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Impact of Participating in a Short-Term Intervention Model of Sports Education Camps for Children with Visual Impairments

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IMPACT OF PARTICIPATING IN A SHORT-TERM INTERVENTION MODEL OF SPORTS EDUCATION CAMPS FOR CHILDREN WITH VISUAL IMPAIRMENTS

by

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This three-paper format dissertation explores three topics relevant to participating in a short-term model Sports Education Camp for youth with vision impairments. The three papers are independent studies, yet build upon each other by first measuring physical performance in certain skills, then exploring their levels of self-perception, body mass index, and level of physical activity in their local communities, and finally describing the population of participants at various points over a 25-year period. Papers one and two examined differences in pre- and post-camp measures for first-time and repeat participants, with the first paper focusing on physical performance, and the second paper looking at self-perception, level of physical activity in participant's local communities, and body mass index. Papers one and two also compared the state with the largest number of participants to the total number of participants from all other states. Paper three provides an examination of selected characteristics of those who attended various Sports Education Camps for the first time compared to those who repeated attendance, and also made comparisons of the 12 states where data were available. Results from the first study indicate that first-time attendees demonstrated significant improvement between pre- and post-camp measures of

physical performance in three of the four skills being measured (over and under arm throw, and standing long jump). The second study revealed similar results for first-time attendees, who demonstrated significant growth in their positive attitudes of themselves between pre- and post-camp measures in three out of four areas of self-perception ("I love sports," "I am better at sports than most kids my age," and "I consider myself a good athlete"). Results from the third paper indicate that participants of Sports Education Camps are representative of national datasets for gender and level of vision in that the majority were males with low vision. The level of Caucasian participants attending Sports Education Camps in this study, however, was overrepresented in our sample. Implications of the effectiveness of the Sports Education Camp model for teaching basic body mechanics and sports skills in increasing physical performance and self-perception of students with vision impairments are discussed.

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CHAPTER 1

INTRODUCTION

This dissertation examines factors related to youth with visual impairments who participated in Sports Education Camps (SEC) for children with vision impairments over the past 25 years. It is comprised of five chapters and employs a three-paper method. The unifying construct under investigation is the impact on youth who are blind or have low vision of the short-term intervention of participating in the SEC model created by Western Michigan University (WMU). The three papers are independent studies, but are written to build upon each other. In Paper one, I examine if, and to what extent, students who participated in a SEC gained in performance measures. In Paper two, I examine body mass index (BMI) of participants and the effect of the sports camp on attitude of the participants. In Paper three, I describe the population of youth who participated in a SEC. Each of the three chapters in the body of the dissertation (chapters 2, 3, & 4) are written as stand-alone articles. The introduction chapter (chapter 1) provides an overall framework for the three manuscripts, while the conclusion chapter (chapter 5) discusses the collective implications of the findings from the three chapters as well as provides recommendations for future research.

Maintaining an appropriate level of physical activity is an essential life skill for adults and children. The literature tells us that participation in such activities has a positive effect on physical and emotional well-being (Martinsen & Stephens, 1994; U.S. Department of Health and Human Services, 2000). Conversely, lack of participation in

such activities has consequences that include poor levels of physical fitness and motor skill development (Kobberling, Jankowski, & Leger, 1991; Short & Winnick, 1986).

Teaching the techniques and activities necessary for children to be physically active, and making it an ordinary and routine part of a person's life, is important to begin early in childhood (Stuart, Lieberman, & Hand, 2006). Furthermore, placing value on children being physically active may be a foundation for them on which to develop an interest in exercise and physical fitness activities later in life (Stuart et al., 2006). Without children learning the necessary skills, they become adults who lack the potential to engage in physical activity and experience quality of life benefits commonly associated with adequate levels of physical activity (Ayvazogiu, Oh, & Kozub, 2006). The importance of development of such foundation skills is especially clear as it relates to current trends of physical activity levels which decline as older children tend to be less active than younger children (Ayvazogiu et al., 2006). A similar trend with age is seen in adolescents with visual impairments, consistent with nondisabled peers, although the rate of decline in physical fitness is steeper for adolescents with visual impairments (Kozub & Oh, 2004). Furthermore, this trend can carry into adulthood, as those who engage in regular physical activity as children are more likely to have a physically active lifestyle in adulthood (Stuart et al., 2006).

Inactivity, in general, is a major health concern, and individuals with disabilities are at a heightened risk for developing secondary lifestyle patterns as a result of this inactivity (U. S. Department of Health and Human Services, 1996). Children with physical and sensory disabilities are at particular risk of sedentary lifestyles, which may contribute to their being less physically fit than nondisabled children (Longmuir &

Bar-or, 2000). This is consistent with public health concerns about inactivity and obesity found in the general population (Vincent, Pangrazi, Raustorp, Tomson, & Cuddhy, 2003), which also apply to individuals with visual impairment (Kozub, 2006). These increased levels of inactivity are pervasive and habitual in individuals with visual impairments, with estimates being as high as one-third of persons with visual impairments leading sedentary lives compared to only 21% who lead active lives (Longmuir & Bar-or, 2000). Children with visual impairment, in particular, consistently exhibit lower levels of fitness than their sighted peers (Blessing, McCrimmon, Stovall, & Williford, 1993; Kalloniatis & Johnston, 1994; Kef, 1997; Kobberling et al., 1991; Korhonen, 2000; Kroksmark & Nordell, 2001; Meek & Maguire, 1996; Rosenblum, 1997; Skaggs & Hopper, 1996), and their activity level falls below the levels of casual, incidental activity that are characteristic of sighted children as they engage in everyday tasks (Lieberman & McHugh, 2001). Further research underscores the pervasiveness of this issue in that up to 80% of children with visual impairments failed to reach criterion levels of health-related physical fitness compared to only 30% for sighted children (Lieberman & McHugh, 2001).

The issue of physical inactivity expands beyond healthy levels of fitness, however. Children with visual impairments have a greater need for physical activity and physical education than do their sighted peers (Dunn & Leitschuh, 2006; Lieberman, 2005) as they often show delays in motor development such as poor balance and inefficient gait (Bouchard & Terrault, 2000; Celeste, 2002; Horvar et al., 2003; Jan, Sykanda, & Groenweld, 1990; Pereira, 1990), and motor skills, particularly loco-motor activities (Pereira, 1990; Sleeuwenhoek, Boter, & Verneer, 1995). Children with visual

impairments often demonstrate delays in reaching many developmental milestones (Sherrill, 1998). These delays are due primarily to lack of visual input (Wyatt & Ng, 1997), visual stimulus, and social and environmental cues (Lieberman, Houston-Wilson, & Kozub, 2002). Specific areas of particular concern are cardiovascular endurance, muscular endurance, flexibility, and balance, which were found to be significantly lower in individuals with visual impairments than in fully sighted individuals (Skaggs & Hopper, 1996).

Such delays in basic physical skills, such as balance and spatial awareness, may also generalize to difficulty in performing tasks of daily living for children with visual impairments. For example, fundamental movement skills taught in physical education classes, such as walking, running, or even safe falling, can be transferred and applied to various daily living tasks, and are a critical mobility issue for a child with a visual impairment (Ayvazogiu et al., 2006). Furthermore, the combination of these delays in motor development with lower levels of fitness can have even more of an impact as many activities of daily living demand increased energy when performed with impaired vision (Nakamura, 1997). One of the reasons for this increased energy requirement for tasks as a function of vision loss results from less efficient movement in persons with visual impairments compared to peers without disabilities (Kobberling, Jankowsky, & Leger, 1989). Even for simple activities such as running and walking, the energy cost is significantly higher for children with visual impairments than for sighted children because of biomechanical inefficiency, such as backward lean, decreased stride length, and “guided posture” (Arnold & McGrain, 1985; Dawson, 1981; Kobberling et al., 1989; Nakamura, 1997).

Short-term intensive programs may provide an alternative to, or augment, general physical education classes being offered in students' schools. The Sports Education Camp model created at Western Michigan University is an example of one such strategy that allows us to look at the effects of one-on-one, intentional, and sequential instruction in a wide variety of controlled movements across several sport activities. The Michigan SEC, which was created in 1988, was initially designed as two separate camps. One was geared toward younger students aged 10-12 and was located at the Michigan School for the Deaf and Blind in Flint, Michigan, while the senior camp, for ages 13-16, was located on the campus of WMU in Kalamazoo, Michigan. These two camps were combined into a one-week model housed on the WMU campus in 2000, and were divided into a junior and senior camp, with the junior camp operating the first three days of the week and the senior camp being run on the last four days of the week. Both components of the Michigan SEC consisted of introductory and advanced sports-training clinics using adaptation strategies specific to vision impairment and sports participation.

Exploring general characteristics of the participants of this SEC, as well as measuring certain levels of performance, attitudes, and BMI over time, may contribute to the body of knowledge related to the benefits of vigorous physical activity and sports for individuals with visual impairment. Students with visual impairments, when given an equal opportunity to participate in regular physical activity, have the same potential to develop motor skills and levels of fitness that are comparable to those of sighted students (Shephard, Ward, & Lee, 1987; Winnick, 1985; Wiskochil, Lieberman, Houston-Wilson, & Peterson, 2007). Paper one of this dissertation focuses on the physical capability of

youth with visual impairments by examining performance measures of participants of SECs from across the United States.

Some of the benefits of participating in vigorous physical activity or sports, in addition to a better level of fitness, are higher levels of self-concept and self-esteem (American Alliance for Health, Physical Education, Recreation, and Dance, 1999). Many children who are blind or visually impaired, however, do not have the perception that participating in physical activity has any benefits for themselves, which contributes to a more inactive lifestyle (Sherrill, 1998). Unless helped to feel good about themselves related to their success in participating in physical activity, children who are blind are less prone to take part in physical activity. Paper two of this dissertation focuses on examining levels of body mass index, and changes in attitudes, of participants of Sports Education Camps.

It is important to describe in detail the participants of the various Sports Education Camps across the country to learn if they are representative of national samples of students with visual impairment or the population in general. Paper three of this dissertation, by exploring demographic and other characteristics specific to those who participated in SECs, may contribute to a better understanding of why these youth chose to attend the camps, and ways to expand participation to groups who are so far under- or unrepresented in the overall population in such programs.

By examining general characteristics, performance measures of certain sports, BMI, and change in attitudes of participants of a SEC, we may be able to better understand the benefits of such short-term instructional interventions and participation in sports for youth who are blind or have low vision.

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CHAPTER 2

PHYSICAL PERFORMANCE OF PARTICIPANTS OF SPORTS EDUCATION CAMPS FOR CHILDREN WITH VISUAL IMPAIRMENTS

Background

Physical activity is an important contributor to the emotional and social growth and development of individuals and is essential for physical or motor skills development (American Alliance for Health, Physical Education, Recreation, and Dance, 1999; McKenzie, Sallis, Kolody, & Faucette, 1997). Children with visual impairments typically demonstrate delays in reaching many developmental milestones, particularly in the area of motor development (Sherrill, 1998). The literature provides ample evidence of delays in development of motor skills, motor planning, and in locomotor activities, such as poor balance and inefficient gait (Bouchard & Terrault, 2000; Celeste, 2002; Horvar et al., 2003; Jan, Sykanda, & Groenweld, 1990; O'Donnell & Livingston, 1991; Pereira, 1990; Sleeuwenhoek, Boter, & Verneer, 1995). These delays are due primarily to cognitive, physical, and social-emotional consequences of blindness which all result from a child's lack of visual input, visual stimulus, and social and environmental cues (Gosch, Bambring, Gennat, & Rohlmann, 1997; Jan et al., 1990; Lieberman, Houston-Wilson, & Kozub, 2002; O'Donnell & Livingston, 1991; Troster & Brambring, 1993; Troster, Brambring, & Beechman, 1991; Wyatt & Ng, 1997).

Children who are blind generally have fewer opportunities and incentives to engage in activities that provide the amounts and kinds of stimulation that are typical for sighted children (Gosch et al., 1997; O'Mara-Maida & McCune, 1996). Furthermore, visual impairment results in a limited ability of youths who are visually impaired to learn spontaneously or incidentally (MacCuspie, 1996), and many of these concepts and experiences, such as motor skills, are those that would otherwise only be acquired through incidental learning, examination, modeling and imitation (Auxter, Pyfer & Huettig, 1997; Hatlen, 1996; Lohmeier, 2005; Sanford & Burnett, 1996). These experiences and concepts that are casually and incidentally learned by sighted students must be intentionally, systematically, and sequentially taught to the student with a visual impairment (American Foundation for the Blind, 2008; Blankenship, 2006; Lieberman, Ponchillia, & Ponchillia, 2013). Locomotor movement, in general, may be an example of one such concept that is incidentally or spontaneously learned. For children with blindness or low vision movement may be the most accurate replacement for vision when clarifying information about surroundings as it will create a kinesthetic awareness of the environment which helps to replace the inability to see motion (Barraga & Erin, 1992).

Motor Skill Development

Children must be proficient in movements and concepts in order to perform motor skills needed to successfully complete physical activity at a higher level (Block & Burke, 1999). Young children most often use more primitive or rudimentary approaches such as "freezing" body parts such as the feet and trunk (Halverson, 1966; Roberton, 1987), which may result in reducing the number and types of movement to a minimum to

achieve a task (Langendorfer, 1990). This type of reduction in movement, or biomechanical inefficiency, manifests in children who are blind or have low vision in backward lean, decreased stride length, and "guided posture" (Arnold & McGrain, 1985; Dawson, 1981; Kobberling, Jankowski, & Leger, 1989; Nakamura, 1997). Movements are expanded throughout the developmental course of a skill, in a hierarchic and cumulative process, until a maximum number are available and are able to be coordinated by the individual (Langendorfer, 1990).

There are a variety of specific physical activities that can be used to demonstrate that motor tasks change across time and age (Langendorfer, 1990), and demonstrate the differences between novice and advanced movements, as more primitive movements produce poor outcome measures and advanced movements produce superior outcomes (Robertson & Konczak, 2001). The forceful over arm throw and standing long jump (or broad jump) are two such physical activities. Forceful over arm throw, for example, is learned by children in stages proceeding from an anterio-posterior plane to a horizontal plane, and from a stationary base of support to a standing position involving transfer of weight (Wild, 1938). Langendorfer (1990) further describes this kind of stage development of the forceful over arm throw as sequential organization manifesting itself as an ordered series of movements, which, according to Butterfield, Loovis, and Lee (2003), culminate in more advanced movements with much of the impetus for overhand throwing being generated by spinal rotation and vigorous forward arm action. Furthermore, novice throwers in the early stages of developing the over arm throw are not only using primitive movements, they appear to lack the options to accommodate the throwing pattern to changing demands or constraints (Roberton, 1987).

Measuring Growth

Outcome measures. This type of stage development can be transferred into measurable terms by tracking performance on tasks as children get older. The customary way to measure motor development is the outcome, or product, score produced by the movement under study (Robertson & Konczak, 2001). Standing long jump, which is measured from the takeoff line to the heel of the foot landing nearest the takeoff line (Ellis, Carron, & Bailey, 1975), provides an example of using an outcome score to measure this stage development. For example, in their study of 106 boys, Ellis, Carron and Bailey (1975) found a 33% increase in standing broad jump between ages 10 and 16, which was paralleled by another study which found a 36% increase in the standing broad jump for boys between ages 12 and 17 (Bailey, 1968).

Growth curve measures. Another method that can be used to map these changes over a period of time as described above is with the use of a growth curve. Growth curve modeling is especially useful when looking at some measurement of each member of a group or group of individuals (Fearn, 1975). The main concept underlying growth curve modeling is in an individual's variation in their rate of growth over time (Mullen & Khoo, 1998). Butterfield, Loovis, and Lee (2003) describe the benefit of using growth curve modeling in that it establishes trajectories depicting individual rates of growth or change while capturing variability around those trajectories. Furthermore, they state that converging growth trajectories would be manifested at some point, which is a visual method of showing that a catch-up effect has occurred (Butterfield et al., 2003). On the other hand, the difficulty in using a growth curve is that one cannot make the usual

assumptions of independence and homoscedasticity when considering the deviations of individuals from an overall growth curve (Fearn, 1975).

Physical Education

Physical education (PE), as defined by Block and Burke (1999), involves the development of physical and motor fitness, fundamental operations, and the skills related to individual and group sports, and may provide an excellent opportunity to look at stages of motor development. Physical education is an important part of the educational process, and the level of physical education children receive in their early years has a direct and positive impact on their health as adults (Kendall, 1997). Children learn eye-hand coordination, balance, spatial orientation and body mechanics in contribution to general physical development and fitness during their elementary school years (Sherrill, 1993), and a skill-based physical education program in the early grades will likely increase the rate of motor development for a specific skill (such as throwing) for most children (Butterfield et al., 2003).

Physical Education and Visual Impairment

Structured physical education may be especially important for children who are blind as the benefits go beyond development of specific types of motor skills to skills that are essential to everyday living. Research demonstrates that when a child who is visually impaired participates in PE classes there are observable differences in a wide variety of areas such as awareness of gravity, body image, spatial awareness, improved posture, self-confidence, balance, and overall stamina (Palazesi, 1986).

This level of importance, however, becomes more far reaching when one looks at the lack of opportunity for children with visual impairments to participate in a basic level of physical activity. For children with visual impairments, limitations on the opportunities and incentives to engage in general physical activity equivalent to that of sighted children result in delays in levels of physical activity and basic mobility (Auxter et al., 1997; Lieberman & McHugh, 2001; Sanford & Burnett, 1996). Furthermore, these limitations in opportunities expand beyond physical activity into other areas of daily life, which also contributes to a lack of physical development. The lack of vision, for example, may restrict the participation of children with visual impairment in the everyday activity of play to such an extent that there are noticeable delays in their physical development (Dunn & Leitshuh, 2006; Jan et al., 1990).

This lack of participation in basic levels of physical activity results in individuals with visual impairments generally having lower levels of motor performance and health-related fitness (Kozub & Oh, 2004; Lieberman & McHugh, 2001; Lieberman, Stuart, Hand, & Robinson, 2006; Longmuir & Bar-or, 2000; Skaggs & Hopper, 1996). In addition, when compared to sighted children, there is a tendency for children with visual impairments to have lower levels of cardiovascular endurance, muscular strength, and muscular endurance (Jankowski & Evans, 1981). This was further shown by a study of health-related fitness of youth with visual impairments, which found clear areas of weakness among all the participants in the areas of cardiovascular endurance and upper-body strength (Lieberman, Byrne, Mattern, Watt, & Fernandez-Vivo, 2010). Additional research has shown that even when youth who are blind or have low vision attend a well-

equipped facility they still experience weak upper limbs, age-related obesity, and low tolerance for exercise (Jankowski & Evans, 1981).

Although the evidence noted previously provides numerous examples of the severity and commonality of children with visual impairments lagging behind in many areas of motor development, there is also some evidence that students with visual impairments have the same potential to develop motor skills and fitness as do sighted students (Shephard, Ward, & Lee, 1987; Winnick, 1985). This potential was underscored by research that has shown that when children who are visually impaired are given an equal opportunity to participate in regular physical activity, and given time, their physical fitness improves, and they exhibit levels of fitness that are comparable to those of sighted children (Adelson & Fraiberg, 1974; Wiskochil, Lieberman, Houston-Wilson, & Peterson, 2007).

Research has shown that just having students with visual impairments included in physical education classes does not address these issues. Robinson and Lieberman (2004) found that students with visual impairments are typically not afforded the same opportunities to participate in various aspects of inclusive general physical education classes or activity environments in the same manner as are their sighted peers. Even when they are included in general physical education classes or physical activity in their schools, students with visual impairments often do not participate in vigorous physical activities with sighted students (Lieberman & McHugh, 2001; Longmuir, 1998; Longmuir & Bar-Or, 2000). Even if they do participate in vigorous activity in PE class the time students with visual impairments do devote to such movement is often brief as

educators still resort to alternatives such as keeping score (McHugh & Lieberman, 2003; Sherrill, 1993).

Access to participation in physical education for students with visual impairments is a complex issue. Safety concerns; families' and teachers' lack of knowledge about motor development; and the cognitive, physical, and social-emotional consequences of blindness are among some of the overarching factors that contribute to limit a child's exposure to the experiences that are necessary to acquire motor planning and performance obtained through structured physical education (Gosch et al., 1997; Jan et al., 1990; O'Donnell & Livingston, 1991). More specific factors that impact access to participation in PE are that students with visual impairments are allowed to regularly miss physical education classes altogether to receive specialized services, allotted study halls or substituting other classes rather than attend physical education (McHugh & Lieberman, 2003; Sherrill, 1993). Parental beliefs and misconceptions also contribute to limitations in that they are often afraid to let a child with a visual impairment participate in physical activities. This may be due to a lack of knowledge about the capabilities of children with visual impairments or concerns over the risk of their child being hurt, even though research has shown that the risk factor would be no greater for children with visual impairments than for sighted children if the activity is well supervised and is appropriately planned (Lieberman & McHugh, 2001). Access to participation in physical education can also be self-imposed as children with visual impairments may have a negative attitude towards PE class. This is supported by research that found that children with visual impairments were more likely to hate physical education, not feel as strong physically as others their age, and not consider themselves to be good athletes or as

physically fit as others (Longmuir & Bar-Or, 2000; Ponchillia, Armbruster, & Wiebold, 2005).

There is a connection between participation in physical education and participation in sports for children who are blind or have low vision. Research has shown that when children with visual impairments are involved in appropriate physical education classes, they are more likely to engage in sports (Ponchillia, Strause, & Ponchillia, 2002). The issue of access to participation found in physical education is similar to that found in the area of athletics and organized sports. This is underscored by Ponchillia, Armbruster, and Wiebold (2005), who in their study of participants who attend Sports Education Camps for children with visual impairments across the U. S. found that 42% of students with visual impairments received no or limited access to physical education and athletic opportunities, and 58.9% of the participants reporting they lacked opportunities to be involved in local sports with others.

Sports Education Camps

An alternative for providing structured instruction in motor skill development to children with visual impairments is possible through the AccesSports Model (ASM) developed at the Michigan Sports Education Camp (SEC). This model is used to adapt, and thus make accessible, virtually any sports activity. It is based on analyzing the activity's basic components, that is, the goals or targets it uses, its playing boundaries, and its rules (Ponchillia, 1995; Lieberman et al., 2013). Although not part of the ASM, certain instructional methods, such as providing the instruction in specific motor skills by using literal descriptors, step-by-step hands-on teaching and constant verbal feedback are

also integral components of instructional methods used at the SEC (Lieberman et al., 2013; Ponchillia, Powell, Felski & Nicklawski, 1992).

The SEC started in 1988 through a combined effort of Western Michigan University's Department of Blindness and Low Vision Studies and the Michigan Blind Athletic Association. The SEC used the ASM as an access tool to enable its participants to actually experience active sports participation with the express purpose of increasing the participants' physical skills, their knowledge of sports, increasing their perception of themselves as athletes, and for improving basic body mechanics (Lieberman et al., 2013; Ponchillia et al., 2005).

Although these sports camps have been evaluated on an annual basis and generally show that children with visual impairments show growth in skill performance, there has never been an overall study of all of the camp participants. Therefore, the purpose of this study is to explore the effectiveness of short-term, intensive instruction in physical education and sport activities for children with visual impairments by focusing on measures of performance in specific physical activities. This will be accomplished by examining specific performance measures of participants in SECs over time. Having the information obtained from this study will demonstrate the effectiveness of the short-term sports camp instruction model on physical performance of children with visual impairments. This study will contribute to the body of knowledge by responding to the following research questions:

1. What gains in physical performance exist between participants' pre-camp and post-camp measures during their first year of participation at the camp?

2. What differences in physical performance exist between participants' pre-camp and post-camp measures for those who only attended a Sports Education Camp once and those who returned to the camp at least once?
3. What gains in physical performance exist between participants' pre-camp and post-camp measures over repeated years of attendance at Sports Education Camps?
4. Are there differences in physical performance measures between male and female participants of Sports Education Camps?
5. Are there differences in physical performance measures between visual categories of participants of Sports Education Camps?

Method

The data for this research were collected through standardized camp evaluation procedures conducted at each site by trained evaluators and a database of all variables over all camps was compiled. The research reported on in this article consisted of a secondary analysis of these data.

Setting

The data were collected at the camp sites, which were divided nearly equally between the housing and athletic facilities of college campuses and residential schools for students with visual impairments. Pre-camp interviews were conducted one-to-one in private indoor settings, while post-camp interviews were held in private outdoor settings during the closing hours of the camps. Pre-camp performance measures were taken in

gymnasiums or outdoor athletic facilities. Post-camp data for throwing and jumping were collected during the track event on the final day, and goalball throwing data were taken on a goalball court in a gymnasium.

Participants

There were a total of 671 individual athletes included in this study. Since many athletes attended an SEC two or more times, the results show 1,185 camp participations. The number of athletes varied by state, as indicated parenthetically: Alaska (19), Arizona (38), Colorado (29), Georgia (20), Maine (6), Michigan (331), North Carolina (30), Pennsylvania (28), Texas (57), Washington (59), West Virginia (6), and Wisconsin (48).

Instrument

Interview and performance data were recorded on the Sports Camp Evaluation Instrument (SCEI) (see Appendices A and B, respectively) (Ponchillia et al., 2005). Specific measures of skill performance taken as part of the pre- and post-camp assessments were standing long jump, over arm softball throw, under arm softball throw, and goalball throwing. These performance data were gathered through measurements of distance from actual throws and jumps and the raw scores were recorded on the SCEI. The pre-camp administration of the SCEI took 20 to 30 minutes, and post-camp administration took 10 to 15 minutes. The pre-camp SCEI was administered during registration on the first day of camp and performance measures were gathered on the final day.

During both the pre- and post-camp evaluations, participants were divided into groups and rotated through numerous interview and skill measuring stations. Trained interviewers or evaluators at each station explained the instrument, read the items, and recorded the distance measures on the paper forms. The evaluators instructed participants with regard to which skill activity to perform, including where to stand to begin the activity, how to begin the activity (from both feet for standing long jump, for example), and when to begin the activity. If participants requested additional assistance, such as an explanation of how to do an over arm throw, evaluators were instructed to provide no additional instruction, but to encourage the children to "try your best." The farther distance measure of two trials for the over arm and under arm softball throws and the standing long jump were recorded on both the pre-camp and post-camp evaluation. Incorrect executions of a skill were recorded as zero. Goalball throwing speed was recorded as total time in seconds the ball took to travel from the front line on the throwing end of a goalball court to the goal line on the other, a distance of 14 meters. This score was then converted to feet per second. If the ball was thrown outside of the court so many times that two throws could not be measured, a 0 was recorded for speed.

Visual classification was defined functionally as there were a number of participants who reported having some useful vision who also reported not feeling like they had enough vision to run fast safely. Thus, participants who answered "yes" to the question "Do you have some vision?" were also asked "Do you have enough vision to run fast safely without a guide runner?" The group who answered "no" to "Do you have some vision?" was combined with participants who answered "no" to the question, "Do

you have enough vision to run fast safely without a guide runner?" The reconstituted sample was termed the "run-unsafe group" and the "run-safe group."

Analysis

Data collected from the pre- and posttests for first time participants, and the pre- and post-camp assessments for returning athletes from each year's camp were imported into the Statistical Package for the Social Sciences (SPSS) database. A mixed method (between subjects and within subjects) analysis of variance (ANOVA) was used to test the statistical differences in performance measures between pre- and posttests (between subjects) of first time participants as well as for returning participants over time (within subjects), and were compared by the variables of age, gender, degree of vision, and race/ethnicity. Missing data and nonresponses were excluded from analysis on a case-by-case basis.

Results

A paired-samples *t* test was conducted to evaluate the differences between pre- and post-camp measures of distance in over and under arm throwing and standing long jump, goalball throwing speed, and throwing a goalball with one or two hands. The results indicated a significant difference between pre- and post-camp means for first-time attendees in the activities of over arm throw (M = 476.89, SD = 343.80 pre and M = 503.19, SD = 356.52 post), $t(283) = -3.92$, $p < .001$; under arm throw (M = 388.40, SD = 263.31 pre and M = 452.47, SD = 263.80 post), $t(280) = -6.07$, $p < .001$; and standing long jump (M = 45.09, SD = 18.78 pre and M = 49.04, SD = 18.34 post), $t(280) = -5.90$,

$p < .001$. Although the data show an overall non-significant decrease in the throwing speed of a goalball between pre- and post-camp measures for first-time participants (M = 5.77 and 5.23 feet per second, respectively), it is interesting to note the increase in the speed of the throws in the lower range between the pre- and post-camp measures (0 and 1.13 feet per second respectively) (see Table 2.1). These results indicate that first-time participants of Sports Education Camps gained in almost every measure of physical performance measured at the camps.

Table 2.1

Physical Performance Measures of First-time Participants at a Sports Education Camp, N = 671

Activity	Minimum	Maximum	Mean	*SD*	*N*
Standing Long Jump (cm.)					
Pre	0	94	45.09	18.78	301
Post	0	121	49.04	18.34	287
Over Arm Throw (cm.)					
Pre	0	1956	476.89	343.80	300
Post	0	1968	503.19	356.52	291
Under Arm Throw (cm.)					
Pre	0	1504	388.40	263.31	303
Post	0	1398	452.47	263.80	288
Goalball Throwing Speed					
Pre	0	21	5.77	3.65	191
Post	1.13	19.50	5.23	3.26	186
Goalball Hands Used					
Pre	1	2	1.62	.49	152
Post	1	2	1.51	.50	156

Table 2.2 shows selected characteristics of gender, race/ethnicity, and vision classification and comparisons of pre- and post-camp measures of physical performance of first-time participants of Sports Education Camps. A series of mixed methods

ANOVAs were conducted on mean performance outcome measures (long jump, over arm throw, under arm throw, goalball throwing speed) with time (pre- vs. post-performance as the within-subjects variable and gender, race/ethnicity, vision classification, and safe running category as the between-subjects variables).

Table 2.2

Average Performance Measures of First-time Attendees at a Sports Education Camp by Gender, Race/Ethnicity, and Vision Classification

	Standing Long Jump		Overhand Throw		Underhand Throw		Goalball Throwing Speed	
Characteristic	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Gender								
Male	48.37	53.43	593.27	632.12	471.55	530.90	5.12	4.77
Female	40.38	44.48	334.74	360.96	288.21	362.25	6.62	11.57
Some Vision								
Yes	46.33	50.15	512.54	549.06	412.17	478.19	5.42	8.36
No	39.84	44.93	340.34	338.61	303.19	353.96	7.13	6.89
Feel Safe Running								
Yes	49.53	52.03	564.00	606.17	455.31	520.72	4.91	4.56
No	37.92	45.54	338.68	342.80	271.55	337.91	7.07	13.98
Race/Ethnicity								
Caucasian	46.48	48.91	493.17	521.27	401.48	459.73	5.35	4.91
Minority	46.04	49.37	494.58	501.60	427.43	459.17	4.49	4.10

Note. Numbers of participants in each cell ranged from 70 to 291.

For standing long jump there were significant main effects for the within-subjects variable of time ($F(1, 173) = 18.01$, $p < .001$) and the between-subjects variables of gender and the safe running group ($F(1, 173) = 10.09$, $p = .002$ and $F(1, 173) = 11.14$, $p = .001$, respectively). Both boys and girls increased in their mean measures in standing long

jump (*M* = 48.37 pre and *M* = 53.43 post for boys, and *M* = 40.38 pre and *M* = 44.48 post, for girls), as did those who felt safe running (*M* = 49.53 pre and *M* = 52.03 post) and those who felt unsafe running (*M* = 37.92 pre and *M* = 45.54 post). For under arm throw, there were significant main effects for the within-subjects variable of time ($F(1, 173) = 5.59$, $p = .02$) and the between-subjects variables of gender and the safe running group ($F(1, 173) = 13.04$, $p < .001$) and ($F(1, 173) = 10.86$, $p = .001$, respectively). Both boys and girls increased in their mean measures in under arm throwing (*M* = 471.55 pre and *M* = 530.90 post for boys, and *M* = 288.21 pre and *M* = 362.25 post, for girls), as did those who felt safe running (*M* = 455.31 pre and *M* = 520.72 post) and those who felt unsafe running (*M* = 271.55 pre and *M* = 337.91 post).

For over arm throw, there was not a significant main effect for the within-subjects variable of time ($F(1, 173) = 1.07$, $p = .30$) but there were significant main effects for the between-subjects variables of gender ($F(1, 173) = 13.22$, $p < .001$) and those in the safe running group ($F(1, 173) = 9.02$, $p = .003$). Although not significant, boys, girls, campers who felt safe running alone and those who did not all increased in their mean measures in over arm throwing from pretest to posttest. There were significant main effects for goalball throwing speed for the within-subjects variable of time ($F(1, 105) = 10.25$, $p = .002$) and the between-subjects variables of gender ($F(1, 105) = 12.05$, $p = .001$). Girls increased their mean goalball throwing speed (*M* = 6.62 feet per second, pre and *M* = 11.57 feet per second, post), whereas boys decreased their mean goalball throwing speed (*M* = 5.12 feet per second, pre and *M* = 4.77 feet per second, post). These findings show that for these performance measures, first time camp attendees tended to improve from pre-camp to post-camp performance, boys tended to perform better than girls, and

students who reported that they could run fast safely independently performed better than those who could not.

For over arm throwing, under arm throwing, and long jump there were also significant three-way interaction effects for the between-subjects variables of gender, race/ethnicity, and those in the safe running group for over arm throw performance ($F(1, 173) = 8.49$, $p = .004$, $F(1, 173) = 6.39$, $p = .01$, and $F(1, 173) = 6.02$, $p = .02$, respectively). For each performance measure, this three-way interaction is difficult to interpret and is, in one way, not meaningful. For all performance measures, and for pretest as well as posttest performance, boys scored higher than girls and those who felt safe running scored higher than those who did not. Two factors were responsible for this three-way interaction. First, in some cases Caucasian students scored better than non-Caucasian students and sometimes it was the reverse. However, these differences tended to be minor. Secondly, the amount by which boys outperformed girls or safe runners outperformed non-safe runners varied slightly. These variations were enough to create the significant three-way interaction.

Table 2.3 shows the age and mean measures of performance measures for first-time participants at a SEC. A series of paired-samples *t* tests were conducted to evaluate the relationship between pre-camp and post-camp performance for each performance measure for each age. The increases in performance for standing long jump were significant only for participants aged 10 and 11 ($t(47) = –2.60$, $p = .01$ and $t(49) = –4.05$, $p < .001$, respectively). Increases in performance for over arm throw was significant only for 11 year olds ($t(51) = –2.75$, $p < .001$). Increases performance for under arm throw was significant for a wider range of ages (10, 11, 12, 13, 14, and 16 year olds). Results for

these comparisons, in chronological order, are $t(46) = -2.19$, $p = .03$; $t(50) = -3.90$, $p < .001$; $t(38) = -2.67$, $p = .01$; $t(28) = -3.11$, $p = .004$; $t(29) = -3.15$, $p = .004$; and $t(20) = -2.39$, $p = .03$. Campers aged 13 had the largest overall mean increase (400.80 in. to 508.22 in.). Increases in goalball throwing speed were significant for students aged 9, 13, and 15 ($t(8) = -2.61$, $p = .03$; $t(17) = -2.30$, $p = .03$; $t(19) = -2.48$, $p = .02$, respectively).

Table 2.3

Performance Measures of First-time Attendance at a Sports Education Camp by Age

Age	*N* Range	Standing Long Jump		Overhand Throw		Underhand Throw		Goalball Throwing Speed	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
9	10-14	37.94	49.90	338.95	333.12	311.62	240.40	6.20	5.82
10	23-52	40.31	44.55	356.63	378.61	303.87	348.28	6.78	20.93
11	27-55	38.38	44.55	365.59	407.06	292.07	374.19	6.47	5.87
12	22-44	44.77	46.58	448.15	471.29	354.92	427.44	7.32	6.49
13	13-31	51.43	51.23	532.34	558.80	400.80	508.22	5.68	4.02
14	11-30	53.22	56.48	736.25	779.58	531.72	627.90	4.58	4.22
15	20-33	55.84	59.45	618.22	664.75	544.80	589.52	3.41	3.75
16	12-21	47.76	51.86	542.13	528.26	440.04	511.84	3.91	3.50
17	5-8	32.10	36.69	339.27	302.27	398.36	379.68	5.33	6.25
18	2-4	45.12	45.84	383.71	375.23	395.47	384.50	7.29	5.85

Table 2.4 compares mean measurements in physical performance of participants of Sports Education Camps who only attended one time, to those who repeated participation at least once and those who repeated participation more than once. A series of paired-samples *t* tests were conducted to evaluate the differences between pre- and

post-camp scores for all of the performance measures. The results showed a significant improvement in standing long jump performance between pre- and post-camp means for

Table 2.4

Comparison of Average Physical Performance of Study Participants

	One-time participants (N = 141-265)		Repeat attendees First session (N = 19-59)		Repeat attendees Last session (N = 13-38)	
Activity	Pre	Post	Pre	Post	Pre	Post
Standing Long Jump						
Mean	46.19	49.28	38.32	46.87	47.21	50.92
St Dev	19.25	19.03	14.93	16.76	16.08	15.53
Over Arm Throw						
Mean	490.18	513.30	372.48	413.57	382.45	452.23
St Dev	356.06	367.39	232.83	244.99	233.26	237.12
Under Arm Throw						
Mean	397.62	458.74	332.67	422.56	344.17	452.60
St Dev	270.31	270.05	210.43	203.91	204.19	192.68
Goalball Throwing Speed						
Mean	5.39	5.09	8.09	6.87	9.20	7.15
St Dev	3.17	3.25	4.85	3.84	6.69	3.33
Goalball Hands Used						
Mean	1.60	1.49	1.74	1.68	1.77	1.83
St Dev	.49	.50	.45	.48	.44	.38

one-time attendees ($t(246) = –4.70$), $p < .001$), and those who repeated participation at least once ($t(53) = –5.00$), $p < .001$). There was a significant difference between pre- and post-camp means for over arm throw for one-time attendees ($t(249) = –3.51$), $p < .001$) and those who repeated participation more than once ($t(53) = –2.58$), $p = .01$]). For under arm throw, there was a significant difference between pre- and post-camp means for all three groups; one-time attendees ($t(248) = –5.46$), $p < .001$), those who repeated

participation at least once ($t(47) = –3.71$), $p < .001$), and those who repeated participation more than once ($t(29) = –4.16$), $p < .001$). Differences in pre- and post-camp means for goalball throwing speed were only found to be significant for one-time attendees ($t(154) = 3.34$), $p < .001$).

The data indicate that those who participated in a SEC only one time significantly improved in their skill performance between pre- and post-camp measures for all four physical activity variables measured (over and under arm throw, standing long jump, and goalball throwing speed). For those who repeated at least one time, after their first repeat attendance they showed significant differences between pre- and post-camp measures for three out of the four performance measures (over and under arm throw and standing long jump). Attending camp more than once did not lead to as many significant improvements in performance, with only the variable of under arm throw improving significantly in the last session for those who repeated more than once.

Discussion

The main purpose of this study was to determine if participation in Sports Education Camps for young athletes with visual impairments made a significant difference in physical performance levels. First-time attendees at a SEC demonstrated significant improvement between pre- and post-camp measures of physical performance in the activities of over arm throw, under arm throw, and standing long jump. This level of improvement was consistent across these three physical activities for the specific variables of gender and the safe running group, as well. Although males had slightly greater increases in performance measures for standing long jump and over arm throw,

females had a larger increase in under arm throw. Furthermore, participants in the safe running group had a slightly greater increase in performance measures for over arm throw, compared to those in the unsafe running group who had a slightly greater increase in performance measures for under arm throw and standing long jump. Females and those in the unsafe running group also had a significant increase in performance measures for goalball throwing speed.

Of particular note are the differences in gender and visual classification between the more complex movement of overhand throwing and the less complex movements needed for underhand throw, standing long jump and goalball throwing speed. It is understandable that males and those in the safe running group would have greater increases in distance measures for the more complex movement of overhand throw, and that females and those in the unsafe running group had similar or greater increases in physical measures in the activities that appear to require less complex movements. This also appears to be similar for females who were in the unsafe running group. These basic gender differences are consistent with research with sighted children, that found that boys inherently throw farther and with more velocity than same-aged girls (Runion, Roberton, & Langendorfer, 2003), that these differences are consistent over time (Halverson & Roberton, 1982), and that girls lagged behind boys in overhand throwing development (Butterfield et al., 2003).

In addition, the increased distance measures achieved by those in the safe running group in the more complex movement of over arm throw is consistent with the impact of vision on incidental learning. As a consequence of being able to more effectively observe the complex movements required for forceful over arm throwing through casual

observation it makes sense that participants in the safe running group could more easily examine, model, and imitate the more complex components of the over arm throw, which include changing from a series of short individual movements to a more ordered and continuous single movement where spinal rotation and vigorous forward over arm action are used.

The improvement in distance measures between pre- and post-camp achieved by those in the unsafe running group in the less complex movement needed for under arm throw, standing long jump, and goalball throwing speed is also consistent with the impact of the lack of vision on incidental learning. Because the basic body movements for these particular activities are similar, they lend themselves nicely to the methods employed by the SEC that utilize literal descriptors, step-by-step hands-on teaching and constant verbal feedback in the instruction of these basic movements. This is consistent with the use of intentional, systematic, and sequential methods used to teach numerous concepts that can reduce the impact of incidental learning for students with visual impairments.

These more focused methods of instruction provided by the AccessSports Model appear to be a major contributing factor to the significant improvement made by those in the unsafe running group. The differences in physical performance between those in the safe running and unsafe running groups is further underscored by the raw mean measures in over arm and under arm throw and standing long jump. Although those in the unsafe running group had more statistically significant increases between pre- and post-camp measures in standing long jump and under arm throwing, those in the safe running group achieved greater overall mean scores in both pre- and post-camp measures in over and under arm throw and standing long jump (with the distance measures in over arm throw

twice as far for the safe running group). These findings may suggest that children with greater levels of vision have increased levels of physical development than do those who are totally blind or more severely visually impaired.

In order to look at the potential effect of participating in a SEC over time on physical performance, the investigators looked at differences between pre- and post-camp measures for those who attended only one time, those who repeated at least one time, and the last time athletes repeated participation. Although the bulk of the improvements seen were during the first time at camp or the first repeat attendance, it is interesting to note that most performance measures decreased from the post-camp score of the first attendance and the pre-camp score of the first repeat attendance. While mean distance measures for over and under arm throw decreased between the post-camp measures and the pre-camp measures of athletes repeated participation, goalball throwing speed increased progressively between the post-camp measures and the mean initial measures of all sessions where the athlete's repeated participation in a SEC. One explanation for the increase in goalball throwing speed over time could be that attendees during an SEC throw a goalball many more times throughout the course of instruction, practice clinics, and competition components than they do for over and under arm throwing and standing long jump. This increased opportunity to throw a goalball during a SEC is also a factor of the amount of time needed to teach someone who came to the camp throwing a goalball with two hands how to do so using only one hand, which allows for more velocity in the throw. It may also be an outcome of participants of a SEC having more opportunity to play goalball between SEC sessions then they do sports that require the other variables. These findings seem to suggest that there is some evidence to support that attending a

SEC has a positive impact on some physical skills over time (i.e. increases in goalball throwing speed), which is consistent with findings of earlier research by Ponchillia, Armbruster, and Wiebold (2005), who found that returning participants of Sports Education Camps in Michigan had a positive impact on skills taught at the camp.

Although the sample of first-time attendees of a SEC is sufficient in size to generalize its positive impact on improving physical skill performance for youth who attend such camps, the small sample size for those who repeat participation in a SEC used in this study is a limitation on the longitudinal data. Further research of existing SECs in future years is recommended. Adding data from the SECs that were part of the National SEC project following its conclusion in 2003, as well as other SECs that have been developed in other states not included in this study, is one way to eliminate the limitations of the small number of participants who repeated attendance in the SECs in this study.

Conclusions

This paper explored the relationship between participation in a SEC and performance measures of specific physical activities by the variables of age, gender, race/ethnicity, level of vision, and whether or not they felt safe running fast without the use of a guide runner. These findings suggest that the Sports Education Camp model of short-term intervention for teaching basic body mechanics and sports skills is highly effective in increasing physical performance of students with vision impairments. The use of the AccesSports Model utilized to adapt sports and the provision of the use of intentional, systematic, and sequential methods used to teach numerous concepts in basic

body mechanics and teaching sport-specific skills in sports taught at a SEC are likely major contributing factors to the participants' increases in physical performance during the camps. This is consistent with other research that examined the SEC model for teaching basic body mechanics and sports skills (Lieberman et al., 2013; Ponchillia et al., 2005).

Future research should focus on (a) methods for increasing the effect of participating in a SEC over time, (b) strategies for increasing the number of SEC participants in this database, and (c) comparing growth curves for repeat participants in a SEC with their sighted peers to determine if there is a "catch up" effect occurring for repeat participants.

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CHAPTER 3

MEASURES OF SELF-PERCEPTION, LEVEL OF PHYSICAL ACTIVITY, AND BODY MASS INDEX OF PARTICIPANTS OF SPORTS EDUCATION CAMPS FOR YOUTH WITH VISUAL IMPAIRMENTS

Background

Perceptions

Perception, or self-concept, can be defined from a variety of perspectives. Christy, Shanimole, and Nuthetie (2002) state that self-perception is one's idea of who he or she is and is the sum total of one's dreams, limitations, expressions, concerns, and ideals. Another definition of self-concept is in the totality of a complex, organized, and dynamic system of learned beliefs, attitudes, and opinions that each person holds to be true about his or her personal existence (Alexander, 1996). Still another way to look at this is through an individual basing his decisions on "what he thinks he is rather than on what he actually is" (Rosenberg, 1979, p. 59).

Learning one's inner self is another way of learning who one "actually is." This self-knowledge is dependent on, and constructed through, social interaction (Doise & Palmonari, 1984). Self-perceptions are stronger and take place more often in childhood than at any other time of life (Christy et al., 2002), and next to the home, the school is the most important environment where such social opportunities exist for shaping the child's self-concept (Swayze, 1980). This system of development can be problematic for children who are blind or have low vision in that they have fewer opportunities for social interactions. Although all kids are affected by social expectations, this development of

self is more complex for children who are visually impaired as their expectations are influenced by misperceptions and attitudes (Laird & Bresler, 1992). The effect of these social expectations can be particularly flawed by others' misperceptions and negative feedback, especially in the absence of positive interaction (Conrod & Overbury, 1999). This continues into adulthood as adults with low vision have more negative self-perceptions than those who are sighted (Sacks, 1996).

Self-Esteem

Self-esteem, as with self-perception, is connected to internal and external factors. Self-esteem can be defined as the value that an individual places on his or her own characteristics, qualities, abilities, and actions (Woolfolk, 2001). Alexander's (1996) definition of self-esteem also contains a measure of feelings from within but expands it by describing it as the product of interactions between the individual and the significant others in their lives. The quality of these social interactions is a major factor in the development of self-esteem. For children and adolescents, the development of self-esteem requires an environment that provides freedom to explore and experiment as well as protection from danger (Baumrind, 1991). This safe environment for trying things out reinforces individuals with high self-esteem who tend to have confidence in their own abilities to make decisions, expectations for successful outcomes, and a willingness to experience new things (Tuttle & Tuttle, 2004).

As children develop this sense of self and interact with and gain experience in the world, their self-esteem is affected, and these social interactions are even more important when considering that self-esteem is not static, but dynamic and changing with variables

in a person's life (Griffin-Shirley & Nes, 2005). Even though self-esteem changes over time, it is the lack of early social experience that may lead to long-term difficulties in social understanding (Brown, Hobson, Lee, & Stevenson, 1997). This is also true for social interaction of children with visual impairments in their early years in that the lack of training in social skills may affect their ability to succeed as adults in their work and personal lives (Sacks, Kekelis, & Gaylord-Ross, 1992; Sacks & Wolffe, 2006).

One manner in which these social interactions allow for the development of self-esteem is that the perception of one's self is based to a great extent on identifying with gratifying and admired objects in one's surroundings (Tahka, 1993). Enckell (2001) describes this process of identification from the first-person perspective: "When I do things in the same way as the person I admire, I am just as good as he is and manage just as well." Through this process of acceptance the child feels that he can take the admired person with them as part of themselves (Enckell, 2001).

Effects of Visual Impairment

Children with disabilities, in general, experience difficulty acquiring adequate social skills that contribute to problems in relating with the outside world that fully support the development of a positive self-concept. Research suggests that many children with special needs in early intervention programs exhibit social skills deficits (Buysse & Bailey, 1993). This is consistent for children with visual impairments, as children who are blind are less socially active and generally have fewer opportunities and incentives to engage in activities that provide the amount and kinds of stimulation that are typical for sighted children (Gold, Shaw, & Wolffe, 2010; Gosch, Bambring, Gennat, & Rohlmann,

1997; O'Mara-Maida & McCune, 1996). This lack of participation is reinforced by research that reported approximately 40% of youth with visual impairments participated in social activities (Valdes, Williamson, & Wagner, 1990).

In addition, children who are visually impaired are often more socially immature, more ego-centric, and spend significantly more time alone than sighted adolescents (Sacks & Wolffe, 1998; Tuttle & Tuttle, 2004). As a result, children with visual impairments worked harder to maintain friendships (Sacks & Wolffe, 1998), and build their identity from interactions with others in these close friendship environments (Junefelt, 2004), which may make it even more difficult in relating with the broader outside world that may then influence their psychosocial development (Kef, 2002).

This identification process for a child who is visually impaired is complicated when the identification object or person has to be taken in by other than visual means (Enckell, 2001). This means that since children who are blind or have low vision often have difficulty visually observing and imitating peers, they may have more difficulty developing positive self-esteem (Tuttle & Tuttle, 2004, Warren, 1994). Furthermore, this limited ability to learn spontaneously or incidentally through visual observation extends to broad learning in the social domain (Wolffe, 2009; Wolffe & Erin, 2012), and many of these concepts and experiences, such as facial expressions and body language, can interfere with interpersonal relationships (Wolffe, 2000).

Most of these experiences and concepts that are casually and incidentally learned by sighted students must be intentionally, systematically, and sequentially taught to the student with a visual impairment (American Foundation for the Blind, 2008; Blankenship, 2006). Developing these skills in this manner may be further complicated

because of the lack of contextual cues and honest feedback from others during their social interactions (Kim, 2003).

The difficulty for children with visual impairments in acquiring adequate social skills that contribute to problems in relating with the outside world may also be exacerbated by a negative effect on a youth's social status as a result of being visually impaired. Factors that may contribute to the child's social status are their impairment becoming more apparent, and one's own discomfort in discussing her impairment with peers, both of which create challenges to building relationships. In addition, this negative social status can leave youths feeling that they are outsiders and being excluded, tolerated and not necessarily accepted by their peers (MacCuspie, 1996; Rosenblum, 2000).

Being able to make choices in one's life, or the ability to have a certain amount of self-determination, is another important component in the development of self-perception. Christy, Shanimole, and Nuthetie (2002) include making decisions and expression preferences as factors that affect and mold an individual's personality. This is as important for children with visual impairments who should be given equal opportunities to express their own choices and make decisions, which will help them to build their own identities (Wolffe & Rosenblum, in press). Ferrell (1985), in her self-perception theory, states that the manipulation of expressive behavior should provide the opportunity for deliberate self-regulation of feelings. Wolffe (2000) further explains that children with visual impairments should be encouraged to be risk takers and problem solvers in order to facilitate social and emotional development.

Improving Self-Esteem

One of the ways children can learn to feel good about themselves is by successful participation in physical activity, especially since they often have an early interest in sports and other physical activities (Harter, 1990a, 1990b). Participation in physical activity affords children a way to develop a high level of physical competence, which seems to reinforce a positive evaluation of physical self-concept and contributes to a more positive global self-worth (Harter, 1990a, 1990b). Furthermore, perceptions of competence become more stable and resistant to change with age, which supports the need to intervene early in the development of self-perceptions of competence (Shapiro, Lieberman, & Moffett, 2003). Since kids with vision impairment show an early interest in at least some forms of physical activity, the physical activities can be easily demonstrated and reciprocated in a physical manner, which allows kids who are blind to be involved with another person more easily than other social interactions that involve more of a visual component. The process of developing physical competence is described by Roberts, Kleiber, and Duda (1981) who explain that an individual's goal is to develop skills, learn new skills, and develop mastery of a task within a specific domain (such as physical activity). Each successful mastery experience increases an individual's perceptions of ability, which in children, transfers into those who have a high perception of competence, exert more effort, persist longer, feel more in control, experience pride, and are intrinsically motivated to participate in areas in which they feel competent (Roberts et al., 1981; Weiss, Amorose, & Wilko, 2009). The benefits of feeling competent are supported by Harter's competence motivation theory, which states that

positive experiences of behavior lead to the development of positive self-concepts, which, in turn, lead to feelings of contentment, with a subsequent positive affect of global self-worth (Harter, 1978, 1981a, 1981b, 1990b). Competence motivation theory continues to be used as the basis for supporting the acquisition of perceived competence in school aged children (Weiss et al., 2009; Zou, Liu, & Yang, 2012).

These positive experiences can also translate into an internal or external locus of control (Roy & MacKay, 2002). For instance, people may act positively to exercise influence on things around them, seeking to shape their lives according to their own drives and goals, or they may act more passively fearing that their every effort is or will be useless. Repeated success or failure can shift the locus of control in either direction (Roy & MacKay, 2002), and failure in activities that seem easy for others may result in reduced self-worth (Sherrill, 1993). An external locus of control for children who are blind or visually impaired can easily translate to a perceived loss of control, which is central to the process of adjusting with sight loss (Dodds, 1993) or when one realizes they are different due to being visually impaired (Ponchillia & Ponchillia, 1996; Rosenblum, 2000). This is supported by research by Tuttle (1984) who in a study of students with visual impairments in specialized and mainstreamed schools found that these children felt a loss of control in their lives.

Physical activity is an important contributor to the growth and development of individuals in the areas of emotional and social development (American Alliance for Health, Physical Education, Recreation, and Dance, 1999; McKenzie, Sallis, Kolody, & Faucette, 1997). People who are more sedentary tend to have negative affect, depression, less effective coping mechanisms for stress, and low confidence, which contribute to low

self-esteem effecting both psychological and social aspects of their lives (Akande, Van Wyk, & Osagie, 2000; Morgan 1994). This can be exacerbated in children who experience difficulty in movement as they often have lower self-perception. These poor physical self-perceptions lead to reduced confidence in movement that often results in adverse psychosocial consequences (Bouchard & Tetrault, 2000) and failure in activities that seem easy for others may result in reduced self-worth (Sherrill, 1993).

Effect of Low Physical Fitness

Although many children with visual impairments may perceive physical activity as having few benefits and are unlikely to develop active lifestyles unless helped to feel good about themselves (Sherrill, 1998), research demonstrates that when a child with a visual impairment participates in physical education there are observable differences in body image, improved posture, and self-confidence (Palazesi, 1986). Furthermore, the lack of physical activity for youth with visual impairments becomes pervasive in adolescence as the older the individual, the less engaged they are in activities compared to sighted adolescents (Kozub & Oh, 2004; Kroksmark & Nordell, 2001; Longmuir & Bar-Or, 1994, 2000). Self-perception and health-related fitness are interconnected benefits of being physically active for persons with visual impairment. Not only do individuals with visual impairments who lack motivation to engage in physical activity often become dependent members of society who rely on others for success in navigating the community (Skaggs & Hopper, 1996), physical fitness enhances life skills that are needed for successful and independent living such as orientation and mobility training,

social development, job training, and lifetime recreational and leisure pursuits (Rosen, 1993).

Body mass index. The lower levels of physical activity of children and adults with visual impairments reach beyond the benefits of self-perception and general health-related fitness into more specific ones such as obesity (Holbrook, Caputo, Perry, Fuller, & Morgan, 2009). One method for assessing obesity is through measuring one's body composition through the calculation of the body mass index (BMI). One of the more common methods used to calculate BMI is to determine the relationship (or ratio) of an individual's weight-to-height. This is accomplished by dividing a person's body weight in kilograms by the square of his or her height in meters. There is a tendency for children with visual impairments to have higher levels of body fat than their sighted peers (Jankowski & Evans, 1981). This is further evidenced by a study of health-related fitness of youth with visual impairments, which found the passing rate for body mass index for all participants was only 34.9%, but dropped with age from 39.5% for ages 10-13 to 28.6% for age 14-17. This decline was even more pronounced in the girls in the study who had a passing rate on BMI of only 28.3% (all ages), but dropped from 36.8% for ages 10-13 to 13.6% for ages 14-17 (Lieberman, Byrne, Mattern, Watt, & Fernandez-Vivo, 2010). Another study indicated similar data for adults with visual impairment, finding mean body fat percentages of 26% for men and 37% for women (Holbrook et al., 2009), which are higher than the recommended range of health levels of body fat (10% to 22% for men, and 20% to 32% for women) (Lohman, 1982).

Physical Education and Sports

Participation in physical education (PE) classes is one avenue where children with visual impairments can learn physical skills that may in turn affect their self-concept. Furthermore, participation in physical education and sports offer many opportunities for youths to compare their skills and competence (Deci & Ryan, 1985), which can lead to positive experiences in performing various activities resulting in positive self-concepts (Gronmo &Augestad, 2000). For children with disabilities, participating and competing in sport provides the ideal type of mastery challenges to help individuals develop positive perceptions of competence and view themselves as an athlete beyond the limitations that their disability may offer (Shapiro et al., 2003). The positive impact of participating in sports for persons with visual impairments is further supported by views of national and international athletes who are blind who see sports as a way of affirming their competence, a way of focusing attention of others in their life on their abilities not their disabilities, that sports made them feel good, and that it improved self-confidence and self-fulfillment (Sherrill, 1986).

Lack of access. The connection between participation in PE classes and sports is supported by Ponchillia, Strause, and Ponchillia (2002), who reported that when children with visual impairments are involved in appropriate physical education classes, they are more likely to engage in sports. Research has shown, however, that just having students with visual impairments included in PE classes does not address these issues. Robinson and Lieberman (2004) found that students with visual impairments are typically not afforded the same opportunities to participate in various aspects of inclusive general PE

classes in the same manner as are their sighted peers. Even when they are included in general physical education classes or physical activity in their schools, students with visual impairments often do not participate in vigorous physical activities with sighted students (Lieberman & McHugh, 2001; Longmuir, 1998; Longmuir & Bar-or, 2000). Even if they do participate in vigorous activity in PE class the time students with visual impairments do devote to such movement is often brief as educators still resort to alternatives such as keeping score (McHugh & Lieberman, 2003; Sherrill, 1993).

The issue of access to participation found in PE is similar to that found in the area of athletics and organized sports. This is underscored by Ponchillia, Armbruster, and Wiebold (2005), who in their study of participants who attend Sports Education Camps for children with visual impairments across the U.S. found that 42% of students with visual impairments received no or limited access to physical education and athletic opportunities, and 58.9% of the participants reported they lacked opportunities to be involved in local sports with others.

Sports Education Camp

An alternative model of providing instruction in skill development in a way that promotes positive experience in a structured manner for children who are blind or have low vision is the AccesSports Model (ASM) developed at the Michigan Sports Education Camp (SEC). This model is used to make virtually any sports activity accessible. It is based on analyzing and then adapting an activity's basic components, that is, the goals or targets it uses, its playing boundaries, and its rules (Ponchillia, 1995; Lieberman, Ponchillia, & Ponchillia, 2013). Although not part of the ASM, certain instructional

methods, such as providing the instruction in specific motor skills by using literal descriptors, step-by-step hands on teaching and constant verbal feedback are also integral components of instructional methods used at the SEC (Lieberman et al., 2013; Ponchillia, Powell, Felski, & Nicklawski, 1992).

The SEC started in 1988 through a combined effort of Western Michigan University's Department of Blindness and Low Vision Studies and the Michigan Blind Athletic Association. The SEC used the ASM as an access tool to enable its participants to actually experience active sports participation with the express purpose of increasing the participants' physical skills, increasing their perception of themselves as athletes, for improving basic body mechanics, and increasing their knowledge of sports (Ponchillia et al., 2005; Lieberman et al., 2013).

The SEC provides ample opportunity for peer interaction and access to role-models, and is designed to provide positive experiences while building competence that can have a positive impact on the children's attitude and self-esteem. In addition, empowerment, education, and advocacy are vital components in the Michigan SEC (MSEC), and efforts such as insisting on staff referring to the participants as "athletes" and having them wear proper athletic gear during sports activities, were used to foster the image of students with visual impairments as athletes (personal communication, P. Ponchillia, March 7, 2012). Research data collected during the annual SEC evaluation repeatedly demonstrate positive growth among athletes in sports knowledge, physical skills, and attitudes towards themselves and sports. Furthermore, data from the MSEC indicate that participants who annually attend the Sports Education Camp are more likely to display a positive outlook on physical education and sports more than athletes who

have never attended a camp). In addition, children who attended a MSEC for the first time showed significant improvement in the area of positive attitude, and were 50% more likely to feel that they were better at sports then they were prior to camp (Ponchillia et al., 2005).

The SEC has been in operation for more than 25 years, yet the evaluation outcomes for the athletes have been reported sporadically (Ponchillia et al., 2005). Little is known about the SEC's effect on the hundreds of students it has served; therefore, the purpose of this study is to explore the effectiveness of short-term, intensive instruction in physical education and sport activities for children with visual impairments by focusing on self-perception and body composition of youth with visual impairments participating in a Sports Education Camp. This will be accomplished through examining measures of attitudes of participants over 24 years of the camps, and body mass index of participants over the past 10 years of the Michigan Sports Education Camp. The data obtained from the accumulated participant pool will increase the statistical power of the findings as compared to the short-term nature of the Ponchillia et al. study of 2005 and give us more confidence in the results of the analysis. This study will contribute to this body of knowledge by responding to the following four research questions:

1. What differences in measures of physical activity exist between participants over the course of their first time and repeated participation in Sports Education Camps?
2. What differences in measures of self-perception exist between participants over the course of their first time and repeated participation in Sports Education Camps?

3. What differences in measures of body mass index exist between participants over the course of their repeated participation in Sports Education Camps?
4. Is there a relationship between the levels of self-perception, physical activity and body mass index in participants of Sports Education Camps?

Method

The data for this research were collected through standardized camp evaluation procedures conducted at each site by trained evaluators and a database of all variables over camps within the specific years for which data were available (1989, 1996, 2000-2010) was compiled. This research consisted of a secondary analysis of these data.

Setting

The data were collected at the camp sites, which were divided nearly equally between the housing and athletic facilities of college campuses and residential schools for students with visual impairments. The pre-camp interviews were conducted in private settings, usually in a dormitory room somewhat separated from where the main body of the athletes were being registered during the first day of the SEC, while post-camp interviews were held in conjunction with the final track and field meet. The post-camp interviews, which required less than half the time of their pre-camp counterparts, were administered to the athletes while they were awaiting the next event for which they were registered. As far as was possible, these interviews were taken at private places around the track and field competition area.

Participants

There were a total of 671 individual athletes included in this study. Since many athletes attended an SEC two or more times, the results show 1,185 camp participations. The number of athletes varied by state, as indicated parenthetically: Alaska (19), Arizona (38), Colorado (29), Georgia (20), Maine (6), Michigan (331), North Carolina (30), Pennsylvania (28), Texas (57), Washington (59), West Virginia (6), and Wisconsin (48).

Instrument

Interview data were recorded on the Sports Camp Evaluation Instrument (SCEI) (see Appendix A) (Ponchillia et al., 2005). Data related to athletes' self-perception, sports knowledge, students' degree of participation in physical activity or sports at their local level, and BMI were obtained at the pre-camp assessment interview. In order to measure changes in self-perception and sports knowledge, these data were collected at the post-camp interview as well. BMI was calculated by dividing the athletes' body weight in kilograms by the square of their height in meters (i.e., $wt/(ht^2)$). All pre- and post-camp data were recorded on the SCEI and later transferred to Statistical Package for the Social Sciences (SPSS) data files for analysis.

Pre-camp administration of the SCEI required 20 to 30 minutes, while post-camp administration took 10 to 15 minutes. Participants were divided into groups and rotated through numerous interview and skill measuring stations. Trained interviewers or evaluators at each station explained the instrument, read the items, measured the

participant's body mass index, and recorded the measures and participant responses on the SCEI.

A 4-point Likert-type response, with categories of "never," "sometimes," "most times," and "always," was used to rate attitudinal items. Item examples include statements such as "I love sports," "I feel I am better at sports than most kids my age," and "I consider myself a good athlete." Sports-knowledge items consisted of 10 true-false statements, such as "A discus is thrown differently than a baseball," "The best goalball players throw the ball with one hand," or "The only modification made in high school wrestling for athletes with visual impairments is that the two wrestlers must maintain constant contact" (see Appendix A). The post-camp form contained identical attitudinal and sports-knowledge items as well as several items designed to determine participants' satisfaction with the camp. Examples of items designed to measure students' degree of participation in local sports or physical activity were, "I take gym class with the sighted kids in my school," "I know how to change most sport so I can play," "I play sports in places other than sports camp," and "I exercise at least 20 minutes 3 or more times a week." These items were assessed with use of Likert-type responses, as described above.

In the data, variables related to physical activity level were sometimes answered yes/no and sometimes ranked on a 4-point scale. To better understand participants' initial levels of physical activity and sports involvement, 6 variables were used to create an overall activity score. The variable of playing sports other than at camp had data in only 53 out of 671 participants and so it was dropped. The overall activity score was calculated by combining the remaining 5 variables. In the data, these variables were sometimes answered yes/no and sometimes ranked on a 4-point scale. Values for

calculating the overall activity score were assigned as follows: No = 0, Yes = 1, Never = 0, sometimes = 1, most times = 2, always = 3. Scores for the 5 variables were added to get an overall score that could range from 0 to 12. The upper limit for the overall variable was 12 instead of 15 because the overall variable was calculated for those instances where data were available for 4 of the 5 component variables (there were only 32 cases where all 5 were present and these were omitted in favor of the 398 cases where 4 were present). Variables related to self-perception were always measured on a 4-point scale. Overall scores for self-perception were created by assigning values as follows: Never = 1, sometimes = 2, most times = 3, always = 4. Scores on the self-perception variables were then added to create an overall score that could range from 4 to 16.

Analysis

Data collected from the pre- and posttests for first time participants, and the pre- and post-camp assessments for returning athletes from each year's camp were imported into the SPSS database. Analysis of Variance (ANOVA) was used to test the statistical differences in BMI between repeated camp attendances, controlling for variables such as gender and visual condition. Matched samples *t* tests were used to follow up year-to-year differences. In addition, paired samples *t* tests were used to test the statistical differences in BMI, level of physical activity, and level of self-perception between pre- and posttests for first time as well as returning participants. Chi-squares were used to explore relationships of self-perception and activity level, between pre- and posttests of first time and returning participants, and to compare self-perception to the variables of age, gender,

vision categorization, and race/ethnicity. Missing data and nonresponses were excluded from analysis on a case-by-case basis.

Results

Results indicate that average BMI for first-time participants of Sports Education Camps was relatively consistent across gender (males = 21.74, females = 23.02), race/ethnicity (Caucasian = 22.27, minorities = 22.47), vision classification (have some vision = 22.37, have no vision = 22.03) and feeling safe when running (feel safe running = 22.55, do not feel safe running = 21.92) (see Table 3.1). Independent samples *t* tests found no significant differences of average BMI for the above characteristics. An analysis of variance (ANOVA) for average BMI across ages indicated a significant difference for first-time attendees ($F(10,326) = 3.44$, $p < .001$). Table 3.1 shows a fairly steady increase in BMI as the age of participants increases from 9 to 18 years old.

Table 3.2 shows initial BMI of participants of Sports Education Camps in Michigan compared to all other states, broken down by the selected characteristics of gender, race/ethnicity, age, and vision classification. The data indicate that mean BMI was lower for males in the Michigan sample than other states ($t(168) = 3.9$, $p < .001$, means 20.33 and 23.09, respectively), but this was not true for the mean BMI of females from all other states ($t(164) = –.08$, $p = .94$). Mean BMI tended to be higher with increasing age in both samples ($F(10,166) = 3.18$, $p = .001$ for MI sample and $F(9,150) = 2.33$, $p = .02$ for non-MI sample). Mean BMI was not statistically different between Caucasians and minorities for either the Michigan sample ($t(114) = –.11$, $p = .92$) or the non-Michigan sample ($t(141) = .54$, $p = .59$). Those in the "have some vision" category from the Michigan sample had a significantly lower mean BMI than participants from all

other states (21.61 and 23.10, respectively, $t(270) = 2.15$, $p = .03$). This was not the case when those camp attendees who felt safe running were compared along Michigan versus non-Michigan attendees ($t(178) = 1.43$, $p = .15$).

Table 3.1

Breakdown of Average BMI by Selected Characteristics of First-time Participants of a Sports Education Camp

Characteristic	*N*	%	Min.	Max.	Mean	*SD*
Gender						
Male	125	54.6	11	38	21.74	5.08
Female	104	45.4	13	48	23.02	6.84
Age category						
9	12	5.2	15	25	18.51	3.72
10	25	10.9	14	24	18.68	2.61
11	39	17.0	15	36	21.66	5.52
12	32	14.0	13	42	21.84	6.31
13	26	11.4	11	32	21.57	5.28
14	24	10.5	14	38	22.31	4.75
15	39	17.0	18	42	24.96	6.13
16	17	7.4	17	37	24.65	6.37
17	11	4.8	16	48	25.81	8.62
18	3	1.3	17	38	25.67	10.97
19	1	.004	n/a	n/a	n/a	n/a
Race/Ethnicity						
Caucasian	163	71.2	11	42	22.27	5.79
Minority	66	28.8	14	48	22.47	6.41
Have some vision						
Yes	200	87.3	11	48	22.37	6.04
No	29	12.7	14	38	22.03	5.52
Feel safe running						
Yes	148	64.6	11	48	22.55	6.07
No	81	35.4	14	38	21.92	5.77

Table 3.2

Comparison of Average Initial BMI and Selected Characteristics of Study Participants

	Only Michigan participants					Non Michigan participants				
	n	Min.	Max.	Mean	*SD*	*n*	Min.	Max.	Mean	*SD*
Gender										
Male	61	11	38	20.33	4.91	64	16	37	23.09	4.90
Female	51	13	48	23.37	7.54	53	15	42	22.70	6.14
Age category										
9	8	15	25	18.64	4.26	4	15	22	18.25	2.87
10	20	14	24	18.86	2.77	5	16	20	18.00	2.00
11	19	15	36	21.35	6.20	20	16	34	21.95	4.94
12	13	13	28	19.14	4.33	19	16	42	23.68	6.86
13	10	11	32	20.97	6.32	16	16	32	21.94	4.70
14	13	14	38	21.80	5.73	11	18	31	22.91	3.45
15	19	18	42	25.92	6.87	20	18	39	24.05	5.36
16	5	17	27	20.84	3.75	12	18	37	26.24	6.67
17	3	20	48	31.04	14.91	8	16	32	23.85	5.14
18	1	n/a	n/a	n/a	n/a	2	17	22	19.50	3.54
19	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Race/ Ethnicity										
Caucasian	84	11	42	21.69	5.98	79	15	39	22.88	5.56
Minority	28	14	48	21.79	7.65	38	16	42	22.97	5.38
Do you have some vision?										
Yes	98	11	48	21.61	6.41	102	15	42	23.10	5.59
No	14	14	38	22.43	6.55	15	16	32	21.65	4.56
Do you feel safe running?										
Yes	67	11	48	21.68	6.48	81	15	42	23.26	5.65
No	45	14	38	21.75	6.36	36	16	35	22.13	5.03

Table 3.3 shows pre-camp BMI values broken down by one-time or repeat attendance, gender, age, ethnicity, visual classification, and whether a camper felt safe running unassisted. An analysis of variance compared average pre-camp BMI using

between subjects factors of age, gender, race/ethnicity, visual classification, whether a camper felt safe running alone, and whether a camper came to camp only once or eventually came again. There was a significant main effect of age ($F(10,116) = 1.93$, $p = .05$) and the only significant interaction was a three-way interaction between gender, ethnicity, and safely running ($F(6,116) = 7.31$, $p = .008$).

Table 3.4 shows BMI for those who repeated attendance at a Sports Education Camp. A paired samples *t* test was conducted to measure the impact of repeated participation at SECs by evaluating the differences of mean BMI between each succeeding years participants attended an SEC. The means indicate that BMI tended to increase with repeated participation ($M = 21.36$, $SD = 6.05$ first-time and $M = 23.74$, $SD = 4.31$ seventh time). Significant differences were found for mean BMI between one and two camp attendances ($M = 21.36$ versus $M = 22.23$; $t(82) = –2.26$, $p = .03$), between two and three camp attendances ($M = 22.23$ versus $M = 22.59$; $t(45) = –4.17$, $p < .001$), and between four and five camp attendances ($M = 23.22$ versus $M = 23.65$; $t(18) = –2.52$, $p = .02$). In addition to the mean BMI tending upward for participants with repeated attendance, the minimum range of BMI also tended upward between one-time attendance ($M = 9$) and seventh time ($M = 18$), while the maximum range of BMI tended downward between one-time attendance ($M = 42$) and seventh time ($M = 29$). These results seem to suggest that repeat attendance at a Sports Education Camp did not have a positive impact on a participant's BMI. This may be confounded by age as adolescents with visual impairments have a higher BMI than younger children.

Table 3.3

BMI Comparison Between One-time and Repeat Participants at a Sports Education Camp by Gender, Age, Race/Ethnicity and Visual Classification

	One-time participants					Repeat participants				
	n	Min.	Max.	Mean	*SD*	*n*	Min.	Max.	Mean	*SD*
Gender										
Male	86	11	38	22.59	5.06	39	13	36	19.87	4.64
Female	83	13	48	22.48	6.49	21	15	42	25.19	7.88
Age category										
9	6	15	25	18.85	3.95	6	15	25	18.17	3.82
10	14	16	22	18.74	2.00	11	14	24	18.60	3.41
11	26	15	34	21.45	4.75	13	15	36	22.06	7.02
12	25	16	42	22.87	6.52	7	13	24	18.14	3.85
13	20	11	32	20.69	5.22	6	20	32	24.50	4.72
14	20	18	38	23.02	4.69	4	14	23	18.75	3.69
15	31	18	39	24.30	5.56	8	20	42	27.50	7.89
16	14	18	37	25.29	6.60	3	17	27	21.67	5.03
17	10	16	48	26.39	8.85	1	n/a	n/a	n/a	n/a
18	2	17	22	19.50	3.54	1	n/a	n/a	n/a	n/a
19	1	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	n/a
Race/ Ethnicity										
Caucasian	114	11	39	22.49	5.60	49	13	42	21.75	6.25
Minority	55	15	48	22.64	6.22	11	14	38	21.64	7.55
Do you have some vision?										
Yes	148	11	48	22.62	5.96	52	13	42	21.65	6.25
No	21	16	32	21.94	4.48	8	14	38	22.25	8.03
Do you feel safe running?										
Yes	113	11	48	22.88	6.11	35	13	42	21.48	5.92
No	56	15	38	21.85	5.08	25	14	38	22.08	7.21

Table 3.4

Impact of Repeated Attendance on BMI for Repeat Participants at a Sports Education Camp

Camp Iteration	*N*	Min.	Max.	Mean	*SD*
Time 1 (first time)	94	9	42	21.36	6.05
Time 2	111	13	44	22.23	5.99
Time 3	61	14	37	22.59	5.11
Time 4	34	16	36	23.22	4.90
Time 5	19	17	42	23.65	5.94
Time 6	8	17	29	23.00	4.24
Time 7	5	18	29	23.74	4.31
Time 8	1	19	19	19.00	n/a

Table 3.5 compares initial physical activity levels of one-time and repeat participants of Sports Education Camps. Due to limited frequencies in some response cells, categories were combined for initial analysis. During some years camp participants were asked the questions in Table 3.5 as "yes/no" questions while in other years they were given a choice of 4 levels of response (see Table 3.5). For the initial analysis, responses of "never" were categorized as "no" and all other levels were categorized as "yes." This recategorization reflects a comparison of participants who indicated any level of positive response versus a negative response to a given question. Chi-square analyses indicated that there was no difference between participants who attended once versus those who came more than once in amount of exercise per week ($\chi^2(1) = .70$, $p = .40$), whether they took gym with their sighted peers ($\chi^2(1) = .91$, $p = .34$), whether they played the same games as their sighted peers ($\chi^2(1) = .14$, $p = .71$), whether they were on a sports

Table 3.5

Activity Level Comparison Between One-time and Repeat Participants at a Sports Education Camp

	One-time participants							Repeat participants						
	Yes	No	Never	Sometimes	Most times	Always		Yes	No	Never	Sometimes	Most times	Always
	Exercise 20 minutes three times a week (*n* = 414)							*Exercise 20 minutes three times a week* (n = 414)					
Freq	46	24	66	129	62	87	Freq	40	23	9	11	6	10
%	11.1	5.8	15.9	31.2	15.0	21.0	%	40.4	23.2	9.1	11.1	6.1	10.1
	Take P.E. class with sighted kids (*n* = 234)							*Take P.E. class with sighted kids* (*n* = 40)					
Freq	108	32	20	12	10	52	Freq	22	7	1	2	2	6
%	46.2	13.7	8.5	5.1	4.3	22.2	%	55.0	17.5	2.5	5.0	5.0	15.0
	Participate in same P.E. as sighted kids (*n* = 442)							*Participate in same P.E. as sighted kids* (*n* = 104)					
Freq	83	34	139	81	34	71	Freq	45	26	13	6	2	12
%	18.8	7.7	31.4	18.3	7.7	16.1	%	43.3	25.0	12.5	5.8	1.9	11.5
	On a sports team in school last year (*n* = 256)							*On a sports team in school last year* (*n* = 73)					
Freq	76	180	0	0	0	0	Freq	21	52	0	0	0	0
%	29.7	70.3	0	0	0	0	%	28.8	71.2	0	0	0	0
	Play sports with other VI kids (*n* = 464)							*Play sports with other VI kids* (*n* = 104)					
Freq	61	92	132	127	17	35	Freq	30	48	9	8	4	5
%	13.1	19.8	28.4	27.4	3.7	7.5	%	28.8	46.2	8.7	7.7	3.8	4.8

team in the last year ($\chi^2(1) = .02$, $p = .88$), or whether they were on a sports team with other visually impaired youth ($\chi^2(1) = .60$, $p = .44$).

The overall activity score was calculated by combining the 5 variables shown in Table 3.5. For 328 one-time participants, scores ranged from 0 to 12 with a mean of 4.33 and a standard deviation of 2.49. For 69 repeat participants, scores ranged from 0 to 9 with a mean of 3.28 and a standard deviation of 2.18. An independent samples *t* test was conducted to evaluate the differences between measures of initial activity levels between one-time and repeat participants. Results indicated that those who attended an SEC only one-time had higher overall activity scores than those who eventually repeated participation ($t(3.28) = 395$, $p = .001$).

Table 3.6 shows scores of self-perception of first-time participants of a SEC across characteristics of gender, age, race/ethnicity, visual classification, and whether they felt safe running fast without a guide runner. For the variable of age in each section of the table, only ages 9-18 had enough data to satisfactorily fill the cells to run chi-square statistics. Chi-square analyses were conducted on the four self-perception variables of "I love sports," "I am better at sports than most kids my age," "I consider myself a good athlete," and "I am as strong as other kids" with each of the demographic variables. Results indicate that gender was significantly related to the variable of "I love sports," ($\chi^2(3) = 30.27$, $p < .001$), with boys feeling stronger about their view of loving sports than girls. The variable of "have some vision" was significantly related to both "I am better at sports than most kids my age" ($\chi^2(3) = 10.94$, $p = .01$) and "I consider myself a good athlete" ($\chi^2(3) = 12.79$, $p = .005$), with participants who reported having some

Table 3.6

Relationship of Self-Perception and Selected Characteristics of First-time Participants of a Sports Education Camp

Characteristic	Scores on Perception Items			
	Never	Sometimes	Most times	Always
		I love sports		
Gender				
Male	0	67	64	160
Female	10	88	67	90
Age				
9	1	8	6	12
10	1	26	16	42
11	0	24	24	43
12	2	21	20	34
13	2	12	19	27
14	1	15	17	23
15	0	25	10	28
16	1	13	9	18
17	1	7	4	14
18	0	4	3	3
Race/Ethnicity				
Caucasian	4	86	55	111
Minority	0	27	26	50
Have Some Vision				
Yes	9	126	100	213
No	1	29	30	39
Feel Safe Running				
Yes	3	92	82	15
No	5	46	34	7

Table 3.6—Continued

Characteristic	Scores on Perception Items			
	Never	Sometimes	Most times	Always
	Am better in sports than most kids my age			
Gender				
Male	64	172	34	24
Female	73	133	29	14
Age				
9	8	11	3	4
10	24	49	3	7
11	18	56	11	7
12	23	34	11	5
13	14	35	6	3
14	17	31	9	2
15	12	44	9	2
16	9	23	5	4
17	3	14	5	2
18	4	5	1	0
Race/Ethnicity				
Caucasian	73	148	32	19
Minority	20	66	15	9
Have Some Vision				
Yes	99	264	53	31
No	37	45	9	6
Feel Safe Running				
Yes	68	203	38	27
No	49	89	18	10

Table 3.6—Continued

	Scores on Perception Items			
	Never	Sometimes	Most times	Always
	Consider myself a good athlete			
Gender				
Male	18	72	52	124
Female	19	87	43	92
Age				
9	3	6	6	9
10	2	15	12	45
11	4	23	15	38
12	5	24	11	32
13	4	23	8	25
14	7	16	11	18
15	3	26	15	20
16	5	14	8	12
17	2	4	5	12
18	1	5	1	3
Race/Ethnicity				
Caucasian	24	83	53	113
Minority	6	33	18	53
Have Some Vision				
Yes	23	129	78	188
No	14	30	16	30
Feel Safe Running				
Yes	18	87	59	148
No	11	58	27	59

Table 3.6—Continued

	Scores on Perception Items			
	Never	Sometimes	Most times	Always
	I am as strong as other kids			
Gender				
Male	12	60	36	43
Female	8	54	29	37
Age				
9	1	5	0	4
10	2	24	12	9
11	3	25	6	14
12	4	12	7	10
13	1	13	10	8
14	5	6	9	8
15	0	8	9	14
16	0	11	3	8
17	1	7	5	1
18	0	2	2	1
Race/Ethnicity				
Caucasian	6	38	23	28
Minority	2	14	8	11
Have Some Vision				
Yes	15	96	58	65
No	5	19	6	16
Feel Safe Running				
Yes	10	72	45	51
No	8	30	14	22

vision feeling much stronger about these variables than did those who do not have some vision. There was no significant relationship between any of the selected characteristics noted above and the variable of "I am as strong as other kids."

Data indicate that three out of the four measures of self-perception were not significantly related to the location of the camp for either one-time or repeat participants. Chi-square analyses were conducted on the four self-perception variables, and only the variable of "I love sports," was significantly related to where the camp was held for one-time participants ($\chi^2(33) = 59.86$, $p = .003$). No significant relationship was found between whether the participant participated only once or repeated their participation and the location of the camp they attended.

Chi-square analyses were conducted comparing the variables of gender, age, race/ethnicity, and vision category to each of the self-perception variables of "I love sports," "Consider myself a good athlete," "I am as strong as other kids," and "Am better in sports than most kids my age." These analyses were performed separately for one-time attendees and repeat attendees. The variable of "I love sports" was significantly related to gender for both one-time and repeat participants ($\chi^2(3) = 22.36$, $p < .001$, and $\chi^2(3) = 8.22$, $p = .04$, respectively), with boys feeling much stronger about loving sports. The only other significant relationship for repeat camp attendees was between the variables of "I love sports" and age ($\chi^2(3) = 39.95$, $p = .02$). For one time participants, gender was significantly related to "Consider myself a good athlete" ($\chi^2(3) = 8.13$, $p = .04$). Data also indicated that for one-time participants there was a significant relationship between "have some vision" for three of the self-perception variables: "Consider myself a good athlete" ($\chi^2(3) = 11.92$, $p = .008$); "I am as strong as other kids" ($\chi^2(3) = 7.66$, $p = .05$); and "Am

better in sports than most kids my age"($\chi^2(3) = 7.88$, $p = .05$). Table 3.7 shows the data behind the significant relationships.

Table 3.7

Comparison of Self-Perception by Gender, Age, Race/Ethnicity and Visual Classification for One-time and Repeat Participants at a Sports Education Camp

	One-time participants				Repeat participants			
Characteristic	Never	Some times	Most times	Always	Never	Some times	Most times	Always
				I love sports				
Gender								
Male	0	56	57	127	0	11	7	33
Female	8	73	59	75	2	15	8	15
Age								
9	0	6	2	10	1	2	4	2
10	1	17	13	32	0	9	3	10
11	0	20	23	29	0	4	1	14
12	2	19	19	25	0	2	1	9
13	2	10	16	24	0	2	3	3
14	1	11	15	21	0	4	2	2
15	0	23	9	24	0	2	1	4
16	0	13	9	16	1	0	0	2
17	1	7	4	14	n/a	n/a	n/a	n/a
18	0	3	3	3	0	1	0	0
				Consider myself a good athlete				
Gender								
Male	15	50	40	103	3	22	12	21
Female	16	72	36	76	3	15	7	16
Have some vision								
Yes	19	99	61	157	4	30	17	31
No	12	23	14	24	2	7	2	6
				Am better in sports than most kids my age				
Have some vision								
Yes	79	218	46	24	20	46	7	7
No	29	38	8	5	8	7	1	1
				I am as strong as other kids				
Have some vision								
Yes	13	81	54	52	2	15	4	13
No	5	16	4	13	0	3	3	3

Chi-square analyses were conducted to explore the relationships between measures of self-perception to measures of physical activity level for youth who participated in a SEC one-time and youth who repeated participation. The self-perception variable of "I love sports" was significantly related to the physical activity level variable of "On a sports team in school last year" for both one-time participation in a SEC ($\chi^2(3) = 20.97$, $p < .001$), and repeat participation in a SEC ($\chi^2(3) = 8.14$, $p = .04$). Data indicated no other significant relationships between any variables of self-perception and physical activity level for repeat participants. On the other hand, for one time participants, "I love sports" was significantly related to the variables of "Take part in same PE activities as sighted peers" ($\chi^2(15) = 28.39$, $p = .02$), and "exercise at least 20 minutes three times a week" ($\chi^2(15) = 42.02$, $p < .001$). For one-time participants, "I am as strong as other kids" was also significantly related to the variable "take part in same PE activities as sighted peers" ($\chi^2(15) = 32.30$, $p = .006$), and the variable "I am better at sports than other kids" was significantly related to the variable "exercise at least 20 minutes three times a week" ($\chi^2(15) = 34.79$, $p = .003$). Also for one-time participants, the variable of "I am as good an athlete as other kids" was significantly related to the variables of "take part in same PE activities as sighted peers" ($\chi^2(15) = 27.23$, $p = .03$), "exercise at least 20 minutes three times a week" ($\chi^2(15) = 26.35$, $p = .03$), and "on a sports team in school last year" ($\chi^2(15) = 16.58$, $p = .001$).

Table 3.8 shows mean scores for the derived overall scores of physical activity and self-perception, as well as BMI, for one-time and repeat participants of Sports Education Camps. A mixed model ANOVA with overall perception score and overall activity score as within subjects variables and one-time or repeat attendance as a

between-subjects variable was run. The variable of BMI was not able to be entered in this analysis due to limited cases in the dataset. Results indicated no significant effects. Matched samples *t* tests indicated no significant differences between mean self-perception and BMI for either those who attended an SEC one-time or those who repeated participation.

Table 3.8

Self-Perception, Level of Physical Activity, and BMI for One-time and Repeat Participants in a Sports Education Camp

	One-time participants					Repeat participants				
	n	Min.	Max.	Mean	*SD*	*n*	Min.	Max.	Mean	*SD*
Overall perception score	154	6	16	11.13	2.47	17	6	15	10.76	2.41
Overall activity score	328	0	12	4.33	2.49	69	0	9	3.28	2.18
BMI	267	11	48	22.05	5.66	76	13	42	21.38	6.07

Comparisons between pre- and post-camp measures of self-perception for one-time and repeat participants of an SEC (see Table 3.9) were evaluated using chi-square analyses. Data indicated a significant relationship between pre and post-camp measures for the self-perception variable of "I love sports" for both one-time and repeat participants ($\chi^2(9) = 42.1$, $p < .001$ and $\chi^2(6) = 41.74$, $p < .001$, respectively). In addition, pre- and post-camp measures for the self-perception variable of "I am as strong as other kids" were also significantly related for both one-time and repeat participants ($\chi^2(9) = 82.37$, $p < .001$ and $\chi^2(9) = 17.86$, $p = .04$, respectively), as were the pre- and post-camp measures for the self-perception variables of "I am as good an athlete as other kids" ($\chi^2(9) = 163.2$, $p < .001$ and $\chi^2(6) = 38.66$, $p < .001$, respectively), and "I am better at

Table 3.9

Pre-Post Comparisons of Self-Perception for One-time and Repeat Participants at a Sports Education Camp

One-time participants					Repeat participants				
	I love sports					*I love sports*			
	Post					Post			
Pre	Never	Some times	Most times	Always	Pre	Never	Some times	Most times	Always
Never	2	4	0	0	Never	n/a	0	0	0
Sometimes	2	65	33	23	Sometimes	n/a	5	5	8
Most times	1	19	54	33	Most times	n/a	6	6	6
Always	1	10	14	146	Always	n/a	1	1	41
	I am as strong as other kids					*I am as strong as other kids*			
	Post					Post			
Pre	Never	Some times	Most times	Always	Pre	Never	Some times	Most times	Always
Never	9	3	1	0	Never	1	0	0	0
Sometimes	12	39	12	13	Sometimes	1	3	2	2
Most times	2	12	22	15	Most times	0	1	1	4
Always	4	7	11	30	Always	0	1	2	8
	I am as good an athlete as other kids					*I am as good an athlete as other kids*			
	Post					Post			
Pre	Never	Some times	Most times	Always	Pre	Never	Some times	Most times	Always
Never	7	14	5	3	Never	n/a	4	1	1
Sometimes	1	45	32	35	Sometimes	n/a	12	9	13
Most times	1	13	30	26	Most times	n/a	1	8	10
Always	0	12	26	127	Always	n/a	0	3	32
	I am better at sports than other kids					*I am better at sports than other kids*			
	Post					Post			
Pre	Never	Some times	Most times	Always	Pre	Never	Some times	Most times	Always
Never	47	40	6	4	Never	12	12	2	2
Sometimes	15	142	25	17	Sometimes	3	29	6	7
Most times	2	16	20	9	Most times	0	2	1	3
Always	1	8	6	12	Always	0	3	0	5

sports than other kids" ($\chi^2(9) = 155.5$, $p < .001$ and $\chi^2(9) = 33.15$, $p < .001$, respectively). Furthermore, a paired-samples *t* test was conducted to evaluate the differences in pre- and post-camp means on overall measures of self-perception for one-time and repeat participants. Results showed a significant difference between the pre- and post-camp means on measures of self-perception between those who attended a SEC one-time ($M = 11.09$ pre and $M = 11.73$ post; $t(149) = -3.57$, $p < .001$) and those who repeated participation ($M = 10.76$ pre and $M = 12.41$ post; $t(16) = -3.2$, $p = .006$).

Table 3.10 shows how participants attending an SEC for their first through eighth time responded to questions regarding how often they exercised, whether they take part in the same physical activities as their sighted peers, whether they are on sports teams at school, whether they play sports other than at camp, and whether they play sports with other youth with visual impairments. In order to determine whether increased attendance at SECs has an impact on positive responses, response categories of "sometimes," "most times," and "always" were grouped with the response of "yes" and responses of "never" were grouped with response of "no." Chi-square analyses were conducted on the data but limited to years of participation 1 through 5 in order to maintain at least a frequency of 5 in each cell of the analysis (years 1 through 3 for "play sports other than at camp"). Analyses indicate a strongly significant association for increased participation in a SEC to increase the likelihood of a positive response in each of the measures. For exercising at least 20 minutes, three times a week, $\chi^2(4) = 990.49$, $p < .001$; for taking part in the same activities as sighted peers, $\chi^2(4) = 604.32$, $p < .001$; for being on a sports team in the last year, $\chi^2(4) = 151.05$, $p < .001$; for playing sports other than at camp, $\chi^2(2) = 49.69$, $p < .001$; and for playing sports with other youth with visual impairments, $\chi^2(4) = 254.63$,

$p < .001$. It is important to note that with the exception of being on a sports team, responses on all of these measures tended to be more positive than negative at the outset and the proportion of positive to negative increased as years of participation increased. On the measure of being on a sports team in the last year, almost twice as many participants started out not having been on a sports team but by the time a youth had taken part in 5 sports camps, the proportion was more 50-50.

Table 3.10

Impact of Repeated Attendance on Activity Level for Repeat Participants at a Sports Education Camp (Frequencies)

Camp iteration	Never	Sometimes	Most times	Always	Yes	No
			Exercise at least 20 minutes three times a week			
Time 1 (first time)	14	24	15	25	47	30
Time 2	10	22	12	23	64	28
Time 3		9	3	8	33	15
Time 4			1	1	19	14
Time 5				1	12	7
Time 6					6	3
Time 7					3	2
Time 8					1	
			Take part in same PE activities as sighted peers			
Time 1 (first time)	19	9	11	31	51	33
Time 2	27	11	12	21	49	25
Time 3	4	4	3	5	28	14
Time 4		2	1	2	14	5
Time 5					12	5
Time 6	1	1		1	2	2
Time 7					3	2
Time 8						

Table 3.10—Continued

Camp iteration	Never	Sometimes	Most times	Always	Yes	No
			On a sports team in school last year			
Time 1 (first time)					35	67
Time 2					43	81
Time 3					16	36
Time 4					12	22
Time 5					9	10
Time 6					5	4
Time 7					2	3
Time 8						1
			Play sports other than at camp			
Time 1 (first time)					16	32
Time 2					14	31
Time 3					10	9
Time 4					1	1
Time 5					1	
Time 6						
Time 7						
Time 8						
			Play sports with other kids with visual impairments			
Time 1 (first time)	16	15	9	12	41	54
Time 2	7	15	3	29	33	73
Time 3		1	1	5	30	30
Time 4				1	20	14
Time 5					11	9
Time 6					6	3
Time 7					5	
Time 8					1	

Discussion

The main purpose of this study was to determine if participation in Sports Education Camps for young athletes with visual impairments made a significant difference in their self-perception, level of physical activity in their local community, and BMI. Data were organized so that comparisons could be made between first-time and repeat participation, or one-time and returning participation, as well as the location of the camp.

Data indicated that the short-term intervention model of a Sports education camp had a positive impact on the participants' perceptions of themselves. First-time attendees at a SEC demonstrated significant growth in their positive attitudes of themselves between the times of pre- and post-camp measures in three out of four areas of self-perception ("I love sports," "I am better at sports than most kids my age," and "I consider myself a good athlete"). Findings were similar for those in the one-time grouping, who also demonstrated significant growth in their positive attitudes of themselves between the times of pre- and post-camp measures in three out of four areas of self-perception ("I am as strong as other kids," "I am better at sports than most kids my age," and "I consider myself a good athlete"). First-time participants of a SEC who were in the "have some vision" group were more likely to perceived themselves as a good athlete and being better at sports than other kids their age.

Data indicated a strength of positive attitudes for repeat participants as they continued to respond positively to the self-perception item of "I love sports." This is consistent with findings of earlier research (Ponchillia et al., 2005). In addition, this level

of positive impact on participants' view of loving sports was also significant across locations of the SEC. Furthermore, this positive impact was particularly evident for boys in that after attending an SEC, boys felt strongly about their view of loving sports for first-time, one-time, and repeat attendance at a SEC. This may be explained by the long-held notion that boys are more oriented and encouraged toward sports, and that many of their boyhood heroes and idols are sports figures (Giuliano, Turner, Lundquist, & Knight, 2007). Or it may simply be that those interested in sports go to this type of camp and are more likely to repeat participation.

These findings suggest that the effect of attending a SEC on participants' self-perception is much stronger for first-time attendees, and that significant changes occur in how they perceive themselves during that first time attendance. This is consistent with findings of earlier research (Lieberman et al., 2013; Ponchillia et al., 2005). There are a multitude of possible explanations of why there is such a major change in one's self-perception during the course of their first attendance at a SEC. These include participants being expected to be athletes and being treated as athletes from the moment they arrived at the camp, the specific instruction (AccessSports model) they received that enabled them to experience success at sport activities, the ability to spend a great deal of time with other kids with vision impairments, exposure to other athletes with vision impairments who were seen as being good at sports (which can be the only time many of the students have access to such peers), and exposure to adults with visual impairments who were elite athletes themselves or who were in leadership or instructor roles. Although none of these explanations were specifically investigated in this study, their potential effect cannot be understated. Any one of these factors individually fit Sherrill's

(1998) two important components in the development of self-concept: “I can do” reflecting perceived competence, and “I am” reflecting perceived identity. When these factors are combined, they surely promote the kind of positive experiences of behavior that lead to the development of positive self-concepts, which have a positive effect on the student’s self-worth described by Harter (1978).

The significance of the change that occurred in those who participated in SEC one time was also evident when looking at levels of physical activity in local communities, and the relationship between this activity level and self-perception. Scores for one-time participants increased on four out of five measures of physical activity, with only the measure of “On a sports team in school last year” having no difference between one-time and repeat participants. This indicates that participants are taking the experience and confidence from SEC and incorporating it in their lives at home, which underscores the effect of this short-term intervention model.

Although the connection between participation in a SEC one time and growth in measures of physical activity level and self-perception seems abundantly clear, there are also areas where there is a significant relationship between self-perception and level of physical activity for those who repeat attendance at a SEC. Those one-time and repeat participants who love sports also are those who scored high on the physical activity level of “On a sports team at school last year.” Although it might be expected that those who love sports would be more apt to join sports in their schools, this finding might also be explained by those who scored high in both measures being those who love sports enough to join a local sports team are more likely to return to a subsequent Sports education camp.

BMI of one-time and repeat participants was also investigated. Although mean BMI of first-time participants of a SEC was consistent across the variables of gender, race/ethnicity, and vision category, as well as for the location of the camp, BMI of first-time participants tended to be higher with the age of the participant. This is consistent with findings of earlier research that show a higher BMI for adolescents with vision impairments than younger children (Lieberman et al., 2010). Although BMI for first-time adolescent participants in this study were representative of adolescents in the general population (M = 24.65 and 24, respectively, for 16 year olds), younger participants in our study tended to have a higher BMI than the general population (Longley, 2002; Ogden, Carroll, & Flegal, 2008). In addition, mean BMI was consistent between one-time participants and those who repeated participation at least once, except in the case of gender. In this case, males who repeated attendance at least once at a SEC had a significantly lower BMI than males who attended only one time. This finding underscores the connection between BMI for boys who return to a SEC and their heightened feeling of loving sports and being more likely to be on a sports team in school. Results of this study also show that mean BMI tended to increase with the number of repeated participations. This finding is also consistent with the findings described above that indicate that adolescents with visual impairment have a higher BMI. Thus, age may be a confounding variable for BMI over repeated participation and could simply be increasing normally as children age into adolescents.

Although the sample of first-time attendees of a SEC is sufficient in size to generalize its positive impact on improving self-perception for youth who attend such camps, the small sample size for those who repeat participation in a SEC used in this

study is a limitation on the longitudinal data. Further research of existing SECs in future years is recommended. Adding data from the SECs that were part of the National SEC project and continued to operate following its conclusion in 2003, as well as other SECs that have been developed in other states not included in this study, is one way to eliminate the limitations of the small number of participants who repeated attendance in the SECs in this study. Increasing the longitudinal sample in this manner will assist researchers in analyzing the effect of repeated attendance in a SEC on self-perception, level of physical activity in local settings, and BMI.

Conclusions

This study explored the relationship between first-time or repeat participation at a SEC and demographic variables of gender, age, race/ethnicity, measures of self-perception, BMI, and level of physical activity in participants' local communities. These findings revealed that the short-term intervention model of a Sports education camp is highly effective in increasing participants' level of self-perception for youngsters with vision impairments. The use of the AccesSports Model utilized to adapt sports and the provision of the use of intentional, systematic, and sequential methods used to teach numerous concepts in basic body mechanics and teaching sport-specific skills in sports taught at a SEC, being immersed in an environment where expectations are heightened, exposure to peers, and exposure to adults who are visually impaired and who are elite athletes or in positions of leadership or instructors could be major contributing factors to the participants' increases in self-perception during the camps. These findings are

consistent with other research that looked at the impact of the SEC model on the positive attitude of participants (Lieberman et al., 2013; Ponchillia et al., 2005).

Future research should focus on (a) methods for increasing the effect of participating in a SEC over time, and (b) strategies for increasing the number of SEC participants in this database.

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CHAPTER 4

DESCRIBING THE POPULATION OF PARTICIPANTS OF SPORTS EDUCATION CAMPS FOR CHILDREN WITH VISUAL IMPAIRMENTS

Background

Lack of General Access

Access to appropriate levels of physical education for children with visual impairments can be problematic in three ways. First, children with visual impairments have motor needs which result from lack of suitable movement experiences due to their limited sight. In addition, lack of instruction and practice in movements experiences further impact their motor development (Jan, Sykanda, & Groenweld, 1990; Kozub & Oh, 2004; Lieberman & McHugh, 2001; Pereira, 1990; Sherrill, 2004). Finally, perceived and/or actual barriers may inhibit successful physical education instruction for children with visual impairments (Lieberman, Houston-Wilson, & Kozub, 2002). Although children with visual impairments may have the same potential for motor skills and fitness as their sighted peers, the lack of the type of opportunities noted above (i.e., suitable movement experiences, lack of training, and perceived or actual barriers to participation) lead to poor levels of physical fitness and motor skill development (Kalloniatis & Johnston, 1994; Kef, 1997; Korhonen, 2000; Kroksmark & Nordell, 2001; Lieberman & Houston-Wilson, 1999; Lieberman & McHugh, 2001; Ponchillia, 1995; Rosenblum, 1997; Skaggs & Hopper, 1996).

Barriers to Participation

In addition to fewer opportunities, children who are blind have fewer incentives to engage in activities that provide the amount and type of stimulation that are typical for sighted children (Gosch, Bambring, Gennat, & Rohlmann, 1997; O'Mara-Maida & McCune, 1996). Lower expectations from others and a general devaluing of physical activity for children who are visually impaired, and the greater barriers these children face, can exacerbate the deficits in physical activity they already experience compared to sighted children (Stuart, Lieberman, & Hand, 2006). Specific barriers to participation in physical activity include overprotection of the children by parents and teachers, limited expectations on the part of parents and teachers, and fears about children's safety and lack of understanding of children's ability to be physically active on the part of parents (Kalloniatis & Johnston, 1994; Kef, 1997; Korhonen, 2000; Kozub & Oh, 2004; Kroksmark & Nordell, 2001; Lieberman & Lepore, 1998; Lieberman & McHugh, 2001; Longmuir, 1998; Nixon, 1988; Rosenblum, 1997; Sherrill, 2004; Skaggs & Hopper, 1996; Winnick, 1985).

There are several external barriers that can affect children's participation in their school's physical education classes, which may well be their first exposure to physical activity and fitness behaviors (Stuart et al., 2006). Specific barriers related to lack of participation in physical education classes include fears about children's safety and potential for injury (both for the child with a visual impairment, as well as the other children in the class while participating with the child with a visual impairment), the priority placed on academics and/or other specialized services such as orientation and

mobility instruction, lack of experience of teachers in including children with disabilities in physical education classes, lack of professional preparedness relative to including children with visual impairments, lack of necessary equipment, programming or curriculum, lack of enough time in the student's schedule, fewer opportunities to participate than their sighted peers, teachers who are apathetic, and the lack of understanding of the meaning of being physically active (Block, 2007; Ellery & Stewart, 2000; Lieberman & Houston-Wilson, 1999; Lieberman et al., 2002; McHugh, 1995; McHugh & Pyfer, 1999; Stuart et al., 2006; Suvak, 2004). This has led to some children with visual impairments not participating fully in their school's physical education classes (Robinson, Lieberman, & Rollheiser, 2005). Of all of these external barriers to inclusion in physical education classes, the most frequently cited is lack of knowledge and experience concerning children with visual impairments on the part of general physical education teachers (Lieberman et al., 2002).

There are also internal barriers to involvement in physical activity. Self-imposed barriers by children with visual impairments are common. One of the most prevalent is limited expectations by the children themselves (Longmuir, 1998; Shapiro, Moffett, Lieberman, & Dummer, 2005), with as many as 80% of children who are visually impaired perceiving a limitation in their ability to engage in physical activity (Longmuir & Bar-or, 2000). These beliefs on the part of children with visual impairments are particularly concerning because it has been found that a positive relationship exists between beliefs and behaviors (Stuart et al., 2006). These self-imposed beliefs can contribute to an environment where students with visual impairment have even less control over their participation in physical education. This is evidenced by research

indicating that teachers, parents, and administrators make most of the decisions for students with regard to activities, teams, positions, modifications, equipment, and rules, regardless of the students' level of visual impairment (Robinson & Lieberman, 2004; Stuart et al., 2006).

Lack of Access in Athletics

The lack of access to, and participation in, physical activities spreads beyond physical education classes into athletic, recreational, and social activities that provide stimulation typical for sighted children (Lieberman & Houston-Wilson, 1999; Lieberman, Ponchillia, & Ponchillia, 2013; Ponchillia, 1995; Shapiro, Moffett, Lieberman, & Dummer, 2008). Although we know that students with visual impairments who have been introduced to physical activities through participation in physical education programs in school are more likely to compete in organized sports than are those who have not had such exposure (Ponchillia, Strause, & Ponchillia, 2002), research has shown that as many as 42% of students had limited or no access to physical education and athletic opportunities (Lieberman & Houston-Wilson, 1999; Ponchillia, 1995; Ponchillia, Armbruster, & Wiebold, 2005).

Barriers to sports access are numerous, and include lack of attention to individual students in large classes, lack of time allocated for physical education in the special education curriculum, failure to train physical education instructors in adaptive techniques, lack of knowledge on the part of the student which can result in fear and lack of confidence, which can lead to a self-imposed barrier in the form of an unwillingness to attempt athletic activities (Goldfine & Nahas, 1993; Lieberman & Houston-Wilson, 1999;

Ponchillia, 1995; Trippe, 1996). Just as with physical education, removing barriers to accessing sports can improve physical fitness and motor skills in individuals with visual impairments (Ponchillia, Powell, Felski, & Nicklawski, 1992; Williams, Armstrong, Eves, & Faulkner, 1996).

Short-Term Sports Education Camps

Little attention has been focused on specific inclusion strategies into organized sports and physical education, and the ones that do exist have been largely ignored (Skaggs & Hopper, 1996). Short-term Sports Education Camps have been implemented to teach sports, facilitate physical fitness through basic body mechanics, and develop athletic skills in children with visual impairments. Such short-term Sports Education Camps have been in existence for 25 years, with the first one having been started in 1988 through a combined effort of Western Michigan University's Department of Blindness and Low Vision Studies and the Michigan Blind Athletic Association. This camp has been developed as a one-week Sports Education Camp (SEC) consisting of introductory and advanced sports-training clinics in a residential setting where participants could interact with other students with visual impairments, culminating with a final day of spectator-supported competition. The goals of the Michigan SEC include empowering students with visual impairments by teaching them basic sports skills and activities; increasing the knowledge of families, teachers, and the community regarding adaptations required for participation; assessing and facilitating the athletic potential of the participants; and increasing their access to physical education, sports, and recreation by building a network of advocates (Ponchillia et al., 2005).

Research data gathered from the Michigan SEC indicate that the short-term model used in the Michigan camp had a positive and lasting impact on attitudes, knowledge, skill, and participation in community sports activities (Ponchillia et al., 2005). In addition, data comparing the outcomes of returning participants with those of first-time participants indicate an ongoing positive impact on attitudes, knowledge, skills, and local community involvement in sports, increased confidence in the participant's ability to explain modifications to sports, self-reported increased likelihood of playing an organized sport in their local community, and more frequent perception of themselves as good athletes (Ponchillia et al., 2005).

The National Sports Education Camp (NSEC) Project was created in 2000 as a cooperative program between Western Michigan University and the U.S. Association of Blind Athletes. The NSEC Project provided funding, training, and sports technical assistance to schools and agencies in 12 states including Alaska, Arizona, Colorado, Georgia, Michigan, North Carolina, New Hampshire, Pennsylvania, Texas, Washington, Wisconsin, and West Virginia. Although over 10 other camps were started as part of the NSEC Project, camps in other states have also begun since the conclusion of the national project. Data from only one of these additional camps (Maine) were obtained for this study. Since the Michigan camp had been accepted by the U.S. Department of Education as a successful model, each new site was designed to replicate it as closely as possible. In order to accomplish this goal, the National Sports Camps Director provided the following: supervision of local focus groups and organizational meetings; an operations manual that included instructional plans, planning objectives, timelines, and evaluation

procedures; onsite training of the local site director at the Michigan SEC and co-supervision of the new site's first camp and its evaluation (Ponchillia et al., 2005).

The purpose of this study is to describe in detail the participants of Sports Education Camps for children with visual impairments across the United States. Access to these camps is needed to effectively reach the entire population of children with visual impairments in the U.S., but to date, no study has examined if the target population is being equitably served. Exploring demographic and other variables specific to those who participated in the various SECs may contribute to a better understanding of why these youth chose to attend the camps, and ways to expand participation to groups who are so far under- or unrepresented in the overall population.

Method

The data for this research were collected through standardized camp evaluation procedures conducted at each site included in the national project plus one additional new camp, by trained evaluators and a database of all variables over all camps was compiled. This research consisted of a secondary analysis of these data.

Settings

The data were collected at camps in Alaska, Arizona, Colorado, Georgia, Maine, Michigan, North Carolina, New Hampshire, Pennsylvania, Texas, Washington, Wisconsin, and West Virginia. Camps were located on college campuses and residential schools for students with visual impairments in nearly equal numbers. Pre-camp interviews were conducted one-to-one with camp attendees in private indoor settings,

while post-camp interviews were held in private outdoor settings during the closing hours of the camps.

Participants

There was a total of 671 individual athletes included in this study. Since many of these 671 athletes attended an SEC two or more times, the 671 individuals resulted in 1,185 camp participations. The athletes came from the following states (number noted parenthetically): Alaska (19), Arizona (57), Colorado (47), Georgia (26), Maine (11), Michigan (735), North Carolina (37), Pennsylvania (36), Texas (67), Washington (62), West Virginia (13), and Wisconsin (75).

Instruments

Interview data were collected on the Sports Camp Evaluation Instrument (SCEI) (see Appendix A) (Ponchillia et al., 2005), and demographic information including age, gender, level of vision, and race/ethnicity was culled from student applications to the various camps. Data related to a camp participant's sports knowledge, self-perception and other attitudes, and degree of participation in sports activities in local communities were also collected from the SCEI during pre- and post-camp assessments. The pre-camp administration of the SCEI required 20 to 30 minutes, and post-camp administration took 10 to 15 minutes (the latter form did not repeat items regarding vision, personal characteristics, or sports activities in a participant's local community).

Attitudinal items used a 4-point Likert-type response, including "never," "sometimes," "most times," and "always." Items included statements such as "I love

sports," "I feel I am better at sports than most kids my age," and "I consider myself a good athlete." Sports-knowledge items consisted of 10 true-false statements, such as "A discus is thrown differently than a baseball," "The best goalball players throw the ball with one hand," or "The only modification made in high school wrestling for athletes with visual impairments is that the two wrestlers must maintain constant contact." The post-camp form contained identical attitudinal and sports-knowledge items as well as several items designed to determine participants' satisfaction with the camp. Examples of items designed to measure students' degree of participation in local sports or other type of physical activity are, "I take gym class with the sighted kids in my school," "I know how to change most sport so I can play," "I play sports in places other than sports camp," and "I exercise at least 20 minutes 3 or more times a week."

Some participants who reported having some useful vision also reported not feeling like they had enough vision to run fast safely so visual classification was defined functionally. Participants who answered "yes" to the question "Do you have some vision?" were also asked "Do you have enough vision to run fast safely without a guide runner?" The group who answered "no" to "Do you have some vision?" was combined with participants who answered "no" to the question, "Do you have enough vision to run fast safely without a guide runner?" The reconstituted sample was recategorized into the "run-unsafe group" and the "run-safe group."

Analysis

The data were imported into the Statistical Package for the Social Sciences (SPSS) database where descriptive statistics for specific characteristics were calculated.

Histograms and measures of central tendency and dispersion were performed. Chi-squares were conducted to evaluate relationships between the variables of age, gender, degree of vision, and years of attendance at the Sports Education Camp. *t* tests were used to compare age across each of the variables of gender, "some vision," and "safe running." Missing data and nonresponses were excluded from analysis on a case-by-case basis.

Results

Descriptive Statistics

Selected characteristics of the 671 first-time participants in Sports Education Camps and national data sources are presented in Table 4.1. Nearly 90% of first-time attendees were between the ages of 10 and 16, while 7% were between ages 17 and 20 and 5% were between the ages of 7 and 9. The majority of first-time attendees were male (53%) and Caucasian (72%). Gender is relatively consistent between the study sample and nationally representative datasets for students with disabilities such as the National Longitudinal Transition Study-2 (NLTS2) (52% male) (U.S. Department of Education, 2002) and the national general student population (51% male) (National Household Education Survey [NHES]; U.S. Department of Education, 1999). Percentages of participants who are Caucasian differed between our study sample and the NLTS2 and NHES datasets (61% and 66%, respectively) (U.S. Department of Education, 1999, 2002).

Table 4.1

Selected Characteristics of First-time Participants of a Sports Education Camp for Children with Vision Impairments (N = 671) Compared to National Datasets

	First-timer participants		NLTS2 data for VI[a]	NLTS2 data, 1999 data[b]	General student population[c]
Characteristic	*n*	%	%		
Gender					
Male	345	52.5	56.7	52	51
Female	312	47.5	43.3	48	49
Age					
7	1	.2			
8	2	.3			
9	29	4.5			
10	97	14.9			
11	105	16.2			
12	88	13.5			
13	80	12.3	8.9		
14	73	11.2	24.6		
15	79	12.2	24.3		
16	50	7.7	25.6		
17	30	4.6	16.6		
18	13	2.0			
19	2	.3			
20	1	.2			
Race/ethnicity					
Caucasian	273	71.5	60.8	61	66
Minority	109	28.5	39.2	39	34
Do you have some vision?					
Yes	521	81.8			
No	116	18.2			
Do you feel safe running?					
Yes	354	67.0			
No	174	33.0			

[a]*n* = 1063 in wave 1 of NLTS2, VI defined as having visual impairment as primary disability (either total blindness or visual impairment). [b]Percentages are weighted national estimates. Sources: U.S. Department of Education, Institute of Education Sciences, National Center for Special Education Research, National Longitudinal Transition Study-2 (NLTS2), student's school program survey, 2002. [c]U.S. Department of Education, National Center for Educational Statistics, National Household Education Survey (NHES), 1999 parent survey; responses for youth ages 13-17 for general population of students.

Eighty-two percent of the sample reported having some useful vision; however, only 67% reported they felt safe running fast without a guide runner. A chi-square analysis was conducted on the variables of "have some useful vision" and "do you feel safe running fast without a guide runner," with each variable having two levels (useful vision/no useful vision, feels safe/feels unsafe). The result indicates that athletes who reported having some vision were more likely to feel safe running fast without a guide runner than did athletes with no vision ($\chi^2(1) = 129.4$, $p < .01$), with 99% (347) of participants being in the "some vision" and "safe running" category compared to only 1% (5) in the "no vision" and "safe running" category.

The 671 athletes who attended the various Sports Education Camps around the country accounted for 1,185 separate camp participations, which consisted of those who reported participating only one time and those who participated two or more times. Table 4.2 shows a breakdown of the years for which data were available for each state and how many one-year and multiple-year attendees states reported. When looking at the overall study sample, camps held in Michigan had the most number of athletes who participated only one time (232), with camps in Washington having the second largest number of athletes who participated only one time (59). Only two states (Michigan and Arizona) reported having athletes who repeated camp participation two or more times. The Michigan camps had the greatest number of returning participants (99) and Arizona had 12 returnees.

Table 4.2

Comparison of One-time and Repeat Participants at a Sports Education Camp by State

	One year only		Two or more years			
State	*n*	%	*n*	%	Total	Data years
AK	19	100	0	0	19	2003
AZ	26	68.4	12	31.6	38	2001, 2002, 2003
CO	29	100	0	0	29	2003, 2004
GA	20	100	0	0	20	2003
ME	6	100	0	0	6	2011
MI	232	70.1	99	29.9	331	1989, 1992, 1996, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011
NC	30	100	0	0	30	2001, 2002, 2003
PA	28	100	0	0	28	2002, 2003
TX	57	100	0	0	57	2003, 2005
WA	59	100	0	0	59	2001, 2002, 2003
WI	48	100	0	0	48	2001, 2002
WV	6	100	0	0	6	2001, 2002
Total	560					

Note. "Data years" column indicates years for which data were available. This means that some students entered into the "only one year" category may actually have been repeat attendees but more than one year of data was not available.

Table 4.3 compares selected characteristics of the entire study sample of 671 SEC athletes to those who attended camps in Michigan. Even though the majority of SEC participants were from Michigan camps, the selected characteristics of gender, race/ethnicity, and "have some vision" were similar in the samples from all other states and for the combined sample. In addition, all three samples for all age categories were quite similar; the exception was for the participants who were age 10. For those

Table 4.3

Selected Characteristics of Study Participants of Entire Sample Compared to Just Sports Education Camps in Michigan, N = 671[a]

	All study participants		Only Michigan participants		Non Michigan participants	
Characteristic	*n*	%	*n*	%	*n*	%
Gender						
Male	345	52.5	175	52.9	170	52.1
Female	312	47.5	156	47.1	156	47.9
Age category						
7	1	.2	0	0	1	.3
8	2	.3	1	.3	1	.3
9	29	4.5	15	4.5	14	4.4
10	97	14.9	59	17.9	38	11.9
11	105	16.2	53	16.1	52	16.2
12	88	13.5	42	12.7	46	14.4
13	80	12.3	38	11.5	42	13.1
14	73	11.2	38	11.5	35	10.9
15	79	12.2	39	11.8	40	12.5
16	50	7.7	22	6.7	28	8.8
17	30	4.6	15	4.5	15	4.7
18	13	2.0	5	1.5	8	2.5
19	2	.3	2	.6	0	0
20	1	.2	1	.3	0	0
Race/ Ethnicity						
Caucasian	273	71.5	103	73.0	170	70.0
Minority	109	28.5	38	27.0	73	30.0
Do you have some vision?						
Yes	521	81.8	252	80.8	269	82.8
No	116	18.2	60	19.2	56	17.2
Do you feel safe running?						
Yes	354	67.0	150	63.3	204	70.1
No	174	33.0	87	36.7	87	29.9

[a]Participants who attended more than one year are represented only for their first year of attendance.

participants who were 10 years old, Michigan had the greatest percentage of participants (18). The combined sample and samples from all other states had slightly less (15% and 12%, respectively). Furthermore, the variable of "feel safe running fast without a guide

runner" also differed slightly between the three samples. Sixty-three percent of the Michigan sample reported they felt safe running fast without a guide runner, whereas 67% of the overall sample and 70% of the all other states sample felt safe doing so.

The number of years of attendance at a SEC was also larger for the Michigan camps than for those of all other states. Table 4.4 compares the total years of attendance and average age for participants of the Michigan camps to the entire dataset. There is a large difference in the number of participants between the total dataset and the Michigan sample for those who attended one year of a SEC (540 and 231, respectively). In addition, athletes attending a SEC for the first time were slightly older in the Michigan sample (13.8 years) when compared to the combined sample (13.0 years). There were no data provided for participants who attended three or more years of a camp other than for the Michigan camps.

Table 4.4

Comparison of Average Age and Number of Years of Camp Data We Have for Attendees at Sports Education Camps in Michigan and the Entire Dataset

	Total dataset			Michigan data only		
Years of camp	*N*	Mean age at first session	*SD* of age at first session	*N*	Mean age at first session	*SD* of age at first session
One	540	13.0	2.38	231	13.08	2.42
Two	98	12.38	2.13	85	12.51	2.15
Three	36	12.08	2.14	36	12.08	2.14
Four	14	12.21	1.12	14	12.21	1.12
Five	11	10.73	1.42	11	10.73	1.42
Six	4	11.0	0	4	11.0	0
Seven	4	10.25	.25	4	10.25	.25
Eight	1	10.0	n/a	1	10.0	n/a

Note. Total *N* for each year row includes only participants who attended that many years.

A chi-square analysis was conducted to evaluate the relationship of selected characteristics against the level of camp participation. Camp participation was defined by those who participated in a SEC only one time versus those who repeated attendance at least once. For one time and repeat attendees, data for the first session is shown in Table 4.5. The variables of gender, race/ethnicity, have some vision, and feel safe running fast each had two levels, while the variable of age had 13 levels (8-20). None of the chi-square analyses comparing demographic characteristics to level of camp participation were statistically significant.

When restricting the sample to only those participants who repeated attendance at any SEC, the number of repeat participants dropped off significantly between attending two years (n = 99) and attending three years (n = 36). The number of participants was extremely low for the greater years of participation (see Table 4.6). The highest number of years an individual attended a SEC was eight, but only one individual participated that many years. Of those who repeated participation in an SEC, males were in the majority in all but two repeating years, ranging from a low of 53.5% for two years up to 100% for eight years. Females made up 54.5% for five years of participation and 75% for seven years of participation. Repeat attendees were mostly Caucasian with a range of 52.8% of participants who repeated three years up to 100% of the sample for higher years of participation (six and seven years). The majority of those who had repeat attendance reported having some vision. This ranged from 63.6% for those coming for five years up to a high of 88.9% for those attending for three years (the lone participant who participated for eight years answered no to “have some vision”). The majority of athletes for most years of participation indicated feeling safe running fast without a guide runner,

Table 4.5

Relationship Between Selected Characteristics of Single Session and Repeat Attendees of the Michigan Sports Education Camp

	Single session participants[a]		First session of repeaters	
Characteristic	*n*	%[b]	*N*	%[b]
Gender				
Male	50	49.5	95	56.9
Female	51	50.5	72	43.1
Age category				
8	0	0	1	.6
9	3	3.0	9	5.4
10	17	16.8	35	21.1
11	10	9.9	31	18.7
12	16	15.8	23	13.9
13	10	9.9	26	15.7
14	11	10.9	15	9.0
15	15	14.9	18	10.8
16	9	8.9	6	3.6
17	7	6.9	1	.6
18	1	1.0	1	.6
19	1	1.0	0	0
20	1	1.0	0	0
Ethnicity				
Caucasian	46	65.7	81	77.9
Minority	24	34.3	23	22.1
Do you have some vision?				
Yes	80	80.0	135	81.3
No	20	20.0	31	18.7
Do you feel safe running?				
Yes	63	64.9	94	61.8
No	34	35.1	58	38.2

Note. Data were limited to include only Michigan participants from 2000 and after in order to present the most clean and robust first timers and repeaters.
[a]Does not include 131 cases from early years of data for whom it is unclear whether they repeated or not. [b]Percentage does not equal 100 due to rounding.

with the exception of years five, six, and eight (which had 45.5%, 50% and 0%, respectively). The years of participation where a majority of athletes indicated feeling safe running fast without a guide runner were in years two, three, four, and seven (67.1%, 52.8%, 61.5% and 75%, respectively) as noted in Table 4.6.

Table 4.6

Characteristics of Repeat Attendees by Total Number of Years of Attendance at a Sports Education Camp

Characteristic	Two years *n* (%)	Three years *n* (%)	Four years *n* (%)	Five years *n* (%)	Six years *n* (%)	Seven years *n* (%)	Eight years *n* (%)
Gender							
Male	53 (53.5)	22 (61.1)	11 (78.6)	5 (45.5)	3 (75)	1 (25)	1 (100)
Female	46 (46.5)	14 (38.9)	3 (21.4)	6 (54.5)	1 (25)	3 (75)	0
Ethnicity							
Caucasian	42 (80.8)	19 (52.8)	7 (70)	7 (77.8)	3 (100)	4 (100)	0
Minority	10 (19.2)	8 (29.6)	3 (30)	2 (22.2)	0 (0)	0 (0)	0
Have some vision							
Yes	82 (83.7)	32 (88.9)	10 (71.4)	7 (63.6)	3 (75)	3 (75)	0
No	16 (16.3)	4 (11.1)	4 (28.6)	4 (36.4)	1 (25)	1 (25)	1 (100)
Feel safe running							
Yes	57 (67.1)	19 (52.8)	8 (61.5)	5 (45.5)	2 (50)	3 (75)	0
No	28 (32.9)	17 (47.2)	5 (38.5)	6 (54.5)	2 (50)	1 (25)	0

Table 4.7 shows the age range and mean age of first-time participants at a SEC broken down by gender, vision category, safe running category, and ethnicity. Participants who answered no to “have some vision” and identified themselves as a minority were the categories with the highest mean ages (13.34 and 13.02, respectively). Independent samples *t* tests were conducted to determine whether the age of first-time attendees at a SEC varied across gender, vision classification, safe running category, and

ethnicity. The results indicate that the mean age for first-time attendees was significantly related to only the vision classification variable of "have some vision" ($t(621) = –2.91$, $p = .004$). These data show that first time participants of Sports Education Camps who answered "no" to "have some vision" tend to be older before attending a SEC than those who report having some vision.

Table 4.7

Age Comparison of First-time Participants at a Sports Education Camp by Gender and Vision Classification, N = 671

Gender	Minimum age	Maximum age	Mean	*SD*	*t* value	*df*	*P* value
Male	8	19	12.67	2.23	–1.48	641	.14
Female	7	20	12.95	2.53			
Have some vision							
Yes	8	20	12.63	2.30	–2.91	621	.004
No	7	19	13.34	2.57			
Feels safe running							
Yes	8	18	12.72	2.32	.31	515	.75
No	9	20	12.65	2.46			
Ethnicity							
Caucasian	8	20	12.88	2.38	–.52	375	.60
Minority	9	18	13.02	2.30			

Independent samples *t* tests were also conducted to evaluate the relationship between the age of repeat participants and gender, at each level of repeat attendance. Although the results indicated that athletes with more years of participation in an SEC were younger when they began, and males tended to be slightly older in each year of

participation, there were no significant relationships between mean age of repeat participants and gender (see Table 4.8).

Table 4.8

Age Comparison of Repeat Participants at a Sports Education Camp by Gender

	Age of return participants when first attending						
Total years attended	Minimum	Maximum	Mean	*SD*	*t* value	*df*	*p* value
Two (n = 98)							
Males (*n* = 53)	9	16	12.43	2.08	.30	96	.77
Females (*n* = 45)	9	18	12.31	2.21			
Three (n = 33)							
Males (n = 19)	9	16	12.05	1.91	–.13	34	.90
Females (n = 14)	9	17	12.14	2.54			
Four (n = 14)							
Males (*n* = 11)	10	13	12.27	1.01	.36	12	.73
Females (*n* = 3)	10	13	12.00	1.73			
Five (*n* = 11)							
Males (*n* = 5)	10	13	11.00	1.23	.56	9	.59
Females (n = 6)	8	12	10.50	1.64			
Six (*n* = 4)							
Males (*n* = 3)	11	11	11.00	0	n/a	n/a	n/a
Females (*n* = 1)	11	11	11.00	0			
Seven (*n* = 4)							
Males (*n* = 1)	10	10	10.00	0	n/a	n/a	n/a
Females (*n* = 3)	10	11	10.33	.58			
Eight (*n* = 1)							
Males (*n* = 1)	10	n/a	n/a	n/a	n/a	n/a	n/a
Females (*n* = 0)							

Discussion

In looking at the typical profile of a youngster who attends a Sports Education Camp, whether for the first time or multiple times, we found that the typical participant of camps in our study was male, Caucasian, between the ages of 10-16, and had enough vision to feel he is safe when running fast without the use of a guide runner. This is also true when we only looked at the characteristics of those who participated in a SEC for the first time.

With regard to gender, this sample was consistent with national data, 52.6% of participants in our study were male versus 52% for the NLTS2 dataset, and 51% for the NHES dataset (U.S. Department of Education, 1999, 2002). Other factors, such as race/ethnicity, for example, were not similar, 71.5% Caucasian in our sample versus 61%, and 66% from the above noted national datasets. These findings suggest the need for a more targeted recruiting strategy for participants who are in ethnic minorities, which will likely need to involve more direct contact between SEC personnel and blindness education professionals. Although reasons why our sample had lower levels of minorities is beyond the scope of this study, one wonders if there might be some relationship between cultural attitudes related to blindness and/or sports.

Participants who attended a SEC for the first time and who answered “no” to the question “Do you have some vision?” tended to be about a year older than those answering yes to this question (13.34 and 12.63, respectively). Being older before attending a SEC for the first time suggests possible over protection by parents, which is consistent with other studies (Lieberman & McHugh, 2001), which discussed parent’s

concerns over the risk of their child being hurt when participating in vigorous physical activity. This over protection may also be attributable to parents being reluctant to have their totally blind children be away from home overnight resulting in a longer period of recruitment being needed to convince or reassure such parents.

As might be expected due to the length of time the Michigan camp has been running (since 1988 compared to 2001 for the next oldest), the camps in Michigan had more participants than any other state. When looking at the Michigan and non-Michigan sample, we found the set of characteristics noted above for the typical first-time participant of SECs to be similar. The variable of age showed the greatest difference between the Michigan and non-Michigan sample, with participants aged 10 years being the highest percentage of first-timers in the Michigan sample (17.9%) compared to the non-Michigan sample (11.9%). This higher percentage of 10-year olds as first-time participants in the Michigan camps may be explained by being the youngest age at which youth can begin at Michigan camps, whereas some other state's camps allow children younger than 10 to participate resulting in less participants starting at age 10.

Very few camps from other states had data available earlier than 2001 or after 2003. This explains why the number of repeat participants dropped off significantly between attending two years and three years (99 and 36, respectively). Therefore, in order to analyze longitudinal data, only participants from the Michigan SECs from 2000 through 2011 were used. This afforded a more robust data set of one time and repeat participants. Characteristics of the typical participant described earlier in this section were similar when the data were organized in this manner.

Although Sports Education Camps have been in existence since 1988, the investigators only had data for 15 of the 24 years. Not only was data missing from entire years, the data for each of the years included in the study were not always complete. Because we were unable to track participants year to year, different numbers of participants were obtained, depending on how we organized the data. For example, when identifying the number of "pure" first-time participants of a SEC, we initially identified everyone when they first appeared in our dataset. Then, we took out participants who answered "yes" to the question "Have you ever been to a camp like this before?" but for whom we had no previous data (878 who first appeared – 207 who reported having attended a previous camp = 671 of "pure" first-timers). Although the dataset of first-time participants is more robust, the lack of data from year to year is a limitation that impacts our ability to generalize the longitudinal results.

Conclusions

The population of youth who participated in a Sports Education Camp was examined in this study. These findings suggest that participants of Sports Education Camps are representative of national datasets for gender and level of vision in that the majority were males with low vision. The level of Caucasian participants attending SECs in this study, however, were over represented in our sample.

Future research should focus on (a) strategies for increasing the participation of participants who are of minorities in a SEC, and (b) strategies for increasing the number of SEC participants in this database, both from the SECs from the national project that

have continued operation beyond 2003 and from new camps that have begun since the conclusion of the national camps project.

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CHAPTER 5

CONCLUSION

Maintaining an appropriate level of physical activity is an essential life skill for children and adults. We know that participation in such activities has a positive effect on physical and emotional well-being (U.S. Department of Health and Human Services, 2000), and that access to physical activity, physical education, and sports participation is limited for children and youth with visual impairments (Ponchillia, 1995; Shapiro, Moffett, Lieberman, & Dummer, 2008; Stuart, Lieberman, & Hand, 2006). The Sports Education Camp (SEC) developed in 1988 by Western Michigan University and the Michigan Blind Athletic Association, and replicated in 2000 into the National Sports Education Camp Project, was designed as a short-term model to facilitate physical fitness through basic body mechanics, teach specific sport activities, and develop athletic skills in children with visual impairments. (Ponchillia, Armbruster, & Wiebold, 2005). This study sought to quantify the role of individual characteristics and one-on-one instruction in body mechanics for youth with visual impairments. The roles of gender, age, race/ethnicity, level of visual impairment, and whether or not the participants felt safe running fast without a guide runner were examined cross-sectionally. Study findings and limitations, as well as implications for future research, will be discussed in this final section of this dissertation.

Measures of Physical Performance

The first paper explored the relationship between participation in a SEC and performance measures of specific physical activities by the variables of age, gender, race/ethnicity, level of vision, and whether or not they felt safe running fast without the use of a guide runner. It was found that the Sports Education Camp model of short-term intervention for teaching basic body mechanics and sports skills is effective in increasing physical performance of students with vision impairments. The use of the AccesSports Model utilized to adapt sports and the provision of the use of intentional, systematic, and sequential methods used to teach numerous concepts in basic body mechanics and teaching sport-specific skills in sports taught at a SEC are likely major contributing factors to the participant's increases in physical performance during the camps, which are consistent with other research that examined the SEC model for teaching basic body mechanics and sports skills (Lieberman, Ponchillia, & Ponchillia, 2013; Ponchillia et al., 2005).

Cross sectional analyses were conducted on pre and post-camp measures of the four specific physical activities of over and under arm throwing, standing long jump, and goalball throwing speed, as well as for the athlete's first-time or repeated participation in a SEC. This study revealed that first-time attendees demonstrated significant improvement between pre and post-camp measures of physical performance in three of the four physical activities (over arm throw, under arm throw, and standing long jump). This level of improvement in these three performance measures was also consistent across the specific variables of gender and the feel safe running group. Some gender

differences existed; however, as males had slightly greater increases in performance measures for standing long jump and over arm throw, whereas females had a larger increase in under arm throw. In addition, differences existed between those who felt safe or unsafe running fast without a guide runner as participants in the safe running group had a slightly greater increase in performance measures for over arm throw, compared to a slightly greater increase in performance measures for under arm throw and standing long jump for those in the unsafe running group. Furthermore, females and those in the unsafe running group also had a significant increase in performance measures for goalball throwing speed.

This study also compared differences between pre and post-camp measures for those who attended only one time, those who repeated at least one time, and the last time athletes repeated participation. This study revealed the bulk of the improvements seen were during the first time or the first repeat attendance at a SEC. Data further indicate that most performance measures, decreased from the post-camp score of the first attendance and the pre-camp score of the first repeat attendance. While mean distance measures for over and under arm throw decreased between the post-camp measures and the pre-camp measures of athletes repeated participation, goalball throwing speed increased progressively between the post-camp measures and the mean initial measures of all sessions where the athlete's repeated participation in a SEC.

Measures of Self-Perception, Physical Activity and BMI

The second study explored the relationship between first-time or repeat participation at a SEC and demographic variables of gender, age, race/ethnicity, measures

of self-perception, BMI, and level of physical activity. This study revealed that the short-term intervention model of a Sports Education Camp is highly effective in increasing participant's level of self-perception for youngsters with vision impairments. The use of the AccesSports Model utilized to adapt sports and the provision of instruction in basic body mechanics and for teaching sport-specific skills in sports taught at a SEC, being immersed in an environment where expectations are heightened, exposure to peers, and exposure to adults who are visually impaired and who are elite athletes or in positions of leadership or instructors could be major contributing factors to the participant's increases in self-perception during the camps. These findings are consistent with other research that looked at the impact of the SEC model on the positive attitude of participants (Ponchillia et al., 2005).

Data were organized so that comparisons could be made between first-time and repeat participation, or one-time and returning participation, as well as the location of the camp. Data from this study indicated that first-time attendees at a SEC demonstrated significant growth in their positive attitudes of themselves between the times of pre and post-camp measures in three out of four areas of self-perception ("I love sports," "I am better at sports than most kids my age," and "I consider myself a good athlete"). Findings were similar for those in the one-time grouping, who also demonstrated significant growth in their positive attitudes of themselves between the times of pre and post-camp measures in three out of four areas of self-perception ("I am as strong as other kids," "I am better at sports than most kids my age," and "I consider myself a good athlete"). Differences in level of vision were found as first-time participants of a SEC who were in the "have some vision" group were more likely to perceived themselves as a good athlete

and being better at sports than other kids their age. Although the effect of attending a SEC on participant's self-perception is much stronger for first-time attendees, data further indicated a significant positive impact on attitudes over time as repeat participants continued to respond positively to the self-perception variable of "I love sports", which is consistent with findings of earlier research (Ponchillia et al., 2005). In addition, this level of positive impact on participant's view of loving sports was also significant across locations of the SEC. Gender differences existed as this positive impact was particularly evident for boys in that after attending an SEC, boys felt strongly about their view of loving sports for first-time, one-time, and repeat attendance at a SEC.

Although this study revealed no significant change between the level of a participants' physical activity in their local community whether they attend a SEC one time or repeated their attendance, there was a significant relationship for those who participated in SEC one time between levels of physical activity and self-perception. Scores for one-time participants increased on one or more of four out of five measures of physical activity and at least one of the four measures of self-perception. The significance of this relationship between self-perception and level of physical activity for those who repeat attendance at a SEC was evident for only one variable in each category, with those one-time and repeat participants who love sports also are those who scored high on the physical activity level of "On a sports team at school last year." BMI of one-time and repeat participants was also investigated. Although mean BMI of first-time participants of a SEC was consistent across the variables of gender, race/ethnicity, and vision category, as well as for the location of the camp, BMI of first-time participants tended to be higher with the age of the participant. This is consistent with findings of earlier research that

show a higher BMI for adolescents with vision impairments than younger children (Lieberman, Byrne, Mattern, Watt, & Fernandez-Vivo, 2010). This study also found that BMI for first-time adolescent participants in this study were representative of adolescents in the general population (*M* = 24.65 and 24 respectively for 16 year olds), younger participants in our study tended to have a higher BMI than the general population (Longley, 2002; Ogden, Carroll, & Flegal, 2008). In addition, mean BMI was consistent between one-time participants and those who repeated participation at least once across all study variables except gender. For gender, males who repeated attendance at least once at a SEC had a significantly lower BMI than males who attended only one time. This study also revealed that mean BMI tended to increase with the number of repeated participations, which is consistent with the findings described above that indicate that adolescents with visual impairment generally have a higher BMI.

Describing the Population of Participants of Sports Education Camps

The population of youth who participated in a SEC was examined in the third paper. The number of participants in the study varied among states, with SECs in Michigan consistently reporting the greatest numbers of participants, including during the three years of the national project, for first time and repeat participation (232 and 99 respectively). Furthermore, camps in Michigan had the most number of years of data included in this study (14 different years, compared with three states (Arizona, North Carolina, and Washington) having the next most number of years of reported data in this study (three different years).

This study revealed the typical profile of a youngster who attends a Sports Education Camp, whether for the first time or multiple times, was male, Caucasian, between the ages of 10-16, and had enough vision to feel he is safe when running fast without the use of a guide runner. Because those attending a SEC for the first time constituted by far the largest sample of study participants (671 compared to 111 who repeated at least once), this sample was used to explore whether or not it is representative of the general population of students with disabilities within the same age group.

Data indicate that the majority of first-time attendees were male (53%) which is relatively consistent between the study sample and nationally representative datasets for students with disabilities such as the National Longitudinal Transition Study-2 (NLTS2) (52% male) (U.S. Department of Education, 2002) and the national general student population (51% male) (National Household Education Survey [NHES]; U.S. Department of Education, 1999). On the other hand, first-time participants of a SEC in our study who are Caucasian (72%) differed from the NLTS2 and NHES datasets (61% and 66%, respectively) (U.S. Department of Education, 1999, 2002).

Further findings from the first-time sample reveal that the majority of the sample reported having some useful vision (82%) and reported they felt safe running fast without a guide runner (67%). In addition, participants who attended a SEC for the first time and who answered “no” to the question “Do you have some vision?” tended to be about a year older than those answering yes to this question (13.34 and 12.63, respectively). Being older before attending a SEC for the first time may be related to possible over protection by parents, which is consistent with other studies (Lieberman & McHugh,

2001), which discussed parent's concerns over the risk of their child being hurt when participating in vigorous physical activity.

This study also compared those who participated in a SEC only one time, the first repeat session of those who repeated at least once, and the last time participants attended if they were repeat attendees Data revealed that athletes who were Caucasian made up the majority of participants for all three samples; those with a single session (65.7%), those who repeated at least once (77.9%), and the last session of repeat attendees (71.7%). Percentages of participants who reported having some vision and feeling safe running fast without a guide runner were also similar across all three samples.

Study Limitations

This report is subject to a number of limitations. First, very few SECs from states other than the Michigan camp had data available earlier than 2001 or after 2003, which greatly limited the number of repeat participants between attending two years and three years. Second, although Sports Education Camps have been in existence since 1988, the investigators only had data for 15 of the 25 years. Third, in addition to data missing from entire years, the data for each of the years included in the study were not always complete. Because we were unable to track participants year to year, different numbers of participants that were obtained were dependent on how we organized the data. For example, when identifying the number of "pure" first-time participants of a SEC, we initially identified everyone when they first appeared in our dataset. Then, we took out participants who answered "yes" to the question "have you ever been to a camp like this before," but for whom we had no previous data (878 who first appeared – 207 who

reported having attended a previous camp = 671 of "pure" first-timers). Although the dataset of first-time participants is more robust, the lack of data from year to year is a limitation that impacts our ability to generalize the longitudinal results.

Implications and Recommendations

This study outlines the importance of, and lack of access to, physical activity, structured physical education, and participation in sports for children who are blind or visually impaired. In addition, the study showed the positive impact related to these areas for youth who participated in Sports Education Camps. Although factors such as gender were representative of national data, race/ethnicity were not similar (71.5% Caucasian in our sample vs. 61% and 66%) (NHES, U.S. Department of Education, 1999; NLTS2, U.S. Department of Education, 2002). These findings suggest the need for a more targeted recruiting strategy for participants who are in ethnic minorities, which will likely need to involve more direct contact between SEC personnel and blindness education professionals. Although reasons why our sample had lower levels of minorities is beyond the scope of this study, one wonders if there might be some relationship between cultural attitudes related to blindness and/or sports.

As stated previously in this report, although the sample of first-time attendees of a SEC is sufficient in size to generalize its positive impact on improving physical skill performance and self-perception for youth who attend a SEC, the small sample size for those who repeat participation in a SEC used in this study is a limitation on the longitudinal data. In addition, the majority of repeat participants were from the Michigan camp only, which is a further constraint on the longitudinal data. Adding data from the

SECs that were part of the National SEC project that continued to operate following its conclusion in 2003, as well as adding data from other SECs that have been developed in other states not included in this study, would greatly increase the sample size of participants who repeated attendance in the SECs in this study. Increasing the longitudinal sample in this manner will assist researchers in analyzing the effect of repeated participation in a SEC on measures of physical performance, self-perception, level of physical activity in local settings, and BMI. It may also help in better understanding why minorities are under-represented in this study.

Although the significance of improving measures of physical performance in this study were clear, there may be longitudinal implications for the ability of participants to "catch up" to measures of physical performance of sighted peers. As the dataset of SEC participants grows (especially for repeat attendance) our ability to compare this catch up effect will become available. If such an effect is shown to exist, this could have implications for expanding the SEC model to more locations and maybe even for starting children in SECs at an earlier age.

Recommendations for specific future research include:

1. Methods for increasing the effect of participating in a SEC over time.
2. Strategies for increasing the number of SEC participants in this database.
3. Plot and compare growth curves for repeat participants in a SEC with their sighted peers to determine if there is a "catch up" effect occurring for repeat participants.
4. Strategies for increasing the participation of participants who are of minorities in a SEC.

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Appendix A

Pre- and Post-Camp Assessment Instrument

Sports Education Camp Evaluation Instrument

Pre-Camp Evaluation

1. Name

2. Age

3. Male Female

4. Weight (lbs)

5. Height (inches)

6. Body Mass Index (calculated later)

7. Caucasian African/American Other Minority

8. Do you have some vision? Yes No

   If no, skip next question:

9. Do you have enough vision to feel safe running fast without a guide runner?
   Yes No

10. Have you ever been to another Junior or Senior Sports Camp?
    Yes No

    If yes, which one? _____

11. Did your school have any sports activities for students with visual impairments during this school year?
    Yes No

    If so, what were they?

Interviewer Instructions:

*Some questions have four options for the athlete to choose from. Offer the following choices to the athlete and record his/her answer as specified:

*Never	If you never feel that way.
*Sometimes	If you sometimes feel that way.
*Most times	If you feel that way most times.
*Always	If you feel that way all the time.

Perceptions

12. I love sports.
    Never Sometimes Most times Always

13. I feel I am better in sports than most kids my age.
    Never Sometimes Most times Always

14. I consider myself a good athlete.
    Never Sometimes Most times Always

Local Involvement

15. Which type of physical education class did you take this year?
    Regular P.E. Special or adapted P.E. None

16. Do you always participate in exactly the same activities in physical education class as the sighted students?

    Yes No

17. If you do not participate in exactly the same activities, what do you usually do instead?

_____

18. Did you feel the students in your regular physical education class treated you like everyone else?

Yes No

*19. I know how to change most sport so I can play.
Never Sometimes Most times Always

An example of one of these changes that I know about is:

---

20. My family supports my sports participation.
Never Sometimes Most times Always

21. Do you play sports with other visually impaired students in places other than sports camp?

Yes No

If yes, what sports and where?

---

22. I exercise at least 20 minutes three or more times a week.
If "No", skip next item:

Yes No

23. What kind of exercise do you do?

---

24. Were you on a sports team at school last year?

Yes No

If yes, please describe it.

---

25. Do you belong to or use the "YMCA or YWCA " or any other sports club?

Yes No

If yes, which one or ones?

---

26. Does your community or state have any sports activities for students with visual impairments? Yes No

What are they?

27. (Returning athletes only) Did you deliver the packet of information about adapting sports for athletes with visual impairments to someone at your school after Sports Camp last year? ___ Yes ___ No

What was the teacher's name and what subject did he or she teach?

Name _____

Subject _____

Sports Knowledge

1. T F A USABA B1 athlete is one who is totally blind.

2. T F A goalball is about the same size as a volleyball.

3. T F A discus is thrown just like a baseball.

4. T F The only modification made in high school wrestling for athletes with visual impairments is that the two wrestlers must touch hands in the standing position.

5. T F In wrestling, you get 1 point for a take down.

6. T F Most pools used for swim races are 25 or 50 meters long.

7. T F A tapstick is used in a swim race.

8. T F When the referee blows the whistle three times in a row in a goalball game, it means the game has started.

9. T F Most 12- to 14-year old athletes with visual impairments can't do a running long jump of 18 feet.

10. T F The best goalball players throw the ball with two hands.

Evaluation Sports Education Camp Instrument

Post-Camp Evaluation

Name

Interviewer Instructions are the same as in the Pre-camp evaluation:

*Some questions have four options for you to choose from.

*Never	If you never feel that way.
*Sometimes	If you sometimes feel that way.
*Most times	If you feel that way Most times.
*Always	If you feel that way all of the time.

Perceptions

1. I love sports.

   Never Sometimes Most times Always

2. I feel I am better in sports than most kids my age.

   Never Sometimes Most times Always

3. I consider myself a good athlete.

   Never Sometimes Most times Always

General follow-up questions

4. I know how to change most sports so I can play.

   Never Sometimes Most times Always

5. An example of one of these changes is:

---

6. The greatest thing about Sports Camp is that I get to be with other athletes who have vision loss.

   Yes No

---

7. What was your favorite sport at Sports Camp?

---

8. What was your least favorite sport at Sports Camp?

---

9. What sport would you like to learn that was not covered at Sports Camp?

---

10. Would you like to come back to Sports Camp next year?

Yes No

11. What is one improvement you would like made at Sports Camp next year?

_____

Sports Knowledge

1. T F A USABA B1 athlete is one who is totally blind.

2. T F A goalball is about the same size as a volleyball.

3. T F A discus is thrown just like a baseball.

4. T F The only modification made in high school wrestling for athletes with visual impairments is that the two wrestlers must touch hands in the standing position.

5. T F In wrestling, you get 1 point for a take down.

6. T F Most pools used for swim races are 25 or 50 meters long.

7. T F A tapstick is used in a swim race.

8. T F When the referee blows the whistle three times in a row in a goalball game, it means the game has started.

9. T F Most 12- to 14-year old athletes with visual impairments can't do a running long jump of 18 feet.

10. T F The best goalball players throw the ball with two hands.

Appendix B

Pre- and Post-Camp Physical Skills Measurement

Pre- and Post-Camp Physical Skills Measurement

1. During the pre-camp evaluation, we are attempting to measure the effect of our teaching clinics at the camp, so we want to know what the athletes can do when they come. As such, you cannot provide jumping or throwing instructions. If they ask: "how do you do an overhand throw" for example, just answer by saying: "we'll teach you at the camp. Right now, just do the best you can."

2. Give each athlete two attempts at each skill and record the best effort.

3. For standing long jump, place a piece of rope under tape, so the athletes can place their toes just behind the line.

4. For the softball throws, also have a raised line and tell them that they must stay behind the line to throw and do not count the throw if the athlete steps over the line. Be sure you get two recorded scores though. However, there may be a few athletes who cannot do one or both of the throws. If they clearly cannot do it, record a"0" for their score and describe what they did instead. Don't worry about getting two complete throws, if they cannot do them correctly. These same guidelines apply to the kicking assessment.

5. For goalball throwing speed, either use a goalball court or set off an area with goalball court dimensions, that is 48 feet, 9 inches long and 29 ft 3 inches wide (length from the front team area line to the other goal line). To make your throwing area like the court, you need a back line, so place a raised "starting line" behind your throwing line at 9 ft 9 inches behind and in the middle of the 29 ft width. Have the athletes begin their throws at the back middle orientation line of the court or from the "starting line" you made. Then have each athlete make two throws, staying behind the line. Measure the elapsed time in seconds from the time it leaves the hand to the time it touches the goal line or the line you set at the other end. If you do not have enough width for 29 ft and must use a hallway or something similar, don't count throws that hit a sidewall before crossing the end line. If you must vary the length to something other 48 feet 9 inch please make notice of the length you use in your final report. Also record whether the athlete threw one – or two-handed.

Final Performance Measures

Name:

	Pre	Post
Overhand Softball Throw (feet and inches)	____	____
Underhand Softball Throw (feet and inches)	____	____
Standing Long Jump (feet and inches)	____	____
Goalball throwing speed (time in seconds)	____	____
Number of throwing hands (1 or 2)	____	____

Appendix C

Human Subjects Institutional Review Board
Letter of Approval

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: March 22, 2011

To: Robert Wall, Principal Investigator
John McMahon, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 11-03-19

This letter will serve as confirmation that your research project titled "Measuring Performance and Attitude of Children Who are Blind or Visually Impaired: Study of Participants of Sports Education Camps" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: March 22, 2012

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