks clearly. When you think of your answer please try to remember the last week.

You do not have to show your answers to anybody. Also, nobody who knows you will look at your questionnaire once you have finished it.

1. Physical Activities and Health
   1. In general, how would you say your health is?

○ excellent ○ fair

○ very good ○ poor

○ good

Thinking about the last week…

	not at all	slightly	moderately	very	extremely
2. Have you felt fit and well?	○	○	○	○	○
3. Have you been physically active (e.g. running, biking)?	○	○	○	○	○
4. Have you been able to run well?	○	○	○	○	○
5. Have you felt full of energy?	○	○	○	○	○

2. General Mood and Feelings about yourself
   Thinking about the last week..

	never	seldom	quite often	very often	always
1. Has your life been enjoyable?	○	○	○	○	○
2. Have you been in a good mood?	○	○	○	○	○
3. Have you had fun?	○	○	○	○	○
4. Have you felt sad?	○	○	○	○	○
5. Have you felt so bad that you didn't want to do anything?	○	○	○	○	○
6. Have you felt lonely?	○	○	○	○	○
7. Have you been happy with the way you are?	○	○	○	○	○

3. Family and Free Time
   Thinking about the last week..

	never	seldom	quite often	very often	always
1. Have you had enough time for yourself?	○	○	○	○	○
2. Have you been able to do the things that you want to do in your free time?	○	○	○	○	○
3. Have your parent(s) had enough time for you?	○	○	○	○	○
4. Have you parent(s) treated you fairly?	○	○	○	○	○
5. Have you been able to talk to your parent(s) when you wanted to?	○	○	○	○	○

6. Have you had enough money to do the same things as your friends?	○	○	○	○	○
7. Have you had enough money for your expenses?	○	○	○	○	○

4. Friends

Thinking about the last week..

	never	seldom	quite often	very often	always
1. Have you spent time with your friends?	○	○	○	○	○
2. Have you had fun with your friends?	○	○	○	○	○
3. Have you and your friends helped each other?	○	○	○	○	○
4. Have you been able to rely on your friends?	○	○	○	○	○

5. School and learning

Thinking about the last week..

	not at all	slightly	moderately	very	extremely
1. Have you been happy at school?	○	○	○	○	○
2. Have you got on well at school?	○	○	○	○	○
3. Have you been able to pay attention?	○	○	○	○	○
4. Have you got along well with your teachers?	○	○	○	○	○

APPENDIX E

Barry University
Informed Parental Consent Form

Your child's participation in a research project is requested. The title of the study is Differences in adolescents' psychological well-being based on levels of mental toughness and physical activity. The research is being conducted by Christine Garrido, a student in the Sport, Exercise, and Psychology program of Barry University, and is seeking information that may be useful in the field of psychology. The aim of the research is to examine the relationships among physical activity, mental toughness, and psychological well-being in adolescents (ages 14-18 years old). In accordance with this aim, the following procedures will be used: Completing the parental consent form will allow your child to partake in the study. We anticipate the number of participants to be 500.

If you decide to allow your child to participate in this research, he/she will be asked to do the following: He or she will have to complete an assent form, which explains the purpose of the study including what will be asked in order to participate in the study, and once they have completed the form then he or she will complete a survey which includes four sections, consisting of a demographic form and three questionnaires. The involvement for the entire process should take approximately 20-30 minutes to complete.

The consent to be a research participant is strictly voluntary and should you decline to allow your child to participate or should your child choose to drop out at any time during the study, there will be no adverse effects on you or your child.

There are no risks in participating in this study. Although there are no direct benefit to your child, his/her participation in this study may help our understanding of how they handle pressured situations and their quality of life, more specifically their psychological well-being.

As a research participant, the information that your child provides will be held in confidence to the extent permitted by law. Any published results of the research will refer to group averages only and no names will be used in the study. Data will be kept in a locked file in the researcher's office, maintained for a minimum of 5 years and then will be destroyed. Your signed consent will be kept separate from the data. All data will be destroyed after February 1st 2017.

If you have any questions or concerns regarding the study or your child's participation in the study, you may contact me, Christine Garrido at 786-564-5305 or at christine.garrido@mymail.barry.edu, my thesis advisor, Gualberto Cremades at 305-899-4846 or at gcremades@barry.edu or the Institutional Review Board point of contact, Mrs. Barbara Cook at (305)899- 3020 or bcook@mail.barry.edu.

Voluntary Consent

I acknowledge that I have been informed of the nature and purposes of this experiment by _____ and that I have read and understand the information presented above, and that I have received a copy of this form for my records. I give my voluntary consent to participate in this experiment.

_____ _____
Signature of Participant *Date*

_____ _____ _____ _____
Researcher *Date* *Witness* *Date*
(Witness signature is required only if research involves pregnant women, children, other vulnerable populations, or if more than minimal risk is present.)

Appendix F

Barry University

Assent Form (AGES 14-17)

Your participation in a research project is requested. The title of the study is Differences in adolescents' psychological well-being based on levels of mental toughness and physical activity. The research is being conducted by Christine Garrido, a student in the Sport, Exercise, and Performance Psychology program of Barry University, and is seeking information that will be useful in the field of psychology. The aim of the research is to examine the relationships among physical activity, mental toughness, and psychological well-being in adolescents (ages 14-18 years old). In accordance with this aim, the following procedures will be used: The information that you provide is anonymous and by completing the assent forms you will be acknowledging that you are below 18-years-old and you are not involved in high intensity sports. The research study will include a survey which has four sections. We anticipate the number of participants to be 500.

If you decide to participate in this research, you will be asked to do the following: you will be asked to complete a survey, which has four sections. Your involvement will consist of completing a parental/guardian consent form and an assent form for minors and should take approximately 20- 30 minutes to complete.

The consent to participate in this research is strictly voluntary and if you chose not to do it or should you want to drop out at any time during the study, there will be no unfavorable effects on you.

There are no risks in being a part of this study. Although there are no direct benefits to you, your participation in this study may help our understanding of how you handle pressured situations and your overall quality of life, more specifically your psychological well-being.

As a research participant, the information that your child provides will be held in confidence to the extent permitted by law. Any published results of the research will refer to group averages only and no names will be used in the study. Data will be kept in a locked file in the researcher's office, maintained for a minimum of 5 years and then will be destroyed. Your signed consent will be kept separate from the data. All data will be destroyed after February1st 2017.

If you have any questions or concerns regarding the study, you may contact me, Christine Garrido at 786-564-5305, or at christine.garrido@mymail.barry.edu my thesis advisor, Gualberto Cremades at 305-899-4846 or at gcremades@barry.edu or the Institutional

Review Board point of contact, Mrs. Barbara Cook at (305)899- 3020 or bcook@mail.barry.edu. If you are satisfied with the information provided and are willing to be a part of this research, please consent by signing this assent form.

Voluntary Consent
I acknowledge that I have been informed of the nature and purposes of this experiment by Christine Garrido. I have read and understand the information presented above. I have received a copy of this form.

____I am willing to be a part of the research study.

____ I am not willing to be a part of the research study.

_____ _____
Signature of Participant *Date*

_____ _____ _____ _____
Researcher *Date* *Witness* *Date*
(Witness signature is required only if research involves pregnant women, children, other vulnerable populations, or if more than minimal risk is present.)

APPENDIX G

Barry University

Cover Letter

To whom this may concern,

Your participation in a research project is requested. The title of the study is "Differences in adolescents' psychological well-being based on levels of mental toughness and physical activity." The research is being conducted by Christine Garrido, a Master's student in the HPLS – SES department and Sport, Exercise, and Performance Psychology program at Barry University, and is seeking information that will be useful in the field of Sport and Exercise Psychology. I am in the process of completing my thesis research project and am looking for participants for my study. The purpose of this study is to examine the relationships among physical activity, mental toughness, and psychological well-being in adolescents (ages 14-18 years old). We anticipate the number of participants to be 500.

In accordance with these aims, a detailed description of the issue will be sought once I receive permission to go into this location. I will then ask whoever is in charge of the adolescents' to sign a third party confidentiality agreement. The third party confidential agreement states that those who will be holding on to the sealed folders, will make sure that they are aware that the forms and the questionnaires which are inside the sealed folders should be kept confidential. Once the third party confidential agreement is signed, then I will personally distribute the sealed folders to the adolescents', which will include both the parental and assent forms and a survey consisting of a demographics form and three questionnaires which will be collated. Prior to completing the questionnaires, a parental/guardian consent form and an assent form for minors, must be completed. The survey that the participants will complete, is strictly confidential and anonymous; as they will not be asked to put their name to any other affiliation information in the questionnaires. The first part of the survey will be the demographic form, which will include information such as gender, age, and ethnicity. The second section will be the International Physical Activity questionnaire, which will include questions about the adolescents' different levels of physical activity such as low, moderate, or vigorous physical activity. The third section will be the mental toughness questionnaire, which will include questions about the adolescents' different levels of mental toughness such as commitment, control, challenge, and confidence. The fourth section will be the Kidscreen-27 questionnaire, which will include questions about the psychological well-being of the adolescent. Completing in this research project will be expected to take approximately 20-30 minutes of their time and will benefit the researcher on the topic being investigated in the study. After two weeks, the researcher will go back to the location and pick up the sealed folders with the forms and

questionnaires completed. I will then ask the individual who signed the third party confidential agreement to notify me if there are any other sealed folders, which were turned in so that I could pick it up. Participating in this research is strictly voluntary and if the participants choose to opt out of the study at any time there will be no adverse effects. There are no known risks to participating in this study and there are no known direct benefits. Indirect benefits include contributing to the knowledge base in both the exercise psychology and sport psychology fields of study.

Any information that the participants provide will be held in confidence to the extent permitted by law. If results of the research are published, it will refer to group averages only and no names will be used in the study. Data will be kept in a locked file in the researcher's office, maintained for a minimum of 5 years and then will be destroyed. Your signed assent will be kept separate from the data. All data will be destroyed after February 1st, 2017.

All data collected is anonymous. If you have any questions or concerns regarding the study or your participation in the study, you may contact me, Christine Garrido at 786-564-5305, or at christine.garrido@mymail.barry.edu my thesis advisor, Gualberto Cremades at 305-899-4846 or at gcremades@barry.edu or the Institutional Review Board point of contact, Mrs. Barbara Cook at (305)899- 3020 or bcook@mail.barry.edu**.** If you are interested in completing this survey, please contact me via-email or by phone. Thank you for your participation!

Sincerely,

Christine Garrido

APPENDIX H

Third Party Confidentiality Agreement

As a member of the research team investigating the differences in adolescents' psychological well-being based on levels of mental toughness and physical activity, I understand that I will have access to confidential information about study participants. By signing this statement, I am indicating my understanding of my obligation to maintain confidentiality and agree to the following:

- I understand that names and any other identifying information about study participants are completely confidential.
- I agree not to divulge, publish, or otherwise make known to unauthorized persons or to the public any information obtained in the course of this research project that could identify the persons who participated in the study.
- I understand that all information about study participants obtained or accessed by me in the course of my work is confidential. I agree not to divulge or otherwise make known to unauthorized persons any of this information unless specifically authorized to do so by office protocol or by a supervisor acting in response to applicable protocol or court order, or otherwise, as required by law.
- I understand that I am not to read information and records concerning study participants, or any other confidential documents, nor ask questions of study participants for my own personal information but only to the extent and for the purpose of performing my assigned duties on this research project.
- I understand that a breach of confidentiality may be grounds for disciplinary action, and may include termination of employment.
- I agree to notify my supervisor immediately should I become aware of an actual breach of confidentiality or situation which could potentially result in a breach, whether this be on my part or on the part of another person.

_____ _____ _____

Signature Date Printed Name

Table A1: Descriptive statistics for participants

Variables	Categories	Frequency	Percentage
Gender	Female	79	50.00%
	Male	77	48.7%
Age	14	27	17.1%
	15	36	22.8%
	16	33	20.9%
	17	24	15.2%
	18	36	22.8%
Nationality	Hispanic	62	39.2%
	Caucasian	27	17.1%
	African American	59	37.3%
	Asian	4	2.5%
	Hawaiian	4	2.5%

Table A2: Cont. of Descriptive statistics for participants

Variables	Categories	Frequency	Percentage
Physical Education	No	92	58.2%
(PE)	Yes	64	40.5%
Sport Affiliation	No	69	43.7%
	Yes	87	55.1%
Recreational team	No	123	77.8%
	Yes	33	20.9%

Table A3: Descriptive of Scales by Gender

Scales	Gender	N	Mean	Std. Deviation	Std. Error
IPAQ	Female	79	4166.11	3324.20	374.00
	Male	77	4749.55	3447.277	392.85
MTQ	Female	79	4.80	1.90	.21
	Male	77	4.68	2.01	.23
PWB	Female	79	23.04	3.01	.34
	Male	77	22.06	3.38	.38

Note. IPAQ, International Physical Activity Questionnaire, out of 11,000 METS; MTQ, Mental Toughness Questionnaire, out of 10; PWB, Psychological Well-Being from KIDSCREEN-27 Scale, out of 35

Table A4: Correlations between physical activity, mental toughness, and psychological well-being

		Physical Activity	Mental Toughness	Psychological Well-being
Physical Activity	Pearson Correlation	1	-.027	-.113
	Sig. (2-tailed)	-	.742	.162
Mental Toughness	Pearson Correlation	-.027	1	-.007
	Sig (2-tailed)	.742	-	.928
Psychological Well-being	Pearson Correlation	-.113	-.007	1
	Sig (2-tailed)	.162	.928	-

** Correlation is significant at the 0.01 level (2-tailed)

Table A5: Mental toughness and physical activity groups

Variable	Group Level	Frequency	Percent
Mental Toughness	Sensitive	41	26.43
	Average	101	52.54
	Mentally tough	14	21.03
Physical Activity	Inactive	13	23.21
	Minimally Active	57	26.95
	HEPA active	86	49.84

Table A6: Means and standard deviations for the interaction of mental toughness and physical activity on psychological well-being

Mental Toughness Level	Physical Activity Level	Mean	Std. Deviation	N
Sensitive	Inactive	20.80	3.42	5
	Minimally active	23.60	3.72	10
	HEPA active	22.42	2.53	26
	Total	22.51	2.99	41
Average	Inactive	22.29	3.95	7
	Minimally active	23.05	3.51	41
	HEPA active	22.36	3.07	53
	Total	22.63	3.30	101
Mentally tough	Inactive	19.00	-	1
	Minimally active	22.67	4.46	6
	HEPA active	22.14	2.79	7
	Total	22.14	3.48	14
Total	Inactive	21.46	3.57	13
	Minimally active	23.11	3.59	57
	HEPA active	22.36	2.87	86
	Total	22.56	3.22	156

Table A7: Three by three-way ANOVA of mental toughness and physical activity on psychological well-being

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Observed Power	Effect Size
Corrected Model	53.224	8	6.653	.629	.753	.283	.033
Intercept	21445.409	1	21445.409	2026.981	.000	1.000	.932
MTQ_Levels	10.382	2	5.191	.491	.613	.129	.007
IPAQ_Levels	34.760	2	17.380	1.643	.197	.342	.022
MTQ_Levels* IPAQ_Levels	13.657	4	3.414	.323	.862	.121	.009
Error	1555.256	147	10.580				
Total	80989.00	156					
Corrected Total	1608.481	155					

**indicated significance at the 0.01 level

a. R Squared = .033 (Adjusted R Squared = -.020
b. Computed using alpha = .05

Table A8: T-tests examining gender differences in mental toughness, physical activity, and psychological well-being

		F	Sig	t	df
Mental Toughness	Equal variances assumed	.663	.417	.390	154
Psychological Well-Being	Equal variances assumed	.859	.355	1.902	154
Physical Activity	Equal variances assumed	.540	.464	-1.076	154

Table A9: Gender differences in mental toughness, physical activity, and psychological well-being

	Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Mental Toughness	Female	79	4.50	1.90	.21346
	Male	77	4.68	2.01	.22900
Physical Activity	Female	79	4166.11	3324.20	374.00
	Male	77	4749.55	3.447.28	392.85
Psychological Well-Being	Female	79	23.04	3.01	.33822
	Male	77	22.06	3.38	.38484