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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

EXAMINING THE INFLUENCE OF MODIFIED TENNIS EQUIPMENT ON YOUNG PLAYERS' ENJOYMENT, PERCEIVED COMPETENCE, AND INTENTION TO PARTICIPATE IN TENNIS IN THE STATE OF KUWAIT

A Dissertation Submitted in Partial Fulfillment of
the Requirements for the Degree of Doctor of
Sport and Exercise Science

Abdullah Akbar

College of Natural and Health Science
School of Sport and Exercise Science
Exercise Science

July 2016

This Dissertation by: Abdullah Akbar

Entitled: *Examining the Influence of Modified Tennis Equipment on Young Players' Enjoyment, Perceived Competence, and Intention to Participate in Tennis in the State of Kuwait*

has been approved as meeting the requirement for the Degree of Doctor of Sport and exercise Science in College of Natural and Health Sciences in Department of Sport and Exercise Science

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ABSTRACT

Abdullah Akbar. *Examining the Influence of Modified Tennis Equipment on Young Players' Enjoyment, Perceived Competence, and Intention to Participate in Tennis in the State of Kuwait*

Children's sport needs to be designed in ways that is developmentally-appropriate to maximize the possibilities that participants will have positive experiences that will result in sustained interest and motivation. The purpose of this mixed-methods study was to compare the impact of playing with modified or traditional tennis equipment on children's perceptions of enjoyment, perceived competence, and intentions to continue participation in the sport of tennis in the State of Kuwait. Focus group interviews were used to understand children's perceptions of their tennis experiences through the utilization of the modified and traditional tennis equipment. The quality of children's skill acquisition was also examined.

Quantitative analyses were computed through repeated measures analysis of variance (RM ANOVA) to determine changes in children's enjoyment, perceived competence, and intention to continue to participate in tennis from pretest to posttest. The findings indicated that children in the modified tennis equipment group improved significantly more in their tennis enjoyment, perceived competence, and intention to continue to play tennis than did the children in the traditional tennis equipment group. Differences in children's skill acquisition was examined through the Mann-Whitney U

and revealed significant improvements in forehand and backhand performance for the children in the modified tennis equipment group from pre-test to post-test.

Qualitative findings were consistent with the quantitative results. Children in the modified tennis equipment group reported high levels of enjoyment, perceived competence, and intention to continue to play tennis in the future. Conversely, children in the traditional tennis equipment group expressed less interest in tennis and had lower enjoyment, perceived competence, and intention to continue to play tennis in the future.

The findings from this study provide empirical evidence that developmentally appropriate sports equipment can be beneficial for youth and can contribute to positive outcomes in terms of more favorable competence perceptions and increased motivation to play sport. In addition, the use of modified tennis equipment was found to be beneficial in contributing to actual skill performance. Further exploration of the potential benefits of developmentally appropriate equipment is needed.

DEDICATION

It is immensely difficult to find the right words to express our appreciation for the people who dedicated their time, effort, and emotions to help us accomplish our dreams. To do this requires the existence of exceptional people who assist not only in achieving dreams, but also in celebrating them. Cherished moments exist in having wonderful people who are willing to share their true feelings of happiness for our own success.

Thank you to my precious mother and father for dedicating your lives to invest in mine. Thank you to my family for living my dream with me, including both the difficult and happy moments. Between this dissertation's tremendous words and ink there dwell feelings of appreciation for all people who believed in my humble ability.

ACKNOWLEDGEMENTS

Learning does not occur accidentally. We learn to seek knowledge to improve our lives. Knowledge needs to be provided from experts and experienced people who are willing to share their precious time and effort to see other people succeed. This work would not be accomplished without amazing people like my committee members. Each esteemed member shared with me priceless knowledge and valuable expertise that I will appreciate all my life.

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CHAPTER I

INTRODUCTION

Athletic participation is linked to benefits in psychological, physical, and social well-being (Fraser-Thomas & Côté, 2006). There is an extensive range of psychological benefits, including greater self-esteem, increased overall self-worth, more positive self-image, lower levels of stress and anxiety, and a lower incidence of psychopathology for young people who participate in sport (Hills, King, & Armstrong, 2007). Sport involvement also improves concentration, attention, memory skills, and academic achievement (National Federation of State High Schools, 2003). The benefits can also include enhanced social skills and decision-making skills (McCallister, Blinde, & Weiss, 2000). In order for children to benefit from athletic participation, they must be encouraged to continue to participate in positive youth programs (Fraser-Thomas, Côté & Deakin, 2005). According to Weiss and Williams (2004), numerous factors can affect a child's participation in athletics, including the social environment around the athlete, including the involvement of their peers and significant adults.

The International Tennis Federation (ITF) assembled in 2002 a team of tennis experts to determine the best way to promote tennis for beginning players for the purpose of encouraging lifelong participation. Research conducted in multiple nations found an increasing number of tennis players in various countries had difficulty maintaining involvement in the sport. Subsequently, they determined that the retention of new tennis

players requires effort and rigorous training for young players to reach advanced levels of play. Therefore, the team acknowledged the need for changes in tennis equipment and rules and has recommended adaptations to make the game more enjoyable, particularly for young people. These adaptations, called Play and Stay, were specifically designed for players 10 years of age and younger (Miley, 2007). Starting in 2012, the face of tennis for children (10 years and younger) was officially changed through these modifications. New modified tennis equipment such as low-compression balls, lighter and shorter racquets, smaller-size courts, lower net height, and modified game rules replaced the older and more traditional tennis equipment around the globe (International Tennis Federation, 2013). The effort made to encourage the utilization of scaled tennis equipment in all competitions for players 12 years and under was proposed by the ITF in 2012, and all affiliated local tennis federations, including the United States Tennis Association (USTA), joined this effort.

Each of the changes in equipment was rooted in the belief that scaling both courts and equipment would positively impact the learning experience, motivation, and participation of youth (Timmerman et al., 2015). In other words, use of this developmentally appropriate equipment was expected to increase participation among the age group of 5- to 10-year-old children, speed up the development of both technical and tactical tennis skills (Anderson, 2007), and retain children in the sport over the age of 10 more effectively (Timmerman et al., 2015).

Recently, the *State of Industry Report* (Tennis Industry Association, 2015) revealed the tennis industry was worth 5.5 billion dollars in the United States. Tennis was the fastest growing traditional sport in the United States, with an overall participation

of 17.7 million players frequently participating. The report also indicated that 15 million individuals were interested in playing tennis across all age groups. In 2013 alone, 658,000 new participants from different age groups were added to the tennis community. The number of youth tennis players aged 6 to 12 years grew 5% to reach an overall level of 2 million in 2013. The growth in the number of youth tennis players has also been accompanied by a parallel growth in the shipments of modified tennis equipment (e.g., tennis balls) as was evident with a 375% increase between 2008 and 2013. Interestingly, the scaling tennis equipment such as low-compression balls was the only tennis equipment area to grow from the previous year, from 4.2% in 2014. This was in comparison to traditional youth tennis equipment which decreased for the same year by -3.1% (Tennis Industry Association, 2015). These numbers reflect the fast growth of tennis in the United States and the potential benefits that tennis could offer people from different ages, especially young individuals. However, according to the *State of Industry Report* (Tennis Industry Associationb, 2010), the tennis growth was not stable, and a reduction in total participation of 7% in 2010 was noticed.

Many countries throughout the world, including the United States and Kuwait, have policies in place to promote and support sport and physical activity. These policies and programs are focused on increasing participation levels, especially in organized and competitive athletics. Children are most likely to leave an athletic activity if they do not find success, develop skills, enjoy what they are doing, or meet friends in the activity (Crane & Temple, 2015). The overall well-being of the child should be the primary goal of the sport programs in which they participate. As sports become more and more

competitive, children need support in effectively coping with injuries and dealing with negative feedback (McCarthy & Jones, 2007).

Kirk (2005) stated that "quality early learning experiences not only develop physical competencies, but crucially, also perceptions of competence that underlie the motivation that is vital to continuing participation" (p. 251). At this time in their development, youth are in a position to benefit from positive physical, social, and psychological developmental outcomes resulting from athletic participation (Kirk, 2005). This is also an important age range because withdrawal rates increase after the age of 14, demonstrating that not all children experience the desired outcomes (Guèvremont, Findlay, & Kohen, 2008).

According to Cook and Hess (2007), "To learn about a child's perspective, adult researchers have to get beyond their own beliefs about a situation and listen to children in different ways" (p. 31). Recently, more attention has been devoted to the experiences of children when conducting research, as opposed to using adult experiences and perceptions to guide assumptions about what children experience and perceive (Cook & Hess, 2007). Adult emphasis on winning can lead to an overly competitive environment (Scanlan, Babkes, & Scanlan, 2005). Eliminating the role of adults when designing children's sport experiences does not necessarily lead to positive outcomes, while intensive involvement by adults might not necessarily lead to efficient development and positive youth sport experience (Lauer, Gould, Roman, & Pierce, 2010). Instead, significant adults such as coaches and parents should be encouraged to play important roles in supporting youth's need to positively influence their sport experience. This can be done by balancing what coaches and parents would like the youth to learn with the

youth's actual physical, psychological, and social readiness to learn. For this reason, adults should advocate for constructing positive youth development experiences that focus on promoting the development of children and youth psychologically, physically, and socially.

There has been some concern expressed that early sport participation, or specialization, could actually lead to a higher risk for physical, psychological, and developmental complications (American Academy of Pediatrics, 2000; Strachan, Côté, & Deakin, 2009) including burnout (Coakley, 2009; Gould, 2010; Strachan et al., 2009), overuse injuries (Kaleth & Mikesky, 2010), social isolation (Callender, 2010; Coakley, 2010; Gould, 2010), and dropout (Butcher, Lindner, & Johns, 2002; Strachan et al., 2009; Wall & Côté, 2007). Gould, Tuffey, Udry, and Loehr (1996) found that specialization at a younger age and highly structured training decreased the intrinsic motivation of participants and increased their burnout and withdrawal. Similarly, Wall and Côté (2007) found that hockey players who had withdrawn from their sport had started their off-ice training earlier than their counterparts who still participated. This evidence seems to suggest that lower levels of enjoyment negatively impact the development of skills (Russell & Symonds, 2015).

In order to create the best conditions for development, it is important to understand the process of motor development and the physical and psychological effects on learning to create situations where youth can develop competence with increasingly difficult tasks (Coker, 2013). Minor modifications in regard to sport (tennis) rules, equipment size or weight, and the structure of the practice might lead to meaningful changes in patterns of children's movement (Liu, Mayer-Kress, & Newell, 2006). It has

been observed for some time that changes in movement behavior can occur (i.e., a switch in behavioral patterns) when key constraints in the performance context are manipulated (Kelso, 1995). Renshaw, Chow, Davids, and Hammond (2010) stated that "nonlinear development is predicated on the constant interactions of individuals and the environment where the learner is placed at the center of the process as movements and decisions are made based on unique interacting individual, task, and environmental constraints" (p. 120). Newell (1986) defined constraints as the structures that influence individual behaviors when learners are striving to stabilize their movement patterns to accomplish a precise task. According to the constraints-led approach, three general categories of constraints include personal constraints (e.g., player's experiences), environmental constraints (e.g., tennis court surfaces), and task constraints (e.g., modified equipment). Applying these categories of constraints allows for an understanding of coordination when acting with purpose and understanding that constraints continuously interact (Araújo, Davids, & Hristovski, 2006). The appropriate and positive interaction between the three constraints might enhance children's self-adjusted and goal-directed behaviors (Newell, 1986).

Modifying sports through task constraints might be considered a beneficial strategy to enhance children's movement behaviors during the learning process in supporting them to successfully learn the desired sport skill (Chow et al., 2009). Modifications and adaptations can be made so that the task is set at an appropriate level in accordance with the skill of the athlete (Davids, Button, & Bennett, 2008). A helpful paradigm for analyzing the effectiveness of scaling tasks or equipment can be found in a constraints-led framework (Davids et al., 2008). Hence, task, personal, and environment

constraints are three varied, but interrelated, constraints proposed by Newell's (1986) model of learning that will affect the outcome of skill production (Clemente, Rocha, & Korgaokar, 2012).

Utilizing modified tennis equipment is a useful approach to enhance children's skill acquisition and movement patterns. In this regard, Davids et al. (2008) explained that "modified equipment can restructure the practice environment and enable learners to cope with less stringent task constraints" (p. 161). Coaches can increase skill attainment by using scaled equipment to restrict an athlete's movement pattern (Davids et al., 2008). Research suggests that scaled sports equipment would positively impact youth skill acquisition (Alderman, Beighle & Pangrazi, 2006). Further, studies have assessed applicable strategies showing how these practice restrictions allow for the development of more skilled movement in young people (Coker, 2013). The athlete's size and body type must be considered when determining the appropriate size and weight of equipment to be used (Araújo, Davids, Bennett, Button, & Chapman, 2004). Motor development theorists have a sustained interest in how the size of equipment and playing areas affect the youth athlete's attainment of skills (Haywood & Getchell, 2001). A useful approach to retain young athletes can be to disseminate the sport into age- and developmentally appropriate games that maintain the general integrity of the overall game (Coker, 2013). Scaled equipment and courts can give young tennis players the opportunity to find small successes as they progress in their skills, leading to longer rallies and increased fun (Goldfine, 2013).

Enjoyment and pleasure associated with sports are major reasons why children choose to participate in a specific sport such as tennis (Weiss & Ferrer-Caja, 2002), and

sport enjoyment is considered the most powerful factor for determining sport participation and persistence (Weiss & Weiss, 2007). In fact, sport enjoyment has been found to have a significant relationship with other factors such as perceptions of competence, which have a direct relationship with children's participation behaviors (Cairney et al., 2012). Therefore, creating a sport environment that fosters individual's intrinsic motivation by enhancing the enjoyment attached to the tasks and activities should have a positive impact on children's participant behaviors (Crocker, Hoar, McDonough, Kowalski, & Niefer, 2004).

According to the ITF, beginning amateur tennis players should first use slower, lower-compression balls on a reduced-size court (International Tennis Federation, 2007). Similar to equipment modification approaches used in other sports, beginning tennis players can benefit from modifications and accommodations to increase enjoyment as skills are developed, making scaling children's equipment widespread (Australian Sports Commission, 2015), despite the fact that there is not currently a strong base of data to indicate the precise nature of this scaling. Frequently, programs assert positive outcomes such as utilizing modified tennis equipment without empirical evidence to support this assertion (Kachel, Buszard, & Reid, 2015). Therefore, understanding and examining the influence of modified tennis equipment on children's enjoyment, perceptions of competence, and intentions to continue participation in tennis is crucial to provide empirical evidence on the affordance of the equipment to retain children in the sport of tennis.

Purpose of this Study

The purpose of this mixed-methods study was to compare the impact of playing with modified or traditional tennis equipment on children's perceptions of enjoyment, perceived competence, and intention to continue participation in the sport of tennis in the State of Kuwait. In addition, this study sought to understand in depth, via focus group interviews, children's perceptions regarding their tennis experience through the utilization of the modified tennis equipment. Evaluation of the quality of children's skill acquisition via analyzing their performance through utilization of Dartfish software was also conducted in this study. Students' performance (i.e., forehand and backhand strokes) was assessed to examine the differences between students' performance at the beginning and at the end of intervention.

Research Questions

Q1 Do young tennis players who use modified tennis equipment differ significantly in their *level of enjoyment* from players who use traditional tennis equipment?

Q2 Do young tennis players who use modified tennis equipment differ significantly in their *perceived competence* relative to players who use traditional tennis equipment?

Q3 Do young tennis players who use modified tennis equipment differ significantly in their *intention to continue to participate* relative to players who use traditional tennis equipment?

Q4 Do young tennis players who use modified tennis equipment differ significantly in their *ability to execute forehand and backhand groundstrokes* relative to players who use traditional tennis equipment?

Significance of this Study

Throughout the United States and the rest of the world, an effort is being made to increase player participation and retention in tennis through the creation of environments

conducive to developing young players into top athletes. At its core, this movement focuses on the type of environment required for adolescent and adult athletes to hone their skills to both increase their enjoyment of the sport and succeed at the highest levels of competition (Goldfine, 2013). Modern organizations have focused efforts on retaining youth participation through the adaptation of the rules, equipment, and courts to better meet the needs of younger athletes (Timmerman et al., 2015). The proposed benefits of these changes are increased skill development and enhancement of fun and motivation which should lead to higher levels of continuous involvement (Farrow & Reid, 2010). With respect to tennis, these adaptations result in a reduced speed of play, allowing for children to participate and learn the necessary skills to be competent players (Farrow & Reid, 2010; International Tennis Federation, 2015). Research done in the past has found that the speed of the game is affected by the type and size of the ball used (Cooke & Davey, 2004). Through research with adult participants, it was found that player reaction time is increased when the speed of the ball is decreased, allowing for the player to make proper adjustments (Andrew, Chow, Knudson, & Tillman, 2003). This thinking lends itself to the belief that young tennis players may benefit from playing with balls of different characteristics including lighter, lower-compressed tennis balls. The development of their strokes may be negatively affected by balls that bounce above their usual groundstroke impact zone or move too quickly (Barrell, 2008). Adjusting the size of both tennis balls and courts may benefit young players by providing them with less rebound height. Despite this possible benefit, there is very little research on the advantages of low-compression balls on the participation of young players (Larson & Guggenheimer, 2013).

Importantly, it is clear that the ITF and the USTA succeeded in their mission and enhanced tennis participation in the last few years. It is obvious that the tennis community has accepted the logic underlying the use of modified tennis equipment. Nevertheless, we should generate empirical research to determine whether equipment modifications are beneficial to motivation, enjoyment and skill execution of young and beginning players. To date, tennis organizations have been very supportive of the use of equipment scaling, despite the lack of research on the actual connection between scaling and performance (Timmerman et al., 2015). The use of scaling is expected to give young players a sense of success, enjoyment, and continuous motivation to participate, which would seemingly provide a solution to the declining numbers of participants in the sport of tennis.

Some recent research has examined the effectiveness of modified equipment. The initial purpose of the ITF and USTA scaling tennis equipment was to create opportunities for young players to hold longer rallies. One study conducted by Kachel et al. (2015) found that the modified ball did not result in longer rallies or shots taken; nevertheless, modified equipment did assist young tennis players to strike ground strokes at a more comfortable height and helped players to increase rally speed (Farrow & Reid, 2010; Hammond & Smith, 2006). Research conducted in the past has led to performance testing using modified court sizes and ball types; however, there is still very little knowledge regarding performance differences when making comparisons between modified equipment and courts and standard equipment and courts (Kachel et al., 2015).

Until recently, research efforts were directed toward understanding the impact of scaling/modified tennis equipment on young tennis players via examining just a few

aspects of modified equipment such as the two types of low-compression balls (Kachel et al., 2015), racquet sizes and ball compressions (Buszard, Farrow, Reid, & Masters, 2014), and low-compression balls and court sizes (Larson & Guggenheimer, 2013) which has created a lack of clear understanding regarding the efficacy of the proposed scaling of tennis equipment. Almost all research attempts on scaling tennis equipment failed to clearly examine the influence of scaling tennis equipment in relation to psychological considerations, and understand, interpret, anticipate their impacts on children's desire for long life tennis participation through motivational framework perspectives. Therefore, this study was intended to add to the literature by exploring the influence of modified equipment on young athletes' perceived competence, enjoyment, and intention to continue participation in tennis via two current theoretical models including competence motivation theory (CMT) (Harter, 1978, 1981) and self-determination theory (SDT) (Deci & Ryan, 2000; Ryan & Deci, 2000). The current study also had a qualitative and skill acquisition focus. This supplemental evaluation provided rich data to understand if the modified tennis equipment assists children in executing forehand and backhand groundstrokes compared to the traditional tennis equipment.

Need for this Study

There are a number of reasons to scale sports equipment for youth and novices, including facilitating the acquisition of skills while maintaining the overall characteristics of the professional game. Many sports now use equipment scaling of some kind to increase access and enjoyment of young participants in youth programs. There is not yet a large body of evidence to support scaling of equipment (Kachel et al., 2015). In tennis, there remains a lack of published empirical evidence regarding the effects of ball

compression (Farrow & Reid, 2010; Hammond & Smith, 2006) and court size (Coldwells & Hare, 1994).

Within the state of Kuwait, a lack of physical activity is believed to be associated with various health complications. The Kuwait Ministry of Health (2008) indicated that health risks could be attributed to a lack of physical activity. These numbers underscore the need for increasing children's physical activity in Kuwait given the high number of people, especially younger people, who are overweight or obese. Motivating children to initiate and maintain sport participation should be a priority for government institutions such as the Ministry of Education which represents schools.

The findings obtained from this study can be beneficial for two different reasons. The first benefit pertains to the lack of current knowledge in regard to the influence of scaled tennis equipment on children and youth's physical, social, and psychological development. There is an urgent need to investigate the influence of modified tennis equipment on children's perceptions of skill development, competence, enjoyment, and intention to continue participating in tennis. Although there is consensus on the need and importance of the scaled equipment, there are many different scaled versions across different tennis nations. Examples of these programs are the Project 36/60 created by the USTA; the MLC Tennis Hot Shots program created by Tennis Australia (TA); and the Play and Stay program which was implemented by the ITF (Timmermani et al., 2015). Due to the variations in utilizing the scaling tennis equipment worldwide, the uncertainty surrounding the influence of scaled equipment on children's skills and psychological development is important to study (Kachel et al., 2015). The second primary need for

this study involves the potential benefits for countries such as Kuwait so that they can adopt a useful method of coaching in a demanding sport like tennis.

Physically inactivity is a major problem and affects children and adolescents in Kuwait (Moussa et al., 2008). More than 40% of the Kuwaiti population is younger than 15 years old (Public Authority for Civil Information, 2016). This high proportion of youth means that there will be difficulties for the country's health system and families (International Diabetes Federation, 2011; World Health Organization, 2006). Students with higher sports competence typically enjoy and participate in physical education classes, whereas the non-athletic students avoid participating in physical education and, thus, are more likely to develop an inactive lifestyle (Behbehani, 2014).

Research indicates that physical activity generally decreases as children move into adulthood (Corbin, Pangrazi, & Le-Masurier, 2004; Currie et al., 2008). This trend indicates a need for research into the eventual physical, social, and psychological impact of involvement in sports as a young person and the connection to an active lifestyle later in life (Russell & Symonds, 2015). Three factors significantly impact and lead to young people leaving sports and they are the social environment, the sport, and the person's own developmental changes (Butcher et al., 2002). About three-quarters of youth participants leave sport by the age of 13 because of low enjoyment and a lack of basic skills (National Alliance for Youth Sports, 2013). Basically, when the athletic activity is no longer enjoyable or satisfactory, young people are likely to leave (Choi, Johnson, & Kim, 2014). It is possible that these individuals may try the sport again later, but at a less-competitive level due to the negative experience such as adopting other interests, puberty, sports

burnout, less playing opportunity, intensive pressure, a coach's disapproval, lower perceived competence, injury, and ability (Barnett & Weber, 2008; Butcher et al., 2002).

In order to increase the likelihood that young people will participate in, and maintain involvement in sports, it is important to recognize that their motivating factors will differ from adults (Woods, Bolton, Graber, & Crull, 2007). Motivation is widely understood as an important contributor to physical activity (Ntoumanis, Pensgaard, Martin, & Pipe, 2004; Yli-Piipari, Watt, Jaakkola, Liukkonen, & Nurmi, 2009). Additionally, research has continuously shown that enjoyment is an essential factor in maintaining continuous involvement in physical activity (Gråstén, Jaakkola, Liukkonen, Watt, & Yli Piipari, 2012; Prochaska, Sallis, Slymen, & McKenzie, 2003; Wallhead & Buckworth, 2004; Yli-Piipari et al., 2009). The past 30 years of research have revealed numerous reasons, mostly related to motivation, for the continued involvement in and withdrawal of children and youth from sport and physical activity. Low physical competence, limited enjoyment, and a lack of social acceptance have been the most frequently cited factors for lack of participation.

In this regard, the Competence Motivation Theory (CMT) (Harter, 1978, 1981) is a suitable model to understand children's perceptions of sport competence and was utilized in this study. The CMT was constructed based on White's (1959) research in which she proposed the motive toward competence. She emphasized that individuals are intrinsically involved, through mastery attempts, to interact with their social and physical environment following White's (1959) work. In addition, a primary tenet of CMT is that the sense of curiosity, the desire to seek optimal challenges, and the urge to have an effect on one's environment are primary motives for individuals' behaviors (Harter, 1978). One

thing that should be considered from a developmental standpoint is that the positive interaction of children with their social environment and their additional cognitive maturation will help them to move from depending on significant others and external criteria in assessing competence to utilizing more internal criteria and self-reward systems to assess success. Finally, it is fundamental to understand that the balance between the mastery attempts (successful and not successful) and the type of reinforcement by significant others will have an impact on children's self-perception and intrinsic motivation (Weiss & Amorose, 2008).

Harter (1981) emphasized the role of developmental considerations in competence motivation. Harter also emphasized that the perception of competence dimensions will vary in content and number according to a child's age because of the cognitive maturation and social experiences of the child. In the current study, the competence motivation theory was utilized to understand if changes occur in children's perceptions of competence due to the employment of modified and traditional tennis equipment.

Self-determination theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000, 2002) was developed to explain the contributors to intrinsic motivation and the influence of intrinsic and extrinsic motivation upon behavior. Self-determination theory is a meta theory which contains four mini-theories: cognitive evaluation theory, organismic integration theory, causality orientation theory, and basic needs theory (Ryan & Deci, 2002).

Proponents of SDT assert that there are universal psychological needs that need to be satisfied to enable development in human psychological functioning, development,

and motivation. These basic psychological needs are the need for competence, autonomy, and relatedness. Competence refers to the need to perceive our behaviors and interaction with the surrounding social environment as effective. To satisfy this need to feel competent, coaches need to provide many opportunities to increase the perception of competence to positively influence their motivation (Deci & Ryan, 2012). The need for autonomy refers to the need to perceive our beliefs and thoughts as freely chosen and to perceive ourselves as the initiators of our behaviors and actions. The need for relatedness refers to the need to perceive a sense of belonging and a connection to others. This study's intervention will support these needs by giving students the opportunity to choose the appropriate equipment that they feel comfortable using to enhance their success and feeling of competence.

Limitations of this Study

Several limitations must be discussed regarding this study. First, the study was conducted in the State of Kuwait, and the findings may only be generalizable to this context. Second, the sample size was relatively small, and a larger sample size would be beneficial. The reason for the small sample size is because the young tennis player population in Kuwait is very limited (fewer than 100 tennis players are officially registered in the Kuwait Tennis Federation). Therefore, conducting the study in a PE classroom is more efficient for enlarging this study's sample size.

Summary

The influences of sport and physical activity on children and youth's physical, social, and psychological outcomes have been studied in the literature. In this regard, the International Tennis Federation's modification of (scaled) tennis equipment was

developed as an instructional program to encourage positive outcomes for children. Although scaled tennis equipment is widely utilized, there is no clear empirical evidence to support the claim that modified tennis equipment will encourage young tennis players to maintain participation in the sport for a longer time, to enhance their perception of competence, and to experience greater enjoyment of the game of tennis. Therefore, the purpose of this study was to examine the effectiveness of scaled equipment on children's psychological and skill outcomes.

CHAPTER II

LITERATURE REVIEW

Research has shown that overall physical activity among young people has continued to decline (USDHHS, 2008). Rates of physical inactivity in children and adolescents has risen over the past 20 years in the United States creating a major concern for the health of the nation (Ogden, Carroll, Kit, & Flegal, 2012). A variety of factors can increase a child's risk of becoming physically inactive (e.g., sedentary behavior) (Power, Ullrich-French, Steele, Daratha, & Bindler, 2011); however, improving engagement in physical activity can decrease this risk (Hills et al., 2007; USDHHS, 2008).

There is widespread recognition of the physical and psychosocial benefits that come from athletic participation (Fraser-Thomas et al., 2005). Children make up the largest percentage of participants in organized sports (Holt, 2007). Estimates are that 27 million American children aged 6 to 18 years are involved in team sports through middle and high schools (DiFiori et al., 2014). Additionally, organized club sports and Amateur Athletic Union (AAU) sports offer athletic opportunities to at least 60 million American children (DiFiori et al., 2014). Regardless of the organization providing sports opportunities to children, physical, mental, and social benefits are clear (Fraser-Thomas et al., 2005).

The Benefits of Sport Participation

Youth can reap physical, psychological, and social benefits through engagement in sports activities (Fox, Barr-Anderson, Nieumark-Sztainer, & Wall, 2010; Krustrup, Dvorak, Junge, & Bangsbo, 2010). It has been found that cardiovascular and musculoskeletal fitness can be enhanced when youth participate in athletics over the long term (Krustrup et al., 2010; Vandendriessche et al., 2012). There are also improvements in motor coordination (Vandendriessche et al., 2012), overall physical activity (Debate, Pettee Gabriel, Zwald, Huberty, & Zhang, 2009; Taliaferro, Rienzo, & Donovan, 2010), decreased television viewing (Sirard, Pfeiffer, & Pate, 2006), lower body mass index and body fat percentage (Vandendriessche et al., 2012), and an overall reduction in health problems (Vandendriessche et al., 2012). A two-year study conducted by Krustrup and colleagues (2010) found that as children participated more and more in small-sided games of football (soccer), they noticed benefits across numerous areas such as stamina, coordination, and the amount of oxygen consumed and these benefits extended to overweight children as well.

Sports can contribute to cognitive and social development in addition to increasing improved physical health in young people (Annesi, 2007). In addition, higher self-esteem (Findlay & Coplan, 2008), better mood states, improved social functioning, and greater emotional control and feelings of social adequacy can accompany participation (Griffiths, Dowda, Dezateux, & Pate, 2010). In addition, more positive perceptions of competence (McCarthy, Jones, & Clark-Carter, 2008) have been associated with participation in sport.

Athletics can also be credited with lessening psychological and social problems, including anxiety (Smith, Smoll, & Cumming, 2007), shyness (Findlay & Coplan, 2008), depressed mood (Gore, Farrell, & Gordon, 2001), and hyperactivity (Griffiths et al., 2010). A lower tendency to smoke and an increased likelihood of adopting healthy eating behaviors were found in athletes who were part of an extensive study (n > 70,000) assessing relationships between athletic participation and health risk behaviors of youth in the United States conducted by Taliaferro et al. (2010). There is evidence to suggest that this increased physical activity involvement continues throughout a participant's lifetime, with young athletes more likely than non-athletic peers to participate in physical activity as adults (Backmand, Kujala, Sarna, & Kaprio, 2010). Adult leadership and associated experience can have a huge impact on the positive or negative end results of children's athletic participation (Fraser-Thomas & Côté, 2009). Indeed, whether youth engagement in sport and physical activity experience results in positive or negative consequences depends on the interaction of many considerations in the sport setting (Gould & Carson, 2008).

Positive Youth Development

Extracurricular activities, not exclusively sport, are essential to the developmental process of young people (Petitpas, Cornelius, Van Raalte, & Jones, 2005). According to Côté and Fraser-Thomas (2007), involvement in athletics is an effective means of reaching three goals in child development. Physical health can be enhanced by participation. Psychosocial development, such as cooperation, discipline, leadership, and self-control, can also be improved. Motor skills can be developed and form the basis for future success in professional or recreational athletic participation. However, many

sports programs have been found to focus on institutionalization, elitism, early selection, and early specialization and these orientations do not foster the best environment for the physical, mental, and social development of young athletes (Côté & Hay, 2002). Research has shown that the development of desired skill levels is contingent on deliberate practice, commitment, ambition, willingness to work hard, and good coaching (Wojtys, 2013). These considerations should lead the athletic community to rethink specialized training centers for youth, as they are typically developmentally inappropriate (Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2013). In order for all youth to have access to sports and all they have to offer, nations have to implement certain policies, which can be established through official and unofficial programs (Fraser-Thomas & Côté, 2006). Programs serving youth should focus on building the intrinsic motivation that young people have to be involved in athletics. To accomplish this goal, a variety of sports and activities should be available to youth as they develop self-regulation, decision-making skills, and feelings of competence, all of which increase the likelihood of creating long-term, competent athletes (Jayanthi et al., 2013). It is important for program leaders and coaches to be aware of the tendency for the most talented athletes to receive the most support and chances for play. All children should be granted opportunities for participation, regardless of the pace at which they acquire and demonstrate new skills (Wojtys, 2013). To design and implement effective programming, it is important to understand and apply the reasons for participation or withdrawal from athletics.

One must look through the lens of motivation to comprehend what leads youth to participate in the first place (Power et al., 2011). Over the past 20 years, evidence has

been found to suggest that fun, enjoyment, demonstrating physical competence, and acquiring peer acceptance and approval are essential in determining participation (Weiss & Amorose, 2008). Research regarding the discontinuance of young people in sports has found that conflicts of interest, inadequate amounts of fun, coaching personality difficulties, and reduced playing time (Weiss & Williams, 2004) reduce motivation and sustained involvement.

Motivational Theories of Youth Sport Participation

Involvement in athletics stands at out as the preferred structured activity for many young people (Mahoney, Larson, Eccles, & Lord, 2005). Researchers have spent time trying to determine and categorize what drives individuals to join and maintain participation in athletic activities, especially for young people (Garcia-Mas et al., 2010). Sports that are enjoyable and offer growth opportunities are likely to be attractive to play, either as individuals or with peers (Findley & Bowker, 2009). Enjoyment is a fundamental element of continuous participation in physical activity for young people (Yli-Piipari et al., 2009). Enjoyment is an intrinsic motivator for involvement in physical education (Dishman, Motl, Saunders, Felton, Ward, & Pate, 2005) and factors into some of the major sport motivation theories, including self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) and competence motivation theory (Harter, 1978, 1981). These theories of motivated behavior have been utilized in the comprehension and prediction of physical activity participation and highlight the importance of positive affect such as fun and enjoyment as proximal motivators of sport and physical activity (Cairney et al., 2012).

The theories that are most relevant to the study of motivation of youth in sport in relation to the present study are competence motivation theory (CMT) and self-determination theory (SDT). These two theories will be thoroughly explained to better understand the theoretical perspective underpinning the current study and to explain the proposed influence of modifying tennis equipment on children's motivation by increasing youth's perceptions of physical competence and sport enjoyment.

Competence Motivation Theory

Effectance motivation theory (White, 1959) proposed that the amount of motivation individuals experience is related to the level of competence they feel (White, 1959). The competence motivation model (Harter, 1978, 1981) is an extension of the original effectance motivation model proposed by White (1959). It has been argued that children have an innate desire to learn (Spinath & Spinath, 2005). The motoric representation of this desire is apparent in children's motivation to be physically competent (Harter, 1978; White, 1959). This type of motivation is guided by, and satisfied by, a sense of efficacy (White, 1959). In other words, the primary reason behind children's engagement in any task is to experience the sense of efficacy or competence that results from learning (Spinath & Spinath, 2005).

The theory of CMT proposed by Harter (1978, 1981) stated that children strive to succeed by exhibiting efforts (mastery attempts) to develop competency in multiple domains including academics, peer acceptance, physical appearance, behavioral conduct, and sport or physical activity. Children's perceptions of competence depends tremendously on their interpretation of success and failure experiences during mastery attempts combined with significant adults' feedback. According to the theory, children's

perceptions and interpretations of successful mastery attempts lead to increased perceptions of competence, positive affect, and a stronger internal locus of control. All of these positive outcomes lead to additional attempts towards mastery and help children maintain interest and enjoyment in the activity. However, if these attempts at mastery are perceived as unsuccessful, their perceived competence is decreased, which often leads to anxiety. This result can lead a child to discontinue his or her mastery attempts. Numerous studies have supported these theoretical expectations and the theory is important in sport and physical activity because mastery is important in the physical domain (Zou, Liu, & Yang, 2012).

From a developmental perspective, age and cognitive development are both important factors as a child develops perceptions of competence (Harter, 1978, Nicholls, 1984). As youth develop over time, maturation of their cognitive processes and contact with peers can affect their competency beliefs (Harter, 1990). Children use generalized perceptions of competence when they are 4 to 7 years old (Harter & Pike, 1984). However, from the ages of 8 to 13, youth begin to discriminate between areas of competence so that they make distinctions between academic and athletic and behavioral competence, to name a few of the competence areas (Harter, 1982). As children reach middle and late adolescence they identify additional competence domains, such as romantic relationships and friendship and continue to increase the number of competence dimensions through adulthood (Harter, 1988).

Another important developmental consideration involves youth's understanding of effort and ability which changes throughout their development (Fry & Duda, 1997; Nicholls, 1989). Youth around the ages of 6 to 10 begin to understand how competence

relates to effort, ability, and eventual success or failure outcomes (Nicholls, 1978). Specifically, they are able to understand the connection between effort and outcomes which enhances their enjoyment and perceptions of competence after they expend effort in an area of achievement (Nicholls, 1989). Later, after 11 years of age, youth begin to understand that effort alone will not be enough to realize success and successful mastery attempts and hard work must supplement effort (Scanlan et al., 2005). As youth begin to assess and comprehend their own ability, they will naturally make comparisons to their peers (Ruble, Boggiano, Feldman, & Loebl, 1980). Eventually, youth are able to become more capable of making accurate perceptions of their competence (Harter, 1982; Spinath & Spinath, 2005).

Motivation and emotion related to achievement are impacted by perception of competence (Nicholls, 1989). People who experience high-perceived competence tend to find pleasure in participating in activities that will allow them to demonstrate mastery (Nicholls, 1989). Conversely, those with low-perceived competence generally do not find pleasure or motivation in a given activity because they are concerned that they will demonstrate their lack of mastery (Brustad, Babkes, & Smith, 2001). Children who are not expecting to demonstrate mastery will tend to avoid the situation or will not participate (Weiss & Ferrer-Caja, 2002). Coaches and teachers need to understand and appreciate the impact and interrelationships among emotions, goal orientation, and perceived competence as they contribute persistence as well as success and fun (McCarthy et al., 2008).

A study conducted by Weiss and Horn (1990) was grounded in CMT and included 133 female and male young athletes. The researchers assessed the relationships

among perceived competence, motivation, anxiety, and perceived control. The intention of this research was to determine whether children who were accurate in their assessment of their physical competence or overestimated or underestimated their physical competence demonstrated certain cognitive characteristics. The participants were between the ages of 8 and 13 years old and were involved in a summer athletic program (N = 133). These children and youth completed questionnaires assessing perceptions of competence and control, motivational orientation, and competitive trait anxiety. Teacher ratings were used as an additional measure of physical competence to compare with these young people's evaluations. The results were standardized according to the participant's grade level, and an accuracy score was produced through the difference in scores. Children could then be grouped based on the accuracy of their assessments into *underestimators*, *accurate raters*, or *overestimators* according to upper and lower quartiles of this distribution. A 2 x 2 x 3 (age level by gender by accuracy) MANCOVA showed an interaction effect related to gender and accuracy. Girls who underestimated their competence showed lower levels of challenge motivation and higher trait anxiety and demonstrated more external control perceptions than their accurate or overestimating peers. Underestimating boys had greater perceived unknown control when compared with their accurate and overestimating counterparts. It was concluded that an underestimating child would, thus, be more likely to discontinue participation in athletics or demonstrate low physical achievement.

A similar study conducted by Wong and Bridges (1995) attempted to build and utilize a motivational orientation model for youth sports that would fit Harter's (1981) framework. The participants included 108 male soccer players who ranged from 9 to 13

years of age and who completed questionnaires in the areas of control, perceived competence, anxiety, and motivation orientation. Moreover, this research utilized observations of the behavior of the 12 soccer coaches of the players involved in the study. Findings suggested that perceived competence, moderated by adult feedback, level of anxiety, and perceived control influenced motivation for athletic participation. Specifically, they found a causal relationship between coaching behavior and athletes' perceptions of control. Although a direct causal relationship between trait anxiety and perceived competence was not found to be significant, the mediating role of perception of control was found to influence the relationship between the athletes' trait anxiety and their perception of competence. Overall, the study supported the expectation that children's perceived competence, trait anxiety, and perception of control were impacted by their coaches' behaviors.

Klomsten, Skaalvik, and Espnes (2004) utilized the Physical Self-Description Questionnaire as part of an inclusive study to assess the competency of 1098 female and male children over numerous domains of physical self-concept including health, body fat, sports competence, endurance, strength, flexibility, coordination, and global self-esteem. Differing ages and the effects of gender were assessed at the elementary and middle school levels as participants spanned 5th to 10th grade. These students were participating in athletic activities during the school day or outside of school. A relationship was found between age and each of the domains apart from health. Elementary school participants had higher scores across each subscale, except health. Secondary students demonstrated lower scores in physical self-concept and sports competence than the elementary participants.

Boiche and Sarrazin (2009) conducted a study assessing determinants of withdrawal from athletics among a population of French youth, specifically analyzing body mass index, perceived competence, perceived autonomy, and self-determined motivation. Those involved in the study were either currently involved or had withdrawn from participation in soccer, basketball, handball, cycling, tennis, or table tennis. Of the 376 youth involved in the study, 261 were currently playing one of the previously mentioned sports and 106 had withdrawn from one of the listed sports. The findings suggested that those who were currently involved in an activity possessed both a higher perception of their own competence and a higher perceived value of the sport overall than those who had withdrawn from the sport. On the other hand, the level of athletes' satisfaction, valuing of the sport, and parental investment were the primary reasons why athletes dropped out of their sports. In other words, athletes who did not value the sport and did not acknowledge opportunities and value did not continue participation in their sport.

Ommundsen and Vaglum's (1997) study of 223 adolescent soccer players assessed dropout rates in relation to competence perceptions and actual competence. It was found that dropping out was best explained by a combination of low-perceived and low actual competence. It should come as no surprise that athletic dropout rates were higher when perceptions of competence were lower because children tend to be interested in areas in which they feel capable and move away from those in which they do not (Weiss & Williams, 2004).

In order to adequately support children in continuous participation in sports, it is important for coaches to understand the primary reasons why children participate (Côté,

Ericsson, & Law, 2005). Primarily, children participate in sports to have fun (Crane & Temple, 2015). Crane and Temple (2015) stated that children will start to play sports because they want to have fun and make friends and, over time, will try to develop their skills and to learn new ones. Children's efforts, thus, reflect their desire to gain competency in the athletic domain (Zou et al., 2012). When children feel that they are successful, they are hypothesized to have greater intrinsic motivation to work hard to become even better. According to Harter (1978, 1981), perceived competence is essential for continuous involvement in sport. Various studies have also found a positive relationship between children's perceived physical competence and their overall physical activity level (Gao, 2008; Kalaja, Jaakkola, Liukkonen, & Watt, 2010; Stein, Fisher, Berkey, & Colditz, 2007). Positive connections between perceived competence, physical activity reported by children, and health-related physical fitness levels have been found in recent studies (Bagoien & Halvari, 2005; Gao, 2008).

Children stop participating in sports for a multitude of reasons. Research has shown that these reasons include low-perceived sport competence, injuries, lack of fun, and chronic stress from significant adults (Jowett & Cramer, 2010; McCarthy & Jones, 2007). Just as high-perceived competence could increase participation, low-perceived competence can lead to decreased participation or withdrawal (Zou et al., 2012).

A longitudinal study conducted by Butcher et al. (2002) included 1378 children who were followed for over a decade and these researchers found that young children most frequently quit because of a lack of enjoyment. Overall, the majority of research is in agreement that the high withdrawal rate from sports can be attributed to a variety of factors, such as conflicts of interest, lack of enjoyment, low-perceived competence, lack

of improvement in skills, and stress and pressure from others (Butcher et al., 2002; Netz & Raviv, 2004).

Various studies have found that competence is the strongest predictor of motivation in the physical education setting (Taylor, Ntoumanis, Standage, & Spray, 2010). Perceived competence might be considered to be even more important than actual competence in this relationship (Laurson, Brown, Dennis, & Cullen, 2008). For example, Taylor et al. (2010) found that children with high-perceived physical competence displayed greater effort in physical activity, were high in physical activity engagement, and reported greater leisure time physical activity. Graham (2008) suggested that discontinued participation could be related to perceived lack of competence or perceived failure.

Perceived sport competence is, therefore, related to multiple adaptive cognitive, affective, and behavioral consequences for youth such as enjoyment and participation in physical activity (Kipp & Weiss, 2013). Enjoyment, or fun and pleasure (Scanlan, Simons, Carpenter, Schmidt, & Keeler, 1993; Weiss & Williams, 2004), have typically been linked to motivation to participate in sport (McCarthy & Jones, 2007) and the desire and perseverance to continue participation (Scanlan et al., 1993; Weiss & Ferrer-Caja, 2002). Understanding what contributes to enjoyment and what detracts from enjoyment for children in sport is an important research focus. When considering the limited amount of information about what causes a lack of enjoyment, there is important research to be conducted, especially when considering the relationship to dropout rates.

Crane and Temple (2015) conducted a systematic review of 43 studies to better understand the factors that influenced athletic participation in relation to competence

perceptions and enjoyment of athletic activity. To be included in this review, certain components had to be in place: (a) verifiable qualitative or quantitative evidence existed; (b) participants ranged from 5 to 19 years of age; (c) withdrawal or intention to do so was assessed in the study; and (d) the context was athletics. The majority of the selected research in this study concentrated only on adolescent populations and 89% of the studies' participants were male and from the United States and Europe. Lack of enjoyment, low perceptions of competence, social pressures, competing priorities, and physical factors emerged as the primary causes for child and adolescent dropout. In regard to enjoyment and children's perception of competence, the study found these influences were important in at least 26 different studies. This review revealed that a lack of enjoyment and a lack of perceived competence were the most common contributors to leaving sport. These feelings were expressed in numerous ways across the studies, such as "not being good enough," "not as good as I wanted to be," and "lack of skill improvement." Interestingly, a very small number of quantitative studies addressed what led to this lack of enjoyment or fun. When "lack of fun" was addressed, responses included: lack of playing time or opportunities, dissatisfaction with the coach, and too much time committed to training (Crane & Temple, 2015).

McCarthy and Jones (2007) examined sources of enjoyment and non-enjoyment in young athletes between 7 to 12 years of age. The authors divided the participants into two categories—older (middle school) and younger (elementary) children. The results of their focus group interviews indicated that positive perceptions of physical competence led to enjoyment in athletics. On the other end of the spectrum, perceptions of a lack of physical competence were associated with non-enjoyment. Moreover, both groups of

participants identified common enjoyment sources such as perceived competence and psychosocial support. On the other hand, both groups indicated that inappropriate psychosocial support and a perceived lack of competence were sources of non-enjoyment.

Enjoyment

Sport enjoyment is "a positive affective response to the sport experience that reflects generalized feelings such as pleasure, liking, and fun" (Scanlan & Simons, 1992, pp. 202–203) and factors into most major sport-motivation theories, including the sport commitment model (Scanlan et al., 1993) and CMT (Harter, 1978, 1981). Youth participation in athletics is a common choice for how to spend free time for many young people (Mahoney et al., 2005), but enjoyment is essential for continued involvement (Dishman et al., 2005). Research has demonstrated that enjoyment and intrinsic motivation in sport are related and both affect youth involvement and self-determination (Deci & Ryan, 1985). It is important to consider the type of motivation guiding the behavior as it may help predict level of involvement (Duncan, Hall, Wilson, & Jenny, 2010).

Self-Determination Theory

Self-determination theorists (Deci & Ryan, 1985; Ryan & Deci, 2000) have suggested that behavior can be understood through a continuum of self-determination, stretching from intrinsic or self-regulated reasons to externally controlled reasons. Self-determination theory (Deci & Ryan, 2000) is widely used in the study of lifelong motivation (Plotnikoff, Costigan, Karunamuni, & Lubans, 2013; Teixeira, Carraca, Markland, Silva, & Ryan, 2012).

Self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) can be explained as a dialectic and organismic method related to individuals' motivation (Weiss & Amorose, 2008). This theory consists of four different mini-theories (i.e., Cognitive Evaluation Theory, Organismic Integration Theory, Causality Orientation Theory, and Basic Needs Theory). The SDT is a theory describing human motivation, development, and wellness (Deci & Ryan, 2008). The SDT has been extensively applied during the last decade to examine cognitive, affective, and behavioral resultants of distinct kinds of motivation in sport and physical activity contexts (Ntoumanis & Standage, 2009). Historically, most theories of motivation have centered on the quantity of motivation that individuals demonstrate for certain behaviors, SDT focuses on the types of motivation and how each type affects behavior (Deci & Ryan, 2008). The theory explores both the nature of positive developmental tendencies and detrimental environments for these tendencies (Ryan & Deci, 2000). Deci and Ryan (2002) identified three essential human psychological needs as competence, autonomy, and relatedness. Competence describes an individual's perception that they have the ability to master demanding tasks in a given environment. Autonomy refers to an individual's sense of personal control over their behavior. Relatedness refers to the sense of connection one feels with peers in their social community (Wilson, Mack, & Grattan, 2008). According to Ryan and Deci (2000), perceptions of autonomy, competence, and relatedness determine self-determined motivation. Pursuing this further, when children's competence, autonomy, and relatedness needs are satisfied, they are more likely to develop high intrinsic motivation and will experience pleasure from engaging in an activity. This will lead to stronger autonomous motives for participation in the activity (Ryan & Deci, 2000). The degree of

satisfaction of these needs can also predict overall psychological well-being across cultures (Deci & Ryan, 2008). These three needs are considered "innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being" (Deci & Ryan, 2000, p. 229). In order to achieve ideal development, all three needs must be met. When they are not met, negative outcomes can be the consequence. The SDT has been applied to sport, and researchers have proposed that greater perceived competence, autonomy, and relatedness by young athletes should contribute to enjoyment (Sebire, Standage, & Vansteenkiste, 2009).

Individuals who are self-determined act through their own will (Ryan & Deci, 2002). When an activity is completed for the innate satisfaction of the completion of the task, it is considered intrinsic motivation (Teixeira et al., 2012). This type of motivation leads to feelings of enjoyment, the use of skills, a sense of personal accomplishment, and excitement (Deci, 1975). However, extrinsic motivation is considered the completion of an activity for instrumental reasons (Teixeira et al., 2012). This perspective targets both the type and the amount of motivation, with self-determined motivation types deemed higher quality than less independent types of motivation (Sebire, Jago, Fox, Edwards, & Thompson, 2013). Positive interaction between young athletes and their coaches, peers, parents, and other social agents, in conjunction with the three psychological needs, can help individuals attain multiple levels of autonomous motivational regulations over a continuum (Deci & Ryan, 2002). The SDT also differentiates intrinsic and extrinsic types of motivation for behavior regulation (Deci, 1975). The desire to engage in activity for inherent satisfaction is defined as intrinsic motivation. Intrinsic motivation leads to feelings of enjoyment, the use of skills, personal accomplishment, and excitement (Deci,

1975). Extrinsic motivation means an activity is completed for reasons that may be separate from the actual activity (Deci, 1975). For example, extrinsic motivation is when someone participates in an activity solely for a reward or to avoid punitive consequences. A more intrinsic form of behavioral regulation would be when an individual engages in an activity for personal value as opposed to engaging for fun or satisfaction (Teixeira et al., 2012).

Overall, SDT proposes three different types of motivation, including intrinsic motivation, extrinsic motivation, and amotivation that capture the various motives, with different levels of self-determined motivation that will drive participation in an activity (Calvo, Cervelló, Jiménez, Iglesias, & Murcia, 2010; Deci & Ryan, 2011). Extrinsic motivation describes motivation that is driven by something other than the actual activity itself (Ryan, Williams, Patrick, & Deci, 2009). The four types of extrinsic motives as described in SDT reflect controlled motives, and they are heteronomous in nature (Teixeira et al., 2012). This theory identifies four distinct types of extrinsic motivation (i.e., external regulation, introjected regulation, identified regulation, and integrated regulation) of regulation.

External regulation is the label used to describe the least self-determined type of extrinsic motivation, as these types of motivated behaviors occur only in response to an external demand or for the purpose of attaining a reward (Niemiec & Ryan, 2009; Ryan & Deci, 2000). An example of external regulation would be when students join an athletic activity only out of fear of negative repercussions if they don't participate (Taylor et al., 2010). Introjected regulation refers to internalized motivation that is not part of the integrated self (Wininger & DeSena, 2012). In this case, behaviors are the consequence

of the desire to avoid guilt, to bolster ego, or for pride (Ryan & Deci, 2000; Ryan et al., 2009). Participation in after-school athletics solely for the purpose of doing what "good children do" would be an example of introjected regulation (Standage, Duda, & Ntoumanis, 2005). Moving closer to self-determination, the next type of extrinsic motivation is identified regulation. An individual's actions that reflect self-endorsement and represent her/his values are considered to be identified behavioral regulation (Teixeira et al., 2012). This type of regulation describes when people choose to participate because of personal value or significance (Ryan & Deci, 2000, 2006; Ryan et al., 2009). While identified regulation reflects a greater capacity to choose one's participation than the previous two types, it is still extrinsic motivation because the foundational motive is instrumental (Deci & Ryan, 2000; Standage et al., 2005). In other words, extrinsic instrumental motives refer to the desirable separable consequences that are not inherent in the activity itself such as participating in an activity for social recognition. Involvement in physical activity for the sake of reaping the health benefits is an example of identified regulation (Karagiannidis, Barkoukis, Gourgoulis, Kosta, & Antoniou, 2015). When exercise is driven by an individual's self-concept, they are utilizing integrated regulation (Wininger & DeSena, 2012). The greatest amount of self-determination can be found in integrated regulation when identified regulations have been fully assumed and synthesized with one's values, goals, and needs (Ryan & Deci, 2000; Ryan et al., 2009). Research has found integrated regulation more common in adult populations, as adults are more able to synthesize goals and values than are children (Deci & Ryan, 2000; Vallerand, 1997, 2001).

The most autonomous type of motivation is intrinsic motivation, which involves participating in an activity purely for the enjoyment and satisfaction it provides (Ryan & Deci, 2000). Intrinsic motivation is reflected in those situations in which persons purposely participate in sports and physical activities that they personally feel to be exciting and pleasurable and which afford interesting occasions for learning (Deci, 1975; Deci & Ryan, 1985). Intrinsic motivation is the most transparent form of autonomy and demonstrates true self-determination (Deci & Ryan, 2000). People who are driven by this type of motivation are motivated by the demand, entertainment, and excitement of the activity (Niemiec & Ryan, 2009). Pursuing this further, when children's participation in activities such as sports is based on an internal locus of causality and they perceive their behaviors to be self-determined, it is considered to be intrinsically motivated (Calvo et al., 2010).

It is important to recognize that specific motivation types may vary with developmental life stages. For instance, in early childhood, participation in physical activity may manifest as intrinsically motivated play (Pellegrini & Smith, 1998) or externally driven obedience to parents. In adolescence, physical activity may correspond with more self-identified benefits or introjected societal expectations associated with image of one's body (Ingledew & Sullivan, 2002).

In order to become an ambitious and self-determined athlete, young athletes must develop and sustain their intrinsic motivation (Deci & Ryan, 2000). To encourage participation in athletics, it is essential to understand the underlying social, environmental, and psychological factors (Sallis et al., 2006). Theory-based interventions can be used to structure the social environment of the youth experience to

improve participation in physical activity (Plotnikoff et al., 2013). Advising teachers, coaches, and parents on adequately supporting athletic activity can enhance motivation in young athletes. The theory of self-determination describes elements of personality and behavioral self-regulation through the relationship found in social settings between inherent needs and environmental components (Ryan & Deci, 2000). It can be used to comprehend motivation and behavior related to physical activity (Deci & Ryan, 2002). Specifically, SDT is frequently applied to research that examines youth physical activity and exercise and related motivation and behavioral changes (Standage, Gillison, Ntoumanis, & Treasure, 2012).

Coaches can have the most prominent and continuous interaction with athletes and, therefore, they have the potential to significantly affect the athlete's ability to improve (Conroy & Coatsworth, 2007). Theoretically, almost every action coaches take, such as managing practice and game situations, and the steps they follow to make an important decision can influence athletes' motivation (Mageau & Vallerand, 2003).

Theorists of SDT propose that everyone has three basic psychological needs that need to be fulfilled, regardless of any other personal characteristics (Niemiec & Ryan, 2013). Using SDT, psychological integration, social wellness, and physical health are impacted by social-contextual influences (Curran, Hill, & Niemiec, 2013). Mageau and Vallerand (2003) suggested that coaches can affect their players' foundational psychological needs and motivational outcomes (Keegan, Harwood, Spray, & Lavallee, 2009; Vazou, Ntoumanis, & Duda, 2006). Peers and coaches can impact players' perceptions of belonging and acknowledgement of hard work and perseverance (Reeve & Jang, 2006).

The SDT helps provide structure, and coaches can communicate plans and methods for moving towards mastery (Mageau & Vallerand, 2003). These structures and plans can include setting expectations and rules ahead of time, providing advice and help during the activity and providing feedback afterward (Vansteenkiste et al., 2012). This is how achievement-related competencies are built, creating a framework for behavioral engagement. Behavioral engagement is when there are increased amounts of work and awareness, as opposed to behavioral dissatisfaction where the participant is going through the motions of the activity (Curran et al., 2013). Without a framework or structure, learning becomes disorganized (Jang, Reeve, & Deci, 2010), and players become disinterested (Soenens et al., 2007).

Curran et al. (2013) suggested that coaches are able to enhance each of the basic psychological needs by setting students up for success with feedback and increasing satisfaction and competence. This structure can help build perceived control in working toward and reaching a goal (Reeve, 2006). Along these same lines, structure is related to the satisfaction of all three psychological needs in athletics (Taylor & Ntoumanis, 2007) and self-regulated learning in secondary school participants (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). The SDT proposes that social agents (i.e., teachers, parents, and coaches) impact motivation in achievement settings (Deci & Ryan, 2002; Vallerand, 2007). Autonomy support describes situations when a mentor takes on the perspective of the protégé (Curran et al., 2013). Conceptions of an autonomy supportive climate (i.e., informational feedback, encouragements, and allowing learners' work based on their preference and providing choices) are anticipated to expand autonomous

motivation (Reeve & Jang, 2006), and players become disinterested (Soenens et al., 2007).

According to SDT, the satisfaction of athletes' psychological needs of competence, relatedness, and autonomy should be closely considered in order to enhance athletes' motivation (Mageau & Vallerand, 2003). Deci and Ryan (1985) proposed that autonomy, competence, and relatedness needs meeting create the opportunity for habits or actions that were not previously internalized to then become internalized (Spray, Wang, Biddle, & Chatzisarantis, 2006). It is essential for an individual to develop intrinsic motivation for an activity because it indicates that they have fully recognized the value of the activity and it has become part of their sense of self (Deci & Ryan, 2008). Numerous cognitive, affective, and behavioral outcomes are impacted by motivational regulations (Karagiannidis et al., 2015). Positive consequences of autonomous motivation are tenacity when confronting adversity, improved performance, more effort, focus, and a positive experience during the event. Controlling motivation has a neutral or negative effect on these consequences (Taylor et al., 2010; Vallerand, 2007).

The SDT has been utilized in the sport and physical activity arena to examine physical activity enjoyment (Yli-Piipari et al., 2009). In sport, enjoyment is a positive affective response to physical activities (Scanlan & Simons, 1992) and is understood as essential in encouraging young children to be physically active (Carraro, Young, & Robazza, 2008). Enjoyment comes from intrinsic motivation and can be enhanced through mastery of demanding skills (Cairney et al., 2012; Graham, 2008). The SDT is a useful framework for understanding continuous participation or withdrawal from sports and has also been applied in contexts outside of athletics (Calvo et al., 2010).

Moreno-Murcia, Huéscar, and Cervelló (2012) conducted a study from the SDT perspective to assess persistence in sport and/or physical activity based on the value one has of their physical education participation. The participants (n = 482) were adolescent students from physical education classes. The authors hypothesized that learners' perceptions of autonomy, competence, and relatedness would influence their intrinsic motivation. In addition, they hypothesized that learners with the highest levels of motivation would more highly value physical education lessons compared with less-motived learners, which would eventually influence them to persist in the future in physical activity or sport. The results showed that providing opportunities for taking responsibility, such as giving the participants more space to choose the tasks and have larger roles in the lesson, positively predicted psychological mediators (competence, autonomy, and relatedness needs) and intrinsic motivation, which positively predicted the importance students attached to physical education and the intention of the student to continue doing sport.

In sum, participation in physical activities can benefit children in many ways, including improving cardiovascular endurance, maintaining desirable body weight, and enhancing overall mental health and quality of life (Rhodes, Matheson, Blanchard, & Blacklock, 2008). However, insufficient involvement in physical activity has become a health issue worldwide (World Health Organization, 2011). Furthermore, research conducted to date has linked children's physical activity and sport intentions and behavior with perceived physical competence (Moreno-Murcia et al., 2012). Perceived competence can be directly linked to enjoyment and can be a greater factor than feelings of self-efficacy, enjoyment, autonomy, and relatedness regarding continuous involvement

in an activity (Dyrlund & Wininger, 2006). Specifically, research has continually indicated the existence of positive relationships among high levels of physical competence and levels of children's participation in sports and physical activity.

A person is more likely to engage in a behavior to which they have strong behavioral intention (Ajzen, 1991). It has been asserted by De Bruijn and Van Den Putte (2012) that an individual's exercise behavior can be predicted from their intentions. Previous studies have demonstrated that a multitude of factors, such as intention, past behavior, and controlled perceived behavior, impact athletic participation in tennis (Chuan, Yusof, Soon, & Abdullah, 2014). Erdvik, Øverby, and Haugen (2014) proposed a relationship between perceived physical competence, intentions, and behavior. It seems logical that if an individual perceives they have competence in an activity such as tennis, their intention to continue to participate would be greater, leading to higher levels of participation than for those with lower perceived competence and intentions (Erdvik et al., 2014).

Developmentally Appropriate Sport Modifications

Elderton (2010) stated that while there are tremendous advantages to playing tennis, there are also difficulties for players, which might become reasons to quit the game. In 2002, the International Tennis Federation (ITF) assembled a team of tennis experts to determine the best way to promote tennis to beginning players. Experts followed tennis growth in multiple nations and found an increasing number of tennis players in various countries had difficulty maintaining involvement in the sport (Miley, 2007). Subsequently, they determined that the retention of new tennis players is complicated by the strenuous effort and rigorous training required for young players to

reach advanced levels of play. Therefore, the team acknowledged that the need for changes in tennis equipment and rules must become a high priority to address this critical challenge, and they have recommended adaptations to make the game more fun for children and beginners. These adaptations were introduced through a campaign called "Play and Stay" (International Tennis Federation, 2015), which was specifically developed for players 10 years and under (Miley, 2007). At the Annual General Meeting of the ITF in 2010, the ITF succeeded in getting countries to vote for, and officially support, the rule that all 10-and-under competitions starting in 2012 must be played with the new equipment which includes slower balls, smaller racquets, smaller courts, and the new scoring system (Miley, 2010). The modified/scaling equipment included modifications to many aspects of the tennis game such as the three balls, and changes in racquet size, net height, court size, and the scoring system (International Tennis Federation, 2015). Therefore, the first change to be made to the rule book of tennis in over a century occurred in 2012 when the ITF implemented a requirement that low-compression balls be utilized by ITF member associations during approved 10-and-under age competitions (Kachel et al., 2015).

Developmental Perspectives

Modified equipment can be provided to help younger players improve their skill level and may motivate them to play for a longer period of time and to eventually seek to play at the elite level (Martens & DeVylder, 2007). Children engage in tennis for reasons of personal interest. One of the important reasons is to participate in a game at which they can be competent and that has continuous action. The tennis equipment modifications are designed mainly to increase children's enjoyment and their sense of

competence by slowing down the game so that they can learn the correct strokes and enjoy a game of continuous action (International Tennis Federation, 2015). Proper stroke development and tactical awareness imitating the adult game can be enhanced by court and equipment adaptations. The scaled-down courts create the opportunity for young athletes to learn and practice patterns of attack and even net play, skills that would prove more difficult on full-sized tennis courts (Goldfine, 2013). The emotional experience of tennis is an important part for players 10 years of age and under (Crespo, 2010). There are advantages to using slower balls and smaller courts, including a more positive and dynamic first experience for the beginning players and increased retention by making the game easier and more fun (Anderson, 2007). When tennis equipment and rules are modified in suitable ways to match the mental and physical demands of young players, they will also play more balls (Crespo, 2010). Barrell (2010) mentioned that slower balls create time for a player to respond, which is critical for young players and beginners in tennis. Players at a young age have limited coordination skills and should use slower balls and lighter racquets in order to help them play better (Farrow & Reid, 2010). It is important to note that these modifications were implemented based on rational arguments, as opposed to scientific evidence (Buszard et al., 2014).

Some coaches are concerned about the logistics of using different balls and court sizes and feel that the changes will make their lessons more complicated to organize. These concerns match what Cabral (2010) found, which is that although 70% of tennis players quit the game, there are some coaches that still insist on coaching in the same traditional way, ignoring all new sophistication in coaching science and new up-to-date research findings. Furthermore, Newman (2010) stated that there are many individuals in

the tennis community who disagree with the new changes in the game and believe that players can make great careers in tennis with the regular ball and court. However, learner-centered coaching means doing the right thing for the player, not doing what is easiest for the coach (Elderton, 2010). Using the modified equipment such as slower balls helps ensure that as many people as possible have the chance to enjoy and continue playing tennis for a long time.

Cognitive Considerations

Adopting modified/scaled tennis equipment is not the sole factor that might influence children's skill acquisition. The cognitive developmental stage of the child and their cognitive capacities can impact how they learn new motor skills.

Cognitive theories of skill acquisition indicate that adults learn and acquire new skills by generating conceptual frameworks to reach their expected goal (Anderson, 1983; Fitts & Posner, 1967; Proctor & Dutta, 1995). Working memory, the part of the brain used for sorting and reserving verbal, visual, and episodic knowledge, is utilized for explicit motor learning on cognitive tasks (Baddeley, 2012). Hernandez, Mattarella-Micke, Redding, Woods, and Beilock (2011) suggest that child learners differ from their adult counterparts in the way they learn and acquire motor skills.

Hernandez et al. (2011) analyzed the performance of golfers who were considered early learners, because they learned the game before the age of 10 years, and late learners, who learned the game after the age of 10 years. The participants' golf putting was analyzed in three ways: normal putting (single task), skill mechanics, and focus on a secondary task (dual tasks). In the comparison of the single-task and dual-task conditions, no difference was determined. In contrast, there was a strong relationship

between age of acquisition and skill mechanics. Early learners struggled more than late learners when skill mechanics were the focus.

The development of working memory throughout childhood can make it difficult for children to learn new physical skills in comparison to adults (Thomason, Race, Burrows, Whitfield-Gabrieli, Glover, & Gabrieli, 2009). Information is sorted and understood more slowly by children than by adults (Ferguson & Bowey, 2005) meaning that conscious methods of skill acquisition are not as reliable and effective for children. The sensorimotor hypothesis is that young children utilize implicit memory more than explicit memory as they learn skills, as opposed to adults who rely much more on explicit than implicit memory (Hernandez et al., 2011). In planning effective instruction for motor learning, emphasis should be placed on implicit memory (Capio, Poolton, Sit, Holmstrom, & Masters, 2013). When working with children, the use of scaled equipment may be helpful in utilizing implicit learning by making it easier for children to perform tasks easily (Buszard et al., 2014). In this regard, it is important to acknowledge the influence of cognitive development factors on the process of skill acquisition in children. The modified tennis equipment is age appropriate and was first proposed as tennis equipment that matched young children's developmental abilities.

Learning a sport skill is dependent upon coaches' ability to organize the coaching process well, making the central role of a coach vital to the improvement in the athlete's performance (Lyle, 2002). The constraints-led perspective is athlete-centered and suggests that successful motor learning relies on a particular interaction between the person (athlete), the task, and the environment (Newell, 1986). Advocates of this theory regard learning as non-linear, such that learning does not occur in a static linear

progression (Davids, 2010). The constraints-led theory is considered to be one of the core methods to explain how athletes learn physical skills (Chow et al, 2009). Each athlete is thought to be a unique complex system comprised of numerous smaller subsystems, such as the muscular, skeletal, and cardio-respiratory systems (Brymer & Renshaw, 2010). As an individual learns new skills, they will go through various periods of steadiness and unsteadiness, demonstrated through changes in movement as they work to successfully self-organize their approach to completing the skill, meaning they will find mastery at their own pace (Renshaw & Chappell, 2010).

In an effort to comprehend how athletic skill is acquired, the Constraints-Led Approach was created (Araújo et al., 2004; Davids et al., 2008). Ecological psychology and dynamical systems are foundational in the origin of this theory (Araújo et al., 2006). This model contrasts with other more traditional methods involving anticipated standard motor patterns (Araújo et al., 2006) for all participants (Brisson & Alain, 1996; Araújo et al., 2006). The constraints-led approach is based on the personal ways that participants overcome specific constraints (Davids, 2010). This method emphasizes that differences in movement patterns, indicated by shifts in stability of execution that enable participants to adapt their movement and play to the game in whatever way is necessary to be successful (Araújo et al., 2006).

Brymer and Renshaw (2010) considered individual constraints to be unique to the emotional, physical, cognitive, and psychological development of the participant. Those who change their coordination in response to dynamic environments proceed to higher levels of skill more quickly (Davids et al., 2008). When a learner experiments and explores, they continue to grow. Numerous factors can affect how a participant chooses

to engage in the exploration process including body image, fitness level, ability, and psychological factors (Davids et al., 2008). According to Brymer and Renshaw (2010), the individual constraints concepts reflect the idea that there are multiple unique possibilities for solving a given task (Newell, 1986). Personal constraints are not factors that inhibit progress toward the desired outcome (Davids et al., 2008). How an athlete solves their movement challenges is responsive to their unique constraints (Brymer & Renshaw, 2010). Manipulations in movement are essential as individuals work toward mastery (Davids, Bennett, & Newell, 2006). Research has shown that expert athletes show considerably more variability in movement than their novice counterparts (Davids et al., 2008).

In the Constraints-Led Approach the task, setting, and participant all interact (Davids et al., 2008; Newell, 1986). Buszard et al. (2014) proposed that adjusting task constraints can speed up the process toward mastery. An example of this would be that learning to strike the ball in tennis effectively involves adjusting the bounce of the ball to an optimum height to maximize the acquisition of an acceptable movement pattern (International Tennis Federation, 2015). Current research shows advantages in using scaled equipment and courts as children practice their skills (Farrow & Reid, 2010; Hammond & Smith, 2006). The use of lower-compression balls has positive implications (International Tennis Federation, 2015) in learning skills. In contrast to regularly sized balls, lower-compression balls move through the air and behave differently, making them ideal for young, novice players (Farrow & Reid, 2010; Hammond & Smith, 2006). Additional research indicates that racquet size can make a difference in performance as well (Elliott, 1981). The smaller racquets provide opportunities to increase horizontal

movement while decreasing vertical movement (Groppel, 1977). Ball compression can be analyzed as a change to any of the three constraints that impacts the progression of skill development (Kachel et al., 2015). Research into scaling has not always eliminated the impact of coaching or adequately divided experimental and control groups by ability or age level (Hammond & Smith, 2006). More research and evidence is needed to determine best practices in regard to task and equipment scaling and skill development (Buszard et al., 2014). As Farrow and Reid (2010) commented, "the challenge now lies in establishing some practical scaling recommendations that help to foster a love for the game and expedite skill acquisition" (p. 232). According to Farrow and Reid (2010), improving skills and demonstrating how enjoyable tennis can be are the main motivators behind scaling tasks and equipment in tennis.

The concept of scaling equipment and modifying games to better suit the physical capabilities of youth was first raised in the 1970s as the result of worry over physical expectations of adult sports (Winter, 1980). Recently, equipment modifications in tennis have started to mirror the growth and physical development trajectories of young people (Larson & Guggenheimer, 2013). This is similar to other sports where the field, baseball diamond, or gymnasiums are scaled to the size of youth athletes (Pang & Ha, 2005). In addition, tennis and other sports such as soccer and basketball have all been made more accessible to children through modifications (Larson & Guggenheimer, 2013). In order to better understand the efficiency of the modified tennis equipment promoted to the children who are interested in tennis, the following questions proposed by Menear and Davis (2007) must be answered:

•Will the participant be able to engage in the activity sufficiently?

•Will the activity motivate participants to continue engaging in physical activities?

•If it is an inclusive activity, will all participants feel successful as a result of their involvement?

•If it is an inclusive activity, will all participants feel challenged during the activities?

According to Farrow and Reid (2010), motivating youth to participate in tennis by improving the attainment of skills and presenting tennis in an enjoyable fashion are the main reasons for modifying and scaling equipment. Unfortunately, objective research to justify this claim is lacking (Buszard et al., 2014). Therefore, this study will examine the influence of scaling tennis equipment to young children's psychological and skill acquisition compared to children using traditional tennis equipment.

CHAPTER III

METHODOLOGY

This chapter provides a thorough explanation of the research design and methodology used in the study as well as the means of data analysis, including the statistical analysis. The instruments used in the study are explained, and their measurement properties are described.

Participants

A convenience sample of young male tennis players (n = 100) ranging in age from 7 to 10 years old from an elementary school in the Alasma educational district in the State of Kuwait were the participants in the study. All participants attended an elementary school during the 2015-2016 academic years under the authority of the Ministry of Education.

Research Design

A mixed-method research design was utilized in this study to better understand the influence of modified tennis equipment on children's enjoyment, perceived tennis competence, and intention for future participation in tennis. The mixed-method approach is a beneficial approach to explore and understand in depth a researched phenomenon (Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007).

A purposive sampling method was used in an effort to represent the general population and enhance the generalizability of the study's findings (Teddlie & Yu, 2007).

Participation was voluntary, and all participants who were recruited had very limited or no experience in tennis. The participants (n = 100) were recruited from two third- and two fourth-grade classrooms. The participants from the four recruited classrooms included one third- and one fourth-grade classroom (n = 50) assigned to the experimental group and an additional third-grade and fourth-grade classroom (n = 50) were assigned to the control group. Participants in the two modified (experimental) tennis equipment groups (n = 50) were introduced to, and taught, the sport of tennis by using the modified tennis equipment as they learned the game. This modified equipment included three different sizes of tennis racquets (sizes 23, 25, and 26), low-compression tennis balls (25% low-compression red balls, which is slower than the regular tennis ball), a smaller-sized tennis court (11-12m long x 5-6m wide), and a shorter net height (80 cm). The two traditional tennis equipment groups **(***n* = 50**)** were coached and introduced to tennis through the use of traditional tennis equipment such as adult tennis racquets (sizes 23, 25 and 26), regular tennis balls (i.e., yellow tennis ball—adult sized), a smaller-sized tennis court (11-12m long x 5-6m wide), and a shorter net height (80 cm) (Figure 1).

Figure 1. USTA description of the Quickstart's three stages.

Intervention

The lead investigator has spent more than 11 years in the field of education as an elementary school physical education teacher and roughly 19 years as a tennis coach in Kuwaiti tennis clubs. The lead investigator was an active tennis coach in the Kuwait Tennis Federation and certified with the International Tennis Federation (ITF) as a professional tennis coach. In this role, the researcher endeavored to contact the best and most-willing personnel in the schools and official tennis clubs in the State of Kuwait in an effort to conduct the research. The researcher contacted the physical education teachers and school principals to request their permission and their verbal assent to participate in the study. The necessary verbal and written permissions to conduct the study in their school were first obtained from school district administrators and the school's principal, and then written consent and written and verbal assent were obtained from the parents and children, respectively. The tennis intervention took place during normal physical education classes so that the participants would consider the tennis

instruction to be part of their normal school curriculum. This use of a natural environment allowed for a more natural and real-world environment for participation.

The duration of the intervention was four weeks, and each week included three practice lessons for each group. The two coaches, four PE teachers, the director of the PE department, and the researcher met before starting the intervention. The researcher met with the coaches and all staff in the study to explain the purpose and the goals of this study. The researcher explained and trained all personnel involved in the study in regard to the procedures, structure, coaching drills, schedule of practices, etc. When the participants came to the lesson, the coach divided them into four smaller subgroups, and they played different activities at different stations (i.e., each station focused on one or two of the six technical aspects). Each subgroup played for 5 minutes at each station. This approach created two rotations during the 40-minute lesson, which provided the opportunity for the coach to instruct each subgroup of players twice. For example, the coach instructed the players and sent them to apply what they learned during the first rotation, and then in the second rotation, he repeated the instruction and provided technical feedback. The coach emphasized explanations of the appropriate forehand and backhand techniques with consideration given to each of the six checkpoints in the Tennis Australia's technical fundamentals checklist such as grip, circular swing, low-to-high swing racquet, step forward step, impact ball, and follow-through (Tennis Australia, 2012). The role of the four physical education teachers was to manage the movement of the players between stations and to give the coach enough time to communicate effectively with the students. In addition, physical education teachers had the

responsibility to provide general instructions such as the movement speed, distance between students, and other skill instructions.

All participants and groups were coached with the same instructional methods and with the same two coaches. The coaches rotated randomly between the four groups to reduce the order effect. Coaches' behaviors were discussed during frequent meetings with the coaches, and the best teaching practices were discussed. The two coaches were encouraged via the meetings or during the practices to support all groups positively and give equal experience to all children.

Instruments and Protocols

The purpose of this study was to contrast traditional and developmentally modified methods of tennis instruction. A mixed-methods approach was undertaken to determine if differences existed in players' psychological characteristics and skill acquisition between the modified and traditional tennis equipment groups. Students completed self-report instruments of enjoyment, perceived competence, and intention to pursue playing tennis in the future. In addition, focus group methodology was employed to understand to a greater level of depth the students' perceptions regarding the tennis experience through the utilization of modified tennis equipment. In addition, the quality of the students' skills was assessed through Dartfish movement software to evaluate changes in students' skill acquisition, before and after the intervention.

Questionnaire Completion

The focus of the questionnaire data was upon changes in participants' tennis enjoyment, perceptions of tennis competence, and intention to continue to play tennis in the future. These outcomes were assessed through a situational self-report questionnaire.

This questionnaire included nine items (i.e., three items for each dependent variable) and was randomly listed to measure the three dependent variables. These nine items were created in an attempt to provide situational assessments of the students' experiences with tennis. All nine questions were scored using a 5-point scale using faces, with 5 representing *happy face*, and 1 representing *sad face* (see Appendix A).

The first of the three scales, children's perceptions of tennis enjoyment, were measured by rating the following three items: (a) "I am having fun playing tennis"; (b) "I think tennis is an enjoyable sport"; and (c) "I like tennis because it is fun". Although these three items have different wording, they reflect the same construct of tennis enjoyment. The idea from these three items is to examine whether the participants enjoyed their tennis participation. The three questions measuring children's tennis enjoyment were adapted and modified to be tennis specific from the revised Physical Activity Enjoyment Scale (PACES) (Motl, Dishman, Saunders, Dowda, Felton, & Pate, 2001). The second instrument measured children's perceptions of competence regarding tennis using the following three items: (a) "I feel competent in tennis"; (b) "I think my tennis skills are good"; and (c) "I think that I can be a good tennis player". The three questions concerning children's perception of competence incorporated in this study were adapted and modified to tennis specific from the Self-Perception Profile for Children (SPPC) (Harter, 2012). These items were modified to appropriately measure situational competence that was assessed in this study. In addition, the tennis-specific focus was also created for use in this study. The third scale assessed children's intention to continue to play tennis in the future and the participants responded to the following three items: (a) "I would like to play tennis every week"; (b) "I would like to play tennis outside of PE

lessons"; and (c) "I think I would like to be a tennis player". These three items were modified and adapted from the Intention to be Physically Active scale (Hein, Muur & Koka, 2004) to appropriately evaluate students' intentions to continue participating in tennis in the future.

The nine-item questionnaire was completed one time each week, following the completion of one of the three weekly lessons. The day that each group was surveyed varied based upon convenience and practicality. Thus, all 100 participants completed the questionnaire on four separate occasions over the four-week intervention. The questionnaire took approximately 10 minutes to complete, and the PE teachers were able to assist the children with the reading of the questionnaire, if needed. Students completed the survey in the school's gym. As the survey was administered in elementary schools in Kuwait, the questionnaire was provided to students in their native language of Arabic.

Back Translation Method

The nine-item survey utilized in this study was translated into the Arabic language through the back translation technique. In this regard, all nine items from the three questionnaires (English version questionnaire) were sent to a bilingual expert in the field of sport and exercise science who translated the questionnaire into the Arabic language. Then, the translated questionnaire in the Arabic version was sent to another bilingual expert in the sport and exercise science field to translate the questionnaire back into the English language. This process was meant to ensure that language and terminology used to construct the items in the Arabic version truly reflected the meaning of the items used in the English version before introducing the questionnaires to the children. The original versions of the questionnaire and the back-translated version were compared by the

author to make sure that they were consistent. In addition, the Arabic questionnaire was then sent to a pool of three active physical education teachers in Kuwait to further clarify the language used in the nine-item questionnaire and to assess the understandability of the instrument for children.

Focus Groups

Five children from each of the four groups (n = 20) were purposefully selected and were asked to participate in the focus groups. Each focus group consisted of five student interviewees from the same classroom and they were interviewed by their PE teacher. The focus group met one time for approximately 20 to 30 minutes during their PE lesson on two separate occasions. Each session was conducted and managed by one of the PE teachers. To illustrate, when five students from 3/1 came to meet for the focus group interview, the same classroom (3/1) teacher took the role of the interviewer, and asked the interview questions and discussion. The process was repeated for the other three classrooms. The participants were encouraged, through friendly dialogue, to express their feelings and perceptions about their tennis experience and their interest in continuing to play tennis. A general guide structured the interviews (see Appendix B). Sample types of questions included:

1. Can you tell me how you felt about learning tennis?

2. In your opinion, what were the best parts of the tennis lessons? Why? Can you provide an example?

3. What activity and equipment (racquet and/or ball) helped you to play the best with your friends and/or with a wall? Could you tell me why and give me examples?

4. In your opinion, what can we do as PE teachers to improve this program? Could you give examples?

Technique Assessment

Twenty students were randomly selected from the overall group of participating students (10 from the modified equipment group and 10 from the control group) and included in the technique assessment. Children who participated in this portion of the research were videotaped twice (one time in the first session and one time in the last session), and their learning was assessed through Dartfish software. The Tennis Australia's technical fundamentals checklist (Appendix C) assess the quality of their forehand and backhand groundstrokes. The checklist consisted of six fundamental check points (grip, circular swing, low-to-high swing, step forward, impact, and follow through) (Tennis Australia, 2012). The coaches rated children's skill performance (forehand and backhand), and the rating system was based on the Australian fundamental checklist and each skill performance was given a score ranging between 0 and 6 points. Players were awarded points in relation to how many of the technical fundamentals (grip, circular swing, low-to-high swing, step forward, impact, and follow through) that they correctly executed.

The participants' movements were recorded via two camcorders (i.e., captured at 25 Hertz). The camera was positioned seven meters away from the players and in the front and to the side of the participants as recommended by the ITF. The movements were assessed through Dartfish software, which is analytical software with movement functions (i.e., slow motion, sequential pictures mode, body angles indication tool, and two-screen display) that enabled coaches to analyze the participants' movement and

performance (Dartfish Software, 2016). Each participant had two non-sequential trials with each trial consisting of five forehands and five backhands. This gave the players two trials each to perform. Technique assessment was also dependent upon the consistency of the flight of the ball coming to the children. Therefore, to maximize the consistency of flight of the balls sent to the participants across all trials during the assessment, the coaches threw each ball (i.e., underhanded throw) in such a way that it should land in a specific area located in front of and on the forehand side of the participants (depending on whether the player was right- or left-handed). If the coach's throw did not land in the appropriate location, the coach had to repeat the throw and the subsequent stroke was evaluated.

Teacher Interviews

The primary physical education teachers for the four recruited classrooms assisted in conducting this study intervention. These teachers were also interviewed individually as sources of knowledge about the effectiveness of the intervention. The unstructured one-on-one interviews sought as a means to gain teachers' perceptions in regard to changes in their classroom students' perceptions of enjoyment, perceptions of competence, and intentions to continue in tennis following the intervention. The physical education teachers presented with open-ended questions to the students regarding the students' participation in this study. The interview took place in a convenient location for the physical education teachers. A general guide structured the interviews (see Appendix D). Sample types of questions included:

1. Do you think students in your classroom enjoyed playing tennis throughout the intervention? Could you explain?

2. At the end of the intervention, do you think students in your classroom started to feel bored and did not feel that tennis was enjoyable? Explain.
3. Did students in you classroom share with you the difficulties they had and their efforts during playing tennis? Could you share some examples?
4. Could you compare students' levels of enjoyment, perceptions of competence, and intentions to continue to play tennis in the future between the groups with modified and traditional tennis equipment?

Additional Data Sources

In this study, some extra and optional activities and opportunities were provided for all students during the recess time to purposefully collect data to use to understand the impact of the tennis equipment on the students' motivation. The PE teachers did not emphasize the importance of these opportunities and activities to the participants. The primary goal of these activities was to understand students' natural and spontaneous reaction toward playing tennis and the use of tennis equipment. The reason behind collecting such data was to construct additional understanding of the influence of the tennis equipment on children's tennis enjoyment, perception of competence, and intention to continue play tennis after the intervention. The additional data were utilized to support and better understand the findings of this study. Students' engagement in these activities were carefully observed to collect different types of data such as percentage of participation, rally points, type of playing tennis format (individually and/or group play), and times of visiting the PE gym. The data were compared between students in the modified and traditional tennis equipment.

Institutional Review Board Approval

Institutional Review Board approval from the University of Northern Colorado was obtained prior to the data collection process. Since all of the potential participants in this study were children under the age of 18 years old, this research study was submitted under the expedited review category to the IRB. It was the researcher's responsibility to consider all possible risks to the participants during the implementation of the study, and all of the IRB criteria for conducting research on children were followed to ensure the participants' safety. Additionally, the probability and magnitude of harm/discomfort anticipated was not greater, in and of itself, than that ordinarily encountered in daily life or routine physical/psychological tests (mild anxiety, embarrassment, physical discomfort, etc.), and the entire study took place during the physical education lessons. Therefore, all of the school's rules were employed and respected to enhance the safety of the participants. In addition, parents, children, and coaches all provided IRB consent or assent forms (Appendices E and F). The parental signed consent forms had clear explanations about the research and all necessary information to ensure that parents and children clearly recognized the purpose of the study and all obligations and risks corresponding with their participation in the study. Children were also provided verbal assent to participate in the study and had the right to discontinue their participation at any time. More importantly, since some participants were video-recorded, all parental and child written consent forms included a clear section suggesting the possibility of filming the children during the intervention, and parents communicated their willingness to have their child videotaped. Finally, it was the researcher's responsibility to ensure participant confidentiality by following all standard protocols stated in the IRB criteria for safe

research implementation. Thus, the researcher clearly stated in the participation consent forms that it was the researcher's priority to ensure confidentiality at all times. Since this study was conducted in another country (i.e., Kuwait) and since the Arabic language is the primary spoken language in the State of Kuwait, all necessary consent forms and questionnaires were translated into Arabic language and submitted to the IRB committee in English and Arabic form.

Data Analysis

Descriptive data were analyzed through the SPSS 20.0 program, and frequencies, means, standard deviations, and correlations were computed for all variables under examination. In addition, using the criteria employed by Tabachnick and Fidell (2013), responses exceeding ±3.29 standard deviations from the mean were considered to be outliers.

A two way repeated measures ANOVA (RM ANOVA) was conducted to determine if differences existed between the groups on each of the dependent variables of enjoyment, perceived competence, and intention to continue participate in tennis. A thematic analysis was used to analyze the focus group interviews. The PE teachers interviewed the students in the focus groups, and all interviews were audio recoded. On the other hand, the researcher managed the PE teachers' interviews. In other words, the PE teachers (interviewee) were interviewed by the researcher, and all interviews were also audio recorded. The researcher took the responsibility for the transcription process. The interview transcripts were sorted and coded to infer the primary themes and quotes that were "highly representative of each theme" were included. According to Creswell's (2013) protocol to ensure the credibility of the qualitative findings, prolonged

engagement and peer review were conducted. Prolonged engagement occurred through the extent of the involvement of the PE teachers who conducted the intervention and the focus groups at the end of the second semester of the 2015-2016 academic year.

All students' focus group and individual teacher interviews were audio taped and the transcription process was conducted by the researcher. After transcribing the content of the audio interviews, the researcher read the transcripts multiple times to start recognizing the data. Sorting and coding of the data took place as an initial step before making inferences about the general themes represented in this study finding. Indeed, transcribing audiotaped data into written format is challenging, especially for children's interviews. Moreover, children used different accents and many different terminologies when expressing their perception of enjoyment, competence, and intention to play tennis as they had varied family backgrounds.

To assess the improvement in the participants' skill technique, pre- and post-tests were administered prior to, and after, the study's intervention. The pre- and post-tests were based on testing techniques of 20 randomly chosen participants, including ten from each group. The test assessed the participants' forehand and backhand stroke based on the Tennis Australia's technical fundamentals checklist (Tennis Australia, 2012). The coaches rated each child after evaluating their performance. To illustrate, each of the 20 students had two trials on the forehand and two trials on the backhand stroke for both the pre- and post-test. For the forehand side, each trial was consisted of two shots. The coaches evaluated each of the two shots by giving them a point rating (e.g., first shot, 3 points, and second shot, 5 points). The sum of the point ratings for the two shots was the first trial's score (e.g., 8 points). The second trial followed the same rating process for

the forehand on the same side (e.g., first shot, 3 points, and second shot, 4 points, for a total of 7 points). Then the total sum of the two trials in the forehand side (e.g., 8 points for the first trial, and 7 points from the second trial, for a total of 15 points) was considered as the final pre-test score for the participants in the forehand side. This process was repeated for the post-test. The total score of the pre-test was compared with the post-test for the same participant to evaluate the presence, or not, of skill improvement. The same process was used for the backhand side for each participant. A Mann-Whitney U test was then conducted and the mean change scores were then compared between the participants in the modified group and the participants in the traditional group to discern any significant differences in skill acquisition and improvement between the control and experimental groups.

CHAPTER IV

RESULTS

A mixed-methods design was utilized in this study to provide a depth of understanding regarding the influence of modified tennis equipment on children's tennis enjoyment, perceptions of competence, and intention to continue to play tennis in the future. Various data sources were used including self-report questionnaires, skill assessments, observational data, individual interviews with teachers, and focus group interviews with children. Utilizing varied sources of data was beneficial in providing rich and detailed information about the effects of the intervention.

This study endeavored to find answers for the following research questions:

Q1 Do young tennis players who use modified tennis equipment differ significantly in tennis *enjoyment* relative to players who use traditional tennis equipment?

Q2 Do young tennis players who use modified tennis equipment differ significantly in their *perceived competence* relative to players who use traditional tennis equipment?

Q3 Do young tennis players who use modified tennis equipment differ significantly in their *intention to continue to participate* relative to players who use traditional tennis equipment?

Q4 Do young tennis players who use modified tennis equipment differ significantly in their *ability to execute forehand and backhand groundstrokes* relative to players who use traditional tennis equipment?

The first section of this chapter provides discussion of the questionnaire and demographic data. The nature of the data collection with the questionnaire is provided by Figure 2.

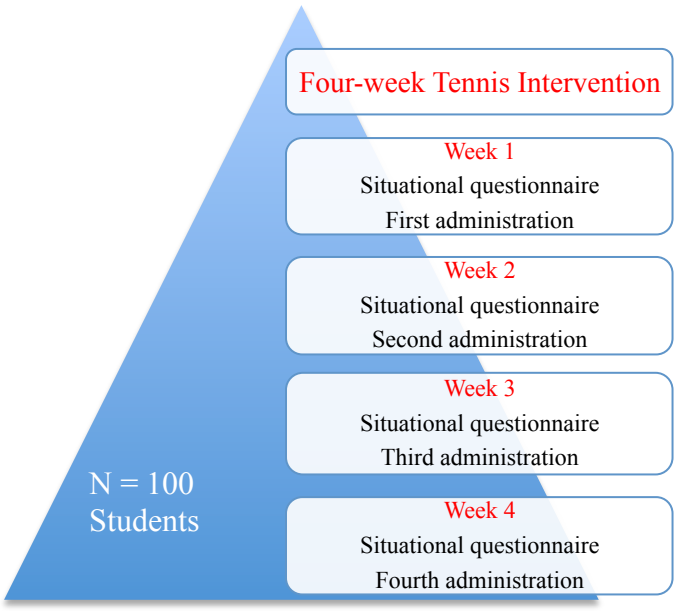

Figure 2. The situational questionnaire procedure.

The second section of this chapter is comprised of students' focus group data. The third section includes video analysis results. The fourth section includes the presentation of data from four teachers' individual interviews. Figure 3 shows each classroom number, the type of tennis equipment used, and the information about the PE teachers' interviews.

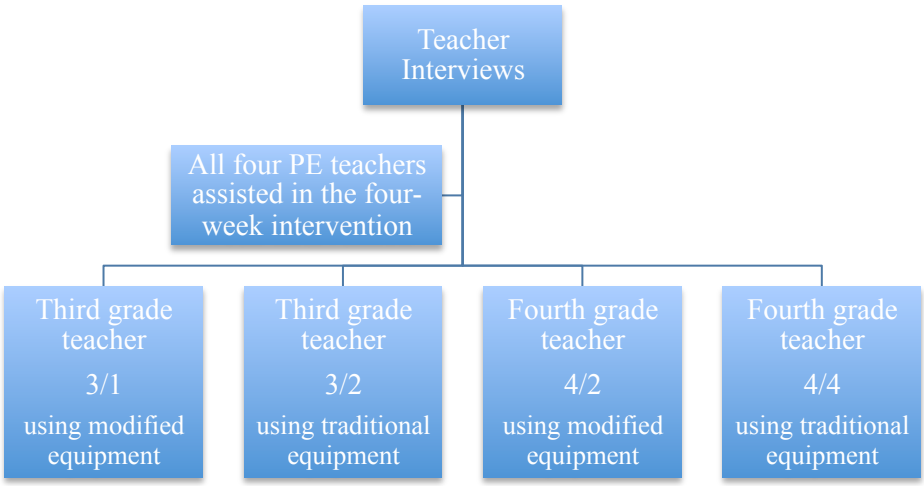

Figure 3. Physical education teachers interview procedure.

The fifth section of this chapter includes observational data. All participants in this study were provided with opportunities and activities for extra engagement in tennis during recess time and outside of the PE lessons. Figure 4 demonstrates the methods that were utilized to acquire the data.

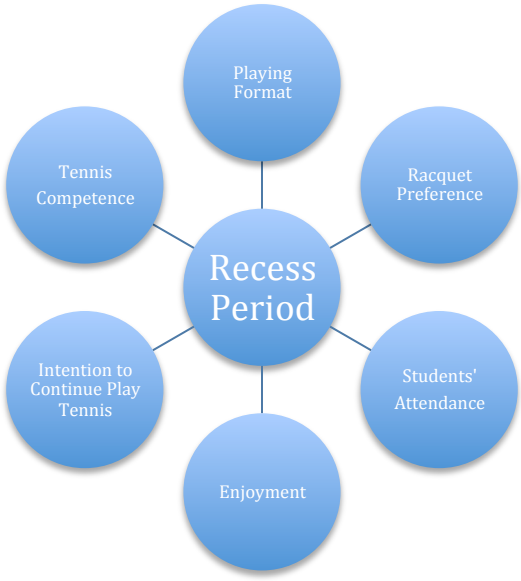

Figure 4. Type of observational data.

Demographic Description

The participants were taken from one elementary school in the State of Kuwait. The male students who participated ranged in age from 8 to 11 years old. The breakdown by specific age was: age 8 (n = 23, 23%), age 9 (n = 43, 43%), age 10 (n = 33, 33%), and age 11 (n = 1, 1%). In regard to tennis experience, only four participants had played tennis previously, and these students had all played four or fewer times.

Descriptive Statistics

To address the first three research questions, the situational questionnaire was completed on four occasions. The situational questionnaire included nine questions. These nine questions measured children's tennis enjoyment, perception of tennis competence, and intention to continue to play tennis after this study's four-week intervention. Importantly, the pre-test to post-test comparisons were of greatest interest because they reflected the overall effectiveness of the intervention. Therefore, research questions 1, 2, and 3 were analyzed based on a comparison of the means between Week 1 and Week 4 of this study intervention on the variables of children's tennis enjoyment, perceived tennis competence, and intention to continue to participate in tennis.

Research Question 1

The first research question was:

Q1 Do young tennis players who use modified tennis equipment differ significantly in *tennis enjoyment* relative players who use traditional tennis equipment?

The results from a two-way repeated measures ANOVA indicated that there were significant differences in enjoyment between students in the modified tennis equipment group and students in the traditional tennis equipment group, F (1, 1, 96) = 23.76, p <

.001. In this regard, students in the modified tennis equipment group improved in tennis enjoyment over the course of the study, whereas the traditional tennis equipment group did not improve. The Week 1 enjoyment mean for the modified equipment group was 4.32 (*SD* = .96), and their Week 4 mean for enjoyment was 4.72 (*SD* = .71). Conversely, the Week 1 enjoyment mean for the traditional equipment group was 4.55 (*SD* = .96), and their Week 4 mean for enjoyment was 3.52 (*SD* = 1.50) (Figure 5).

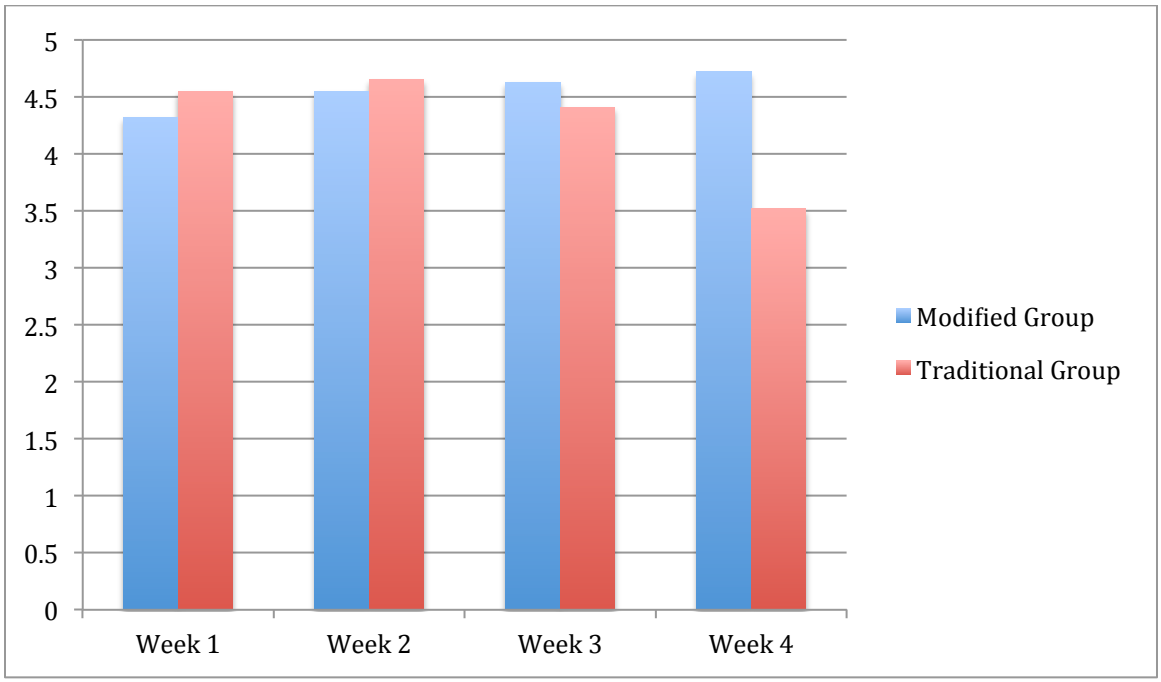

Figure 5. Means for groups on tennis enjoyment.

In addition, during the four-week intervention, students' perceptions of enjoyment followed different trajectories for the modified and traditional tennis equipment groups. The modified equipment group demonstrated an increase in enjoyment over time whereas the traditional equipment group showed a general decline in enjoyment over time except for the period between Week 1 and Week 2.

Table 1

Means and Standard Deviation for Enjoyment for the Modified and Traditional Tennis Equipment Groups

	Students' Enjoyment							
	Week 1		Week 2		Week 3		Week 4	
Group	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Modified Equipment	4.32	.96	4.55	.88	4.63	.85	4.72	.71
Traditional Equipment	4.55	.96	4.65	.78	4.41	.97	3.52	1.50

The two focus groups provided rich and detailed qualitative data to better understand students' perceptions in regard to their tennis enjoyment, perceptions of competence, and intention to continue to play tennis in the future. The interviews consisted of 10 main questions (see Appendix B). However, the conversational nature of the focus group interviews encouraged the interviewer to inquire further using some additional questions to better explore and understand students' perceptions of enjoyment. Data from the students' focus group interviews were sorted and coded to identify the general themes.

Students' Focus Group Interviews:
Modified Tennis Equipment Group

The students in the focus group were asked to evaluate the tennis lessons and their liking of tennis. Four themes were identified from the focus group data with the intervention group and are presented below.

Theme 1: Tennis is a fun and enjoyable sport. The students in the two modified equipment classes perceived tennis to be an enjoyable and fun sport. They mentioned how much they enjoyed tennis and that they preferred to play tennis rather than to do other activities. One participant stated, "I love tennis because it is fun and

easy." Another participant stated, "I did not know tennis was this fun. I want to play it every day forever." Another student agreed with his friends about how enjoyable tennis is and how much fun it was playing tennis by stating, "Yes, like you said 'tennis is fun,' and I think it is the best sport in the world."

Theme 2: Integrate tennis into the physical education curriculum. The majority of the students liked the idea of integrating tennis into the PE curriculum. For example, a student stated, "It would be great if we could also play tennis next year. I am bored with playing only soccer, basketball, and handball, and I wish my teacher would put tennis in the PE curriculum." Although some students did not clearly exhibit a desire to integrate tennis into the PE curriculum, they used phrases and words that reflected their readiness to engage in tennis and to use tennis equipment during the academic year. For instance, a student indicated, "I really, really would like to play tennis in every PE lesson. If you [PE teacher] agree to keep tennis, I promise you I will wear my PE uniform every PE lesson." In the same line of thinking, another student noted, "I think it would be wonderful if we could play tennis every year and not only for this time."

Theme 3: Attractive tennis equipment. Tennis was recognized as an attractive sport for students in the modified tennis group. It was interesting how children were very specific when they were providing their opinion in regard to tennis and tennis equipment and, in this case, the modified tennis equipment. The children commented that they liked the modified tennis equipment such as the color of the ball and racquets, and the modified equipment had a positive effect on their enjoyment. For example, a student stated, "The red ball is beautiful. It is fun to play with it and easy to see it when playing with it." Another student noted, "The racquets are nice, colorful, and light." In addition, one

student expressed that the size of the racquet was the reason why he had fun by stating, "I wasn't having fun until I switched my racquet from the big racquet to the small racquet. I could not control the ball, and I kept missing the ball."

Theme 4: Playing with friends. The students mentioned that their ability to play tennis individually and with friends was enjoyable such as playing against the wall to practice and playing with friends in the small tennis court in the PE gym. A student stated, "It was fun to play tennis with my friends. I was the best one who was able to play and did not miss any balls." Another student also supported this idea by noting, "Me, too, I played with the wall more than 10 points, and I challenged Ahmed and Mohamed, and I won the challenge." Another student indicated, "Me and my friends always come during recess to play the basketball challenge, which is who can be the first one who scores the tennis ball in the basket. It is fun." It is important to recognize that the students identified their ability to play tennis with friends in relation to this theme.

Focus Group Interviews: Traditional Tennis Equipment Group

Students in the traditional equipment group also commented that they generally enjoyed tennis. However, some students also mentioned that they occasionally felt bored or did not enjoy tennis because of the difficulty of maintaining a rally for a longer period of time. The following three themes were drawn from the raw data communicated by the students who participated in the four focus group interviews for the third and fourth grade classes who used the traditional tennis equipment during this study intervention.

Theme 1: Tennis is a fun and enjoyable sport. Similar to the students in the modified tennis equipment group, students in the traditional group perceived tennis to be a fun and enjoyable sport. They explained that they had a good time playing tennis. One

participant stated, “Tennis is a wonderful sport, and I had a lot of fun playing it. I wish I had played it before now.” Another participant indicated, “Yes, yes, tennis is a lot of fun and a cool game.”

Theme 2: Integrate tennis into the physical education curriculum. Students supported the integration of tennis in the PE curriculum. They also requested tennis as a component of the PE lessons. For example, one student stated, “It is a great and enjoyable sport to have in school.” Students perceived tennis to be an enjoyable sport and thought that it could be a good fit in the PE lessons. For example, a student noted, “I had a fun time playing tennis during the PE lessons. Tennis is a good sport, and there are a lot of nice things you can do with the racquet and the ball in PE lessons.” Another student stated, “I wish you [PE teacher] could put tennis in the curriculum and let us play tennis every year because it is fun and a good sport.”

Theme 3: Concerns in regard to tennis equipment. Some students mentioned that they had difficulties and some issues playing with tennis equipment during the PE lessons. Students identified these concerns in different ways and related them to their level of enjoyment and boredom during the PE lesson during the tennis intervention. For example, a student stated, “It wasn’t fun when I had to play with my friends at the tennis court station because me and my friend could not hit the ball correctly for a long time. Sometimes I was chasing the ball more than playing.” Another student indicated, “I did not feel some stations were fun. I couldn’t play with the wall.”

Another concern was directed at the tennis equipment. Although all students were given the opportunity to choose between different tennis racquet sizes, the majority of participants preferred to use the smallest size racquet which is even smaller than what

the International Tennis Federation and United States Tennis Association have recommended. For instance, a student noted, "Using the big racquets wasn't fun, and they were too big. I couldn't play with my friend, and I asked the coach to change it to the smaller one." In a similar way, another participant mentioned, "Every time I played during recess, I chose the smallest racquet because it was the best for the racing game."

Physical Education Teacher Interviews

Interviewing the four PE teachers who were assisting in conducting this tennis intervention was helpful in better understanding students' enjoyment. It is important to clarify that all teachers assisted in all PE lessons during the intervention. Although the teachers were individually interviewed, the similarity in their opinions was notable. Representation of the PE teachers' responses will be combined under each theme to avoid reiterating the same comments. Each PE teacher was interviewed, and their overall responses were sorted and coded to determine general themes regarding students' tennis enjoyment.

The teachers' responses were coded based on their classroom number and the type of tennis equipment used in their classroom. To illustrate, when quoting, the teacher of Third Grade Classroom 1 was as Tm 3/1, which means (T) teachers, (m) modified tennis equipment group, and 3/1 Third Grade Classroom 1. Similarly, Tt 3/2 refers to (T) teachers, (t) traditional tennis equipment group, and 3/2 Third Grade Classroom 2.

Theme 1: High student enjoyment. Generally, all four PE teachers stated that students in their classrooms and in the other classrooms had fun and enjoyed playing tennis, irrespective of the type of tennis equipment. However, teachers mentioned that during, and at the end, of the tennis intervention, a handful of students in the traditional

tennis equipment group started to lose interest, and their level of enjoyment started to decline. This theme is represented in the following quotes:

> During the course of my 17 years of experience, I did not see my students enjoying and engaging in my classroom as much as I saw them doing so with the PE tennis lessons. Although the classroom structure was almost identical to our regular PE lessons, the kids were super happy and kept actively engaging from the beginning to the end of the research. (Tm 3/1)

> I think the students in all groups were very happy with tennis and the colorful equipment, especially the balls. It was nice to see them all playing and active during this month. I think it would be great to integrate tennis into the PE curriculum, especially the modified tennis equipment, as it is appropriate for kids, such as the colors and sizes. We can do many things with the modified tennis equipment to make the kids more engaged and happy. (Tm 4/2)

> Although my classroom used the traditional equipment, the kids still showed a great deal of enjoyment, and the majority were happy using them. Maybe sometimes in my classroom students felt frustrated because they couldn't control and kept losing the ball. But, I can confidently say that I did not see big differences in the kids' enjoyment or happiness between the modified and traditional groups. From my observation while managing all groups, I saw that all students were having fun. Even the kids who used to not participate frequently in the PE lessons were more engaged this time. (Tt 3/2)

> Definitely, you can tell from students' discipline and their enthusiasm to come and play during the PE lessons and recesses that the students had a great time playing tennis. Most of my students were eagerly asking me to keep PE tennis lessons for the rest of the year. Yes, I had a lot of students complaining and were saying it was hard to play, but they were having fun with the racquet and the ball, I guess. (Tt 4/4)

Theme 2: Student cooperation. The PE teachers emphasized the changes in the levels of cooperative attitudes of students in their classroom and other classrooms recruited in this study. In other words, teachers noticed that during the PE tennis lessons, students were engaged and collaborated with each other to succeed in learning tennis. The PE teachers' opinions are illustrated by the following quotes.

> Students were playing and helping each other differently. This time, I could see that the students were highly engaged and they wanted to help each other just to keep playing. It was amazing to see that many students, almost in all training stations, were involved and cooperated with each other. (Tm 3/1)

> It is great to see your students working in harmony. Many students were having fun as a team, and you could see that they were running after, not just their balls, but their friend's balls as well. It is good to see the children were active, especially at the end of the academic year when students are tired and ready for summer vacation. (Tm 4/2)

> Working with each other in groups or stations is always a challenge for PE teachers. Usually, you will have some kids who don't like to engage in some physical activities during the stations in the PE lesson, but in this research, the students were engaged, and the stations were working just fine. Of course, maybe some students weren't effective at some points, but the majority were trying their best. I think this was because tennis is new for everybody, and they wanted to learn it. (Tt 3/2)

> Tennis is a beneficial sport to adopt in school. It teaches the students patience and how to respect others. I saw many occasions where the students were teaching each other. They tried to play long points, and you could see their faces and how sometimes they were frustrated trying to keep the ball in play. (Tt 4/4)

Theme 3: Influence of the equipment on students' enjoyment. Three out of four PE teachers indicated that tennis seemed to be an enjoyable sport, and students in all groups had a fun time learning and playing tennis. However, teachers also communicated that the type of tennis equipment influenced students' enjoyment and lead to feelings of frustration in students in the traditional tennis equipment group moreso than for students in the modified tennis group. The following quotes were included from the PE teachers' responses.

> I totally support the modified tennis equipment not because my students were using it, but because I saw the difference between playing with modified and traditional equipment. The modified equipment really helped the kids to have fun because the equipment was specific to them, and I saw a handful of students in the traditional group who were frustrated sometimes and stopped playing because they felt sad. (Tt 4/4)

Tt 3/2 noted, "It was clear that students in the traditional group needed more time and effort to improve. Almost all of the students who came to me and were complaining about tennis were from the traditional group."

Tt 4/4 commented, "Now I believe in the red ball as an effective tool. With my very limited experience in tennis, I can easily say that students who did not enjoy tennis much were using the yellow tennis ball."

Research Question 2

The second research question in the current study was:

Q2 Do young tennis players who use modified tennis equipment differ significantly in their *perceived competence* relative to players who use traditional tennis equipment?

The results of a two-way RM ANOVA revealed that students in the modified tennis equipment group showed greater improvements in perceived tennis competence than did students in the traditional tennis equipment group, F (1, 1, 96) = 33.68, $p < .001$. The Week 1 perceived competence mean for the modified equipment group was 4.22 (SD = .92), and their Week 4 mean for competence was 4.67 (SD = .69), which reflected an improvement in perceived tennis competence over time. Conversely, the Week 1 perceived competence mean for the traditional equipment group was 4.11 (SD = .91), and their Week 4 mean for competence was 2.98 (SD = 1.25), which indicated a decline in perceived competence over time (Figure 6).

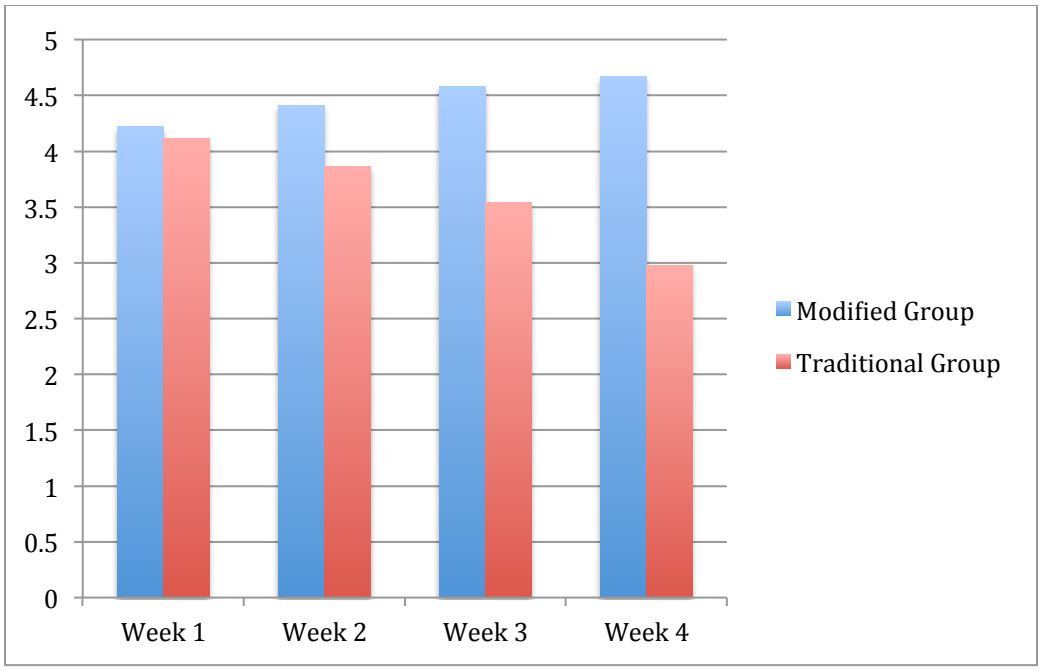

Figure 6. Group means for perceived competence.

The two groups followed different trends over the four-week period. The modified equipment group showed a steady increase in perceived competence over time whereas the traditional equipment group demonstrated a decline in perceived competence each week.

Table 2

Means and Standard Deviation for Perceived Competence for the Modified and Traditional Tennis Equipment Groups

	Students' Perceived Competence							
	Week 1		Week 2		Week 3		Week 4	
Group	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Modified Equipment	4.22	.92	4.41	.86	4.58	.77	4.67	.69
Traditional Equipment	4.11	.91	3.86	.92	3.54	.98	2.98	1.25

Focus groups were conducted with students in both modified and traditional tennis equipment groups. Some differences appeared in students' perceptions of tennis competence between modified and traditional groups. The majority of students in the modified tennis equipment group positively linked their ability to play tennis with the characteristics of the tennis equipment, such as the size of the racquet and ball speed. In the traditional tennis equipment classes, the speed of the yellow tennis ball and racquet size and weight were mentioned specifically as issues that limited students' perceived ability to play tennis well. Three themes emerged from the data acquired through the focus groups.

Students' Focus Group Interviews:
Modified Tennis Equipment Group

Theme 1: Tennis is easy to play. These students perceived tennis as a fun sport and as an easy sport to play. The following quotes supported this theme. One participant stated, "Tennis is a very easy sport, I can play it, I learned it very quickly." Another participant indicated, "From the first shot, I knew how to hit the ball. It is easy to just hit it in the middle of the racquet, and the ball will go quickly to the other part of the court." Additionally, one participant noted, "Tennis is easier than soccer. You can hit the tennis ball further than kicking the soccer ball."

Theme 2: Tennis competence. Students in the modified equipment group felt competent when playing tennis. One participant stated, "I am very good at tennis. I can play for long time without missing the ball." Another participant explained, "I am the best student in my group. I know how to play all shots, and my friends always want me to play with them because I am very good at tennis." Moreover, another student declared, "I am very good at tennis because every time we play, I don't miss the ball."

On the other hand, two students referred to the tennis equipment, specifically the tennis racquet size, with their perceptions of playing tennis well. For instance, one student indicated, "I can't play the ball to my friend with the big racquet. I can play better with the short racquet." Another student stated, "The small tennis racquets are better than the long ones because I feel they are easy to carry and play with."

Theme 3: Tennis equipment. It was noteworthy that the students mentioned the modified tennis equipment during their explanation of their process of learning tennis. The following quotes present some students' indication of the importance of the tennis equipment during their discussion. A student commented, "I like the tennis racquet because it is short and light, and I can hit the ball easily. I can hit it away from my friend when we are playing points." Another student affirmed, "I like the red color of the tennis ball. I can see it very clearly when it is coming to me." Furthermore, a student declared, "Yes, yes, the red ball is good. I can hit it many times on my racquet and the wall."

Focus Group Interviews: Traditional Tennis Equipment Group

Students in the traditional equipment group noted the difficulty in playing tennis. They mentioned many times that they could not play tennis continuously or keep the rally going for a long time. Some students in the traditional equipment group had negative perceptions of their competence in tennis. Three themes emerged from the focus group data for this group.

Theme 1: Tennis is not so easy to play. The majority of students did not perceive tennis as an easy sport to play. During the discussion, students indicated that tennis was hard for them to play and keeping the yellow tennis ball in play was difficult most of the time. In fact, one student stated, "I can't play the ball for more than two

shots. It is difficult to play the ball with my friend for more than two balls." Another student commented, "I don't like playing in the wall station because I keep missing the ball, so I cannot get the ball more than five times." Moreover, a student declared, "Tennis is not easy because every time I want to play with my friends, I keep missing the ball, and my friend cannot play the ball to me. He always plays it hard and away, and I keep running after the ball." However, some participants indicated that tennis was easy for them to play. For example, a participant stated, "For me, tennis is easy. I can play the ball anywhere I want and can even play it hard, and then the student opposite to me can't return it."

Theme 2: Perceived tennis competence. Students in the traditional tennis group had conflicting perceptions about their ability to play tennis. Some students perceived themselves as competent players. For instance, one student stated, "I feel that I am good at tennis. It is not hard to play tennis." Another student commented, "I am okay in tennis. I know how to play the forehand, but the backhand is difficult. I don't know how to do it." On the other hand, some participants showed less-favorable perceptions of competence in tennis. For instance, a student noted, "I am not good at tennis. It is hard to play the forehand and the backhand. only like to play with the racquet and the ball." Another student stated, "I don't like to play at the wall station because my ball always gets away from me, and I can't play it straight to the wall. It is hard." Additionally, a student commented,

> Sometimes it is difficult to correctly play and do what the coach is asking me to do in the stations, especially the tennis court station where I had to play with my friend for as many points as possible. It was sometimes hard to play more than one or two times, and I had to run after the ball to bring it back and start over.

Theme 3: Tennis equipment. Tennis equipment was mentioned frequently as a reason for making tennis fun in the traditional equipment group. However, it was notable that the children perceived the tennis equipment as problematic. To illustrate, a student commented, "I didn't like the big racquets. I like the small racquets because it was easy to carry and play with them." Another participant noted, "Playing in the tennis court station was not my best station. The space is too small, and the ball always comes quickly to me. I kept saying to my friend to play it slowly so I could return the ball." Another student stated, "The ball is too hard and painful, and it hurts when it hits you. One time one of my friends hit me with the ball, and it was painful." Moreover, a student declared, "I feel the ball is heavy, and it hits my racquet very hard."

In conclusion, the students in the modified group perceived themselves as more competent in tennis when compared to the students in the traditional group. Moreover, the majority of students in the modified tennis equipment group declared that playing with the red tennis ball made them feel more competent in tennis. On the other hand, some of the students in the traditional tennis equipment group negatively perceived the tennis equipment and felt that it limited their skill development.

Individual Interviews with the Physical Education Teachers

In the following section, general themes are drawn from teachers' perceptions in regard to their students' tennis competence. Teachers' identities were coded based on their classroom number and type of tennis equipment used in their classroom.

Theme 1: Age appropriate tennis equipment. Teachers in all groups had a preference for the modified tennis equipment, especially the red tennis ball and the shorter racquets such as the 23- and 25-inch racquets. Teachers indicated that although

there was great similarity in the circumstances and contexts between the modified and traditional groups, such as the training stations and learning activities, they noticed the differences in the students' reactions toward the tennis equipment. For example, teachers indicated that the children/students complained about the speed of the yellow tennis ball and the heavy racquets in the traditional group compared with the modified equipment group classes. The following quotes were provided by the four PE teachers. Tm 3/1 indicated that "It is clear that the modified tennis equipment, especially the red ball, was the better choice for the students. They loved it. They kept enjoying playing with it. It is lighter and colorful for children their age." Tm 4/2 stated, "The students were happy with the tennis equipment. The students were always happy about the red ball. I also noticed that they were always asking to play with the shorter racquets because they felt that they are lighter and easier to carry." Other comments included:

> Unfortunately, my classroom had the yellow ball. It is not good for the children at this age. I have limited experience in tennis, but with my 17 years of experience in teaching, I can tell that the kids were able to play and enjoy the red ball because it was lighter and slower for them. Many of my students were frustrated with the yellow ball and its fast speed. (Tt 3/2)

> I have good students in my classroom. During my teaching I did not notice how much the type of ball could make this huge difference in students' ability to play. I was engaged in both traditional and modified groups. I clearly saw the differences in students' performance. Students in the modified group were improving quickly, and the length of the rally was much higher for the modified group compared to the traditional group. The kids in the modified group were improving faster than my students in the traditional equipment group. The ball is really suited for the kids' small physical abilities. Tt 4/4

Theme 2: Perceived tennis competence. The PE teachers were in general agreement in terms of which students who participated in this study showed improvement in their tennis competence and skills. However, it was noteworthy that three of the four

teachers agreed that the perception of competence was higher in the modified group equipment. The following quotes provide the teachers' perspectives:

> Yes, there is difference between the traditional and modified groups. From what I have noticed, children in the modified group were improving faster, and their sense of competence was also improving. Most of the time when I was talking to them about how they feel about tennis, and their answers were almost the same—it is easy to play and they are good at playing tennis. (Tm 3/1)

> Definitely students in the modified group were getting better, in my opinion, than the students in the traditional group. When I was assisting and managing the training stations, the kids was always calling me to see them play. They feel that they are good, and they want me to see them playing because they want to impress me. (Tm 4/2)

> I am not a tennis coach, and I cannot tell if the students in the modified group felt that they are more competent than the students in the traditional group. I feel that they both improved. At the beginning, all students did not play well and could not control the ball. Maybe the modified equipment group was a little bit better with playing, but I did not feel that they were super better or felt super competent compared to the students in the traditional group. (Tt 3/2)

> I think the level of competence was in favor for the students in the modified group. They were continuously happy, and they felt good about tennis from the first week. Some of my students, for example, told me that they like tennis, but they don't feel that they are good at it. I also felt that some of my students had improved during the last week of this intervention, just at the end of it. (Tt 4/4)

Theme 3: Level of engagement in group format play. Three of the teachers mentioned that during the training stations and recess activities, the students engaged in different types of activities according to whether they were in the modified equipment or traditional equipment group. The following quotes illustrate this theme:

> I have noticed that the majority of my classroom students were playing more in groups than individual activities, like the tennis court station, and playing in groups of two or three. The majority of the students in the traditional group were playing individually or maybe in a two group format. (Tm 3/1)

Tm 4/2 indicated, "For the modified group students, I was watching students in the gym during the recess. It was amazing to see that many students were playing in groups, even

students from fourth grade and third grade were playing together." Tt 4/4 commented, "I asked many of my students why they do not play in groups or if they do not like the tennis court station very much, and a fair number of those students said that it is difficult to keep the ball in play."

Theme 4: Tennis equipment. One of goals of this study was to examine and understand the influence of the type of tennis equipment on students' perception of tennis competence. The four PE teachers unanimously agreed that the modified tennis equipment, especially the red ball and shorter racquets, were influential in contributing to students' perceptions of competence. Additionally, they declared that they would adopt the red ball and shorter racquets in their future PE lessons due to the suitability of the modified equipment in increasing children's ability to play tennis. The following section includes quotes from PE teachers to elucidate this theme.

> With no question, I believe that the modified equipment, especially the red ball, is the most influential tool in the tennis equipment. I even tried it, and I played well from the first time. The ball is very good for children at this age. I saw the differences in children's enjoyment and ability in tennis from the beginning of this study. (Tm 3/1)

> If the decision is mine, I will adopt the modified tennis equipment in the PE curriculum, not only to elementary, it is even useful for middle schools and maybe high schools students. In this research, students had the same tennis and PE tools, and the only major difference was the ball, and still I saw the improvement in my students very quickly, especially when they did not play tennis before. (Tm 4/2)

> My students who used traditional equipment seemed like they did not feel comfortable with the ball, and when we offered the big racquets, they preferred to play with the shorter racquets. Some of them were trying to master tennis skills, but it took them a long time and more effort to improve. (Tt 3/2)

> If you want my opinion, we introduced the same equipment to all students, and they have tried the same tools. However, the ball was different, and this different factor alone made the difference in my opinion. As I mentioned before, students in my classroom did not feel confident to continue playing with the yellow ball

> for a long time. Conversely, in the modified group, I saw them playing better and making groups. I think the ball is making this difference. (Tt 4/4)

In sum, the PE teachers were almost all in agreement on the influence of tennis equipment on their students' perceptions of tennis ability. Specifically, the PE teachers suggested that students in the modified tennis equipment group perceived that they were more competent and had greater skill improvement relative to students in the traditional tennis equipment group.

Research Question 3

The third research question in the current study was:

Q3 Do young tennis players who use modified tennis equipment differ significantly in their *intention to continue to participate* relative to players who use traditional tennis equipment?

The results of a two-way RM ANOVA revealed that students in the modified tennis equipment group demonstrated an increase in intention to play tennis in the future relative to students in the traditional tennis equipment group, $F(1, 1, 96) = 17.73$, $p < .001$. The Week 1 mean for intention to play in the modified equipment group was 3.98 ($SD = 1.02$), and their Week 4 mean for intention was 4.16 ($SD = .91$), which reflected a positive change in intention over time. Conversely, the Week 1 mean for intention for the traditional equipment group was 4.08 ($SD = .86$), and their Week 4 mean for intention declined to 3.11 ($SD = 1.03$). Figure 7 demonstrates the change in students' perception of intention to continue future tennis participation in modified and traditional tennis equipment groups between Weeks 1 and 4 of this study.

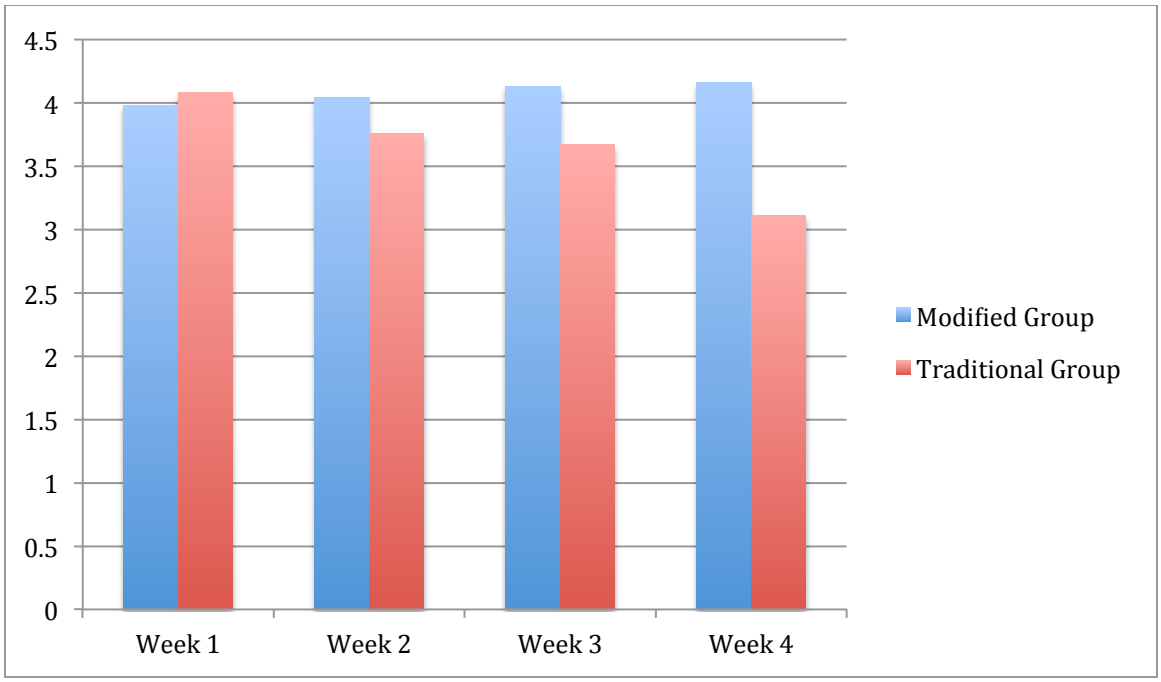

Figure 7. Group means for intention to continue to play tennis.

There were differences between groups over time in their intentions to participate in tennis. The modified equipment group demonstrated a continually greater interest in participation whereas the traditional equipment group demonstrated a week-by-week decline in participation.

Table 3

Means and Standard Deviation for Intention to Continue to Play Tennis for the Modified and Traditional Tennis Equipment Groups

	Students' Intention To Continue To Play Tennis							
	Week 1		Week 2		Week 3		Week 4	
Group	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Modified Equipment	3.98	1.02	4.04	1.04	4.13	1.04	4.16	.91
Traditional Equipment	4.08	.86	3.76	.82	3.67	1.73	3.11	1.03

Focus Group Interviews: Modified Equipment Group

Theme 1: Intention to continue to participate in tennis. The majority of the third- and fourth-grade students in this group expressed the desire to continue to participate in tennis after this study's conclusion. Seven students communicated a high level of enthusiasm and desire to play tennis. The other three students did not totally reject the idea of playing tennis in the future, but they stated that if they had the chance to play it, or if they encountered a tennis opportunity, they would engage in it, especially if it were in the school. The following quotes are representative of this theme.

One participant stated, "I like tennis, and I want to be a tennis player. I already got my father's and mother's permission to register at Kuwait club in the summer." Another participant indicated, "Yes, I will play tennis, and I told my classroom teacher and the tennis coach that I want to register in the club." Additionally, one participant noted, "I know a lot of things about tennis. I know Djokovic is the best tennis player in the world, and my father bought me a tennis racquet and four red balls, and he promised to take me to one of the tennis clubs."

One of the three students who did not have any intention for future tennis participation said, “I do not want to play tennis in the future, I want to be a soccer player and play for the national team.” Another student noted, “No, I don’t want to be a tennis player. I want to play soccer. It is my favorite sport, and all my friends play soccer.” Also, a student commented, “Tennis is fun, but it is hard to play it. I like to play it with my friends in school only. I do not want to play it outside the school.”

Theme 2: Tennis as an extracurricular activity. This theme is a purely cultural theme, and it reflects students’ perceptions in regard to sports in Kuwait. Naturally, the influences of the Kuwaiti culture and societal norms have impact on students’ perceptions of sport participation. In the Kuwaiti society, engagement in sports is primarily for the purpose of excelling in competition. Therefore, children with lower perceptions of their competence in sport are unlikely to participate at the club level.

In this study, of the seven students who reflected desires to engage in tennis in the future, only two mentioned that they would engage in future tennis activities if it was provided by the school. For example, one student stated, “I hope school can provide tennis for me. I do not want to play in the club. I like to play here with my friends and have fun with them.” Moreover, a student declared, “I love tennis now more than soccer. I only want to play it in the school because it is hard to play it in the club.” In addition, the three students who did not feel that they wanted to participate in tennis in the future also mentioned that they would possibly engage in tennis only if it was in the school. For instance, one said, “I don’t think I want to play tennis. If I play it, I want to play it in the PE lessons only.” A student commented, “To play tennis outside the school is very hard. Maybe I will play it in the school, but in the club, it is not fun.” This theme might not

directly reflect students' perception in regard to their intention to continue to play tennis in the future, but it will provide a beneficial venue to understand one of many possible hindrances that prevent students from engaging in tennis or other sports in Kuwait.

Focus Group Interviews: Traditional Equipment Group

Theme 1: Intention to continue to participate in tennis. Fewer students in the traditional tennis equipment group expressed a desire to play tennis in the future. Only three students indicated that they might, or would, seek future tennis participation. For example, one student commented, "Yes, I want to play tennis, and I can't go to the club now, but I will go in the summer." Another said, "Tennis is a good game, and I want to play it. I am now watching tennis on the TV and trying to learn it." Another student affirmed, "I like tennis—it is fun, and me and my friend will play it together in the club."

It is was interesting that some students who did not have intentions to continue in tennis justified the reason for not pursuing tennis as due to their low ability, and they considered tennis a difficult sport to play. Representative quotes from the five students who did not have intentions to continue their participation in tennis included statements such as, "I do not want to play tennis—it is not easy to play it." Another student stated, "No, I do not think I am good at tennis, I play soccer better, and I want to be a soccer player when I grow up." A third student declared, "No, I can't play it well. I want to be a soccer player."

Theme 2: Tennis as an extracurricular activity. Similar to the students in the modified group, two students in the traditional group affirmed that they wanted to participate in school-based tennis activities only. For example, one student stated, "Yes, I will play tennis, but in the school only. Next year, if they will let us play it in the PE

gym during recess, I will come every day to play it." Along that the same line, another student noted, "I asked my teacher if she could let us play tennis next year. I want to play it in the school."

Interviews with the Physical Education Teachers

Teachers' perceptions were also obtained in regard to the students' intentions to continue to participate in tennis. The four PE teachers were interviewed and asked to provide their opinions with respect to students' intentions to continue to participate in tennis based on their dialogue with their students.

Based on the discussion between students and their teachers, the four PE teachers' responses were generally in agreement on three reasons why students in the modified tennis group had greater intention to continue to play tennis. The teachers commented that students in the modified equipment class had greater interest in tennis and were more likely to want to play tennis during the second recess. In addition, parents of students in the modified equipment classes inquired more frequently about tennis, which suggested that the students in the modified equipment group discussed tennis at home.

Theme 1: Student interest. Teachers indicated that more students from the modified group were favorable about continuing in tennis. For instance, Tm 3/1 stated, "Almost all students from the modified group, of course not all students, but the majority, said 'yes' we want to play tennis after these PE tennis lessons when I asked them if they would like to play tennis in the future." In contrast, Tt 4/4 commented, "For example, I have noticed that students in my classroom had inconsistent responses toward their future tennis participation. Throughout the intervention, their opinion kept changing, and they might even end up with a lower desire to continue in tennis for some of them."

Theme 2: Students' engagement. The PE teachers noticed the number of students who came to the PE gym and reported good attendance for both groups. Tm 3/2 noted, "

> Students in both groups constantly wanted to come to play tennis, even in the second recess period. But, my students, they kept asking to come at every possible opportunity, even when they had a substitute teacher in another subject, they kept coming and wanted to play in the gym.

Tt 4/2 declared,

> I can tell, I felt the kids really enjoyed tennis and wanted to keep coming and play it every single time. In my classroom, I saw a high level of enjoyment and intention to come and play it, but maybe at the end, they felt a little bit bored. Overall, and through the intervention, I am confident that they had a great experience.

Theme 3: Parents' inquiries. The parental inquiry theme was a bit surprising because it was not common for parents to inquire about school subjects, especially physical education. To illustrate, Tm 3/1 stated, "During my 17 years of teaching experience, I haven't seen this many parent inquiries about a PE unit. The dozen parents I talked to kept saying that their kids kept asking them to buy tennis racquets and red balls, but they didn't know what they should buy." Moreover, Tt 3/2 noted,

> Students were transferring their passion toward tennis into their homes. Parents usually don't come to school too often, and especially for PE. It was nice to see this enthusiasm toward tennis. Although I didn't have many parents for my classroom, I went a couple times to meet with parents, but it was nice to see these parental inquiries about PE.

In conclusion, teachers perceived that students in the modified tennis equipment group had greater intention to continue to play tennis in the future.

Research Question 4

The fourth research question in the study was:

Q4 Do young tennis players who use modified tennis equipment differ significantly in their *ability to execute forehand and backhand groundstrokes* relative to players who use traditional tennis equipment?

The final research question was examined through observational data. The two experienced tennis coaches who participated in this study evaluated the performance of 20 students who were randomly selected. Five students were selected from each of the four classrooms and were evaluated on their skill performance. Each student's performance was evaluated twice. The first performance evaluation (pre-test) took place during the first day of the intervention. The second performance evaluation (post-test) took place on the last day of intervention. The pre-test and the post-test evaluation processes followed the same procedures. The pre-test and post-test included two forehand trials, each consisting of two backhand and two forehand strokes. The sum of the scores for the two trials represented their overall score.

The nonparametric Mann-Whitney test was utilized to answer this research question. This test was used because the sample size was small, and the data did not necessarily meet the normality assumption. The Mann-Whitney test indicated that there were statistically significant differences between groups in forehand stroke improvement from pre-test to post-test, $U = 13.50$, $p < .01$. The mean score of 14.15 for the modified tennis equipment group exceeded the mean of 6.85 for the traditional equipment group. Therefore, students in the modified tennis equipment group improved on the forehand stroke more than the traditional equipment group over the course of four weeks of tennis intervention.

The groups were also tested on improvement on the backhand stroke, and the Mann-Whitney test revealed a significant difference between the groups, $U = 20.50$, $p < .05$. The mean score of 13.45 for the modified tennis equipment group exceeded the mean of 7.55 for the traditional equipment group. This difference also favored the modified tennis equipment group.

It is worth mentioning that the number of students who participated in forehand and backhand trials was very small and that the findings may not be representative of the sample as a whole. This portion of the study relied upon volunteers and not all students had the opportunity to volunteer given the four-week nature of the intervention.

Additional data were also collected and information was collected regarding students' preferred racquet size. The data for this specific observational data were collected by counting the number of racquets by size that students used each recess. Every time students visited the optional recess tennis activity, they found that all racquets were placed in a large basket (basket A) and the students selected the racquet size that they felt comfortable using. At the end of the recess, students were asked to return their racquets to another basket (basket B) close to the PE gym exit. Following each recess period, the additional data were counted, and the sum of all 12 tennis recess activities were calculated to attain the total numbers and percentages.

Data on students' attendance of the optional tennis opportunities were collected by asking students to sign in on an the attendance sheet in the gym. The findings indicated that there were greater numbers of visits by students from the modified tennis equipment group ($n = 482$) compared to students from the traditional tennis equipment group ($n = 430$). Students were also provided with different sizes of tennis racquets to

use during recess optional tennis activities. Students had free choice in utilizing the racquet size that they preferred. The students' racquet preferences were determined by counting the frequency with which they used each size of racquet. The findings indicated that the majority of students in both modified and traditional groups preferred the 23" and 25" size racquets. To illustrate, students in the modified tennis equipment group used 23", 25", and 26" racquets 194, 240, and 89 times, respectively, during the recess activities. Students in the traditional tennis group utilized 23", 25", and 26"racquet size 224 times, 281 times, and 104 times, respectively, when participating in the recess tennis activities.

Moreover, the data were compared across groups for individual and group play. Individual or group play should be an indicator of perceived competence in tennis because engaging in group tennis play such as playing a tennis rally involves a greater degree of challenge than engaging in some individual activities, such as bouncing the ball on the racquet. The findings indicated that students from the modified tennis equipment group engaged in in-group play 47% of the time (227 times) and in individual play 88% of the time (424 times) during the recess tennis activities. On the other hand, students from the traditional tennis equipment group engaged in group play tennis activities only 29% of the time (124 times) and engaged in individual play of tennis 63% of the time (273 times).

CHAPTER V

DISCUSSION

Numerous factors can affect whether a young person chooses to become involved in sport and subsequently decides whether to maintain or discontinue their involvement. Developmental considerations are vitally important to children's initial sport involvement, and their continuation in sport and youth sport needs to be designed in ways that are developmentally appropriate to maximize participation and to increase the benefits of involvement. Consequently, children's sport should be designed differently than adult sports to take into account these physical, cognitive, social, and psychological differences.

A significant challenge faced by children when they begin participation in any sport is that they don't have fully developed cognitive abilities, such as working memory, which can make it difficult for them to learn new sport skills such as the forehand and backhand strokes in tennis. For example, learning to strike the ball effectively in tennis involves adjusting to the bounce of the ball such that it is at an optimum height, which is a reflection of working memory. Adjusting sports equipment and environments to correspond with children's physical capacities and cognitive ability should increase children's interest and enjoyment in any sport and should increase the rate at which they learn skills. Therefore, to augment learning new motor skills and skill acquisition in

children, participatory environments should be planned to accommodate children's developing physical, psychological, social, and cognitive capacities.

In addition to these developmental considerations, current theory and knowledge on motivation should be incorporated into the design of sport experiences of children and adolescents to maximize their interest and enjoyment and the quality of their participation. Competence Motivational Theory (CMT) (Harter, 1978, 1981) has been an important theoretical model used in youth sport because the theory itself was developed to explain the developmental need for competence and was intended to address the ways in which the development of perceived competence occurs from childhood through adulthood. Self-Determination Theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000) is also an important and widely used current motivational theory that can help to structure many aspects of the youth sport experience. From a SDT perspective, the psychological needs for competence, autonomy, and relatedness must be nurtured to foster intrinsic motivation and sustained interest and involvement in any activity (Deci & Ryan, 2008). Across both theories, perceived competence is considered to be an essential precursor to motivation, and this study was designed with a focus on enhancing children's perceptions of competence to stimulate their motivation. In sum, youth sport programs should be designed to assist children and youth to grow and develop psychologically, physically, and socially through the satisfaction of their need to feel competent.

There is a movement in the tennis community to utilize modified tennis equipment at younger ages so that children have the opportunity to play with developmentally appropriate equipment to facilitate their feelings of competence and their enjoyment of the sport. The International Tennis Federation (ITF), the United

States Tennis Association (USTA), and other organizations have taken the lead in making these modifications. The desire to modify traditional tennis equipment to enhance youth interest and enjoyment of the sport has been based on logic rather than research, however, as there is not yet an existing body of research that has been conducted to examine the effectiveness of equipment modifications. Therefore, the purpose of this mixed-method study was to attempt to understand the effectiveness of learning tennis with modified, developmentally appropriate equipment on children's perceptions of enjoyment, competence, and intention to continue participation in the State of Kuwait.

Findings Related to Research Questions

The first research question addressed whether children who use modified tennis equipment differ in their level of enjoyment from players who use traditional tennis equipment. The results indicated that students in the modified tennis equipment group showed significantly greater enjoyment of tennis over time than did the students in the traditional equipment group. The focus group results were consistent with these findings, as students in the modified tennis equipment group clearly expressed that that they felt that tennis was an enjoyable sport to play. Conversely, students in the traditional tennis equipment group communicated lesser enjoyment and stated that there were some considerations that minimized their interest in playing tennis, such as the difficulty in playing longer tennis rallies. Interviews with the PE teachers provided further support for this difference between groups. The PE teachers explained that students in the modified tennis equipment group had consistently higher levels of tennis enjoyment throughout the intervention compared to their peers in the traditional tennis equipment group. The observational findings indicated that students in the modified equipment group attended

the open recess tennis opportunities more frequently than did students in the traditional tennis equipment group. Thus, in relation to the first research question, there was a relationship found between type of tennis equipment and students' tennis enjoyment. Students in the modified equipment group experienced greater enjoyment over the course of the study than did students in the traditional equipment group.

From the findings it was salient that students level of tennis enjoyment in the modified tennis equipment group started to increase over the course of this study's 4-week intervention. The quantitative and qualitative results were consistent in regard to the improvement of children's level of tennis enjoyment in the modified equipment group and reduction in tennis enjoyment was also notable for students in the traditional equipment group. Students' sense of competence and their ability to play tennis and with friends contributed to tennis enjoyment for students in the modified equipment group during this study intervention. Conversely, students in the traditional tennis equipment group struggled to maintain their tennis enjoyment over time.

The intention of the second research question was to discover whether differences in perceived tennis competence would appear between players using the modified and traditional tennis equipment. The findings indicated that students' perceived competence improved significantly more in the modified tennis equipment group than in the traditional equipment group. The results from the student focus groups were consistent with these findings, as students in the modified tennis group expressed that they perceived tennis to be an easier sport to play than did the students in the traditional equipment group. Furthermore, the students in the modified equipment group perceived themselves to be more competent in mastering the forehand and backhand strokes. On

the other hand, students in the traditional tennis equipment group considered tennis to be a difficult sport to play and felt that they needed more effort to master the necessary tennis skills. In the interviews with the PE teachers, the teachers communicated strong support for the use of the modified tennis equipment to enhance children's competence. Observational findings indicated that students in the modified tennis equipment groups engaged in more group play tennis activities, which would reflect a higher level of perceived competence in these students than in students who preferred to play only individual tennis activities. In relation to the second research question, the modified tennis equipment was found to be beneficial in facilitating children's perceived tennis competence.

The difference between modified and traditional equipment groups in children's perception of competence was very apparent. There was a continuous decline in children's perceived ability in the traditional equipment group to play tennis over time. To the contrary, children's perception of tennis competence in the modified equipment group consistently improved over time.

The third research question addressed whether children who used the modified tennis equipment differed significantly in their intention to continue to participate in the sport relative to children who used the traditional tennis equipment. The quantitative findings indicated that the modified tennis equipment group demonstrated significantly greater intention to continue to play tennis than their peers in the traditional equipment group, and the focus group findings were consistent with this conclusion as well. Interviews with the PE teachers further corroborated this difference between groups. The PE teachers explained that students in the modified tennis equipment groups had

consistently requested more tennis participation opportunities and were in favor of greater inclusion of tennis in the PE curriculum for the following year. Conversely, their peers in the traditional tennis equipment groups demonstrated a reduced interest in tennis involvement over the four weeks of the study. In relation to the third research question, use of the modified tennis equipment contributed to students' intentions to continue tennis participation.

Similar to the findings for the first two research questions, these results reflected a steady decline in students' intention to continue to play tennis in the traditional equipment group. Students' intention to continue to participate in tennis was also influenced by children's perceptions of competence, children's perception of enjoyment, and cultural and societal norms and practices in Kuwait. Students in both modified and traditional tennis equipment groups linked their future intention to participate in tennis with their perception of tennis enjoyment and competence. In addition, students also connected their desire to pursue future tennis participation opportunity to their culture. The cultural norm in Kuwait in regard to official sport clubs is to emphasize competition over fun. For example, students in both modified and traditional equipment groups had great interest in tennis as an extracurricular or PE activity in the school setting only. This cultural norm had impacted students' intention to continue to participate in tennis after this study intervention.

The fourth research question addressed whether children who used modified tennis equipment differed significantly in their ability to execute forehand and backhand groundstrokes relative to players who used traditional tennis equipment. The logic for using the shorter racquets and the low-compression tennis balls was that the racquet size

better corresponds with children's height and limb length and enables them to engage in a less-complex movement pattern than would be the case with the longer racquets. Play with the lower-compression balls allows children more time to prepare to play the ball. Each of these considerations is consistent with children's physical and cognitive developmental capacities, and the modified tennis equipment is, thus, considered to be "developmentally appropriate." The results indicated that students in the modified tennis equipment group showed significantly greater improvement in tennis forehand and backhand stroke execution than did students in the traditional equipment group. Because they played with the lower-compression balls, the students in the modified tennis groups had more time to execute the forehand and backhand strokes compared with students in the traditional tennis equipment group, which helped in learning appropriate technique. These results were important because they were representative of specific benefits of the modified tennis equipment on skills that are essential to successfully playing tennis. However, as mentioned in the results section, the number of students who participated in forehand and backhand trials was relatively small and the findings may not be representative of the sample as a whole.

From the standpoint of motivational theory, the findings from this study corresponded with expectations from both CMT and SDT. In this regard, utilization of the modified tennis equipment was associated with gains in perceived competence for these participants. Furthermore, satisfaction of children's need to feel competent was related to an increased level of motivation. The modified tennis equipment enabled children to learn more quickly learn and to execute tennis skills, which was consistent with expectations based upon developmental considerations. One of the additional, and

unanticipated, benefits of the use of the modified tennis equipment was that the use of this equipment enabled children to participate more with their friends. The interview, focus group, and observational data indicated that students in the modified tennis equipment group participated more in group play with their fellow students, which logically would contribute to their enjoyment and interest in continuing to play tennis. From an SDT standpoint, use of the modified equipment is potentially beneficial in contributing to children's sense of relatedness because feeling competent enables children to participate in more dynamic, group play sport activities.

It is not surprising that the modified tennis equipment had a positive impact on children's skill performance because it was designed and introduced to the tennis community as age-appropriate tennis equipment. The modified tennis equipment, especially the modified tennis ball (low-compression balls), enables children to engage in tennis using tennis equipment that corresponds with their physical and cognitive abilities. There has been a need expressed by individuals within the tennis community for researchers to empirically investigate the potential benefits of modified equipment (Kachel et al., 2015), and the purpose of this study was to pursue this line of research through a controlled intervention.

Summary and Future Directions

The findings from this study are consistent with developmental and motivational perspectives applied to the design of youth sport programming. The findings are also consistent with the arguments advanced by the International Tennis Federation and the United States Tennis Association that developmentally appropriate tennis equipment would be beneficial in helping young people enjoy, and feel competent in, the sport of

tennis which should contribute to their desire to continue participation in the sport. These tennis organizations have also argued that modified equipment should be beneficial for youth in developing the essential skills in tennis, and the results from this study indicated that greater skill development occurred when the modified tennis equipment was utilized.

This study provides support for the belief that youth sport programs should be designed in ways that are consistent with our knowledge about youth development and motivation. It is proposed that developmental and motivational considerations should influence the design of all youth sport programs and that similar modifications could increase levels of enjoyment while reducing attrition from some other popular children's sports. Thus, although this study was designed to address only tennis, it is proposed that the implications of these findings should extend beyond tennis to other youth sports.

The knowledge base supports the idea that enjoyment is an important contributor to tennis participation (Crane, & Temple, 2015). The modified tennis equipment contributed to greater enjoyment for children and should contribute to future tennis participation. Therefore, it is essential that national and international tennis organizations utilize the modified tennis equipment and combine this equipment with appropriate coaching practices that are consistent with motivational theory in order to contribute to positive and age-appropriate tennis experiences for young tennis players. This approach will provide the ideal solution to the struggle of sustaining interest in young tennis players for continued tennis participation (International Tennis Federation, 2015).

There were some unique culturally specific considerations that also emerged in this study. In Kuwait, there is a cultural expectation that the official sport clubs are appropriate only for individuals who are talented and want to continue a sport at a high

competitive level. The students who expressed enjoyment in tennis in this study indicated that they had the desire to continue their participation in the sport, but had a strong preference for playing only at schools, rather than clubs. Thus, the modified tennis equipment had a positive effect on children's tennis interest, but this interest was limited to participating in a school environment that had a stronger orientation toward learning than toward competition.

The current study was based on motivational theory, but there are additional ways in which theoretical considerations can be included in the design of youth sport programs. The present study was grounded in SDT, and there was a major emphasis on developing perceived competence as a means of stimulating intrinsic motivation to play tennis. However, more could be done to stimulate autonomy and relatedness, as each could further contribute to intrinsic motivation. Autonomy could be stimulated by allowing children to have greater choice in the learning process by being able to select equipment and challenges that they prefer. Relatedness could be promoted by encouraging more frequent group interaction and collaboration with others. Thus, there are additional future directions linked to motivational theory that could be beneficial to beginners and young athletes in general.

Tennis federations worldwide have encouraged the adoption of modified tennis equipment to increase the motivation, skill development, and retention of young people in the sport. A systematic and comprehensive evaluation of the effectiveness of the modified tennis equipment is needed to better understand the outcomes of these modifications. This study represented a first step in developing knowledge about developmentally appropriate equipment modifications in the sport of tennis. However,

much remains to be known about how to design sport for children and youth to be developmentally appropriate so that we may help youth to develop psychologically, socially, and physically through sport.

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APPENDIX A

SITUATIONAL QUESTIONNAIRE

How Do You Feel **NOW**?

Chose one face from the provided faces for each question.

To answer each question you can put (✓) in the box under the best face that reflect you feelings.

Right now I feel that……..					
1. I am having fun playing tennis					
2. I would like to play tennis outside of PE lessons					
3. Do you feel you are good in tennis					
4. I like tennis because it is fun					
5. I can be a good tennis player					
6. Tennis is an enjoyable sport					
7. I would like to be a tennis player					
8. My tennis forehand and backhand are good					
9. I would like to play tennis in every PE lesson?					

APPENDIX B

FOCUS GROUP INTERVIEW GUIDELINES

Focus Group Interview

The purpose is to encourage students to talk about their tennis experience and tennis equipment.

Instructions provided by the interviewer:

The PE teachers are starting a new physical education program in which we are going to include tennis as a primary sport in the elementary curriculum. Could you tell me your opinion and evaluate the tennis program for us? Your opinion is important for us to understand if tennis and tennis equipment is beneficial for you. There are no right or wrong answer but just what you think and how you felt during these tennis lessons. Therefore, feel free to say anything and respond to the questions with respect for your friends in the discussion group. I will give you the chance to speak so do not need to interrupt your friends. It is fine to agree or disagree with your friends and remember it is not a test.

Interview questions:

1. Can you tell me how you felt about learning tennis?
2. In your opinion, what were the best parts of learning tennis? Why and give example if you can?
3. In your opinion, what were the parts that you did not like as much?
4. Do you think the tennis lessons in this program were enjoyable or boring? Why and give example if you can?
5. Do you think the tennis lessons in this program helped you to learn tennis? If yes or no, what were the things made you say this?
6. Do you feel the tennis equipment used in this program helped you in improving your forehand and backhand? How?

7. What activity and equipment (racquet and/or ball) helped you to play the most rally with your friends and/or with wall? Could you tell me why and give me examples?
8. In your opinion, what we can do as PE teachers to improve this program? Could you give example?

APPENDIX C

TENNIS AUSTALIA'S FUNDAMENTAL TECHNIQUE CHECKLIST

Tennis Australia's Fundamental Technique Checklist

The technical points outlined below have been created by expert tennis coaches and are considered the fundamentals of performing tennis strokes.

Forehand

Descriptions of the six technical points for the forehand and Technical Point Description:

1. Grip: Eastern forehand grip to a semi western forehand grip.
2. Circular Swing: A circular-like motion in the backswing with the racquet.
3. Low-to-high Swing Racquet: Swung from low to high during the forward swing, but with an arc that was more horizontal than vertical.
4. Step Forward Step: Forward into the shot, with the opposite leg to the hitting hand.
5. Impact Ball: Struck in front and to the side of the body.
6. Follow-through: Follow-through considered a natural extension of the swing (i.e., extension and flexion of the elbow).

Backhand

Descriptions of the six technical points for the backhand and Technical Point Description:

1. Grip Single-handed Grip = Eastern backhand grip.
   - Double-handed Grip: Bottom hand on grip (right hand is the bottom hand for right-hand players) should be an Eastern backhand grip to a continental grip.
2. Circular Swing: A circular-like motion in the backswing with the racquet.
3. Low-to-high Swing: Racquet swung from low to high during the forward swing, but with an arc that was more horizontal than vertical.
4. Step Forward Step: Forward into the shot, with the opposite leg to the hitting hand.
5. Impact Ball: Struck in front and to the side of the body.
6. Follow-through: Follow-through considered a natural extension of the swing (i.e., extension and flexion of the elbow).

* Children could use either a one-handed or a two-handed grip.

APPENDIX D

TEACHER INTERVIEW GUIDELINES

Teacher Interview

Instructions: Please respond to these questions based on your opinion from what you have seen and from what the participants in this study have shared with you. Your responses could include your ideas, thoughts, observations, and opinions. Also, you can share what students in your classroom or other students from other classroom participated in this study provided in terms of their opinions, suggestions, and thoughts.

Interview questions:

1. How did students react in your classroom toward integrating tennis in the PE lessons? Explain.
2. Could you explain what were the major changes and differences in your students' participation practices? Could you please provide examples?
3. Do you think students in your classroom enjoyed playing tennis throughout the intervention? Could you explain?
4. At the end of the intervention, do you think students in your classroom started to feel bored and did not feel that tennis is enjoyable? Explain.
5. Do you think students in your classroom felt competent in tennis throughout the intervention? Could you explain?
6. Did students in your classroom share with you the difficulties they had and their efforts during playing tennis? Could you share some examples?
7. Did you hear or chat with students in your classroom about their potential participation in tennis? Could you provide some examples?

8. Could you make comparisons between students' enjoyment, perception of competence, and intention to continue to play tennis in the future between the groups with modified and traditional tennis equipment?
9. From your participation in this study, could you let me know what type of tennis equipment (modified or traditional) you will adopt in your curriculum if you had the chance to choose? Why?

APPENDIX E

INSTITUTIONAL REVIEW BOARD CONSENT FORM—PARENTS

UNIVERSITY of NORTHERN COLORADO

Informed Consent (Parents) for Participation in Research

Project Title: **Examining the Influence of Modified Tennis Equipment on Young Players' Enjoyment, Perceived Competence, and Intention to Participate in Tennis in the State of Kuwait**

Researcher: Abdullah Akbar (akba2826@bears.unco.edu)
Research Advisor: Dr. Robert Brustad (bob.Brustad@unco.edu)

I am a researcher in Social Psychology of Sport and Physical Activity at The University of Northern Colorado in the United States of America, and I am in the process of conducting a research project that seeks to attain a better understanding of the influence of modified tennis equipment on children. More specifically, I am looking to explore and compare the influence of modified tennis equipment on elementary students' tennis enjoyment, perception of competence in tennis, and intention for future participation in tennis. A comparison between the influence of the traditional and modified tennis on children's perception toward tennis will be examined through different ways, such as responding to a child version of a self-report situational questionnaire, focus group interview, and videotaping and analyzing children's performance.

If you agree to give your child the permission to participate in this project study, a survey will be administered four times (once a week) with questions regarding your child's perception toward his ability to play tennis, his tennis enjoyment, and his feeling toward participating in tennis in the future. The questionnaires are expected to take approximately 10 minutes to complete, and your child's physical education teacher will be responsible to manage the survey administration process. However, this study has two additional sections where the children will be interviewed in group setting with other four students (two times during the intervention) from his classroom to attain further understanding of children's perception toward tennis in general while utilizing different tennis equipment. This part of the study is optional and signing this form will not automatically involve your child in this section. If you wish your child to participate in the focus group part of the study you have to check the provided box below. The last part of this study is also optional and needs your approval to enable your child to participate. In the third part, only twenty students will be videotaped and analyzed using Dartfish software. This analysis will not require any threatening or devices that could cause any threat to your child. Again, this part of the study is optional and signing this form will not automatically involve your child in this section. Therefore, if you wish your child to participate in the performance analysis part of the study you have to check the provided box below.

For research purposes, the children will not be informed that they are participating in research intervention. Instead, the children will be informed this intervention is part of their regular PE curriculum. The only reason for this intentional step is to accurately measure children's perception toward tennis experience. Informing children about the actual nature of this study might influence their perception and could lead to inaccurate findings. Therefore, I highly

recommend that you do not share this study goal and intentions to your child. If you feel that you need to inform your child about the study we recommend that none of the measured variables, such as tennis enjoyment, perception of competence, and intention to participate in tennis in the future, should be explained to the child to avoid misleading results.

Identifying information will not be solicited on the survey and as such, confidentiality will be preserved for all participants. Additionally, all participants will be assigned a code when analyzing the data to enhance their confidentiality. None of the participants' identity will not be shared with any institution including their school principals.

There are limited risks to your child when participating in this research. His identity will be protected and no identifying information will be used in any professional report of this study. Aggregate results from group findings will appear in the final report. All participants will be numerically identified and assigned to enhance the participant's confidentiality when information from the survey is retained. All data and artifacts collected from this research will be locked in the office of the researcher or password protected if in digital format.

Your child participation is voluntary. Your child will be verbally asked if he approve and wish to participate in this study. Your child could refuse to participate in this research and there is no obligation to complete this study, if you decided to withdraw your child after he begins participation any time. Your decision will be fully respected. By participating in the survey, you are providing consent to use your child responses.

If you have any concerns about your selection or treatment as a research participant, please contact Office of Sponsored Programs, Kepner Hall, University of Northern Colorado, Greeley, Colorado, USA, 80639; 1-970-351-2161.

Yours sincerely,

Researchers: Researcher: Abdullah Akbar (akba2826@bears.unco.edu)
Dr. Robert Brustad (bob.Brustad@unco.edu)

Signiture:……

I would like my child to participate in this study	Self-report questionnaire section	Focus group interview section	Video taping analysis section
Please check on the boxes that you would like your child to participate in during this study you can choose 1 or 2 or all study's sections			

APPENDIX F

INSTITUTIONAL REVIEW BOARD CONSENT FORM—COACHES

UNIVERSITY of NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
Coaches Consent Form

Project Title: **Examining the Influence of Modified Tennis Equipment on Young Players' Enjoyment, Perceived Competence, and Intention to Participate in Tennis in the State of Kuwait**

Researcher: Abdullah Akbar (akba2826@bears.unco.edu).
Research Advisor: Dr. Robert Brustad (bob.Brustad@unco.edu). Phone number: 970-351-1737

I am a student of Sport and exercise science at the University of Northern Colorado in the USA. I wanted to conduct a research to understand how children use tennis equipment and their enjoyment, competence and intention to continue participation in tennis

If you agree to our request to participate and assist in this project study; your valuable experience and effort is needed in a four weeks intervention. During these four weeks, you will be friendly asked to attend in one of the Al-Asma educational district (Omar Ibn Al-Aas elementary school). You will participate in this research as a one of the two primary coaches to introduce tennis to third and fourth grades students during the physical education lessons. Each day your attendance in the physical education gym is needed for 4 hours from Sunday through Thursday and for four weeks.

Your expertise is tremendously needed in two parts of this study. First, introducing tennis to the students during the PE lessons. Second, analyzing video taping of twenty student's forehand and backhand performance (at the beginning and at the end of the intervention).

Identifying information will not be solicited and as such, confidentiality will be preserved for all participants and coaches. Additionally, all participants including coaches in this study will be assigned a code when analyzing the data to enhance their confidentiality. None of the participants' identity will not be shared with any institution including you tennis club's administrator and/or head coach.

There is no risk to you when participating in this research other then those would encounter in any normal tennis experience. Your identity will be protected and no identifying information will be used in any professional report of this study. Aggregate results from group findings will appear in the final report. All participants including coaches will be numerically identified and assigned to enhance the participant's

confidentiality when information from the intervention is retained. All data and artifacts collected from this research will be locked in the office of the researcher or password protected if in digital format. All recordings will be erased three-years after the study.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado, Greeley, CO 80639; 970-351-1910.
Yours sincerely,

Researchers: Abdullah Akbar (akba2826@bears.unco.edu). Phone number: 970-691-5640

Dr. Robert Brustad (bob.Brustad@unco.edu). Phone number: 970-351-1737

Signature:……

APPENDIX G

TRANSLATED QUESTIONNAIRE AND INTERVIEWS QUESTIONS

ما/هو/شعورك/في/هذه/اللحظة؟

إختر/إجابة/واحدة/فقط

ضع/علامة/صح/(///)/مقابل/كل/سؤال/و/تحت/أحد/الوجه/التي/تعبر/عن/احساسك

					
1. أنا مستمتع بلعب التنس					
2. أود أن العب التنس خارج المدرسة					
3. إنا أشعر بأني جيد في لعب التنس					
4. إنا أحب التنس لأنها مسلية					
5. أحس بأني سوف أكون لاعب تنس جيد					
6. تنس لعبة ممتعة					
7. أعتقد بأني أود بأن أكون لاعب تنس					
8. أعتقد بأني أعرف كيف ألعب التنس					

					
.9 أود لعب التنس كل حصة بدنية					

مقابلة/الطلبة/في/مجموعات

الهدف/من/المقابلة/هو/تشجيع/الطلبة/على/التحدث/مناقشة/تجربتهم/مع/التنس/وأدوات/التنس.

يجب/أن/تكون/المقابلة:/ودية،/بسيطة،/وأن/لاتكون/على/شكل/إختبار

المقدمة/"مدرسين/التربية/البدنية/سوف/يبدؤن/حاليا/يقومون/بتجربة/منهج/جديد/للتربية/البدنية./هذا/المنهج/الجديد/سوف/يضم/لعبة/التنس/الأرضي/مع/أدواتها/كرياضة/أساسية/في/المنهج/الجديد./هل/يمكنك/أن/تعطيني/رأيك/وتقييمك/لهذا/المنهج/الجديد./لقد/تم/اختاركم/من/قبل/المدرسين/لهذه/المقابلة/لحضوركم/والتزامك/الرائع،/ولأننا/لا/نستطيع/مقابلة/جميع/الطلبة./رأيكم/مهم/لمعرفة/إذا/كانت/التنس/الأرضي/وأدواتها/مناسبة/وفعالة/لكم./ليس/هناك/إجابة/صحيحية/أو/إجابة/خاطئة،/فقط/نحتاج/لرأيك/واحساسك/خلال/حصص/التنس./لذلك/عبر/عن/رأيك/وشارك/في/المحادثة/الجماعية/بكل/حرية/مع/احترام/أصدقائك/في/المقابلة./سوف/أعطي/الجميع/الفرصة/للمشاركة/وإبداء/الرأي./لذلك/لاتوجد/حاجة/لمقاطعة/أصدقائك./لا/توجد/مشكلة/إذا/كانت/أجابتك/متشابة/أو/مخالفة/لصديقك./وتذكر/دائما/هذه/المقابلة/ليست/أختبار"//

الأسئلة:

1. هل/تستطيع/أن/تخبرني/ماذا/كان/شعورك/وانت/تتعلم/التنس/في/الحصة؟/مع/ذكر/أمثلة؟
2. ماهو/أكثر/شيء/عجبك/بالتنس/في/رأيك؟
3. ما/هو/أكثر/شيء/لم/يعجبك/بالتنس/في/رأيك؟/
4. ما/هي/الأشياء/اللتي/يمكن/أن/تخبر/أصدقائك/وعائلتك/عن/لعبة/التنس؟
5. ماذا/يمكن/أن/تجاوب/إذا/سألك/أحدا/عن/التنس؟
6. /هل/تعتقد/بان/التنس/لعبة/مشوقة؟/لماذا؟
7. /هل/تعتقد/بأن/أدوات/التنس/تساعدك/على/لعب/التنس/بصورة/أفضل؟/لماذا؟
8. هل/سوف/تشارك/في/التنس/في/المستقبل/أو/إنك/اكتفيت/بهذا/لاقدر؟/لماذا؟
9. /إذا/أعطي/لك/القرار/في/تغيير/بعض/أو/كل/أدوات/التنس،/ماذا/سوف/تغير؟/اشرح؟
10. هل/تود/أن/تدرس/لعبة/التنس/في/حصص/التربية/البدنية؟/لماذ؟

مقابلة/مدرسات/التربية/البدنية

الهدف/من/المقابلة/هو/اعطاء/فكرة/عن/مشارك/الطلبة/في/البحث/العلمي
الأسئلة:

1. كيف/رأيت/تفاعل/ومشاركة/الطلبة/في/الحصص/اللتي/تم/تطبيق/التنس/فيها؟/إشرحي/من/فضلك؟/
2. هل/هناك/فرق/في/تفاعل/واستمتاع/الطلبة/في/حصص/التنس/مقارنة/في/حصص/التربية/البدنية/التقليدية؟/ كيف؟
3. هل/يمكن/أن/تحددي/أن/الطلبة/تفاعلوا/وشاركوا/بطريقة/إيجابية/أم/سلبية؟/كيف/مع/ذكر/أمثلة/إذا/أمكن؟
4. /هل/تعتقدين/بأن/التنس/زادة/من/استمتاع/الطلبة؟/كيف؟
5. /هل/تعتقدين/بأن/أدوات/التنس/الحديثة/زادة/من/استمتاع/الطلبة؟/كيف؟
6. /هل/تعتقدين/بأن/أدوات/التنس/التقليدية/زادة/من/استمتاع/الطلبة؟/كيف؟
7. /كيف/يمكنك/شرح/الفرق/بين/أدوات/التنس/التقليدية/والحديثة/من/حيث/تأثيرها/على/استمتاع/الطلبة/ واحساسهم؟/
8. /ما/هي/أكثر/ردود/الأفعال/وأقوال/باتجاه/التنس/اللتي/سمعتها/من/الطلبة/خلال/مشاركتهم/في/الحصص/ الدراسية/الخاصة/في/البحث؟/مع/الشرح/إذا/أمكن؟
9. /بما/أنك/ساهمتي/في/تنظيم/جميع/الحصص./هل/يمكنك/أن/تحديد/أي/الأدوات/ساهمت/أكثر/في/استمتاع/الطلبة،/ إحساسهم/بقدرتهم/على/لعب/البتنس،/رغبتهم/في/المشاركة/في/التنس؟/كيف/مع/ذكر/أمثلة؟
10. /لو/تمت/إضافة/التنس/في/المنهج/أي/أدوات/التنس/سوف/تختارين؟/لماذا؟/

APPENDIX H

RESEARCH INVOLVING HUMAN PARTICIPANTS FOR UNIVERSITY OF NORTHERN COLORADO INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	April 8, 2016
TO:	Abdullah Akbar
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[886557-2] Examining the Influence of Modified Tennis Equipment on Young Players' Enjoyment, Perceived Competence, and Intention to Participate in Tennis in the State of Kuwait
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVED
APPROVAL DATE:	April 8, 2016
EXPIRATION DATE:	April 8, 2017
REVIEW TYPE:	Expedited Review

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of April 8, 2017.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.