The Effects of a Theory Based Physical Education Intervention on the Leisure-Time Physical Activity of Adolescents with Visual Impairments

Dissertation

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By

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Abstract

The purpose of this study was to examine the effects of a theory based physical education intervention on the leisure-time physical activity of adolescents with visual impairments. Six adolescents with visual impairments attending a Midwestern residential school for the blind served as participants. The study implemented a multiple baseline across participants single subject design and physical activity behavior was measured by steps taken through the use of Fitbit Zips. In addition to physical activity, questionnaires were used to collect data (i.e., change scores) on selected social cognitive theory constructs. Data were analyzed through visual analysis and descriptive statistics. Results of the multiple baseline design did not demonstrate a functional relation between the number of steps taken and the intervention. These results may have been directly influenced from several limitations of the study, such as seasonality (i.e., the program took place in the winter time where limited leisure-time physical activity opportunities were available) and the truncation of the program for Participants 4, 5, and 6. Because of these limitations, the results may not represent the full effectiveness of the intervention for individuals with visual impairments. With the lack of physical activity intervention research related to adolescent-aged individuals with visual impairments (Haegele & Porretta, 2015), and the influence physical activity has on health-related outcomes (e.g., obesity), further research is needed.
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Vitae

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Chapter 1: Introduction

It has been well documented that physical activity can have a positive impact on overall health. Regular engagement in physical activity can lead to decreases in health-related issues such as obesity, diabetes, coronary heart disease, hypertension, osteoporosis, colon cancer, and anxiety and depression (CDC, 2011; Pate et al., 1995). By developing a physically active lifestyle at an early age, individuals can decrease the chances of developing those health-related issues later in life while preventing chronic disease in childhood (CDC, 2011; Sothern, Loftin, Suskind, Udal, & Blecker, 1999). However, less than half of school-aged individuals report participating in vigorous physical activity and almost 15% report never participating in physical activity (CDC, 2011). The need to increase physical activity at an early age has encouraged the development of school-based interventions (Kriemler et al., 2011). However, school-based programs have had varying levels of success in promoting physical activity (CDC, 2011; Kriemler et al., 2011). The most successful of these programs are multi-component interventions (i.e., curricular, instructional, and environmental components) which are embedded within the school-day and focus primarily on physical activity (Kriemler et al., 2011). Current research suggests that these interventions can be successful increasing physical activity during school hours, afterschool hours, and overall physical activity (Kriemler, et al., 2011).
Therefore, school-based interventions may be the best setting for physical activity interventions for individuals with disabilities (Pan, Frey, Bar-Or, & Longmuir, 2005). However, school-based physical activity research commonly focuses on typically developing individuals and less research has been paid to individuals with disabilities. According to Longmuir and Bar-Or (1994), school-aged individuals with disabilities report enjoying physical activity. Yet, those individuals tend to be less physically active than their typically developing peers (Kim, Conner, Hart, Kang, & Kang, 2013; Longmuir & Bar-Or, 1994; Pan et al., 2005). National data indicates that approximately twice as many individuals with disabilities report being inactive than individuals without disabilities (Rimmer, 2008). Further, physical activity levels tend to decrease as individuals with physical disabilities get older (King, Law, Petrenchik, & Hurly, 2013; Pan et al., 2005). Several barriers and limitations are noted in research which may contribute to physical activity deficiencies (Longmuir & Bar-Or, 1994; Shields, Synnot, & Barr., 2012). For example, individuals with physical disabilities perceive that they have limited ability to be physically active (Longmuir & Bar-Or, 1994). In addition, a lack of physical activity for school-aged individuals with disabilities may lead to health issues (e.g., obesity, diabetes, cardiovascular disease) in adulthood. Rimmer (2008) reports that over 37% of individuals with disabilities report having poor health status, in comparison to only 8% of individuals without disabilities.

**Physical Activity & Visual Impairment**

School-aged individuals with visual impairments tend to be among the least active groups of those with disabilities (Longmuir and Bar-Or, 2000). Despite school-aged individuals with visual impairments reporting high perceived competence in physical
activity (Ward, Farnsworth, Babkes-Stellino, & Perret, 2011), they tend to be less active than typically developing peers both inside (Schedlin, Lieberman, Houston-Wilson, & Cruz, 2011) and outside of school (Gronmo & Augstad, 2000; Kozub, 2006; Wolffe & Sacks, 1997). Like individuals with other disabilities, physical activity decreases as students with visual impairments get older (Kozub & Oh, 2004; Oh, Ozturk, & Kozub, 2004).

Barriers have been reported that may influence physical activity of school-aged individuals with visual impairments. While students are confident in their physical activity ability, they report receiving little encouragement from parents (Ward et al., 2011) even though parents report valuing physical activity and understanding its health-related benefits (Perkins, Columna, Lieberman, & Bailey, 2013). Parents report a lack of appropriate opportunities to participate, a lack of training for the physical education teacher, a fear of injury, and little communication between the parent and physical educator (Perkins et al., 2013; Stuart, Lieberman, & Hand, 2006).

Fortunately, intervention research has provided evidence that physical activity levels can be increased through the introduction of technology-based modifications to equipment (Bofoli, Foley, Gasperetti, Yang, & Lieberman, 2011; Kern & Worely, 2001; Lieberman, Stuart, Hand, & Robinson, 2006) or through physical activity programming (e.g., Cervantes & Porretta, 2013; Ponchillia, Armbruster, & Wiebold, 2005). For example, Cervantes and Porretta (2013), using a social cognitive intervention, examined the impact of an after school physical activity program on adolescents with visual impairments. Their study used a range-bound changing criterion single subject design. At a residential school for the blind, a nine-lesson program was offered to four students with
visual impairments during a five-week period. The purpose of the intervention was to enhance leisure-time physical activity. Physical activity was measured using accelerometers and questionnaires were used to obtain information on selected social cognitive constructs. Results indicate that both leisure-time physical activity levels as well as selected constructs can be enhanced by the after-school intervention.

The current literature pertaining to individuals with visual impairments provide a foundation for future research. A number of areas still need to be explored. First, while several variables have been identified as not directly contributing to youth physical activity, research has yet to determine whether variables act as mediators, moderators, or covariates. Exploring the interrelated nature of several variables may contribute to our understanding of why school-aged individuals with visual impairments are not physically active. Second, there is a lack of comprehensive intervention research relating to physical activity for school-aged individuals with visual impairments. A recent review of literature found just seven intervention studies published since 1982 (Haegele & Porretta, 2015). Last, a limited number of published studies (n=4) have been situated in theoretical or conceptual models. Scholars in adapted physical activity have stressed the importance of using theoretical or conceptual models to drive research and develop hypotheses (Cervantes & Taylor, 2011; Reid & Stanish, 2003). However, only one intervention study and three correlational/comparative studies focusing on physical activity and individuals with visual impairments have taken this into consideration.

**Social Cognitive Theory**

One theoretical model which has gained popularity in physical activity research is Social Cognitive Theory (SCT). SCT has become one of the most commonly used and
accepted theoretical models for understanding health behaviors including physical activity (Motl, 2006; Netz & Raviv, 2004). It is a general theory of human behavior which posits that individuals are active agents in their own lives (Bandura, 2001). The basic assumptions of SCT are that (a) behavior is purposeful, (b) individuals are self-reflective, and (c) individuals are capable of self-regulation (Bandura, 1986, 1989a, 2001). Further, triadic reciprocal determinism is a central tenet of SCT and is the model of causation of behavior (Bandura, 1986, 1989a, 2001). Triadic reciprocal determinism suggests that behaviors are created by bi-directional influences between (a) the behavior, (b) personal factors, and (c) environmental influences (Bandura, 1989a; Motl, 2006). Each interactional link in triadic reciprocal determinism represents a different bi-directional influence between elements. For example, the personal-behavioral link of causation reflects interactions between the individual’s thoughts and their actions (Bandura, 1989a). This link suggests that an individual’s expectations, beliefs, goals, and intentions can influence how they behave (Bandura, 1986, 1989a). The bi-directional nature of the interaction would suggest that the extrinsic effects of actions would then have an effect on the individuals thought as well (Bandura, 1989a).

The reciprocal nature of human functioning in SCT allows researchers to direct behavior change interventions at personal, environmental, or behavioral factors. In physical activity research, personal-based constructs such as self-efficacy, outcome expectancies, and self-regulation and environmental-based constructs such as social support have been thoroughly explored. Previous research has provided supportive evidence suggesting the utility of each of these variables in predicting physical activity for adolescents (Petosa, Hortz, Cardina, & Summinsiki, 2005; Plotnikoff, Costigan,

One such SCT based intervention is the Plan for Exercise, Plan for Health program. This behavior change intervention was developed over a series of doctoral dissertations at The Ohio State University. The Plan for Exercise, Plan for Health program is a SCT based physical education curriculum which focuses on providing behavioral strategies for increasing leisure-time physical activity (Hertz & Petosa, 2006; Mowad, 2007; Stevens, 2006). The program consists of nine lessons, each of which targets a SCT construct. Lessons are taught once a week over a nine week period at the beginning of physical education classes. Results from several studies have supported the utility of the intervention, specifically with increasing moderate physical activity of individuals who were previously sedentary (Hertz & Petosa, 2006; Stevens, 2006). The most recent conceptualization of the Plan for Exercise, Plan for Health program was modified as an after school program for adolescents with visual impairments (Cervantes & Porretta, 2013).

Promising results were found when introducing a modified version of the Plan for Exercise, Plan for Health program to individuals with visual impairments (Cervantes & Porretta, 2013). Like the previous studies, participants increased physical activity throughout the course of the intervention. However, participants were unable to maintain activity levels after study completion (Cervantes & Porretta, 2013). Upon a review of many studies, Kriemler and colleagues (2011) suggest that the most successful interventions are those which are embedded within the school day. However, Cervantes
and Porretta (2013) removed the *Plan for Exercise, Plan for Health* program from the physical education classroom and installed it as an afterschool program. In addition, the program was truncated from nine weeks to five weeks. In an effort to address those limitations, the current study explored the utility of the *Plan for Exercise, Plan for Health* program for individuals with visual impairments by embedding it into the already existing physical education program at a Midwest School for the Blind. Therefore, the purpose of this study was to evaluate the effects of a theory based physical education curriculum on the leisure-time physical activity among adolescents with visual impairments.

**Statement of the Problem**

It has been well documented that low levels of physical activity may prevent individuals from benefiting from health-related outcomes such as decreases in obesity, diabetes, and/or cardiovascular disease (CDC, 2011; Pate et al., 1995). The insufficient levels of physical activity and potential absence of health-related outcomes provide reason to develop physical activity interventions for individuals with visual impairments. Since school-aged individuals, including those with visual impairments, spend the majority of their time in school, school may provide the preferred setting for physical activity intervention (Kriemler et al., 2011). For residential school students with visual impairments, this recommendation may be even more relevant, as they have limited time outside of the school setting. The current study provides further examination of the utility of a SCT based physical activity intervention which will be embedded into physical education classes on the leisure-time physical activity of adolescents with visual impairments.
Purpose of the Study

The purpose of this study was to evaluate the effects of a theory based physical education curriculum on the leisure-time physical activity among adolescents with visual impairments.

Research Questions

1. What effect will the Plan for Exercise, Plan for Health program have on the accumulation of daily steps taken during leisure-time physical activity among adolescents with visual impairments?
2. What effect will the Plan for Exercise, Plan for Health program have on self-regulation among adolescents with visual impairments?
3. What effect will the Plan for Exercise, Plan for Health program have on self-efficacy for overcoming perceived barriers among adolescents with visual impairments?
4. What effect will the Plan for Exercise, Plan for Health program have on outcome expectancy value among adolescents with visual impairments?
5. What effect will the Plan for Exercise, Plan for Health program have on social support among adolescents with visual impairments?

Significance of the Study

This study will extend the knowledge base of the effects of a SCT based physical activity intervention on the physical activity behavior of adolescent-aged individuals with visual impairments. Changes in physical activity as a result of this intervention can influence physical education curricula decisions at residential schools for the blind. Finding a functional relation between the intervention and physical activity can lead to multi-site research at multiple schools for the blind. Further, changes can influence
additional research which focuses on the utility of this program for individuals with other disabilities. A change in the SCT constructs and physical activity behavior may further contribute to the understanding of how the constructs relate to the physical activity behavior of adolescents with visual impairments. This can potentially lead to further research which explores the relationship between SCT variables and physical activity of individuals with visual impairments as well as those with other disabilities.

**Delimitations**

The following are delimitations to this study;

1. The data collection period was between 3:30pm to 10:00pm each day of the week because it represented the available time for leisure-time physical activity time for students.

2. Data collection consisted of four days per week (Monday, Tuesday, Wednesday, and Thursday) because those are the days in which residential students sleep at the school for the blind. Collecting data on Friday’s would skew data because residential students would have different physical activity opportunities and different amounts of time to engage in those activities.

3. One school setting was used for this study. The school setting was a residential school for the blind in a large Midwestern city. This location was chosen because of the access to adolescent students with visual impairments and the convenience of the location to the researcher’s higher education establishment.

4. One physical education teacher taught each of the lessons within the intervention.

5. The program was disseminated over the course of nine physical education classes.

6. Intervention time per class ranged from 20 to 30 minutes in duration.
7. The study focused on after school leisure-time physical activity and did not focus on leisure-time activity during weekends, or during breaks throughout the day.

**Limitations**

There were a number of limitations to this study;

1. Some unavoidable constraints of the environment included (a) availability of physical activity opportunities, (b) weather, and (c) non-physical activity based after school programming.

2. Another unavoidable constraint of the participants was their attendance at school. Several participants missed multiple school days leading to missing data points. This also influenced the intervention schedule. Common reasons for missing school were (a) illness, (b) death in the family, and (c) snow days.

3. Another unavoidable constraint of the physical education schedule was state testing. Several students had to take scheduled state testing during the intervention phase, which altered the intervention schedule.

4. The study focused on after school leisure-time physical activity and did not focus on leisure-time activity during weekends or during breaks throughout the day. This limitation provided a limited view on the overall leisure-time physical activity of the participants.

5. The participants were selected using a purposive sampling design. The participants were selected based on recommendations by the physical education teacher who considered a number of selection variables. This is a limitation because the researcher purposively selected participants who were regarded as inactive prior to the intervention and may not have represented the overall school population.
Definition of Terms

**Fitbit Zip.** A commercial tri-axial accelerometer that was used to measure leisure-time physical activity.

**Leisure-time physical activity.** Leisure-time physical activity refers to physical activity performed during afterschool hours (i.e., 3:00 pm thru 10:00 pm).

**Physical activity.** Physical activity is defined as any body movement produced by muscles resulting in energy expenditure (Caspersen, Powell, & Christenson, 1985). For the purposes of this study, physical activity is defined as any lower-limb body movement produced to move the body through space.

**Step count.** The recorded physical activity behavior that is measured by the Fitbit zip.

**Talking pedometer.** A spring-levered device that moves up and down with vertical accelerations of the hip. The device also includes an automatic voice-announcement feature which announces the participant’s number of steps taken, distance traveled, calories burned or elapsed workout time.

**Visual impairment.** An impairment of vision that, even with corrections, adversely affects a child’s education (IDEA, 2004). This term includes a range from partial sight to complete blindness. Participants in this study will be categorized based on the United States Association of Blind Athletes (USABA) visual impairment classification system. The USABA visual impairment classification system (USABA, 2013) includes four categories of visual impairment ranging from B1 to B4. B1 refers to individuals with a range of vision from no light perception in either eye up to light perception, but an inability to recognize the shape of a hand at any distance. B2 refers to
a range of impairment from the ability to recognize the shape of a hand up to acuity of 20/600 and/or a visual field of less than 5 degrees in the better eye with the best correction. B3 refers to a range of vision from a visual acuity of 20/600 and/or a visual field of less than 5 degrees up to a visual acuity of 20/200 and/or a visual field of less than 20 degrees with the best practical eye correction. B4, also known as a low-vision classification, refers to a range of vision from a visual acuity above 20/200 and up to a visual acuity of 20/70 and a field loss larger than 20 degrees in the best eye with the best practical eye correction. USABA visual impairment classifications are used for international Paralympic competition.
Chapter 2: Review of Literature

The purpose of this chapter is to provide an overview of the literature supporting this study and to describe the theoretical frame in which the study is situated. The chapter begins with a summary of the importance of physical activity and research pertaining to typically developing individuals. Then, research pertaining to physical activity and disability is summarized. Third, a thorough review of physical activity literature pertaining to school-aged individuals with visual impairments is presented. Bandura’s Social Cognitive Theory (SCT) is then explained with application to physical activity. Finally a summary of the chapter is provided.

**Importance of Physical Activity**

Important and favorable health effects of physical activity have been well documented (CDC, 2011; Kriemler et al., 2011; Pate et al., 1995; Sallis, Prochaska, & Taylor, 2000; Sothern et al., 1999). Regular physical activity for adults has been linked to decreases in the risk of several chronic diseases including coronary heart disease, hypertension, obesity, diabetes, osteoporosis, colon cancer, and anxiety and depression (CDC, 2011; Pate et al., 1999). The Centers for Disease Control and Prevention (CDC; 2011) suggests that developing an overall physically active lifestyle at an early age may decrease ones chances of developing health-related problems later in life. Further, the replacement of sedentary behaviors with moderate intensity physical activity may enhance the overall health of children while assisting to prevent chronic disease during
childhood and adolescence (Sothern et al., 1999). However, less than half of young people report being vigorously physically active on a regular basis, and nearly 15% report no recent activity (CDC, 2011).

Determinants of physical activity of typically developing children and adolescents have been well-documented. Sallis and colleagues (2000) conducted a review of correlates to physical activity. The review found 108 studies which evaluated 40 variables for children and 48 for adolescents. For children 4-12 years of age, some of the more commonly studied variables included gender (81% of comparisons found boys to be more active than girls), age (inconsistent findings), perceived barriers (negative correlate), intention (positive correlate), and physical activity of parents (positive correlate). For adolescent-aged individuals (aged 13-18 years), age and physical activity were found to have a negative relationship in 70% of the studies reviewed. Further, the review found 35 studies pertaining to the influence of psychological variables on physical activity of adolescents. The results suggest that variables such as perceived benefits, barriers to participation, and self-efficacy were indeterminable. The best predicting variable for adolescents was gender, where males were found to be more active than females in all but one study (Sallis et al., 2000).

More recent studies continue to examine physical activity determinants for youth. For example, Fairclough, Ridgers, and Welk (2012) sought to determine correlates of moderate and vigorous physical activity for 10-11 year old children. Physical activity data were collected using accelerometers as well as correlate data using google earth (school spatial area), stadiometers and scales (anthropometry), and questionnaires (socioeconomic status, physical self-perceptions). Consistent with the review from Sallis
and colleagues (2000), males were more active than females. Gender acted as the only significant predictor of moderate physical activity ($p<.001$). Vigorous physical activity was predicted by gender ($p<.001$), BMI ($p=.018$), and available playground area ($p=.046$; Fairclough et al., 2012).

The noted importance of an early start to a physically active lifestyle has lead researchers to encourage schools to promote physical activity for all school-aged children (Metzler, McKenzie, van der Mars, Barrett-Williams, & Ellis, 2013a, 2013b; Pate et al., 1999). For many, school-based interventions are thought to be the most universally applicable and effective way to counteract low physical activity in youth (Kriemler, et al., 2011). Two school-based physical activity programs which have gained attention recently are the comprehensive school physical activity program (CSPAP) and the health optimizing physical education curriculum (HOPE). The goal of the CSPAP is to develop a school culture that is conducive to promoting lifelong physical activity cross several components: (a) physical education, (b) physical activity during school, (c) physical activity before and after school, and (d) family and community involvement (Erwin, Beighle, Carson, & Castelli, 2013). Similarly, the focus of the HOPE curriculum is to promote physical activity to students through five strands including: (a) before, during and after school extended physical activity programs; (b) sports, games, and other movement forms; (c) family/home education; (d) community-based physical activity; and (e) health-related fitness (Metzler et al., 2013a, 2013b). While there is published research which supports the utility of individual components of the CSPAP and HOPE curriculum in increasing physical activity (Erwin et al., 2013; Metzler et al., 2013a, 2013b), a comprehensive study including each component of either program is not yet available.
While newly conceptualized physical activity intervention packages are not yet supported by the literature, there is a substantial body of research pertaining to school-based treatments. Kriemler and colleagues (2011) recently summarized findings of recent literature reviews which aimed to increase physical activity or fitness in youth. The authors also conducted a supplemental literature search to include research conducted after the completion of the last review. The previous reviews included 26, 20, 76, and 57 studies, respectively. The analysis of previous reviews found that while physical activity interventions had found success increasing physical activity in school, there has been little transfer out of school (Kriemler et al., 2011). Further, the findings suggest that multi-component interventions, which focus on physical activity only (and not multiple health behaviors) have been the most successful. Lastly, the most influential physical activity interventions were embedded into physical education classes (Kriemler, et al., 2011). The additional studies reviewed in this analysis support the effectiveness of school-based physical activity interventions by providing consistently positive physical activity changes in school, out of school, and overall (Kriemler, et al., 2011).

Physical activity is essential in combating potential health-related issues developing throughout the lifespan (CDC, 2011). However, according to the CDC (2011) less than half of young people report being vigorously physically active on a regular basis, and nearly 15% report no recent activity at all. Variables which contribute to inactivity can include gender (with males being more active than females), age (as children get older, activity decreases), and perceived barriers to activity (Fairclough et al., 2012; Sallis et al., 2000). The critical need to promote physical activity has led to the development of many school-based physical activity interventions (Erwin et al., 2013;
Kriemler et al., 2011; Metzler et al., 2013a, 2013b). The most successful of these programs are multi-component interventions which were embedded within the school day and focus primarily on physical activity (Kriemler et al., 2011). Current research suggests that interventions can increase physical activity in schools, after schools, and overall (Kriemler, et al., 2011).

Physical Activity & Disability

Physical activity levels and determinants of physical activity for children and adolescents have been thoroughly represented in the literature (Kriemler et al., 2011; Sallis et al., 1999). However, less is known about individuals with disabilities. Longmuir and Bar-Or (1994) sought to analyze relationships between physical activity level, gender, and age of a large sample of Canadian school-aged individuals with disabilities, irrespective of disability type. The study included 987 participants of varying disabilities (i.e., 342 physically disabled, 374 chronically ill, 241 sensory impairments, 30 multiple disabilities). Data were collected through a questionnaire which was mailed to potential participants that was available in English, French, and Braille. The results found that the majority of participants reported enjoying being either active (39%) or moderately active (32%; Longmuir & Bar-Or, 1994). On the other hand, the percentage of participants who were considered sedentary (29%) was substantially higher than previously reported results for typically developing peers (10%). Approximately 52% of participants reported limitations to their ability to be physically active (Longmuir & Bar-Or, 1994). For all participants, physical activity was found to be significantly influenced by age ($F(12) = 4.0, p<.01$). It was found across participants that activity levels increased from ages six to
ten, were relatively consistent from ten to fifteen, then decreased thereafter (Longmuir & Bar-Or, 1994).

A follow-up study by Longmuir and Bar-Or (2000) examined habitual physical activity levels, perceived fitness, and perceived participation barriers in Canadian youth with disabilities in regard to gender, disability type and age. The study was a reanalysis of survey data on 957 youths with disabilities (458 female, 499 male; $M_{\text{age}}$ 12.89, $SD=3.61$), that did not include those with multiple disabilities. Disability categories for this study included physical disabilities (e.g., cerebral palsy, spina bifida, head injuries; $n=342$), chronic medical conditions (e.g., cystic fibrosis, kidney disease, arthritis; $n=374$), hearing impairments (e.g., deaf, hard of hearing; $n=164$), and visual impairments (e.g., partial or total loss of sight; $n=77$). The results found that youth with chronic medical conditions (47%) and hearing impairments (53%) were reported significantly more physical activity than those with physical disabilities (26%) or visual impairments (27%; $X^2[6, 957]=59.73, p=.001; \text{ES}=0.25$). Further, where participants with chronic medical conditions (72%) and hearing impairments (78%) considered themselves to be more or as fit as their peers, participants with physical disabilities (86%) and visual impairments (86%) considered themselves to be as fit or less fit than their peers. Lastly, most youth with physical impairments (78%) and visual impairments (84%) viewed themselves as being limited in physical activity (Longmuir & Bar-Or, 2000).

The Canada Fitness Survey data was further analyzed to examine the relationship between physical activity of youth with physical disabilities and their parents (Pan et al., 2005). The sample included 256 completed surveys that were returned to the researcher. Most (>80%) participants reported their overall health as excellent/good (Pan et al.,
The results found that most youth in either age category were sedentary (37%-40%), which was higher than the reported percentage of typically developing peers (18%). There were differences in physical activity scores across disability categories, with individuals with cerebral palsy and muscular dystrophy being less active than those with spina bifida or traumatic brain injuries (Pan et al., 2005). Interestingly, a spearman rank-order correlation revealed no significant correlation between the physical activity of children or adolescents with disabilities and their parents ($r=.17, p=.06$ for children; $r=.09, p=.31$ for adolescents). The lack of correlation matches responses from survey questions where 17% of children and 28% of adolescents reported that they played sports with family and over 50% and 26% reported that their mother and father never play sports with them (Pan et al., 2005). The study indicates that school environment is the most likely in which to participate (77% of children; 64% of adolescents).

More recently, Kim and colleagues (2013) compared the prevalence of physical activity levels, physical inactivity, and BMI between individuals with and without disabilities. Data were retrieved from the 1999-2010 National Health and Nutrition Examination Survey (NHANES) which was available through the Center for Disease Control (CDC) website. The sample consisted of adolescent individuals (aged 12-17) who had valid responses on physical activity, BMI, and metabolic syndrome related questions in the survey. Individuals who responded ‘yes’ to a question asking if they had received special education services were placed in the adolescent with disability group. Results indicated that individuals with disabilities had higher rates of physical inactivity (20.3% compared to 14.7%) and obesity (20.9% compared to 14.3%) than their typically developing peers (Kim et al., 2013). Further, a logistic regression model found that
adolescents with disabilities were less likely to engage in both insufficient physical activity and sufficient physical activity than their typically developing peers (Kim et al., 2013).

Several studies have contributed to our understanding that individuals with disabilities are less active than their typically developing peers. In an effort to synthesize information and explain physical activity deficiencies, Shields and colleagues (2012) conducted a systematic review discussing perceived barriers and facilitators. Of the 2,363 articles originally sampled, 14 were selected for analysis. Of those 14 studies, all referred to physical activity barriers, while only six identified facilitators. Barriers and were situated in one of four categories (a) personal barriers, (b) social barriers, (c) environmental barriers, and (d) policy or program barriers. Twelve studies in the review reported personal barriers such as a lack of skills, preference for non-physical activities, and a lack of knowledge of exercise. Four studies noted personal facilitators such as desire to be fit and practice to gain skills. Social barriers were identified by 13 studies and included parental actions/attitudes, lack of friends to participate with, and unsupportive peers. Six studies identified social barriers that facilitated participation, such as involvement with peers and family. Environmental barriers such as inadequate or inaccessible facilities and a lack of transportation were reported in 11 studies. Four studies identified environmental facilitators as well, including the proximity one lives to a facility. Thirteen studies reported policy or program barriers such as a lack of appropriate physical activity programs, lack of staff capability, and negative staff attitudes. Lastly, five studies identified policy and program facilitators, which included skilled staff and a greater number of community based opportunities.
More recently, King and colleagues (2013) looked to psychosocial determinants to explain deficiencies in out of school physical activity of children with physical disabilities. This study included both children with physical disabilities \( (n=427) \) and children without disabilities \( (n=354) \) from the province of Ontario, Canada. Data on psychosocial variables and physical activity and enjoyment were collected through self-administered questionnaires which were mailed to each family. Results found that enjoyment of recreational, physically active, and self-improvement activities were predicted by age, as younger children tended to score higher than older children. For children with disabilities, friend support was a significant predictor of enjoyment of all activities except for self-improvement activities (King et al., 2013). Further, social acceptance was a significant predictor of the enjoyment of social and skill-based physical activities for individuals with disabilities (King et al., 2013). In regards to physical activity intensity, children with disabilities reported lower intensities of activity as age increased, where children without disabilities displayed the opposite trend (King et al., 2013).

School-aged individuals with disabilities report enjoying and valuing physical activity (Longmuir & Bar-Or, 1994). However, those individuals tend to be less physically active than their typically developing peers (Kim et al., 2013; Longmuir & Bar-Or, 1994; Pan et al., 2005). Further, activity levels tend to decrease as individuals with physical disabilities get older (King et al., 2013; Pan et al., 2005). Several barriers and limitations are noted throughout the studies which may contribute to physical activity deficiencies (Longmuir & Bar-Or, 1994; Shield et al., 2012). Of those individuals
included in these studies, Longmuir and Bar-Or (2000) report that individuals with visual impairments may be some of the least active.

**Physical Activity and Visual Impairment**

Physical activity research pertaining to school-aged individuals has been well-represented in the literature. Unfortunately, little research has been conducted on individuals with visual impairments. A recent review of literature found just 18 published research articles on the topic published since 1982 (Haegele & Porretta, 2015). This next section is dedicated to reviewing the available physical activity research pertaining to school-aged individuals with visual impairments and summarizing the published findings. It will review studies: (a) which provide descriptive information about physical activity levels, (b) which suggest variables that influence physical activity, and (c) which include intervention research.

**Descriptive Research**

Prior to 2000, there were few studies focusing specifically on the physical activity of school-aged individuals with visual impairments. However, one study which explored lifestyle variables of school-aged individuals with visual impairments included physical activity in recreation and leisure environments. Wolffé and Sacks (1997) interviewed 48 students aged 15-21 and their parents on several academic topics and lifestyle activities which included recreation and leisure activities. Of the 48 students, 16 were blind, 16 had low-vision, and 16 were sighted. The results of the study suggested that the sighted students were more involved in physical activities than either the low-vision or blind students (Wolffé & Sacks, 1997). Interesting, no differences were found between students
with low-vision and those who were blind for mid-level social activities which included physical activities such as walking, jogging, and working out at a fitness center.

Wolfie and Sacks (1997) found that sighted students were more active than students with visual impairments. To explore this concept in a physical education context, Schedlin and colleagues (2011) examined students’ academic learning time – physical education (ALT-PE) levels in inclusive physical education settings. This study observed and coded the ALT-PE for one student with low vision and one student who was completely blind, as well as their peers, in inclusive physical education classes over 11 class sessions. ALT-PE was used to present the amount of appropriately engaged physical activity time both students were participating throughout the duration of the classes. Schedlin and colleagues (2011) found that the male student who had low vision had recorded less ALT-PE than the student who was completely blind. Both students, though, were less physically active than their sighted peers (Schedlin et al., 2011).

In an effort to understand influences on physical activity, research began to investigate the perceptions and attitudes of children and parents toward physical activity. One such study investigated both children with visual impairments and their parents and focused primarily on physical activity values and barriers to participation (Stuart et al., 2006). The authors surveyed 25 children with visual impairments between the ages of 10-12 and their parents. Of those children, 13 were categorized as having a B1 visual impairment, two were B2, and 10 were B3 (USABA visual impairment classification). There was a slight disagreement between parents of children with visual impairments (i.e., B2 & B3) in comparison to those with children who were blind (i.e., B1) in regards to barriers to participation. Parents of children who were completely blind reported
barriers to participation as (a) fear of injury, (b) lack of available activities, (c) inability of physical educators to include children who were blind in physical education classes, (d) lack of transportation, and (e) inability to see instructions (Stuart et al., 2006). Parents of children who had a visual impairment reported barriers to participation as a lack of (a) appropriately trained physical educators, (b) opportunities, and (c) peers with which to participate (Stuart et al., 2006). This study makes it clear that parents have reservations as to their child’s school-based physical education program, whether it is the teachers training or the environment, and were hesitant to encourage active participation.

A more recent study with a similar focus also reported perceived barriers of parents (Perkins et al., 2013). This qualitative study included 11 parents of children with visual impairments ranging from legally blind (n=3) to completely blind (n=5). Data were collected through interviews, and parents were asked to discuss their perceptions on physical activity for their children. Three themes emerged from the study including: (a) holistic benefits of physical activity, (b) barriers to physical activity, and (c) solutions to physical activity. Each of the participants believed that their child should always attempt to participate in physical activities regardless of their visual impairment levels (Perkins et al., 2013). Many of the parents attributed the desire for their children to be active to building self-confidence through sports or establishing a healthy lifestyle (Perkins et al., 2013). However, all of the parents listed barriers for their children to participate. Some of the barriers included (a) a lack of opportunities for active participation, (b) poor communication with the physical education teachers, and (c) a lack of training of the physical education teachers in working with students with visual impairments. Some
suggested solutions for these issues were a system of reciprocal communication and a need to focus less on traditional activities during physical activity (Perkins et al., 2013).

Both Stuart and colleagues (2006) and Perkins et al (2013) report perceived barriers from parents on their children’s physical activity performance. Ward and colleagues (2011) investigated parental perceptions in a different way, by looking at the influence that parents have on their children’s physical activity level and attractors for children with visual impairments to participate in physical activities. This study was conducted at a Midwest School for the Blind and included eight total participants; five of which were male, three of which were female. In order to qualify to be included in the study, participants had a visual acuity of 20/70 or worse. The results showed that children with visual impairments report having fun during physical activity and enjoying participating in games (Ward et al., 2011). Further, they reported high perceived physical activity competence and support from their peers at the school (Ward et al., 2011). However, the children reported that they received little encouragement to participate in activities from their parents (Ward et al., 2011). This may be related to reasons previously established by research conducted by Stuart and colleagues (2006) and Perkins and colleagues (2013).

While previous research suggests that students with visual impairments are less active than their sighted peers during physical education (Schedlin et al., 2011) and in general (Wolffe & Sacks, 1997), they report having high competence in physical activity (Ward et al., 2011). One explanation for lower activity levels may be related to the lack of encouragement from parents (Ward et al., 2011). While it has been reported that parents understand the value of physical activity for their children (Perkins et al., 2013) it
is evident that parents perceive many barriers participation. Some barriers can be directly related to the school setting, such as training of the physical educator, opportunities to participate, and poor communication between parent and physical educator (Perkins et al., 2013; Stuart et al., 2006).

**Variables Effecting Physical Activity**

Several scholars have examined determinants of physical activity for school-aged individuals with visual impairments. One such study sought to evaluate the differences between the levels of physical activity of students with visual impairments in Norway and France in an effort to determine whether (a) school type (i.e. residential school v. integrated school) had an impact on physical activity performance and (b) if physical activity had an effect on physical and social self-concepts such as self-worth (Gronmo & Augestad, 2000). The authors noted that students in Norway were educated in an integrated setting, whereas students in France were educated in a segregated setting. This study was situated within the theory of self-efficacy and constructs were measured using a questionnaire. The authors selected a sample of 104 participants which included 20 who were blind (as categorized by the World Health Organization). The study found no significant differences between students in Norway and France in regards to physical activity levels, self-efficacy constructs (i.e., physical and social self-concepts and global self-worth), anthropometric measures, skills, and competence (Gronmo & Augestad, 2000). This result suggests that the different types of schools did not play a role in determining physical activity of individuals with visual impairments. Results of the study did find students with visual impairments to be significantly less active than their sighted peers (Gronmo & Augstad, 2000).
To further explore variables which influence physical activity, a series of studies conducted at a Midwest School for the Blind analyzed a number of variables and their relation to physical activity. In the first of these studies, Oh and colleagues (2004) sought to explore several relationships among individuals with visual impairments including between (a) social engagement and physical activity, (b) level of vision and physical activity, (c) level of vision and social engagement, (d) age and physical activity, and (e) age and social engagement. The study included nineteen students (ten female, nine male; six to eighteen years of age) from a Midwest School for the Blind. Social engagement data was obtained using an observational tool, while physical activity data was taken by survey. This study found physical activity levels of individuals with visual impairments to decrease as students got older ($r = -0.70, p < .01$; Oh et al., 2004). The study also found that there was no significant relationship between vision level and social engagement ($r = -0.32, p = .19$) or physical activity ($r = 0.31, p = .19$). Lastly, the relationship between social engagement and physical activity among individuals with visual impairments was also found to be non-significant ($r = -0.21, p = .38$).

Kozub and Oh (2004) conducted a follow-up study by utilizing accelerometers to explore possible determinants of physical activity for individuals with visual impairments including residential status, gender, vision level, and body composition. This study included 19 participants (ten female, nine male; six to eighteen years of age) from a Midwestern School for the Blind. Participants wore accelerometers for one week in order to assess physical activity levels, and determinate information was gathered via questionnaire. Like the previous study, an inverse relationship was found between age and physical activity levels (Kozub & Oh, 2004). However, physical activity levels were
not able to be explained by gender ($t=-.15, p=.88$), resident type ($t=1.41, p=.17$), body mass index ($t=.29, p=.78$), or visual impairment level ($t=.21, p=.19$; Kozub & Oh, 2004). The study found a significant difference ($t=-5.10, p<.05$) when comparing the physical activity of individuals with visual impairments with data of typically developing peers from a similar study. The results support previous research in explaining decreased participation with increased age.

Kozub (2006) continued studying physical activity of individuals with visual impairments by exploring differences in free-time motivation scores between students at a residential school for the blind who were within a healthy BMI range and their peers with visual impairments who fall outside of that range. The study included 31 participants (11 female, 20 male), aged 12 to 21 who had residual sight but were classified as having a visual impairment (i.e., low vision). Motivation was measured using a motivational scale and physical activity was measured using accelerometers. Amotivation did not correlate to any of the study variables, leading the authors to conclude that there was no relationship between free-time amotivation and either physical activity levels or BMI. Further, the study found no significant differences in physical activity between those who met the criterion for BMI and those who did not. The authors suggest, though, that while the afterschool program at the residential school for the blind offered moderate physical activity opportunities, low physical activity was found for all students (Kozub, 2006).

In the same year, Ayvazoglu et al (2006) sought to explain the physical activity of individuals with visual impairments through the lens of the family systems theory. This study included six school-aged children (ages 6-14; 2 males, 4 females; 2 B1, 1 B2, 3 B3) who had visual impairments, as well as their siblings and parents. Participants were
recruited from a Midwest School for the Blind. The study collected physical activity data on the child, sibling, and one parent using accelerometers as well as conducted interviews with the parents and their children with visual impairments. Varying correlations were reported between physical activity levels of children with visual impairments and other family members. For example, one participant had a moderate correlation with his sister ($r=.51, p<.001$), but not with his other sibling. Other participants had low relationships with their parents, however most relationships were not significant. During qualitative interviews, parents suggested that physical activity levels were explained by transportation, family member involvement, safety, and time constraints. Further, parents and their children with visual impairments reported a desire to learn more physical activities and sports that could be used outside of the school setting (Ayvazoglu et al., 2006). Children with visual impairments also reported the critical role family member’s play in their physical activity since they may act as playmates or facilitators for those activities (Ayvazoglu et al., 2006).

A more recent study sought to determine the effect of gender and vision level on physical activity (Aslan et al., 2012). This study included 30 children and adolescents with visual impairments ages 8 to 16 whom had visual impairments ranging from low vision to complete blindness. Physical activity levels were recorded using a physical activity dairy which participants completed for two week days and one weekend day within the same week. The study found no statistically significant differences between participants who were considered blind and low vision in variables including sleep, light, moderate, and vigorous activity ($p>.05$; Aslan et al., 2012). In regards to gender, there was a significant difference in favor of males with low vision and females with low
vision in light and moderate activity ($p<.05$). Similar results were not found in regards to those who were completely blind. The authors also report low physical activity levels for all children and adolescents included in the study (Aslan et al., 2012).

The research discussed in this section affirms our understanding that school-aged individuals with visual impairments are less physically active than their sighted peers (Gronmo & Augstad, 2000). The research provides mixed results in regards to gender, leading to inconclusive results (Aslan et al., 2012; Kozub & Oh, 2004). Further, research suggests that physical activity tends to decrease as students with visual impairments progress through school (Kozub & Oh, 2004; Oh et al., 2004). The most important results, though, may be the lack of relationships between physical barriers (BMI, visual impairment level) or educational variables (e.g., school setting) with physical activity (Aslan et al., 2012; Kozub, 2006; Kozub & Oh, 2004; Oh et al., 2004).

**Intervention Research**

As we continue to learn about physical activity for individuals with visual impairments, it is essential that we also try to improve it. Siedentop once voiced that “If you want to really understand something, try to change it” (1982, p.48). However, intervention based literature pertaining to individuals with visual impairments and physical activity is limited. Only seven interventions have been identified through a thorough review of the available literature. Of the seven interventions, three were single-subject designs, two quasi-experimental group designs, and two were mixed methods designs. Interventions have provided evidence that the physical activity behavior of school-aged individuals with visual impairments can be influenced by technology integration and physical activity programming. For example, Kern & Worely (2001)
evaluated how audio adaptations to playground equipment would influence the physical activity/play behavior of a three-year-old with congenital blindness. Playground adaptations involved adding musical stations in different locations as well as a path that provided auditory feedback. This single-subject design study evaluated data on physical activity/play and stereotypic behavior. The study found increases in the use of playground equipment when the audio adaptations were in place (Kern & Worely, 2001). Further, the study demonstrated a functional relation between stereotypic behaviors during the playground modification condition. The results of this study suggest that environments that are modified for individuals with visual impairments can lead to further active engagement.

Kern and Worely (2001) demonstrated that audio reinforcement could increase the use of playground equipment for a child with a visual impairment. Lieberman et al. (2006) tested a similar hypothesis when they sought to determine the effects of using a talking pedometer on the walking behavior of children with visual impairments. In addition to gathering data on walking behavior, this mixed-methods design study interviewed participants to determine the value the participants placed on walking while using the talking pedometers. The study included 22 participants, (15 male, 7 female; age range from 9 to 13) who attended a sport camp for individuals with visual impairments. Of the 22 participants, visual impairment levels included B1 (n=4), B2 (n=9), and B3 (n=9). The participants of the study wore the talking pedometers one week prior to and one week during the sport camp. The walking behavior results found that the participants averaged 9,743 steps per day the week prior to camp and 15,793 steps per day during the sports camp (Lieberman et al., 2006). No statistical comparisons were conducted. The
qualitative results found participants understood health related outcomes related to pedometer use and a high interest in and motivation from the audio feedback that the pedometer provides (Lieberman et al., 2006). The participants reported a preference for using the talking pedometers and believed it had an impact on their level of independence during physical activity (Lieberman et al., 2006).

Bofolo and colleagues (2011) manipulated physical activity levels by modifying a more contemporary physical activity option for typically developing individuals; exergames. Exergames are video games which include a physical activity component. Bofoli and colleagues (2011) measured the difference in enjoyment levels of youths with visual impairments playing three commercially available exergames (i.e., Dance Dance Revolution Extreme 2, Eyetoy Kinetic, & Wii Boxing). Participants were sampled from a one-week sports camp for individuals with visual impairments. The study included fifteen youths with visual impairments with a visual impairment classification of B2 or B3. Enjoyment was measured by participants completing a physical activity enjoyment scale. While there were no significant differences found between the enjoyment levels of the three games ($\chi^2[2] = 3.41$, ns), consistently high mean scores of enjoyment were found across exergames. This result indicated that participants enjoyed being physically active through the use of exergames (Bofoli, et al., 2011).

The results of the previous three studies provide evidence that advances in technology can improve physical activity opportunities for individuals with visual impairments. Other studies have focused on demonstrating the influence of the availability of programming specific to individuals with visual impairments on physical activity. Ponchillia et al (2005) conducted a comparison of 321 (144 in 2001, 177 in
2002) school-aged individuals with visual impairments before and after participation in a sports camp in one of several locations. Their study was conducted over a two year period. Females accounted for 42.3% of the sample in 2001 and 47.4% of the sample in 2002. Variables including attitudes toward physical activity, sport knowledge, skills, and degree of participation in sporting activities in local communities were gathered using the sports camp evaluation instrument (SCEI). Descriptive statistics displayed that over two-thirds of participants reported full inclusion in physical education either “most of the time” or “always” (Ponchillia et al., 2005). Participants demonstrated significant growth ($p<.05$) in attitudes, knowledge, and skills between the times of the pre-camp and post-camp evaluations (Ponchillia et al., 2005). More interestingly, 83.2% of participants reported feeling supported by parents as “most of the time” or “always” (Ponchillia et al., 2005). This finding may contradict those previously discussed by Ward and colleagues (2011) where participants reported low parent encouragement.

Robinson and Lieberman (2007) conducted a mixed-methods study to determine the effects of a parent resource manual on physical and sedentary activity of youth with visual impairments. The parent resource manual included a listing of physical activity resources in the general community which were available to youth with visual impairments. These included adapted physical education programs, sport organizations, equipment ideas, journal articles, mailing lists, national links, etc. The study included 18 school-aged individuals with visual impairments (aged 9-23) who had previously attended a one-week developmental sports camp in New York State. Six weeks prior to the camp, families received an information packet including a questionnaire and one-week activity log. When these were returned, the family then received the parent manual
as well as a post-manual questionnaire and activity log, which were returned when the participants went to camp. Results found that males demonstrated significantly larger increases in physical activity time than females ($\alpha = .05, p = .032$) following the distribution of the manual (Robinson & Lieberman, 2007). Of the females in the study, only one increased physical activity time after receiving the manual. Parents reported, through qualitative data, that children participated in physical activities with friends, instructors, and volunteers at after-school programs (note the absence of the parent). When asked if parents were satisfied with their child’s physical activity, 50% and 67% reported that they were before and after receiving the manual, respectively (Robinson & Lieberman, 2007).

Intervention research has provided evidence that technology integration and participation in and the availability of disability specific programming can influence physical activity. However, none of the previously discussed interventions were school-based. Of the seven interventions found, only two were conducted in schools. One of which was conducted in an integrated physical education class and one of which was conducted in a Midwest School for the Blind.

Wiskochil and colleagues (2007) sought to examine the effects of trained peer tutors on the motor-appropriate physical activity of individuals with visual impairments in an integrated physical education class. This multiple-baseline, single-subject design study included four students with visual impairments (2 with low vision, 2 who were blind) from four separate classes (3rd grade, 6th grade, 8th grade, & 11th grade). Once participants were selected, classes were videotaped for baseline data. After baseline data were established, trained peer tutors were introduced in a staggered fashion to ensure that
changes in the target behavior were in relation to the treatment variable and not an extraneous variable (Wiskochil et al., 2007). The results suggest a functional relation between the treatment variable (i.e., trained peer tutors) and motor-appropriate physical activity for the participants who are blind (Wiskochil et al., 2007). On the other hand, there were mixed results in regards to individuals with low vision, where one student’s data suggested a clear functional relationship and the other did not (Wiskochil et al., 2007). Findings also suggest that trained peer tutors were more effective than untrained peer tutors, and that trained peer tutors were effective during both open and closed activities (Wiskochil et al., 2007).

Most recently, Cervantes and Porretta (2013) examined the impact of a SCT (SCT) based afterschool physical activity intervention on adolescents with visual impairments. This range-bound changing criterion single subject design study included four participants (3 male, 1 female; aged 14-19; 2 B1, 1 B3, 1 B4) who were full-time residential students at a Midwest School for the Blind. The SCT intervention was modeled after an existing activity program which was designed specifically for high school aged students who were sighted. The study collected physical activity data using accelerometers, and social cognitive constructs using a series of validated questionnaires. Prior to baseline data collection, social cognitive construct data were collected. Baseline data were then collected on each participant until physical activity behavior was stable. When baseline was established, the treatment program was initiated. The program consisted of nine lesson units which were introduced as an afterschool program over five weeks. Each lesson was intended to help develop the participant’s activity program while addressing SCT the constructs of self-efficacy, self-regulation outcome expectancy, and
social support. Lessons included the introduction of a curricular concept, an in-class activity, and a homework activity. At the conclusion of the program, SCT constructs were measured again. Physical activity maintenance data were then collected one and three weeks after the completion of the program. The results of the study found a moderate functional relationship between the treatment and physical activity behavior change (Cervantes & Porretta, 2013). However, maintenance data showed a regression back to near baseline data across most participants. Further, self-regulation, social support, and outcome expectancy constructs increased in each participant over the course of the intervention. Self-efficacy had a positive change for two of the four participants, no change for one participant, and a negligible negative change (1 point) for one participant (Cervantes & Porretta, 2013).

Intervention research pertaining to physical activity behavior of school-aged individuals with visual impairments provides evidence that physical activity levels can be improved (e.g., Cervantes & Porretta, 2013; Lieberman et al., 2006; Robinson & Lieberman, 2007; Wiskochil et al., 2007). Improvements may be related to advances in technology (e.g., Bofolli et al., 2011; Lieberman et al., 2006) or specialized programs (Cervantes & Porretta, 2013; Ponchillia et al., 2005). Research demonstrates that physical education related inactivity (Schedlin et al., 2011) may be improved through the use of trained peer tutors (Wiskochil et al., 2007). Unfortunately, the low number of intervention studies ($n=7$ since 1982) is of concern, and more research must be conducted to enhance our knowledge of strategies to improve physical activity behavior for individuals with visual impairments.

**Summary and Critique of Physical Activity and Visual Impairment Research**
Available research pertaining to physical activity behavior of individuals with visual impairments reveals several consistent findings. Compared to their sighted peers, students with visual impairments demonstrate less physical activity (Gronmo & Augstad, 2000; Kozub, 2006; Kozub & Oh, 2004; Schedlin et al., 2011; Wolffe & Sacks, 1997). Similar to individuals with physical disabilities (King et al., 2013; Pan et al., 2005), as individuals with visual impairments progress through school, physical activity levels decrease (Kozub & Oh, 2004; Oh et al., 2004). Many variables have been demonstrated not to be directly related to physical activity behavior, including vision level (Kozub & Oh, 2004; Oh et al., 2004), residential v. integrated education (Gronmo & Augestad, 2000; Kozub & Oh, 2004), and BMI (Kozub, 2006; Kozub & Oh, 2004). Fortunately, invention research provides evidence that physical activity levels can be improved (e.g., Cervantes & Porretta, 2013; Lieberman et al., 2006; Robinson & Lieberman, 2007; Wiskochil et al., 2007).

A possible explanation for low physical activity may be a lack of encouragement from parents (Ward et al., 2011). This could result from their perceived barriers including training of the physical educator, appropriate opportunities to participate, and poor teacher-parent communication (Perkins et al., 2013; Stuart et al., 2006). However, these hypotheses have not been empirically tested.

While the published literature provides a foundation for future research, there are limitations. First, while several variables have been identified as not directly contributing to youth physical activity, scholars have yet to explore whether variables act as mediator, moderators, or covariates. Exploring the interrelated nature of several variables may contribute to our understanding of why school-aged individuals with visual impairments
are not physically active. For example, while visual impairment level and BMI may not have been found to directly influence physical activity independently, it would be reasonable to hypothesize that they may interact to influence physical activity.

Further, there has been a dearth of research which has considered the influence of psychosocial variables in physical activity behavior. King and colleagues (2013) found several psychosocial determinants to have utility in explaining physical activity of a large group of children with various physical disabilities. Examples of contributing variables include social acceptance, emotional functioning, and peer difficulties (King et al., 2013). While several studies have attempted to correlate psychosocial variables with physical activity of individuals with visual impairments (Ayvazoglu et al., 2006; Gronmo & Augstad, 2000), results were inconclusive. However, previous research has found success with increasing physical activity with the introduction of a SCT-based intervention (Cervantes & Porretta, 2013). Future research may benefit from evaluating the utility of SCT constructs in explaining physical activity for those with visual impairments.

Third, most of the previously conducted research which discusses physical activity levels for individuals with visual impairments was conducted in either Schools for the Blind or a sport camps for individuals with visual impairments. Readers should keep in mind that this does not account for most school-aged individuals with visual impairments. According to the American Printing House for the Blind (2011), less than nine percent of school-aged individuals with visual impairments are educated in Schools for the Blind. On the other hand, over 83% are educated in neighborhood schools (APH, 2011). These data indicate that while sampling from Schools for the Blind or camps for
individuals with visual impairments may be more convenient, the sample may not be representative of all school-aged individuals with visual impairments.

A fourth limitation of previous research is the overall lack of intervention research promoting physical activity for school-aged individuals with visual impairments. A recent review of literature found just seven intervention studies published since 1982 (Haegele & Porretta, 2015). Of those studies, three were single-subject designs, one was a mixed method design, one was a pre-experimental design, and two were quasi-experimental. Further, only two studies were school-based, with one being conducted in an integrated setting and one in a residential school for the blind. In order to learn more about physical activity for individuals with visual impairments, more research is needed.

Last, a limited number of published studies ($n=4$) have been situated in theoretical or conceptual models. Scholars in adapted physical activity have stressed the importance of using theoretical or conceptual models to drive research and develop hypotheses (Cervantes & Taylor, 2011; Reid & Stanish, 2003). However, only one intervention study and three correlational/comparative studies focusing on physical activity and individuals with visual impairments have taken this into consideration. Theoretical or conceptual models allow researchers to develop hypotheses based on previous knowledge. New results can then either confirm or revise theory. One such theory which has gained some recent interest in physical activity research for individuals with visual impairments is SCT (Cervantes & Porretta, 2013). In an effort to continue to progress theoretically-based research in adapted physical education, the current study will be situated in SCT. Therefore, the following section will review critical features of the SCT and discuss SCT related determinants of physical activity.
Social Cognitive Theory

This study was situated in SCT. Many scholars consider Bandura’s SCT as the most accepted theoretical model for understanding health promotion behavior, including physical activity (Motl, 2006; Netz & Raviv, 2004). SCT is a general theory of human behavior which stipulates that people are active agents in their own lives as they generate thoughts, feelings, and behaviors (Bandura, 2001; Martin & Kulina, 2005). SCT is an evolution of a previous theory of human behavior, Social Learning Theory (SLT). SLT centralized on interrelationships between principles of learning such as reinforcement, punishment, extinction, and imitation of models. These concepts are derived from the work of early behavioral psychologists such as B.F. Skinner and Ivan Pavlov. At the time of its conception, SLT differed from previous work by explaining the reciprocal relationship between environment and behavior. Meaning, where previous theories posited that changes in the environment would have an influence on behavior, SLT stated that the relationship was bi-directional and that behavior would also have an effect on the environment. The SLT was also the first theory of human behavior to insert the cognitive factor (Hortz & Petosa, 2006). While others have contributed to the development of SCT, most progress in the development of the theory can be attributed to Albert Bandura. Bandura (1986) was responsible for introducing concepts such as triadic reciprocity and self-efficacy. These changes led to the evolution of SLT to become SCT.

The SCT is based on the four primary assumptions that (a) behavior is purposeful, (b) individuals are self-reflective, (c) people are capable of self-regulation, and (d) triadic reciprocal determinism is central to the theory (Bandura, 1986, 1989a, 2001; Motl, 2006). The first assumption, that behavior is purposeful, suggests that behavior is regulated by
forethought (Bandura, 1989a). Bandura (1986) asserts that humans, through forethought, can determine how current events impact future expectations. This can include anticipating likely consequences of actions, setting goals for themselves, or otherwise planning courses of actions which can lead to desired outcomes (Bandura, 1989a). Each of these actions relate to the purposeful nature of behavior, as described by Bandura (1989a).

The second assumption, that individuals are self-reflective, refers to the concept of humans processing and analyzing self-thought to determine patterns of error. By analyzing their own thoughts, humans can generate knowledge about themselves as well as how they interact with the world (Bandura, 1986). The process of self-reflection can lead humans to develop judgments of their ability to engage in behaviors in different environments (Bandura, 1986). The assumption of self-reflection is essential to the construct of self-efficacy, which is discussed later in this chapter.

Self-regulation is the third assumption specific to SCT. Self-regulation suggests that humans do not haphazardly behave, but rather they behave because they are motivated by internal desires and/or reactions to previous evaluations (Bandura, 1986). The ability of humans to be able to direct their behaviors is related to the interactions between the environment and the individual in triadic reciprocal determinism (see next paragraph). Self-regulation is exercised when humans use their influence on their environment to change it in order to better suit their behaviors.

The fourth assumption of SCT, triadic reciprocal determinism, is the model of causation which is central to SCT. Bandura (1989) elucidates that previous explanations of human behavior were in terms of a one-sided determination. One such example is
Skinner’s conception of behaviorism (1974), which suggests that human behavior is shaped through changes in the environment. In the triadic reciprocal determinism, the model of causation involves three elements; (a) behavior, (b) personal factors (e.g., self-efficacy, outcome expectancies), and (c) environmental influences (e.g., social support; Bandura, 1989a; Motl, 2006). Each of these determinants influences each other bi-directionally (Bandura, 1989a). While each element is considered essential, reciprocal causation does not suggest that each source of influence must be equal. Rather, some influences may be stronger than others (Bandura, 1989a). The influence of each factor depends upon the nature of the behavior, the differences within the individual, the environment, and the circumstances involved with the behavior.

Each interactional link in triadic reciprocal determinism represents a different bi-directional influence between elements (see Figure 2.1). The personal – behavioral link of reciprocal causation reflects interactions between the individual’s thoughts and actions (Bandura, 1989a). This link suggests that an individual’s expectations, beliefs, goals, and intentions influence how they behave (Bandura, 1986, 1989a). The bi-directional aspect of this link would also suggest that extrinsic effects of actions would then have an effect on an individual’s thoughts. SCT constructs such as self-regulation, self-efficacy, and outcome expectancies are situated in the personal-behavioral link. The environmental-personal link is concerned with the relationship between one’s personal characteristics and environmental influences (Bandura, 1989a). Social influences of the environment can help shape an individual’s expectations, beliefs, and attitudes. Equally, one’s environment can be shaped by their beliefs about themselves. Lastly, the behavior – environment link represents the influence between a person’s behavior and environment.
An environment is not a fixed entity, and can be modified rather easily by one’s actions. Similarly, one’s environment may partly determine the forms of behavior that are developed and activated (Bandura, 1989a). The SCT construct of social support is situated in the behavior-environmental link.

Figure 2.1. Triadic reciprocal determinism (Bandura, 1989a).
SCT Constructs

The reciprocal nature of human functioning in SCT allows researchers to direct behavior change interventions at personal, environmental, or behavioral factors. The SCT postulates that changes in human behavior can be influenced by several interrelated determinants. Many of these constructs are common in research exploring determinants which influence physical activity behavior. Determinants are considered interrelated because several constructs may influence similar behaviors. For example, both self-efficacy and self-regulation may effect one’s goal-setting. This study will centerize on three constructs related to the individual (i.e., self-efficacy, outcome expectancies, self-regulation) and one which relates to the environment (i.e., social support). The four constructs that are central to this study are (a) self-efficacy, (b) self-regulation, (c) outcomes expectancies, and (d) social support.

Self-efficacy. One construct within the SCT that has received considerable attention is self-efficacy. Bandura has proposed that self-efficacy may be the central determinant of SCT because of it influences health behaviors (including physical activity) both directly and indirectly through its effect on other determinants (Bandura, 1994; Dewar et al., 2014; Motl, 2006). According to Bandura (1994), human accomplishments and personal well-being can be enhanced by a strong sense of self-efficacy. Those who have a strong confidence in their abilities approach difficult tasks as “challenges to be mastered rather than as threats to be avoided” (Bandura, 1994, p.1). On the other hand, individuals who doubt their abilities shy away from difficult tasks and have low aspirations and weak commitment to goals (Bandura, 1994). According to Bandura (1994), individuals may create a strong sense of efficacy through (a) meaningful mastery
experiences, (b) vicarious experiences provided by social models, (c) social persuasion, and (d) reduced stress reactions and misconceptions of physical states.

A heightened sense of efficacy may contribute to (a) cognitive, (b) motivational, (c) affective and (d) selection processes. Since SCT postulates that human behavior is purposive, self-efficacy can influence one’s cognitive processing through goal setting. The stronger one’s perceived self-efficacy, the higher the goals one would set for themselves and the stronger their commitments to those goals would be (Bandura, 1994). Motivation processes may be affected by self-efficacy in a number of ways. For example, self-efficacy effects how much effort one would expend trying to meet goals, how long they will persevere to meet goals, and one’s resilience to failure (Bandura, 1989b, 1994). Individuals who have self-doubt (i.e., low self-efficacy) may decrease their efforts and accept mediocre results, or abort attempts prematurely (Bandura, 1989b). Affective processes are influenced through self-efficacy beliefs because those who believe they can control threats do not create disturbing thought processes. Beliefs in one’s capabilities affect how much stress and depression they experience in threatening or taxing situations (Bandura, 1989b, 1994). Lastly, an individual’s self-efficacy belief can shape the types of activities she/he chooses (i.e., selection processes). People typically avoid activities which they believe exceed their abilities, while those who have stronger self-efficacy may take on challenges head on (Bandura, 1989b). However, people tend to readily undertake challenges which they believe to be attainable (Bandura, 1989b).

Self-regulation. Self-regulation can be defined as one’s ability to guide oneself toward distal outcomes (Hortz & Petosa, 2008). Some common examples of self-regulation skills include goal setting and incentivizing behavior. Not all human behavior
is prompted by the possibility of immediate reinforcement or outcomes, and many times future outcomes may provoke behavior (Bandura, 1986, 1991). According to Bandura (1991), self-regulatory systems both mediate the effects of external influences and provide the basis for purposeful actions.

Since human behavior is purposive, it must be regulated by forethought (Bandura, 1991). One of Bandura’s more well-known statements is that “If human behavior were regulated solely by external outcomes, people would behave like weathervanes, constantly shifting direction to conform to whatever momentary social influence happened to impinge upon them” (Bandura, 1991, p. 249; Bandura, 1998). Rather, Bandura (1991) suggests that humans possess the ability to reflect and react, which enables control over thoughts, feelings, motivation, and action. Therefore, human behavior is regulated by the influence of both internal and external sources (Bandura, 1991).

Bandura (1986) suggests that self-regulation can be developed through several sub-functions including (a) self-observation and (b) judgmental processes. Self-observation provides two primary functions within self-regulation (Hortz & Petosa, 2006). First, it provides information needed for an individual to set and monitor realistic goals. Second, it allows humans to identify familiar barriers that may exist in different environments to obtain their objectives. Judgmental processes refer to the ability of an individual to evaluate the quality of the behavioral outcome desired (Hortz & Petosa, 2006). Goal-setting is an important element within judgmental processes as it provides the individual with clear goals by which they can judge their performance.
**Outcome expectancies.** A third SCT construct of interest for this study is outcome expectancies. Outcome expectations about the effect of different lifestyle habits are likely to contribute to health behavior (Bandura, 1998). Bandura (1994) describes outcome expectancies as one’s judgments of the likely consequence that behavior will produce.

Outcome expectations can come in one of three forms: (a) the physical effects that accompany the behavior, (b) positive and negative social sanctions, and (c) positive and negative self-evaluative reactions to one’s behavior (Bandura, 1998). The physical effects that accompany behavior can include pleasant or unpleasant sensory experiences, physical pleasure and discomfort. Positive and negative social sanctions include how others perceive one’s behavior. Lastly, positive and negative self-evaluate reactions are one of the more influential regulators of human behavior and include self-satisfaction or self-worth (Bandura, 1998).

Outcome expectancies are considered a form of cognitive motivation (Bandura, 1994) which is determined, in part, by one’s self-efficacy (Bandura, 1986, 1994). The relationship between self-efficacy is obvious when one considers students and school work. Students who are confident in their ability (high self-efficacy) in their academic work expect high marks on exams (outcome expectancy). The opposite is also true, as students who are not confident in their academic ability (low self-efficacy) expect less success (outcome expectancies). Self-efficacy, though, can have varying influence on one’s outcome expectancy. For example, when outcomes resulting from a specific performance are not controlled by the individual’s performance, efficacy beliefs may not influence ones outcome expectancy (Bandura, 1994). In other words, while a performer
may believe he/she can complete a task, the performer may have lower outcome expectancy due to reasons outside of their control.

**Social support.** Of the four constructs included in this study, social support is the only environmental factor considered. Social support provides incentives, meaning, and worth that can assist humans in overcoming obstacles and stresses encountered in everyday life (Bandura, 1989a). According to Bandura (1989a), a great deal of social support is necessary during the formative years of development when preferences and personal standards are being developed. Social support may also reduce one’s stress, depression, and physical illness (Bandura, 1998). However, social support is not an automatic entity which is universally available. Instead, individuals must find or create supportive relationships for themselves (Bandura, 1998). In other words, humans must understand how to enlist social support in order to sustain their behavioral effects (Bandura, 2004; Stevens, 2006). In order for individuals to seek out supportive relationships, they must have a strong sense of efficacy in social situations. If one has limited efficacy in social situations, the development of social supports are typically impeded (Bandura, 1994). In this way, perceived self-efficacy and social support are bidirectionally related (Bandura, 1998).

There are four types of social support that members of the social environment can provide: (a) instrumental social support, (b) informational social support, (c) emotional social support, and (d) appraisal social support (Stevens, 2006). Instrumental social supports are tangible recourses, such as transportation, that aid in behavioral processes. Information social supports, such as a friend willing to teach someone how to swim, are rules or information which enables behavioral processes. Emotional social support can
include empathy or encouragement for overcoming barriers to active which are provided by the social network to enable behavior. Appraisal social support is reinforcement that members of the social network provide, which can include expressions of pride or physical objects as reinforcement after the completion of a difficult task (Stevens, 2006).

**Limitations**

Several limitations of Bandura’s SCT have been identified. For example, Lee (1989; 1990) suggests that SCT, like many modern theories of human behavior, rely too heavily on undefined and unobservable variables or constructs to explain human behavior. This limits researcher’s abilities to directly observe construct development and rely on self-reports and questionnaires as measurements. Other critics suggest that while SCT constructs may be used to predict human behavior, they should not claim causation in behavior change (Hawkins, 1992). Of the reported limitations, many come from a behavioristic perspective. However, Bandura’s SCT presents a comprehensive theory of human behavior that has gained popularity in health behavior research including research concerning physical activity. Therefore, it is the most appropriate theoretical foundation for this study.

**SCT and Physical Activity**

SCT is a general theory of human behavior. However, there has been an increasing support in the primary tenets of the SCT in understanding health behaviors, including physical activity of adolescents (Motl, 2006). This section will review research pertaining to SCT determinants of physical activity of adolescents and discuss the development of a specific SCT-based physical education curriculum, the *Plan for Exercise, Plan for Health* program.
SCT Determinants of Physical Activity

Physical activity research situated in SCT has commonly sought to examine behavior in adults (Netz & Raviv, 2004); young adults (Dzewaltowski, Noble, & Shaw, 1990; Petosa & Suminski, 2003; Ryan, 2005); and young children (Martin & McCaughty, 2008; Ramirez, Hodges Kulinna, & Cothran, 2012). There has also been consistent support for the application of SCT in examinations of physical activity among adolescents (Motl, 2006). For example, Winters, Petosa, and Chalton (2003) examined whether the SCT constructs of self-regulation, self-efficacy to overcome exercise barriers, social situation, and outcome expectation would predict non-school related moderate to vigorous physical activity for high school students enrolled in introductory physical education classes. The study included a sample of 248 adolescent-aged students from three high schools in central Ohio. Each participant completed questionnaires targeting SCT construct variables and typical leisure-time physical activity. The results revealed a significant association between each of the SCT variables and leisure-time moderate to vigorous activity (Winters et al., 2003). SCT variable results were similar across gender. The SCT variables also demonstrated high intercorrelations, the strongest being between self-regulation and social situation ($r=0.63$). A hierarchical multiple-regression model revealed that the SCT constructs collectively accounted for 29% of the variance in self-reported physical activity (Winters et al., 2003).

Petosa, Hertz, Cardina and Suminski (2005) followed the Winters et al. (2003) study to further examine the relationship between SCT variables and the frequency of moderate-vigorous physical activity in high school students. The study included 256 students in ninth and twelfth grade attending a small Midwestern school. The following
eight SCT variables were measured through questionnaires: (a) self-efficacy/ability, (b) self-efficacy for barriers, (c) negative outcome expectations, (d) general health outcome expectations, (e) physical appearance outcome expectations, (f) social outcome expectations, (g) social situation, and (h) self-regulation. Physical activity was measured using a series of seven consecutive previous day physical activity recall questionnaires.

The results indicate that only 5% of the sample reported meeting recommended standards of five or more days of moderate-vigorous physical activity while 57.4% reported zero bouts (Petosa et al., 2005). The results indicate that all of the SCT variables were significantly correlated with physical activity (p<0.01) with the exception of negative outcome expectations and social outcome expectations (p<0.05). The highest correlation was self-regulation (r=0.52) followed by the two self-efficacy scales (r=0.43 & r=0.47) and social situation (r=0.39; Petosa et al., 2005). According to a hierarchical multiple regression model, the SCT variables accounted for 31% of the physical activity variance (Petosa et al., 2005). The final model included only four variables accounting for a significant portion of variance (p<0.05) which included self-regulation (26.4% variance), self-efficacy (2% additional variance), social outcome expectations (2% additional variance), and self-efficacy of barriers (1% of variance; Petosa et al., 2005).

Additional studies included specific SCT constructs for hypothesis testing. For example, Dishman, Saunders, Motl, Dowda, and Pate (2009) evaluated whether the SCT variable self-efficacy for overcoming barriers to physical activity had a direct, indirect, or moderating relationship with naturally occurring changes in perceived social support and declines in physical activity in high school females. This longitudinal study allowed for the researchers to observe naturally occurring declines in physical activity of participants.
195 female participants from 12 public high schools in South Carolina were the sample of the study. Physical activity was measured using a 3-Day Physical Activity Recall. Self-efficacy for overcoming barriers for physical activity and social support was measured using Likert-type questionnaires. The study used structural equation modeling to evaluate the direct, mediated, and moderating effects of self-efficacy on the change in physical activity. Self-efficacy was found to be stable across the high school years and was not directly or indirectly related to changes in physical activity or perceived social support (Dishman et al., 2009). Instead, the authors suggested that self-efficacy was a moderating variable in relation between changes in physical activity and perceived social support (Dishman et al., 2009). This means that participants who maintained higher perceptions of social support had less decline in physical activity, but only if they also had high self-efficacy. In this way, self-efficacy had utility for maintaining physical activity for high school females.

Each of the previous studies provide evidence that SCT constructs may be related to physical activity of adolescent-aged students. Other studies have targeted SCT constructs in order to determine if physical activity could be manipulated. For example, Hartz and Petosa (2008) sought to identify the degree to which targeted SCT constructs acted as mediators of moderate-intensity exercise of high school students. One hundred forty-three participants in an intervention group and 97 in a comparison group from two rural high schools in Ohio acted as participants. Both groups were exposed to similar physical education curricula throughout the school year. The intervention group received a behavioral skill-building curriculum based in SCT in addition to the typical physical education curricula which emphasized constructs of self-regulation, social situation,
strength of self-efficacy and outcome expectancy value. An interaction effect (F[1,238] =38.99, p<0.01 with a large effect size (x²=.15) was found. Further, the results revealed that the intervention was sufficient in producing changes in self-regulation and social situation, which mediated changes in physical activity. However, the strength of self-efficacy and outcome expectancy values was not significantly changed by exposure to the intervention (Hortz & Petosa, 2008). These conclusions about self-efficacy and outcome expectancy contrast to those of previous studies.

Most recently, Dewar and colleagues (2014) evaluated the impact of a 12-month school-based multi-component program developed using SCT on adolescent girl’s physical activity and sedentary behavior. The study included 357 adolescent girls (M =13.2) from 12 secondary schools in Australia. SCT variables such as self-efficacy, perceived environment, social support, behavioral strategies, outcome expectations, and outcome expectations related to physical activity were measured using questionnaires. Physical activity was measured by accelerometers for seven consecutive days during waking hours as well as through behavioral questionnaires. The intervention significantly reduced females time spent in self-reported sedentary activities (Dewar et al., 2014). However, the intervention did not have a significant impact upon any of the objective physical activity outcomes (i.e., accelerometers) or hypothesized mediators of physical activity behavior change (i.e., SCT constructs; Dewar et al., 2014).

To examine previously published research pertaining to SCT constructs used to explain physical activity, a systematic review and meta-analysis was conducted (Plotnikoff et al., 2013). The review searched for studies which used a several social-cognitive related theory (e.g., health promotion model, theory of planned behavior, self-
determination theory, and Bandura’s SCT) in a series of data-bases. Inclusion criteria limited the review to 23 studies total, only three of which reported specifically on the utility of SCT. The review found that results were favorable for SCT related studies regardless of the size of the sample. Self-efficacy was found to be a generally strong predictor of physical activity across various studies (Plotnikoff et al., 2013). In addition, the review suggested that outcome expectations may be an appropriate construct for increasing physical activity for adolescents (Plotnikoff et al., 2013). While this review discussed constructs from several theories, those associated with SCT were highlighted as explaining physical activity. In addition to self-efficacy and outcome expectations, the authors suggested intention as being an important construct for predicting physical activity behavior for adolescents (Plotnikoff et al., 2013).

**SCT and Disability**

In addition to discussing SCT determinants to physical activity for adolescents, it is important to discuss previous research pertaining to individuals with disabilities. However, little research situated in SCT has focused on understanding and increasing physical activity of people with physical or sensory disabilities. One example examined SCT variables as predictors of physical activity among people living with spinal cord injuries. One hundred sixty participants (74% male, 26% female; \( M \) aged =47.4) who had experienced traumatic spinal cord injuries at least 12 months prior to data collected were included (Martin Ginis et al., 2011). Physical activity was assessed using a physical activity recall designed specifically for individuals with spinal cord injuries. SCT variables of social support, outcome expectancies, self-efficacy, and self-regulation were assessed using questionnaires. The results found self-regulation to be the only variable to
exert significant direct effects on physical activity ($\beta=0.72$). Some aspects of self-efficacy had strong, significant total ($\beta=0.51$) and indirect effects ($\beta=0.53$) on physical activity. Outcome expectations did not have significant total effects ($\beta=0.08$) but had significant indirect effects ($\beta=0.26$). It was noted that self-regulation mediated the effects of outcome expectations on physical activity and that the non-significant total effect was likely due to the negative (although negligible) direct relationship between outcome expectations and physical activity (Martin Ginis et al., 2011). Lastly, no relationship between social support and physical activity ($\beta=0.72$) was found.

Martin, Shapiro, and Prokesova (2013) evaluated the ability of social cognitive variables in predicting physical activity of children with hearing impairments. 64 participants (42 male, 22 female; $M$ age 14.1) from two large cities, one in the United States of America and one in the Czech Republic, acted as the sample for this study. The study measured physical activity and SCT variables of self-efficacy to overcome barriers and social support using questionnaires. The results indicated that children in the United States of America reported greater self-efficacy ($F[1,62] =3.86, p<.05$), sibling social support ($F[1,62] =6.38, p<.05$), and physical activity ($F[1,62] =8.08, p<.01$) than their peers from the Czech Republic (Martin et al., 2013). While none of the individual constructs had a significant effect on physical activity, the largest beta weight was social support from friends ($B =.24$). The overall model, though, was found to be significant ($F[10,53] =2.04, p<.05$) and accounted for 29% of the variance in physical activity (Martin et al., 2013). Further variance may have been accounted for if additional SCT variables were considered.

Summary
Studies pertaining to adolescents and individuals with disabilities and SCT constructs have reported mixed results. Studies by Winters and colleagues (2003) and Petosa et al. (2005) found SCT constructs to account for high levels of variance in self-reported physical activity (29% and 31% respectively). Further, Martin and colleagues (2013) found SCT variables to account for a large variance of physical activity for individuals with hearing impairments (29%). Other studies found one or two constructs to have utility in explaining physical activity behavior (Dishman et al., 2009; Plotnikoff et al., 2013; Hertz & Petosa, 2008). However, Dewar and colleagues (2014) found that while participants decreased sedentary behaviors, no constructs had utility in explaining changes. None the less, since this study did not improve physical activity, it could be explained that SCT constructs did not have utility in decreasing sedentary behavior, but may still have utility in improving physical activity behavior. In this review, most studies found a relationship between SCT constructs and physical activity. Still, more research is needed. Particularly, research pertaining to individuals with disabilities and the utility of SCT based programs for influencing physical activity for those individuals. One such SCT based program is the Plan for Exercise, Plan for Health program.

*Plan for Exercise, Plan for Health*

The *Plan for Exercise, Plan for Health* program is a SCT based physical education curriculum which focuses on providing behavioral strategies for increasing leisure-time physical activity (Hertz & Petosa, 2006; Stevens, 2006; Mowad, 2007). The program has been developed over a series of dissertations at The Ohio State University. The Winters (2001) dissertation began the development of the program. The first conceptualization of the *Plan for Exercise, Plan for Health* program included nine 10-15
minute mini-lessons that were installed into the beginning of a physical education class. Each mini-lesson was designed to address a specific SCT construct. This version of the *Plan for Exercise, Plan for Health* program also included an exercise incentive program, where students were rewarded for achieving weekly goals. The intervention sought to influence frequency of physical activity, as well as four SCT constructs: self-control, social situation, outcome expectations, and self-efficacy. The study included two schools; one school acting as the control and the other as the intervention. SCT construct data were gathered using questionnaires and moderate-vigorous physical activity was measured using the Previous Day Physical Activity Recall (PDPAR). The results of the study found that the initial version of the *Plan for Exercise, Plan for Health* program influenced the treatment groups frequency of moderate exercise from 1.29 days to 2.35 days ($p<.01$; Winters, 2001).

The second study to use the *Plan for Exercise, Plan for Health* program was Hortz and Petosa (2006). Like Winters (2001), Hortz and Petosa (2006) sought to develop a SCT based intervention to increase the frequency of moderate and vigorous leisure-time, physical activity among high school students in Ohio. Also like the Winters (2001) dissertation, this study included two high schools, one which received a typical physical education program and one which received the SCT based supplement. This intervention targeted additional SCT constructs, including (a) knowledge, (b) self-efficacy for overcoming barriers to physical activity, (c) outcome expectancy values, (d) self-regulation, and (e) social situation. Their version of the *Plan for Exercise, Plan for Health* program extended the program to a series of 10 in-class sessions and homework activities. Like the Winters’ (2001) dissertation, all SCT constructs were measured using
questionnaires and physical activity was measured using the PDPAR. Once again, the program was found to have an impact of moderate physical activity, particularly among previously sedentary students (Hortz & Petosa, 2006). The interaction between treatment and time was significant ($p<.025, ES =.14$). However, when examining the SCT variables, the intervention was only found to have a positive impact on self-regulation and social situation. There were no significant effects on outcome expectancy values or self-efficacy for physical activity.

The third dissertation to implement the Plan for Exercise, Plan for Health program was conducted by Stevens (2006). In this study, the program was implemented by teachers rather than by researchers. The study included physical education, health, and/or life-skills teachers from three high schools within the Appalachian region of Ohio implementing the 9-week program as an integrated unit within their class (Stevens, 2006). All measurement considerations were consistent with the previous two studies. The results of the study found the intervention to explain a greater portion of the variance in changes in moderate physical activity at two of the three interventions schools ($R^2=0.353; R^2= 0.40$) than at a comparison school ($R^2=0.287$). However, the third intervention school indicated that a non-significant portion of variance was changed due to the program. Consistent with the Hortz and Petosa (2006), a subgroup analysis indicated that the intervention was particularly effective at impacting previously sedentary individuals. SCT variables of self-regulation and social support were found to contribute to the variance of physical activity and mediate changes in moderate activity.

The fourth study using the Plan for Exercise, Plan for Health program expanded the program to 925 students in seven schools in rural Ohio with 13 physical education
teacher delivering the program (Mowad, 2007). Like previous studies by Winters (2001) and Stevens (2006), the program was integrated into physical education and health classes for a duration of nine weeks. All measurement procedures were consistent with previous students. In this study, the Plan for Exercise, Plan for Health intervention did not have an impact on days of moderate physical activity from pretest to posttest. While not statistically significant, the increase in days of activity increased from 2.11 days to 2.41 days of activity. On the other hand, the comparison group significantly decreased physical activity from 2.86 days to 2.22 days of physical activity. In regards to the SCT constructs, the results of the Mowad (2007) study supported the results reported by Hortz & Petosa (2006) and Stevens (2006) in that the Plan for Exercise, Plan for Health program had an impact on social support and self-regulation.

The most recent study using the Plan for Exercise, Plan for Health program was modified for individuals with visual impairments implemented by Cervantes and Porretta (2013). This study took place in a Midwestern School for the Blind and included four participants. Unlike the other studies which employed a quasi-experimental design, Cervantes and Porretta (2013) used a range-bound changing criterion design. This study measured SCT variables in a similar fashion as the previous studies, but provided questionnaires in mediums which were legible for individuals with visual impairments (e.g., Braille, electronically). To measure physical activity, this study used accelerometers which measured physical activity across baseline and treatment conditions. Modifications were made to the overall Plan for Exercise, Plan for Health program as well. Rather than including nine weeks of treatment, the program was truncated to a five week program. Also, rather than the program being implemented as a supplement to a physical education
program, it was offered as an afterschool option. The study found the intervention to have a functional relationship with participants’ physical activity levels (Cervantes & Porretta, 2013). Also, the study found three of the SCT variables to change with each of the participant’s physical activity behavior. The other construct (self-efficacy) increased for two participants, remained the same for one participant, and have a negligible decrease for the other. Unfortunately, participants were unable to remain physically active and physical activity levels regressed back to baseline after the completion of the program (Cervantes & Porretta, 2013).

**Summary of SCT**

SCT has become one of the most commonly used theoretical models for understanding health behaviors including physical activity (Motl, 2006; Netz & Raviv, 2004). It is a general theory of human behavior which posits that individuals are active agents in their own lives (Bandura, 2001). The basic assumptions of SCT are that (a) behavior is purposeful, (b) individuals are self-reflective, and (c) individuals are capable of self-regulation, and (d) triadic reciprocal determinism is central to behavior (Bandura, 1886, 1989a, 2001). Triadic reciprocal determinism suggests that behaviors are caused by bi-directional influences between (a) the behavior, (b) personal factors, and (c) environmental influences (Bandura, 1989a; Motl, 2006).

The reciprocal nature of human functioning in SCT allows researchers to direct behavior change interventions at personal, environmental, or behavioral factors. In physical activity research, personal-based constructs such as self-efficacy, outcome expectancies, and self-regulation and environmental-based constructs such as social support have been thoroughly explored. Previous research indicates that SCT variables
have consistently demonstrated utility in predicting and influencing physical activity behavior for adolescents. Studies have found SCT constructs to account for 29% and 31% of total variance in physical activity for typically developing adolescents (Winters et al., 2003; Petosa et al., 2005). Self-regulation, social support, self-efficacy, and outcome expectations have each been supported as having utility in maintaining or improving for physical activity behavior of adolescents (Dishman et al., 2009; Hortz & Petosa, 2008; Petosa et al., 2005; Plotnikoff et al., 2013; Winters et al., 2003).

However, there are several weaknesses to the current body of research. First, of the studies discussed in this synthesis, seven of eight relied solely on recalls to collect physical activity data (Dishman et al., 2009; Hortz & Petosa, 2008; Martin et al., 2013; Martin Ginis et al., 2011; Petosa et al., 2005; Winters et al., 2003). Each study reported validity and reliability evidence for the recalls used. However, physical activity recalls have been known to overestimate physical activity (Haskell, 2012). Objective measures, such as accelerometers or pedometer, also have weaknesses. While they may provide more exact estimates of intensity and bout of physical activity behavior, objective measures cannot define activity type, context of activity, or location (Haskell, 2012).

Recently, scholars have encouraged the use of multiple measurement methods in an effort to enhance the quality of research (Cervantes & Porretta, 2010; Haskell, 2012). Haskell (2012) proposes that researchers whom combine the strengths of both self-report and objective measures have the potential to provide new insights into the benefits of physical activity and how to implement successful interventions.

A second weakness of the SCT related literature is the lack of research pertaining to individuals with disabilities. Studies focusing on adolescents with disabilities are
scarce. Martin and colleagues (2013) found the package of SCT variables to account for a high variance in physical activity for individuals with hearing impairments (29%), but were unable to specify which variables were acting as change agents to physical activity. Further, Martin Ginis and colleagues (2011) found some SCT variables to be related to physical activity of individuals with physical disabilities. Unfortunately, at this point only one study has addressed SCT variables and physical activity behavior for individuals with visual impairments (Cervantes & Porretta, 2013). However, in order to obtain a more clear understanding of the utility of SCT in explaining physical activity for individuals with disabilities, including those with visual impairments, more research must be conducted.
Chapter 3: Methodology

This chapter describes the methods which were used to study the effects of the intervention on the leisure-time physical activity of adolescents with visual impairments. It includes the following sections: (a) participants, (b) setting, (c) description of the independent variable, (d) definition and measurement of the dependent variables, (e) experimental design, (f) procedures, (g) treatment integrity and reliability, (h) social validity, and (i) data analysis.

Participants

This study included six adolescent-aged (14-17 years) individuals with visual impairments who were enrolled as students at a Midwest School for the Blind. After receiving approval from the university’s Institutional Review Board and the school’s administration, participants were purposively sampled based on recommendations from the school’s physical education teacher. The teacher made recommendations on potential participants based on the following selection criteria: (a) not currently enrolled in another physical activity intervention, (b) not an active member of an interscholastic sport, (c) no ambulation related disability, (d) not considered an physically active person, and would benefit from the intervention and (e) ability to wear a Fitbit Zip throughout the day. Students who were of full-time residential status lived on campus from Monday to Thursday. They returned to their homes after school on Friday, and then returned to campus Sunday evening. Day students attended the school for the blind during the day,
and returned home each evening. Full-time day students spent the entire school day at the school for the blind, while part-time day students began their school day at a community school and spent the afternoon at the school for the blind. The selection criteria intended to demonstrate the effects of the intervention on individual students that could represent typical students at a school for the blind who are not athletes.

Recommended participants received an option to either (a) participate in the study and not participate in the beginning of their physical education classes throughout the term of the research or (b) not participate in the study and continue their typical physical education experience with the other physical education teacher. Students who volunteered to participate in the study received a parental permission form and demographic questionnaire which were to be returned to the school. The demographic questionnaire asked parents to provide information pertaining to the participants (a) age, (b) gender, (c) visual impairment level (aligned with USABA classifications), (d) ethnicity/race, and (e) assistive technology use (See Appendix A). The questionnaire included a description of each classification category used by USABA in order to ensure that correct visual classifications were chosen. After returning the parental permission forms and demographic questionnaire, potential participants were asked for assent to participate verbally. All enrolled participants returned a completed parental permission form and demographic questionnaire, and verbally agreed to participate in the study (i.e., verbal assent).

Students were selected from three individual physical education classes, as per the multiple baseline design of the study. Therefore, one student was selected from one class, two students were selected from a second class, and three students were selected from a
third class. Specifically, Participants 1, 2, and 3 were in enrolled in the 9th period physical education class, Participants 4 and 5 were enrolled in the 1st period class, and Participant 6 was enrolled in the 5th period class. All demographic information was determined through the demographic questionnaire completed by parents. No names were used to safeguard privacy of each participant. Demographic information and residential status of participants are reported in table 3.1. The participant’s cause of visual impairment and USABA classification are included in table 3.2.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Grade</th>
<th>Gender</th>
<th>Assistive Device</th>
<th>Residential Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>9th</td>
<td>Female</td>
<td>Cane</td>
<td>Residential</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>11th</td>
<td>Female</td>
<td>Cane</td>
<td>Part-Time Day Student</td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>11th</td>
<td>Male</td>
<td>Cane</td>
<td>Part-Time Day Student</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>9th</td>
<td>Male</td>
<td>None</td>
<td>Full-Time Day Student</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>11th</td>
<td>Female</td>
<td>Cane</td>
<td>Full-Time Day Student</td>
</tr>
<tr>
<td>6</td>
<td>14</td>
<td>9th</td>
<td>Female</td>
<td>Cane</td>
<td>Residential</td>
</tr>
</tbody>
</table>

Table 3.1. Participants’ demographic information
<table>
<thead>
<tr>
<th>Participant</th>
<th>Cause of Visual Impairment</th>
<th>Vision Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Retinopathy of Prematurity (ROP)</td>
<td>B1</td>
</tr>
<tr>
<td>2</td>
<td>Peter’s Anomaly</td>
<td>B2</td>
</tr>
<tr>
<td>3</td>
<td>Hypophosphatasia/ optic atrophy</td>
<td>B2</td>
</tr>
<tr>
<td>4</td>
<td>Blue cone achromatopsia, high myopia, congenital nystagmus</td>
<td>B3</td>
</tr>
<tr>
<td>5</td>
<td>Micophthalmia, coloboma, retinal detachment</td>
<td>B3</td>
</tr>
<tr>
<td>6</td>
<td>Premacular fibrosis and amaurosis</td>
<td>B3</td>
</tr>
</tbody>
</table>

Table 3.2. Cause of visual impairment and level of vision for all participants.

**Setting**

This study was conducted at the Ohio State School for the Blind located in Columbus, OH. This school was the first public school for individuals with visual impairments in the United States, opening its doors for the first time in 1837. Classes took place in either the gymnasium or health education classroom. The gymnasium included a full basketball court, gymnastics mats used for stretching and calisthenics, cardio equipment (e.g., treadmills, stationary bikes), and a small weight training area. The health education room included an instructional table where all students meet, and four desktop computers. Three sessions (two for class three, one for class two) were moved into a computer lab because the health education room was being used for testing. This
lab included six desktop computers. During afterschool hours, participants who were of residential status were able to access physical activity opportunities at several locations throughout the residential facility including (a) gymnasium, (b) track, (c) open areas, or (d) exercise equipment located in dormitories. Full-time and part-time day students had access to physical activity opportunities that were available to them on a regular daily basis (e.g., walking in neighborhood, accessing community recreation centers, cycling).

**Description of the Independent Variable**

The independent variable for this study was a SCT-based intervention titled *Plan for Exercise, Plan for Health* program (Stevens, 2006). The program was developed as a physical education curriculum with the intention to increase leisure-time physical activity levels for rural and Appalachian middle school aged students (Hortz & Petosa, 2006; Stevens, 2006; Mowad, 2007). Previous studies have demonstrated that the *Plan for Exercise, Plan for Health* program can have a positive impact on the leisure-time physical activity levels of rural middle school-aged students, especially for those who were previously sedentary (Hortz & Petosa, 2006; Stevens, 2006; Mowad, 2007).

Recently, the curriculum was modified to act as a five-week afterschool program for individuals with visual impairments at a residential school for the blind (Cervantes & Porretta, 2013). Cervantes and Porretta (2013) found the intervention to have a moderate functional relationship with the participants’ physical activity levels. However, participants did not maintain those activity levels after the conclusion of the intervention (Cervantes & Porretta, 2013). For the purposes of this study, the program was implemented as originally intended as a physical education curriculum (e.g., Stevens,
The program was disseminated over the course of nine weeks for the ninth period class, five weeks for the first period class, and three weeks for the fifth period class.

The *Plan for Exercise, Plan for Health* program was developed to act as a supplement to a typical physical education program. Therefore, lessons were introduced over the course of nine physical education classes (Stevens, 2006). For the first period class, lessons ranged from 10 minutes, 48 seconds to 33 minutes, 20 seconds (average, 24 minutes, 50 seconds). Classes ranged from 14 minutes, 33 seconds to 34 minutes, 6 seconds for the fifth period class (average, 20 minutes, 48 seconds). For the ninth period class, lessons ranged from 10 minutes, 32 seconds to 30 minutes, 51 seconds (average, 25 minutes, 26 seconds). Across classes, lesson eight was the longest (32 minutes, 28 seconds) and lesson seven was the shortest (18 minutes, 28 seconds) on average. Physical education classes then continued as usual for the remainder of the class period. The lessons for the curriculum were packaged within a student workbook which was distributed to students on the first day. Students received several options when receiving the student workbook in regard to format, including braille hard copy, large print or electronic access. Participants 1, 2, 3, and 6 accessed the workbooks using their braille note, Participant 4 elected to receive the workbook in both large print and electronically, and Participant 5 accessed the workbook using her IPAD. Lessons included the presentation of a curricular concept, an in-class activity, and a homework activity. Each lesson within the *Plan for Exercise, Plan for Health* curriculum was developed to help students develop a personal exercise program using SCT constructs. The targeted SCT constructs were (a) self-efficacy, (b) self-regulation, (c) outcome expectancy, and (d) social support. Table 3.2 provides a topical outline of the curriculum as well as the SCT
constructs which is the focus of each lesson. For the purposes of this study, the content of each lesson remained consistent to the original *Plan for Exercise, Plan for Health* program.

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Lesson Name</th>
<th>Targeted SCT Construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Completing Exercise Logs</td>
<td>Self-Regulation</td>
</tr>
<tr>
<td>2</td>
<td>Exercise and Health</td>
<td>Outcome Expectancy Values</td>
</tr>
<tr>
<td>3</td>
<td>Goal Setting</td>
<td>Self-Regulation</td>
</tr>
<tr>
<td>4</td>
<td>Reasons Not to Exercise</td>
<td>Self-Efficacy</td>
</tr>
<tr>
<td>5</td>
<td>Keeping Track of Your Exercise: Talking Pedometers</td>
<td>Self-Regulation</td>
</tr>
<tr>
<td>6</td>
<td>Where to Exercise and Exercise Motivators</td>
<td>Outcome Expectancy Values</td>
</tr>
<tr>
<td>7</td>
<td>Friends and Family can Help you Exercise</td>
<td>Social Support</td>
</tr>
<tr>
<td>8</td>
<td>Exercise Intensity</td>
<td>Outcome Expectancy Values; Self-Efficacy</td>
</tr>
<tr>
<td>9</td>
<td>Plan to Keep Going</td>
<td>Self-Regulation</td>
</tr>
</tbody>
</table>

Table 3.3: *Plan for Exercise, Plan for Health* lesson outline and SCT constructs
Definition and Measurement of the Dependent Variables

There were a number of dependent variables in this study. However, the primary dependent variable was leisure-time physical activity. Physical activity was measured by step count recorded by a Fitbit Zip. In addition to leisure-time physical activity, SCT constructs of self-efficacy, self-regulation, social support, and outcome expectancy values for physical activity were measured through questionnaires.

Fitbit Zip

The Fitbit Zip (Fitbit Inc., San Francisco, CA) was chosen as the objective measure of physical activity for this study. The Fitbit Zip is a commercial tri-axial accelerometer that can measure steps taken, distance traveled, and calories burned. The Zip model is one of four wearable activity monitoring devices made by Fitbit. This model is the smallest of the Fitbit models, has an expansive battery life (i.e., approximately 4 to 6 months), and is the least expensive (Lee, Kim, & Welk, 2014). Prior to collecting data, Fitbit software was downloaded to the researcher’s computer and accounts were made for each device. Again, names of participants were not used in the process, and participants did not have access to the Fitbit platform. The Fitbit Zip communicated with the lead researcher’s computer using Bluetooth technology to send data directly to the accounts.

Validation information is still preliminary for this device. However, of several devices tested, researchers found Fitbit devices to have the lowest error (1%) when recording steps of any commercial activity monitor (Guo, Li, Kankanhalli & Brown, 2013). Further, Lee and colleagues (2014) found the Fitbit Zip to measure energy expenditure and steps taken within an acceptable range of error (<10%). These results provided confidence in the accuracy of this new, commercial activity monitor. However,
research pertaining to the accuracy of these devices for individuals with visual impairments is currently unavailable. Since each participant used the same device and device number throughout the baseline and intervention phases, the issue of accuracy was negligible.

**SCT Constructs**

For this study, four SCT constructs were evaluated through five questionnaires. The constructs that were examined are self-efficacy, self-regulation, social support, and outcome expectancy values. A fifth questionnaire, self-efficacy for overcoming barriers to physical activity scale for adolescents with visual impairments, was included to examine self-efficacy specific to the participants in this study. Each of the constructs targeted in the *Plan for Exercise, Plan for Health* curriculum were evaluated using previously developed instruments with reported validity and reliability. Participants were able to choose how questionnaires were administered, according to their visual acuity (e.g., large print, braille, electronically, interview). Participants two and five completed the surveys via interview, while participants one, three, four, and six completed surveys via electronic platform (i.e., google forms).

**Self-efficacy.** Self-efficacy was examined using the self-efficacy for overcoming barriers to physical activity scale which was developed by Saunders et al. (1997) and modified by Winters (2001; see Appendix B). The scale had seven items and defines self-efficacy as one’s ability to overcome barriers to engage in physical activity. Winters (2001) and Stevens (2006) reported internal consistency of the instrument at $\alpha = .89$ and $\alpha = .90$ respectively. Test-retest reliability has been reported at 0.82 as well (Winters, 2001). Participants rated their self-efficacy to be physical active under challenging
conditions on a six-point Likert-type scale. Scores were based on the summation of the scale’s seven items.

**Self-efficacy (visual impairment).** A ten item questionnaire developed by Cervantes (2009) was used to assess self-efficacy for overcoming barriers to physical activity specific to adolescents with visual impairments (see Appendix C). The scale included ten questions which define self-efficacy as one’s ability to participate in physical activity. The scale has face and content validity, which was obtained through collaboration with several experts in the field. The instrument required participants to rate their physical activity under challenging conditions. Scores were based on the summation of the scale’s ten items.

**Self-regulation.** A 25 item questionnaire developed by Petosa (1993) and modified by Winters (2001) was used to assess self-regulation for this study (not included in Appendices, copyright). The questionnaire examined five components of self-regulation: (a) goal setting, (b) self-monitoring, (c) gaining social support, (d) planning to overcome barriers to physical activity, and (e) securing positive reinforcements (Petosa, 1993). Petosa (1993) found internal consistencies across subscales ranging from $\alpha = 0.78$ to $0.94$. Internal consistency of the scale was confirmed by Stevens (2006) at $\alpha = 0.94$ at pretest and $\alpha = 0.96$ at post-test. The instrument required participants to respond to questions about the frequency of using self-regulatory skills during their recent exercise behavior. The questionnaire included a 6-point Likert-type scale, and participant’s scores were based on the summation of the scales 25 items.

**Social support.** An eight item questionnaire developed by Saunders et al (1997) and modified by Winters (2001) was used to assess social support (see Appendix E). The
questionnaire included four questions regarding specific supports regarding family and four questions regarding friends. Internal consistency was reported by Winters (2001) at $\alpha=0.75$ and Stevens (2006) $\alpha=0.85$ at pretest, $\alpha = 0.89$ at post-test. Winters (2001) also reported test-retest reliability at $r = 0.78$. Each probe included a 6-point Likert-type scale and participant scores were based on a summation of the scales eight items.

**Outcome expectancy values.** A 23 item questionnaire developed and validated by Winters (2001) was used to assess outcome expectancy values in this study (see Appendix F). The questionnaire was intended to examine the following six dimensions of the construct: (a) social continuation, (b) social growth, (c) relaxation, (d) fitness, and (e) thrills (Winters, 2001). Internal consistencies for the six dimensions ranged from $\alpha = 0.86$ to 0.96 (Winters, 2001; Stevens, 2006). Students were to respond to a statement regarding their belief about the outcome of a physical activity, then whether or not they valued that outcome. Each probe included a 6-point Likert-type scale. Participant outcome expectancy value score was based on the summation of the belief-value products.

**Experimental Design**

This study used a multiple baseline across participants design (Baer, Wolf, & Risley, 1968) to examine intervention effects on leisure-time physical activity behavior among adolescents with visual impairments. Participants were selected from three separate physical education classes. More specifically, one participant was chosen from one class, two participants were chosen from a second class, and three participants were chosen from a third class. The unit of analysis in this study is the individual, rather than the class.
The multiple baseline design is highly flexible and enables researchers to analyze effects of a treatment across multiple behaviors, individuals/classes, or settings without having to withdraw the treatment. Experimental control is demonstrated when changes in behavior occur in conjunction with the introduction of the treatment (Cooper, Heward, & Heron, 2007). Extraneous and confounding variables are controlled for by steady responding during extended baseline conditions. Baseline observations on the participants’ physical activity were collected for all six participants. When participants in class one reached stable states of responding, the intervention was introduced to that class while participants in the other classes remained in baseline. When all participants in class one reached stable states of responding in the treatment condition, the treatment was then implemented for participants in class two. At that point, class three remained in baseline. When a stable state of responding was obtained for participants in class two in the treatment condition, the treatment was then implemented for the participant in class three. The stable baseline responding for each class provides a prediction that future responding would remain the same if the environment remains the same. Verification of that predicted level of responding for one class is obtained when little or no change occurs in the baseline data of the other classes that are still exposed to baseline (Cooper et al., 2007). Replication is then obtained when changes are similar between each group when the treatment is introduced. For example, replication would be evident for participants in class two if they received the treatment and their responding was similar or the same to that of participants in class one in the same condition.

The appropriateness of using the multiple baseline design for this study is based on three primary rationales. First, it would be undesirable to reverse any gains made in
increasing physical activity behavior. By using the multiple baseline design, the researchers do not need to withdraw the treatment to verify that the improvements in the behavior are a direct result of the treatment (Cooper et al., 2007). Second, in order to evaluate the impact of the Plan for Fitness, Plan for Exercise program, it must be delivered in its entirety. Time limitations would make it less feasible to withdraw and reintroduce the treatment within one study. Lastly, and possibly most importantly, improvements in SCT constructs as a result of the treatment can be considered learning. Since learning effects are irreversible, it would not be possible to use other single-subject designs.

A single-subject design was utilized for this project for several reasons. First, single-subject designs allow researchers to examine the effects of interventions on populations where large samples may not be available (i.e., those with visual impairments; Watkinson & Wasson, 1984). Further, single-subject designs allow researchers to examine intervention effects on highly variable populations, because each participant acts as their own control (Watkinson & Wasson, 1984). That is, single subject research allows researchers to distinguish how individuals are affected by a particular intervention as well as detecting individual responses to treatments (Bouffard, 1993). Because of these considerations and the characteristics of the participants at the school for the blind, a traditional-group design was not utilized for this study.

**Procedures**

Once IRB approval was granted, participants who were recommended by the physical educator, based on the provided inclusion criteria, were given a parental consent form and demographic questionnaire, which was completed and returned to the
researcher prior to data collection. School residential staff and parents were informed on the nature of the study, the measurement tools (i.e., Fitbit Zip), and were informed to allow students to make decisions on physical activity and not to solicit additional activity during the time of the study. Once parental consent forms and demographic questionnaires were returned, a day was scheduled for all of the potential participants to meet with the lead researcher. Prior to any data collection, the researcher received verbal assent from each of the participants. Written assent was not used because of the visual acuity levels of the participants. Once parental permission forms and demographic questionnaires were received and assent was obtained, participants were officially enrolled in the study.

**Social Cognitive Constructs**

After officially enrolling participants in the study, each participant completed the five social cognitive construct questionnaires. Participants were able to choose between completing questionnaires printed in large print or braille, uploaded to a braille note or other electronic device, and verbally administered. Participants 1, 3, 4, and 6 completed the questionnaires via electronic device, while participants 2 and 5 had their surveys verbally administered by the school’s physical education teacher and researcher. Participants completed the questionnaire in the same medium at the end of the intervention phase. The questionnaires were completed for the post screening on the next attendance day after the completion of the intervention.

**Physical Activity Measurement**

After completion of the pre-intervention SCT questionnaires, participants received a tutorial on how to appropriately wear a Fitbit Zip. Participants were informed
to wear the Fitbit Zip (a) on the waistband, (b) on the middle of the anterior side of their thigh, and (c) on the opposite side of their assistive devices. These recommendations were borrowed from literature on audio pedometer accuracy for individuals with visual impairments (Holbrook et al., 2011). Participants practiced putting on and taking off Fitbit Zips. Participants were told to wear the instrument during all after school hours except for when bathing or swimming (Cervantes & Porretta, 2013). In addition, school staff members including the physical education teacher were instructed on proper placement of the instrument to support or remind participants. The primary researcher was available on campus to assist with placement each day of the study. However, since there was a possibility of students swimming or bathing throughout the day, it was essential for students and staff members to understand placement procedures. Fitbit Zips were worn from 3:30pm until participants were preparing for bed each night.

Each evening, participants removed their Fitbit Zip prior to going to bed and placed it in their backpack for the next day. The researcher collected the instruments and synced data from the Fitbits each afternoon right after the end of ninth period classes. This process, for all six participants, took approximately 10 minutes each day. At this time, the researcher checked each pedometer for battery life and damage as well. Each participant used the same Fitbit throughout the study. This protocol remained consistent throughout the baseline and intervention phases.

**Baseline**

Participants began wearing the Fitbit the afternoon of the next school day after the training session. Baseline data were collected for each participant until physical activity behavior for each of the participants in one class remained stable. No further information
and/or prompts were given to the participants about participating in physical activities. Participants were encouraged to continue typical afterschool behavior. Staff members at the school for the blind and parents were encouraged not to promote any physical activity that would not be typically available to students.

**Intervention**

Data collection procedures during baseline remained the same during intervention. The intervention was introduced to the first class of participants that obtained stable responding during baseline. The other two classes remained in the baseline condition until the participants in the first class reached a stable level of responding in the intervention condition. When participants in the first class reached a stable level of responding in the intervention condition, the intervention was introduced to participants in the second class. When the participants in the second class reached a stable level of responding in the intervention condition, the intervention was introduced to the participant in the third class.

**Program Delivery**

The intervention phase was nine physical education classes. The lessons were instructed by the physical education teacher from the school for the blind. Prior to the intervention, the physical education teacher was trained in implementing the *Plan for Exercise, Plan for Health* program by the primary researcher. The researcher was also present during each lesson. His role was to video record each lesson for treatment fidelity. During the first lesson, participants received their program manuals in one of three formats: (1) large print, (2) Braille, or (3) uploaded onto an electronic device (e.g., Braille note, IPad).
Each session began with an introduction of the topic to be discussed, followed by an in-class discussion/main activity, and concluded with directions to complete homework. Each session, the teacher reminded students of when and where to pick up their Fitbits as well as proper care and use. Each following week included other interactive homework such as goal setting or monitoring physical activity behavior. Talking pedometers were introduced during week five. Participants’ initial talking pedometer goal was developed by averaging their baseline steps and adding 1000 (Kurti & Dallery, 2013). The post-intervention SCT questionnaires were completed during an afternoon session after the final day of each participant’s intervention condition.

**Treatment Integrity**

Treatment integrity is the extent to which the intervention is provided as planned (Cooper et al., 2007). While an intervention may have good results, low integrity invites major challenges in interpreting results with confidence (Cooper et al., 2007). A treatment integrity checklist was developed for each lesson in the intervention and utilized to measure the degree to which the physical education teacher provided and the students completed the planned intervention. Treatment integrity was calculated by dividing the number of accurately implemented sections of the lesson plan by the total number of sections in that plan, multiplied by 100.

Each lesson was video recorded. After each lesson, the lead researcher and a second, trained doctoral student completed a treatment integrity checklist (Appendix G) independently of each other. Intra-observer agreement was calculated between both forms of treatment fidelity. Intra-observer agreement was calculated by dividing the
number of agreements by the summation of agreements plus disagreements and multiplied by 100. The target intra-observer agreement score is 95%.

**Social Validity**

The need to evaluate the social validity of interventions has been described thoroughly in the literature (Cooper et al., 2007; Schwartz & Baer, 1991; Wolf, 1978). In this study, social validity was formally evaluated using a written questionnaire. The social validity questionnaire (see Appendix H) was administered to direct consumers (i.e., study participants), indirect consumers (i.e., physical education teacher, parents) and community members (i.e., residential staff) at the completion of the intervention phase. The purpose of the questionnaire was to determine (a) the extent of consumer/participant satisfaction with the procedures (i.e., Plan for Exercise, Plan for Health) and (b) satisfaction with the intervention results. The survey was administered electronically, allowing consumers to remain anonymous while responding. The lead investigator also observed and recorded anecdotally behavioral correlates of satisfaction and dissatisfaction throughout the study. Behavioral correlates of are behaviors which clearly either demonstrate support for or objection to the program. Examples of behavioral correlates of satisfaction include participants (a) arriving either promptly or late to physical education classes during the intervention, (b) recommending the program to friends, (c) warning friends against joining the program and (d) students defending the intervention when others attack it (Schwartz & Baer, 1991). Teachers and participants were also encouraged to provide anecdotal feedback to the investigator on their opinions throughout the intervention.
Data Analysis

Step counts were evaluated through visual analysis of graphic displays (Cooper et al., 2007). Each physical activity data point was inputted in a line graph for each participant. The lead researcher visually analyzed data within (i.e., trend, level, variability) and across (i.e., overlap, immediacy of effect, consistency) baseline and intervention phases for each participant.

Graphic data was also be analyzed for effect size estimates using percentage of nonoverlapping data (PND). PND was conducted in the following four steps: (1) identifying the highest data point in baseline, (2) counting the number of data points in the intervention phase that exceeded the highest data points in the baseline phase, and (3) dividing that number by the total number of data points, (4) multiplying that number by 100 (Kratochwill et al., 2010). PND scores of 70% through 90% are considered fairly effective, whereas scores above 90% are considered highly effective (Kratochwill et al., 2010). PND scores below 70% are considered questionable. SCT questionnaire data were provided for each participant and analyzed by comparing change in individual scores from baseline to post-intervention.
Chapter 4: Results

This chapter presents the results of the effects of the intervention on the acquisition of leisure-time physical activity among adolescents with visual impairments. In the first section of this chapter, treatment integrity results are reported. In the second section, data for all participants are presented followed by a summary of results. The third section describes the results of the social cognitive theory construct questionnaires. In the last section, results from the social validity questionnaire are presented and discussed.

**Treatment Integrity**

Table 4.1 summarizes the treatment integrity scores for all sessions during program implementation. Treatment integrity was established by the use of a series of checklists (Appendix H). The lead researcher and an independent observer reviewed video recordings of each programmatic session separately to ensure the intervention was applied as intended and in a consistent manner. The observers coded each session and interobserver agreement (IOA) was calculated by dividing the number of agreements by the summation of agreements plus disagreements and multiplied by 100. The target IOA was set at 95%. Agreement was assessed across all video-taped program sessions. The overall mean IOA percentage across observers for all sessions was 99.8% (range 89-100), which was above the pre-established IOA percentage. The lead researcher had a mean score of 99.6% across all program sessions. The second observer had a mean score of
100% across all program sessions. Based on the obtained mean scores, treatment integrity was found to be acceptable.

<table>
<thead>
<tr>
<th>Session</th>
<th>Period 1</th>
<th>Period 5</th>
<th>Period 9</th>
<th>Across Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O1</td>
<td>O2</td>
<td>O1</td>
<td>O2</td>
</tr>
<tr>
<td>1</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>89%</td>
</tr>
<tr>
<td>6</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>7</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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<tr>
<td>8</td>
<td>100%</td>
<td>100%</td>
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<td>100%</td>
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<td>9</td>
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<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Range</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>89-100</td>
</tr>
</tbody>
</table>

Table 4.1. Treatment integrity percentages across observers 1 (O1) and 2 (O2).
Leisure-Time Physical Activity Behavior

This section includes the physical activity behavior (i.e., steps) results of all six participants. Results are presented individually. A summary of physical activity behavior data across all participants is then presented.

Participant 1

Participant 1 was present for all data collection sessions during the baseline phase. Data were collected for 29 of 31 (94%) sessions during the intervention phase, missing only days three (session 38) and four (session 39) of lesson eight. Session 38 was missed because Participant 1 did not wear her Fitbit Zip, while session 39 was missed because of transportation issues. In total, data were collected for Participant 1 on 95% of total data collection days. It should be noted that while part-time and full-time residential students missed data collection because of snow days, residential students (e.g., Participant 1) were still in attendance on those days.

Baseline. Baseline data were collected over nine sessions During baseline, Participant 1 demonstrated step totals that ranged from 847-3327 steps per day. The participant demonstrated variability in steps per day across the baseline phase, particularly between sessions three and seven (see figure 4.1). Across the nine days of baseline, Participant 1 demonstrated a downward trend in steps. This downward trend in steps was considered undesirable. Therefore, it was justified to move Participant 1 into the intervention phase.

Intervention. When the intervention was implemented, negligible change in steps occurred. Participant 1 demonstrated two spikes (i.e., increases of 3500 steps in a day), one during lesson 1, the other during lesson 4. However, these large increases were not
sustained throughout the intervention, and physical activity decreased after each spike. In addition to those spikes in performance, there was an increase in the level of steps per day between lessons three and four. However, again, this level of performance was not sustained after lesson four and the level decreased during subsequent lessons. Other than those two spikes and the increased step level during lesson four and eight, stable responding occurred until lesson eight. This responding highly overlapped with baseline data. In the second session of lesson eight, there was another increase in steps, which sustained itself into lesson nine. Since further data were not taken, it was difficult to ascertain whether this change would persist over addition sessions. Leisure-time physical activity data, not including the two spikes and the final increase during lesson eight, ranged from 1089-2915 steps per day during intervention. This range was within the range of performance recorded during the baseline phase.

Of the different lessons in the intervention package, the most successful for Participant 1 were lessons four (i.e., reasons not to exercise), eight (i.e., exercise intensity), and nine (i.e., plan to keep going; see Table 4.4). During lesson four, Participant 1 had the most days with step counts over 2500 steps (four of six days). Lesson eight elucidated the highest steps per day average (3415). While only one data point was collected during lesson nine, Participant 1 walked 4178 steps, which was her fourth highest day. Conversely, lesson three was the least successful lesson for Participant 1, with an average of 1375 steps per day and three of four days under 1500 steps.
Figure 4.1. Steps per session across lessons for Participant 1. Numbers above data points indicate the lesson number of each phase.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5</th>
<th>Lesson 6</th>
<th>Lesson 7</th>
<th>Lesson 8</th>
<th>Lesson 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>847-3378</td>
<td>1089-5414</td>
<td>1324*</td>
<td>1113-</td>
<td>1550-</td>
<td>1917-</td>
<td>2479*</td>
<td>1513-</td>
<td>2083-</td>
<td>4178*</td>
</tr>
<tr>
<td></td>
<td>1826</td>
<td>5738</td>
<td>2194</td>
<td>2135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2225</td>
<td>2268</td>
<td>1324*</td>
<td>1375</td>
<td>2999</td>
<td>2008</td>
<td>2479*</td>
<td>1886</td>
<td>3415</td>
<td>4178*</td>
</tr>
</tbody>
</table>

Table 4.2. Range and mean step count for Participant 1 across lessons. Asterisk indicates phases with one data point.
Percentage Non-Overlapping Data (PND). Step data for Participant 1 was also analyzed using PND. The highest data point in the baseline phase was 3378 steps. Four of the 29 data points in the intervention phase were higher than 3378 steps. Therefore, the PND for Participant 1 was 14%.

Summary. During baseline and intervention, Participant 1’s step count ranged from 847-3327 and 1089-5738 steps per day, respectively. A visual analysis of the data demonstrated that there were no consistent trends or increases in level of step count data. Therefore, a functional relation was not observed. Further, intervention data were highly overlapping with baseline data. High overlap was confirmed with a PND score of 14%. Therefore, those data suggest that the intervention was not effective in increasing leisure-time physical activity for Participant 1. However, Participant 1 demonstrated an average of 2225 and 2327 steps per day across baseline and intervention phases, resulting in a 5% increase.

Participant 2.

Participant 2 was present for all data collection sessions during the baseline phase. Data were collected on 25 of 30 sessions during the intervention phase. Data collection was missed the second day of lesson one, the second and fourth day of lesson three, and the first and third day of data collection for lesson four. Reasons for missing data collection days included missing school because of doctor’s appointments and snow days. In total, data were collected for Participant 2 on 100% of baseline and 83% of intervention sessions.

Baseline. Baseline data were collected over nine sessions. During baseline, Participant 2 demonstrated step totals that ranged from 774-1843 steps per day. Across
the eight days of baseline data collection, Participant 2 demonstrated low variability with a consistent level of responding with no trend (see figure 4.2). Therefore, her responding was considered stable and she was moved into the intervention phase.

**Intervention.** When the intervention was implemented, there was an upward trend in responding starting with the second data point in the first lesson to a peak of 3220 steps per day during session 15. However, this trend discontinued after the introduction of the second lesson and steps remained low and stable until lesson four. Participant 2 demonstrated increased steps beginning at the second data point of lesson four (session 24). Again, though, this trend was not sustain into lesson five. Increases in responding occurred again during lesson seven. This increase had high variability and fluctuation between lessons seven, eight, and nine. Regardless, these increases were demonstrated by an increased level of responding across those three lessons. Across all lessons in the intervention steps ranged from 740-3560 per day.

Of the different lessons in the intervention package, the most successful for Participant 2 were lessons one (i.e. completing exercise logs), seven (i.e., friends and family can help you exercise) and eight (i.e., exercise intensity). Again, during lesson two, Participant 2 demonstrated an upward trend that peaked at 3220 steps per day, her second highest point. Lesson seven elucidated the highest step per day average (2485). Lastly, lesson eight included Participant 2’s highest responding during the intervention (2560). Conversely, lesson five was the least successful lesson for Participant 2, with an average of 1151 steps per day.
Figure 4.2. Steps per session across lessons for Participant 2. Numbers above data points indicate the lesson number of each phase.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Lesson 1</th>
<th>Lesson 2*</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5</th>
<th>Lesson 6*</th>
<th>Lesson 7</th>
<th>Lesson 8</th>
<th>Lesson 9*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>774-1843</td>
<td>1186-3220</td>
<td>1570*</td>
<td>1138-1235</td>
<td>740-1924</td>
<td>998-1407</td>
<td>1333*</td>
<td>1593-2485</td>
<td>1632-3197</td>
<td>2632*</td>
</tr>
</tbody>
</table>

Table 4.3. Range and mean step count for Participant 2 across sessions. Asterisk indicates phases with one data point.
**PND.** Step count data for Participant 2 was also analyzed using PND. The highest data point in the baseline phase was 1843 steps. Twelve of the 25 data points in the intervention phase were higher than 1843 steps. Therefore, the PND for Participant 2 was 48%. It should be noted, though, that PND was substantially higher when only considering lessons seven through nine. Throughout this range, 6 of 8 (75%) of data points were above the highest responding during the baseline phase.

**Summary.** During baseline and intervention, Participant 2’s step count ranged from 774-1843 and 740-3560 steps per day, respectively. A visual analysis of the data demonstrated that while there was an initial upward trend in steps shortly after the introduction of the intervention, they were not sustained. After the discontinuation of this trend, there was steady responding in intervention phases which overlapped with baseline data from lessons two through six. An increased level and high variability of responding was evident after the introduction of lesson seven through the end of the intervention. High overlap was confirmed with a PND score of 48%. When considering Participant 2’s data, the intervention package was not effective in consistently increasing steps. However, data do support lessons seven through nine in potentially impacting Participant 2’s physical activity. Further, Participant 2 demonstrated an average of 1238.4 and 1882 steps per day across baseline and intervention phases, resulting in a 42% increase.

**Participant 3**

Participant 3 was present for six of nine (66%) data collection sessions during the baseline phase. Data were collected on Participant 3 during 15 of 31 (48%) sessions during the intervention phase. Participant 3 missed the majority of intervention data collection sessions, for varied reasons including absences due to (a) illness, (b) doctor’s
appointments, (c) family funerals, and (d) snow days. Across baseline and intervention phases, data were collected on 53% of data collection days.

**Baseline.** Baseline data were collected for six data collection sessions. During baseline, Participant 3 demonstrated step totals that ranged from 473-3083 steps per day. The participant demonstrated a low level of responding with a slight downward trend throughout the baseline condition with the exception of session four. During session four, Participant 3’s step count spiked to 3083 steps per day, which was 2266 steps higher than the average of the other five data points during baseline. The consistent low level of responding provided justification to move Participant 3 into the intervention phase.

**Intervention.** When the intervention was implemented, there was no immediate increase in step count. Participant 3 demonstrated a spike in steps during session 17 of lesson three. However, this spike was not sustained and behavior decreased to the previous level. Disregarding the spike, the level of behavior was stable and responding was between 561-1437 steps from lessons 1-5. Lesson six demonstrated another rise in responding which continued into lesson seven. However, during the third data collection day of lesson seven (session 34), steps decreased again. Responding continued to decrease into the first data point of lesson eight, and the participant missed the rest of data collection for this lesson. During the final day of data collection, steps increased once again to 2111 per day.

Of the different lessons in the intervention package, the most effective for Participant 3 were lessons six and seven. During lesson six, Participant 3 demonstrated an increase from 561 steps (in lesson 5) to 2279 steps. Participant 3 then maintained the highest average steps per day during lesson seven (2219). Conversely, the least successful
lessons for Participant 3 were lessons one, two, and five. Each of these lessons warranted steps per day averages lower than 1000.
Figure 4.3. Steps per session across lessons for Participant 3. Numbers above data points indicate the lesson number of each phase.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5</th>
<th>Lesson 6</th>
<th>Lesson 7</th>
<th>Lesson 8</th>
<th>Lesson 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>476-3083</td>
<td>607-1028</td>
<td>816*</td>
<td>663-2874</td>
<td>889-1437</td>
<td>561-1304</td>
<td>2279*</td>
<td>1365-</td>
<td>486*</td>
<td>2111*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3073</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1137.5</td>
<td>818</td>
<td>816*</td>
<td>1769</td>
<td>1136</td>
<td>933</td>
<td>2279*</td>
<td>2219</td>
<td>486*</td>
<td>2111*</td>
</tr>
</tbody>
</table>

Table 4.4. Range and Mean Step Count for Participant 3 across lessons. Asterisk indicates phases with one data point.
**PND.** Step data for Participant 3 was also analyzed using PND. The highest data point in the baseline phase was 3083 steps. No data points in the intervention phase were higher than 3083. Therefore, the PND for this participant was 0%. It is important to note, however, that 3083 was much higher than any other data point in the baseline condition. If the second highest data point were considered, 1205 steps, seven data points in intervention would be considered higher. Therefore, using 1205 steps rather than 3083 steps, PND scores would be 47% rather than 0%.

**Summary.** During baseline and intervention, Participant 3’s step count ranged from 476-3083 and 561-3073 steps per day, respectively. A visual analysis of the data demonstrated that there was stable responding during the first five lessons with one data spike. After lesson six was introduced, there was a level increase in responding. However, this level did not sustain and decreased during lesson seven. All intervention data highly overlapped with baseline data. High overlap was confirmed with a PND score of 0%. While Participant 3 missed the majority of intervention data collection sessions, the existing data suggests that the intervention was not effective in increasing responding for Participant 3. However, Participant 3 demonstrated an average of 1137.5 and 1371.7 steps per day across baseline and intervention phases, resulting in a 21% increase.

**Participant 4**

Participant 4 was present for 19 of 31 (61%) data collection sessions during the baseline phase. Data were collected on 11 of 18 (61%) intervention days. Common reasons for him to miss data collection were absences from school due to illness and snow days. His school district closed more than any other student, and would not provide
transportation to the school for the blind on those days. In total, data were collected on 30 of 49 (61%) days across phases.

**Baseline.** Baseline data were collected over 31 sessions. For this class, baseline was extended while waiting for an intervention effect from the participants in class 1 (i.e., Participants 1, 2, and 3). When it was evident that the intervention effect would not occur and the allotted time at the school was running out, the researchers decided to intervene with the second group. During baseline, Participant 4 demonstrated step totals that ranged from 604-2156 steps per day. Baseline data began with a downward trend in steps from sessions 2-5. Beginning in session 6 a stable level of responding was maintained until a spike in activity occurred in session 10. The spike was then followed by a return to step levels similar to that of before the spike. Again, in sessions 16 and 17, data spiked. Data then returned to a similar level to that of sessions 5-8 and 11-15. Participant 4’s baseline data ended with an elevation in the level of responding. Again, the decision was made to intervene at this point because of evidence that an intervention effect may not occur with the first class and the allotted time at the school was expiring.

**Intervention.** When the intervention was implemented, little change occurred in Participant 4’s steps during the first week. During the second week of the intervention, there was an immediate spike to his highest point of responding throughout the study (i.e., 2764 steps). This spike was followed by continued responding at a level consistent with the end of the baseline condition and week one. During week three, there was only one data point taken because of absences due to weather. Participant 4 demonstrated his lowest responding during the first data collection session of week 4 (session 44).
However, this was followed by an upward trend in responding that continued into the final week of the intervention.

Of all the weeks of the intervention package, the most successful for Participant 4 were weeks two and five. During week two, Participant 4 demonstrated his highest point in responding (session 35) and his second highest steps per day average (1724). During week five, Participant 4 demonstrated his highest steps per day average (1740) and ended on an upward trend. Of the five weeks, the least successful for Participant 4 was week four. During week four, he had his lowest day of responding during baseline, and his lowest steps per day average.
Figure 4.4. Steps per session across weeks for Participant 4. Numbers above data points indicate the week number of each phase.

Table 4.5. Range and mean step count for Participant 4 across weeks. Asterisk indicates phases with one data point.
**PND.** Step data for Participant 4 was also analyzed using PND. The highest data point in the baseline phase was 2156 steps. One of the 11 data points in the intervention phase were higher than 2156 steps. Therefore, PND for Participant 4 was 9%.

**Summary.** During baseline and intervention, Participant 4’s step count ranged from 604-2156 and 682-2764 steps per day, respectively. A visual analysis of the data demonstrated that there was high overlap between the baseline and intervention phases. Further, the level of responding during intervention is similar to the level of responding demonstrated at the end of the baseline condition. Of positive note, data collection ended on an upward trend and further data points may have seen further increases. Further, Participant 4 demonstrated an average of 1151 and 1518 steps per day across baseline and intervention phases, resulting in a 32% increase. However, from a visual analysis, and a low PND score of 9%, the data suggest that the intervention was not effective in increasing steps for Participant 4.

**Participant 5**

Participant 5 was present for 23 of 31 (74%) of baseline data collection sessions. Data were collected on 11 of 18 (61%) intervention days. Reasons for Participant 5 missing data collection time were absences due to illness and snow days. In total, data were collected on 34 of 49 (69%) days across phases.

**Baseline.** Baseline data were collected over 31 sessions. For this class, baseline was extended while waiting for an intervention effect from the participants in class 1 (i.e., Participants 1,2, and 3). When it was evident that the intervention effect would not occur and the allotted time at the school was expiring, the researcher decided to intervene with the second group (i.e., Participants 4 and 5). During baseline, Participant 5 demonstrated
step totals that ranged from 302-1290, the lowest among all participants in this study. Baseline data were stable across baseline with a low level of responding. One step increase occurred during session 15 (1181 steps), then steps returned to the stable, low level of responding the next session. Baseline data for Participant 5 was stable throughout data collection and therefore it was appropriate to intervene.

**Intervention.** When the intervention was implemented, there was an immediate increase in responding from 401 steps in the last day of baseline to 1181 steps in the first day of intervention. However, this increase was not sustained and the first day of the intervention was the highest step per day total throughout the intervention phase. After the first data point of the intervention, Participant 5 began a downward trend which spanned week’s one through three. Week three was the low point in her steps per day, registering only 291 on the only day of data collection that week. During the last two weeks of data collection, Participant 5 had a stable level of responding and no trend within a range of responding similar to that of the baseline condition.

Of all the weeks of the intervention package, the most successful for Participant 5 was week one. During week one, Participant 5 had her highest level of responding during the intervention package (session 32) immediately after the introduction of the intervention. None of the other intervention weeks produced an effect on total steps per day. Of the other intervention weeks, week three was the least successful as she demonstrating 291 steps per day during the only data collection session that week.
Figure 4.5. Steps per session across weeks for Participant 1. Numbers above data points indicate the week number of each phase.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
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<td>302-1290</td>
<td>636-1181</td>
<td>478-864</td>
<td>291*</td>
<td>534-712</td>
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<td>Mean</td>
<td>521</td>
<td>909</td>
<td>656</td>
<td>291*</td>
<td>623</td>
<td>588</td>
</tr>
</tbody>
</table>

Table 4.6. Range and mean step count for Participant 5 across lessons. Asterisk indicates phases with one data point.
PND. Step data for Participant 5 was also analyzed using PND. The highest data point in the baseline phase was 1290. None of the eleven data points in the intervention phase were higher than 1290 steps. Therefore, the PND was 0%.

Summary. During baseline and intervention, Participant 5’s step count ranged from 302-1290 and 291-1181 per day, respectively. Although there was an initial increase in steps per day at the introduction of the intervention, a visual analysis of the data demonstrated that there were no consistent trends or increases in step counts as a result of the intervention. Therefore, a functional relation was not observed. Further, intervention data were highly overlapping with baseline data, which was confirmed with a PND score of 0%. Therefore, those data suggest that the intervention was not effective in increasing steps for Participant 5. However, Participant 5 demonstrated an average of 527 and 644 steps per day across baseline and intervention phases, resulting in a 22% increase.

Participant 6

Participant 6 was present for 27 of 34 (79%) data collection sessions during the baseline phase. Reasons for Participant 6 to miss sessions were absences due to illness and a family vacation (sessions 12-16). During intervention, data were collected on all intervention days. Being a residential student, Participant 6 was in attendance during several snow days where other students were not able to attend school. In total, data were collected on 38 of 45 (84%) days across all phases for Participant 6.

Baseline. Participant 6 was a member of the last class in the multiple baseline design. Therefore, she had the longest baseline phase (34 sessions). During baseline, Participant 6 demonstrated step totals that ranged from 1691-4733 (see Table 4.7). High variability in responding was found throughout baseline, particularly during sessions 1-
11. While still variable, sessions 17-34 were slightly more consistent than previous responding (approximately 2500 steps per day). Baseline data between sessions 28-33 developed an upward trend, which then sharply decreased in session 34. The decision was made to intervene at this point because (a) the data had trended downward and (b) the time for data collection at the school was expiring.

**Intervention.** During the first week of the intervention, stable responding occurred and steps per day ranged from 2590 to 3543. The second week of responding began in a similar fashion. However, during session 41 a large increase in steps per day occurred (5014 steps). The increase in responding was not sustained, however, into the final week of the intervention and steps per day decreased to the previous level during sessions 42 and 43. During lesson 44, another large increase in steps per day occurred (4988 steps), which was essentially sustained into the final day of the intervention (4379 steps).

Of all of the different weeks of the intervention, the most effective were weeks two and three. During week two, Participant 6 had her largest increase in performance, 5014 during session 41. Week three elucidated the highest steps per day (i.e., 3858 steps per day). Conversely, the least successful week for Participant 3 was week one (lessons 1-3). This week the lowest average steps per day (3130) and the lowest data point (2590) during the intervention phase were observed.
Figure 4.6. Steps per session across lessons for Participant 6. Numbers above data points indicate the week number of each phase.

<table>
<thead>
<tr>
<th>Week</th>
<th>Range</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1691-4733</td>
<td>2751</td>
</tr>
<tr>
<td>Week 1</td>
<td>2590-3543</td>
<td>3130</td>
</tr>
<tr>
<td>Week 2</td>
<td>2950-5014</td>
<td>3847</td>
</tr>
<tr>
<td>Week 3</td>
<td>2912-4988</td>
<td>3858</td>
</tr>
</tbody>
</table>

Table 4.7. Range and mean step count for Participant 6 across weeks. Asterisk indicates phases with one data point.
**PND.** Step count for Participant 6 was also analyzed using PND. The highest data point during the baseline phase was 4733 steps. Just two of the 11 data points in the intervention phase were higher than 4733 steps. Therefore, PND was 18%.

**Summary.** During baseline and intervention, Participant 6’s step count ranged from 1691-4733 and 2590-5014 per day, respectively. A visual analysis of the data demonstrated that intervention data had high overlap with baseline data. There were several increases in steps per day data during the intervention phase; however these increases were not sustained throughout the intervention phase. High overlap is confirmed with a PND score of 18%. However, Participant 6 demonstrated an average of 2850 and 3590 steps per day across baseline and intervention phases, resulting in a 26% increase. When considering all of the data from Participant 6, it suggests that the intervention was not effective in consistently increasing leisure-time physical activity for this individual.

**Physical Activity across Participants**

This study utilized a multiple baseline across classes, single subject design. Experimental control can be demonstrated when changes in behavior occur in conjunction with the introduction of a treatment (Cooper, Heward, & Heron, 2007). Unfortunately, experimental control was not obtained in this study, as there were no evident and consistent changes in steps during the introduction of the intervention (see Figure 4.7). However, percentage increases ranged from 5% (Participant 1) to 32% (Participant 4) across participants. While some participants had temporary increases (e.g., Participant 1 during lessons one and four, Participant 4 in lessons three and seven), these increases did not persist and were not directly related to changes in phases. The lack of
consistent and evident changes in physical activity across participants may have been influenced by limitations in the study, such as seasonality, the time line imposed by the school, and participant attendance (see chapter 5 for further discussion).

Initially, baseline observations on participants’ physical activity were collected for all six participants. When the three participants in class one (i.e., period 9) reached stable states of responding, the intervention was introduced while participants in the other classes remained in baseline. Typically, the intervention would not be introduced to students in the second class until an intervention effect was evident in the first class. However, due to time constraints and a lack of an intervention effect in the first group, the decision was made to introduce the intervention to the second group. At this point, class three remained in baseline. The intervention was then introduced to the third class (i.e., period 5) one week later. Again, the decision to introduce the intervention to classes two and three without intervention effects in class one violated rules of multiple baseline designs, thus affecting the ability to demonstrate experimental control.

Baseline logic is the experimental reasoning used in single-subject designs and consists of three elements; prediction, verification, and replication (Cooper et al., 2007). Stable baseline responding provides a prediction that future responding would remain the same if the environment remains the same. Each participant in this study had a baseline phase that demonstrated some degree of stability. Therefore, a predication of where future responding (should the intervention not be implemented) can be obtained by following the participants’ stable baseline. Verification of that predicted level of responding for one class was obtained when little or no change occurred in the baseline data of the other classes that were still exposed to baseline (Cooper et al., 2007). In this
study, those individuals in classes two (i.e., period 1) and three (i.e., period 5) did not increase while in baseline condition when class one (i.e., period nine) was introduced to the intervention. Therefore, verification was obtained. Replication was then obtained when changes were similar between each group when the treatment was introduced. Unfortunately, as a result of the introduction of the intervention, few changes were found across each of the participants. Therefore, replication was not obtained. This finding confirms evidence that the intervention was not effective study participants.
Figure 4.7. Step count data per session across participants. Phases for Participants 1, 2, and 3 are designated by lessons. Phases for Participants 4, 5 and 6 are designated by weeks.
Social Cognitive Theory Constructs

The following sections describe responses to the social cognitive theory questionnaires of each of the six participants. A summary is then provided.

Participant 1

Table 4.8 illustrates pre and post intervention scores from the social cognitive theory questionnaires for self-efficacy, self-regulation, social support, and outcome expectancy value for Participant 1. For self-efficacy to overcome barriers (SE), the pre and post intervention scores were 34 and 28, respectively (2% decrease). Similarly, pre and post intervention scores for self-efficacy to overcome barriers-visual impairment (SE-VI) were 50 and 46, respectively (9% decrease). For the social support questionnaire (SS), pre and post intervention scores were 17 and 24, respectively (42% increase). For the self-regulation questionnaire, pre and post intervention scores were 60 and 82, respectively (37% increase). Finally, for the outcome expectancy values questionnaire (OEV), pre and post intervention scores were 531 and 720, respectively (36% increase).
<table>
<thead>
<tr>
<th>Social Cognitive Theory Construct</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>Attainable Score</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy to Overcome Barriers (SE)</td>
<td>34</td>
<td>28</td>
<td>-6</td>
<td></td>
<td>7-42</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>17</td>
<td>24</td>
<td>+7</td>
<td></td>
<td>8-48</td>
</tr>
<tr>
<td>Self-Regulation (SR)</td>
<td>60</td>
<td>82</td>
<td>+22</td>
<td></td>
<td>25-150</td>
</tr>
<tr>
<td>Outcome Expectancy Values (OEV)</td>
<td>531</td>
<td>720</td>
<td>+189</td>
<td></td>
<td>23-828</td>
</tr>
<tr>
<td>Self-Efficacy to Overcome Barriers- VI (SE-VI)</td>
<td>50</td>
<td>46</td>
<td>-4</td>
<td></td>
<td>10-60</td>
</tr>
</tbody>
</table>

Table 4.8. Pre-, post-intervention, change scores, and attainable sum ranges of Participant 1 on the social cognitive theory questionnaires.

**Participant 2**

Table 4.9 illustrates pre and post intervention scores from the social cognitive theory questionnaires for self-efficacy, self-regulation, social support, and outcome expectancy value for Participant 2. For self-efficacy to overcome barriers (SE), the pre and post intervention scores were 24 and 32, respectively (33% increase). Similarly, pre and post intervention scores for self-efficacy to overcome barriers-visual impairment (SE-VI) were 36 and 45, respectively (25% increase). For the social support questionnaire (SS), pre and post intervention scores were 17 and 13, respectively (24% decrease). For the self-regulation questionnaire (SR), pre and post intervention scores were 44 and 86, respectively (95% increase). Finally, for the outcome expectancy values questionnaire (OEV), pre and post intervention scores were 196 and 287, respectively (46% increase).
<table>
<thead>
<tr>
<th>Social Cognitive Theory Construct</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>Attainable Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy to Overcome Barriers (SE)</td>
<td>24</td>
<td>32</td>
<td>+8</td>
<td>7-42</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>17</td>
<td>13</td>
<td>-4</td>
<td>8-48</td>
</tr>
<tr>
<td>Self-Regulation (SR)</td>
<td>44</td>
<td>86</td>
<td>+42</td>
<td>25-150</td>
</tr>
<tr>
<td>Outcome Expectancy Values (OEV)</td>
<td>196</td>
<td>287</td>
<td>+91</td>
<td>23-828</td>
</tr>
<tr>
<td>Self-Efficacy to Overcome Barriers- VI (SE-VI)</td>
<td>36</td>
<td>45</td>
<td>+9</td>
<td>10-60</td>
</tr>
</tbody>
</table>

Table 4.9. Pre-, post-intervention, change scores, and attainable sum ranges of Participant 2 on the social cognitive theory questionnaires.

**Participant 3**

Table 4.10 illustrates pre and post intervention scores from the social cognitive theory questionnaires for self-efficacy, self-regulation, social support, and outcome expectancy value for Participant 3. For self-efficacy to overcome barriers (SE), the pre and post intervention scores were 25 and 24, respectively (4% decrease). Similarly, pre and post intervention scores for the self-efficacy to overcome barriers-visual impairment (SE-VI) were 50 and 49, respectively (2% decrease). For the social support questionnaire (SS), pre and post intervention scores were 8 and 11, respectively (38% increase). For the self-regulation questionnaire, pre and post intervention scores were 43 and 71, respectively (65% increase). Lastly, for the outcome expectancy values questionnaire (OEV), pre and post intervention scores were 191 and 211, respectively (10% increase).
<table>
<thead>
<tr>
<th>Social Cognitive Theory Construct</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>Attainable Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy to Overcome Barriers (SE)</td>
<td>25</td>
<td>24</td>
<td>-1</td>
<td>7-42</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>8</td>
<td>11</td>
<td>+3</td>
<td>8-48</td>
</tr>
<tr>
<td>Self-Regulation (SR)</td>
<td>43</td>
<td>71</td>
<td>+28</td>
<td>25-150</td>
</tr>
<tr>
<td>Outcome Expectancy Values (OEV)</td>
<td>191</td>
<td>211</td>
<td>+20</td>
<td>23-828</td>
</tr>
<tr>
<td>Self-Efficacy to Overcome Barriers- VI (SE-VI)</td>
<td>50</td>
<td>49</td>
<td>-1</td>
<td>10-60</td>
</tr>
</tbody>
</table>

Table 4.10. Pre-, post-intervention, change scores, and attainable sum ranges of Participant 3 on the social cognitive theory questionnaires.

Participant 4

Table 4.11 illustrates pre and post intervention scores from the social cognitive theory questionnaires for self-efficacy, self-regulation, social support, and outcome expectancy value for Participant 4. For self-efficacy to overcome barriers (SE), the pre and post intervention scores were 28 and 29, respectively (4% increase). Similarly, pre and post intervention scores for self-regulation (SR) also increased, from 26 to 59 (88% increase). Each of the other constructs for Participant 4 decreased from pre to post intervention. For the social support questionnaire (SS), pre and post intervention scores were 29 and 13, respectively (55% decrease). For the outcome expectancy values questionnaire (OEV), pre and post intervention scores were 319 and 264, respectively (17% decrease). Lastly, for the self-efficacy to overcome barriers-visual impairment scale (SE-VI), pre and post intervention scores were 57 and 44, respectively (23% decrease).
<table>
<thead>
<tr>
<th>Social Cognitive Theory Construct</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>Attainable Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy to Overcome Barriers (SE)</td>
<td>28</td>
<td>29</td>
<td>+1</td>
<td>7-42</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>29</td>
<td>13</td>
<td>-16</td>
<td>8-48</td>
</tr>
<tr>
<td>Self-Regulation (SR)</td>
<td>26</td>
<td>59</td>
<td>+23</td>
<td>25-150</td>
</tr>
<tr>
<td>Outcome Expectancy Values (OEV)</td>
<td>319</td>
<td>264</td>
<td>-55</td>
<td>23-828</td>
</tr>
<tr>
<td>Self-Efficacy to Overcome Barriers- VI (SE-VI)</td>
<td>57</td>
<td>44</td>
<td>-13</td>
<td>10-60</td>
</tr>
</tbody>
</table>

Table 4.11. Pre-, post-intervention, change scores, and attainable sum ranges of Participant 4 on the social cognitive theory questionnaires.

**Participant 5**

Table 4.12 illustrates pre and post intervention scores from the social cognitive theory questionnaires for self-efficacy, self-regulation, social support, and outcome expectancy value for Participant 5. For the social support questionnaire, the pre and post intervention scores were 13 and 15, respectively (15% increase). Similarly, for the outcome expectancy values questionnaire (OEV), pre and post intervention scores were 206 and 218, respectively (6% increase). The largest gains were found in the self-regulation questionnaire (SR), with pre and post intervention scores of 32 and 91, respectively (184% increase). For self-efficacy to overcome barriers- visual impairment scale (SE-VI), pre and post intervention scores were 42 and 47, respectively (12% increase). Lastly, no changes were found with the self-efficacy to overcome barriers scale (SE) between pre and post intervention data collection.
<table>
<thead>
<tr>
<th>Social Cognitive Theory Construct</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>Attainable Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy to Overcome Barriers (SE)</td>
<td>29</td>
<td>29</td>
<td>-</td>
<td>7-42</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>13</td>
<td>15</td>
<td>+2</td>
<td>8-48</td>
</tr>
<tr>
<td>Self-Regulation (SR)</td>
<td>32</td>
<td>91</td>
<td>+59</td>
<td>25-150</td>
</tr>
<tr>
<td>Outcome Expectancy Values (OEV)</td>
<td>206</td>
<td>218</td>
<td>+12</td>
<td>23-828</td>
</tr>
<tr>
<td>Self-Efficacy to Overcome Barriers- VI (SE-VI)</td>
<td>42</td>
<td>47</td>
<td>+5</td>
<td>10-60</td>
</tr>
</tbody>
</table>

Table 4.12. Pre-, Post-intervention, change scores, and attainable sum ranges of Participant 5 on the social cognitive theory questionnaires.

### Participant 6

Table 4.13 illustrates pre and post intervention scores from the social cognitive theory questionnaires for self-efficacy, self-regulation, social support, and outcome expectancy value for Participant 6. For self-efficacy to overcome barriers (SE), the pre and post intervention scores were 22 and 33, respectively (50% increase). Similarly, pre and post intervention scores for the self-efficacy to overcome barriers-visual impairment (SE-VI) were 39 and 56, respectively (44% increase). The largest increase was in the self-regulation questionnaire (SR), with pre and post intervention scores of 38 and 115, respectively (203% increase). For the social support questionnaire (SS), pre and post intervention scores were 29 and 37, respectively (28% increase). Lastly, for the outcome expectancy values (OEV) questionnaire, pre and post intervention scores were 406 and 686, respectively (69% increase).
<table>
<thead>
<tr>
<th>Social Cognitive Theory Construct</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>Attainable Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy to Overcome Barriers (SE)</td>
<td>22</td>
<td>33</td>
<td>+11</td>
<td>7-42</td>
</tr>
<tr>
<td>Social Support (SS)</td>
<td>29</td>
<td>37</td>
<td>+8</td>
<td>8-48</td>
</tr>
<tr>
<td>Self-Regulation (SR)</td>
<td>38</td>
<td>115</td>
<td>+77</td>
<td>25-150</td>
</tr>
<tr>
<td>Outcome Expectancy Values (OEV)</td>
<td>406</td>
<td>686</td>
<td>+280</td>
<td>23-828</td>
</tr>
<tr>
<td>Self-Efficacy to Overcome Barriers- VI (SE-VI)</td>
<td>39</td>
<td>56</td>
<td>+17</td>
<td>10-60</td>
</tr>
</tbody>
</table>

Table 4.13. Pre-, post-intervention, change scores, and attainable sum ranges of Participant 6 on the social cognitive theory questionnaires.

**Summary**

All participants completed each questionnaire during the pre and post intervention sessions. Of the six participants, only Participant 6 reported increases in each social cognitive theory construct questionnaire from pre to post intervention. Conversely, Participant 4 reported increases in only two of the five questionnaires (i.e., self-efficacy and self-regulation). For a summary of all participant scores, see Table 4.14.

Of the different questionnaires, participants responded the most positively to the self-regulation questionnaire. All participants reported increases in their self-regulation scores, with an average increase from pre to post intervention of 112% (range 37-203%). Similarly, five participants reported increases in the outcome expectancy values questionnaire, with an average increase of 33% (range 6-69%). However, one participant decreased from pre to post intervention in this questionnaire (Participant 4). Four
participants (1, 3, 5, 6) had positive responses to the social support questionnaire, with an average increase of 31% (range 15-42%). However, two participants (2, 4) decreased from pre to post intervention in this questionnaire (range 24 – 55% decrease). Of the five questionnaires, the two which had the least increases were the self-efficacy to overcome barriers and self-efficacy to overcome barriers – visual impairment questionnaires. For the self-efficacy to overcome barriers questionnaire, three participants (2, 4, 6) demonstrated increases (range 4-50%), two (1, 3) demonstrated decreases (2-4%), and Participant 5 had no changes from pre to post intervention. Lastly, three participants (2, 5, 6) demonstrated increases for the self-efficacy for overcoming barriers- visual impairment questionnaire (range 12-44%) while the other three (1, 3, 4) demonstrated decreases (range 2-23%) from pre to post intervention. It should be noted the participants 1 and 3 who demonstrated decreases in self-efficacy for overcoming barriers also demonstrated decreases in the self-efficacy for overcoming barriers – visual impairment questionnaire.

**Physical Activity and Social Cognitive Theory Scales**

Table 4.14 provides an illustration of changes in steps per day along with change scores from the social cognitive theory scales. A visual analysis of graphed data demonstrated that a functional relation may was not observed between the intervention and participants’ steps taken. Unfortunately, mixed results for the social cognitive theory constructs make it difficult to suggest any strong relationships between the constructs and increases in steps taken. However, large and consistent increases in outcome expectancy values and negligible changes in steps taken may support the notion that it is plausible for changes in that social cognitive theory construct to influence physical activity behavior.
<table>
<thead>
<tr>
<th>Item</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Direction Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steps (mean)</td>
<td>2225</td>
<td>2327</td>
<td>+ (5%)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>34</td>
<td>28</td>
<td>- (2%)</td>
</tr>
<tr>
<td>Social Support</td>
<td>17</td>
<td>24</td>
<td>+ (42%)</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>60</td>
<td>82</td>
<td>+ (37%)</td>
</tr>
<tr>
<td>Outcome Expectancy Values</td>
<td>531</td>
<td>720</td>
<td>+ (36%)</td>
</tr>
<tr>
<td>Self-Efficacy- VI</td>
<td>50</td>
<td>46</td>
<td>- (9%)</td>
</tr>
<tr>
<td>Participant 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steps (mean)</td>
<td>1328.4</td>
<td>1882</td>
<td>+ (42%)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>24</td>
<td>32</td>
<td>+ (33%)</td>
</tr>
<tr>
<td>Social Support</td>
<td>17</td>
<td>13</td>
<td>- (24%)</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>44</td>
<td>86</td>
<td>+ (95%)</td>
</tr>
<tr>
<td>Outcome Expectancy Values</td>
<td>196</td>
<td>287</td>
<td>+ (46%)</td>
</tr>
<tr>
<td>Self-Efficacy- VI</td>
<td>36</td>
<td>45</td>
<td>+ (25%)</td>
</tr>
<tr>
<td>Participant 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steps (mean)</td>
<td>1137.5</td>
<td>1371.7</td>
<td>+ (21%)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>25</td>
<td>24</td>
<td>- (4%)</td>
</tr>
<tr>
<td>Social Support</td>
<td>8</td>
<td>11</td>
<td>+ (38%)</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>43</td>
<td>71</td>
<td>+ (65%)</td>
</tr>
<tr>
<td>Outcome Expectancy Values</td>
<td>191</td>
<td>211</td>
<td>+ (10%)</td>
</tr>
<tr>
<td>Self-Efficacy- VI</td>
<td>50</td>
<td>49</td>
<td>- (2%)</td>
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<tr>
<td>Participant 4</td>
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<tr>
<td>Steps (mean)</td>
<td>1151</td>
<td>1518</td>
<td>+ (32%)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>28</td>
<td>29</td>
<td>+ (4%)</td>
</tr>
<tr>
<td>Social Support</td>
<td>29</td>
<td>13</td>
<td>- (55%)</td>
</tr>
</tbody>
</table>

Table 4.14. Summary of directional change of baseline and intervention steps and social cognitive theory scales.
### Table 4.14 continued

<table>
<thead>
<tr>
<th></th>
<th>Participant 5</th>
<th>Participant 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steps (mean)</td>
<td>Steps (mean)</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>26</td>
<td>22</td>
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<td>Self-Efficacy- VI</td>
<td>57</td>
<td>32</td>
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<tr>
<td>Self-Efficacy</td>
<td>29</td>
<td>22</td>
</tr>
<tr>
<td>Social Support</td>
<td>13</td>
<td>29</td>
</tr>
<tr>
<td>Outcome Expectancy Values</td>
<td>206</td>
<td>406</td>
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<td>Self-Efficacy- VI</td>
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<td>39</td>
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<td>Social Validity</td>
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</table>

#### Social Validity

Social validity assessments are developed to evaluate the acceptability of an intervention. In this study, social validity was evaluated formally (i.e., a written questionnaire) and informally (i.e., behavioral correlates of satisfaction). The social validity questionnaire was administered to direct consumers (i.e., study participants),
indirect consumers (i.e., physical education teachers, parents) and community members (i.e., residential staff) at the completion of the intervention phase. The questionnaires were distributed to a total of 13 individuals (6 participants, 1 physical education teacher, 4 parents, and 2 residential staff members). Surveys were administered electronically to participants, the physical education teacher, and residential staff, allowing consumers to remain anonymous while responding. Printed surveys were sent home with students for parents to complete. To ensure anonymity, names were not requested for parent surveys. The following sections provide a description of the results of the social validity questionnaires and informal evaluations of social validity.

**Social Validity Questionnaire – Participants**

Participants completed a 10 questionnaire social validity questionnaire the day after their final intervention session. The first nine questions were likert scale questions which asked students to rate their satisfaction regarding the intervention. For these questions, a higher score indicated a more favorable response regarding the program (i.e., 1=Not at all, 2=probably not, 3=neutral, 4=probably/ mostly, 5=definitely/completely). Question 10 was an open ended question that asked participants to share their thoughts on any elements of the Plan for Exercise, Plan for Health program that they may have found undesirable.

All participants completed the social validity questionnaire. Mean responses ranged from 2.7 to 4.5 across questions. Only one question averaged below “neutral” (i.e., 3), question two. Question two asked participants to rate how satisfied they were with the homework activities. Four of the questions ranged between a score of 3(neutral) and 4 (probably/ mostly), indicating that participants were either indifferent or somewhat
satisfied with the intervention. Another four of the questions ranged between a score of 4 (probably/ mostly) and 5 (definitely/ completely), providing further evidence that participants were satisfied with the program. One participant’s average response was a 1.9, indicating little satisfaction with the program. On the other hand, the other five participants’ average responses ranged from a 3.7 to 4.8 indicating that they were at least somewhat satisfied with the program.

Five of six participants included a response to the open ended question regarding elements they did not like (question 10). Responses included; “None. I liked it”, “(I) didn’t like the running and jogging”, and “I cannot find some of the lessons that were uploaded to my braille note. Other than that, I found everything else okay”. The participant who responded with low scores on the likert scale questions wrote that “this program is better for summer, and the in-school papers, no thanks”, indicating that he or she thought that the winter was not the best time for the program and their dissatisfaction with the activities. Two of the six participants did not include any comments. Table 4.15 displays the mean results of each question for the participants. See Appendix H for the complete questionnaire.
<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How satisfied are you with your overall experience with the program?</td>
<td>3.7</td>
<td>2-5</td>
</tr>
<tr>
<td>2. How satisfied are you with the homework activities associated with the program?</td>
<td>2.7</td>
<td>1-4</td>
</tr>
<tr>
<td>3. How satisfied are you with the in-class activities associated with the program?</td>
<td>3.8</td>
<td>3-5</td>
</tr>
<tr>
<td>4. How satisfied are you with the talking pedometers?</td>
<td>4.5</td>
<td>3-5</td>
</tr>
<tr>
<td>5. If given the choice, would you participate in the program next school year?</td>
<td>4.2</td>
<td>1-5</td>
</tr>
<tr>
<td>6. If given the choice, would you continue to wear the talking pedometer to keep track of your exercise?</td>
<td>4.2</td>
<td>3-5</td>
</tr>
<tr>
<td>7. How satisfied were you with the manual?</td>
<td>3.3</td>
<td>1-5</td>
</tr>
<tr>
<td>8. Do you believe that the program would be beneficial for other students like you?</td>
<td>4.3</td>
<td>2-5</td>
</tr>
<tr>
<td>9. Are you satisfied with the results of the Plan for Exercise, Plan for Health program?</td>
<td>3.7</td>
<td>1-5</td>
</tr>
</tbody>
</table>

Table 4.15. Mean and range of social validity questionnaire responses for all participants.
Social Validity Questionnaire – Physical Education Teacher

The physical education teacher completed a 16 item questionnaire the day after the final intervention session. The first 15 questions were likert scale questions which asked the teacher to rate her experiences and preferences regarding the intervention. For these questions, a higher score indicated a more favorable response regarding the program (i.e., 1=Not at all, 2=probably not, 3=neutral, 4=probably/ mostly, 5=definitely/completely). Question 16 was an open ended question that asked the teacher to share her thoughts on any elements of the Plan for Exercise, Plan for Health program that she found undesirable. See Appendix H for specific questions.

Table 4.16 displays results of the teacher’s social validity questionnaire. The physical education teacher’s average response was 4.1, indicating that she was mostly satisfied with the program. However, two questions warranted a response of “very little”; questions two and eight. Question two asked her to rate how satisfied she was with the homework activities associated with the program, while question eight asked the teacher how satisfied she was with the student workbook. These sentiments are reflected in the response to the open ended question. Her response states that:

‘The program is a good curriculum but for students with visual impairments the lesson layouts were poorly formatted for transitioning through topics. Also, lesson 8 should occur earlier in the curriculum to better illustrate the difference intensity levels. I would not sure this exact curriculum but keep model a new curriculum off of it with the same messages. This would provide freedom to move lesson topics around, introduce pedometers and/or other technology earlier and to
recreate student worksheets. For the homework, there was too much going on each day for our students with sometimes three assignments per session.’

While the physical education teacher demonstrates some dissatisfaction with the homework activities and order of the student workbook/ assignments, her average responses were favorable in regard to this program. Further, her open ended answer indicated that she believed it was a good program and the messages of the program are valuable for students with visual impairments.
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How satisfied are you with your overall experience?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>2. How satisfied are you with the homework activities?</td>
<td>Very Little (2)</td>
</tr>
<tr>
<td>3. Would you consider using the homework activities again in the future?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>4. How satisfied are you with the in-class activities?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>5. Would you consider using the in-class activities again in the future?</td>
<td>Completely (5)</td>
</tr>
<tr>
<td>6. How satisfied were you with the talking pedometers?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>7. Would you use talking pedometers again with your students?</td>
<td>Certainly (5)</td>
</tr>
<tr>
<td>8. How satisfied are you with the student workbook?</td>
<td>Very Little (2)</td>
</tr>
<tr>
<td>9. If you had the materials, would you use the program again in your school?</td>
<td>Certainly (5)</td>
</tr>
<tr>
<td>10. Do you believe you can administer the program in the future without the assistance of the researchers from this study?</td>
<td>Completely (5)</td>
</tr>
<tr>
<td>11. Are you satisfied with the time requirements of the program?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>12. Have you noticed an increase in physical activity?</td>
<td>Completely (5)</td>
</tr>
<tr>
<td>13. Do you believe that the program would be beneficial for physical education teachers at other schools for the blind?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>14. Overall, how acceptable was the program for you?</td>
<td>Mostly (4)</td>
</tr>
<tr>
<td>15. How satisfied are you with the results of the program?</td>
<td>Mostly (4)</td>
</tr>
</tbody>
</table>

**Average**

4.1

Table 4.16. Social validity questionnaire responses of the physical education teacher.
Social Validity Questionnaire – Parents/ Residential Staff

Parents and residential staff were asked to complete a five question social validity questionnaire. The first four questions were likert scale questions which asked parents and residential staff to rate their satisfaction regarding the intervention. For these questions, a higher score indicated a more favorable response (i.e., 1=Not at all, 2=probably not, 3=neutral, 4=probably/mostly, 5=definitely/completely). Question five was an open ended question that asked parents/residential staff to share any elements of the program that they found undesirable. See Appendix H for specific questions.

Three of the four parents (75%) who were asked to complete the questionnaire did so and returned the questionnaire to school. Both residential staff members who were contacted also completed the questionnaire. Responses from parents and residential staff were largely neutral, ranging from 3 to 5 across questions. Again, question five allowed parents and residential staff to voice any concerns about the program. No responses were received from either parents the residential staff in regard to this question. Table 4.17 displays results of each question for parents and residential staff.
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Parent</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td>1. Overall, how satisfied are you with the program.</td>
<td>3.7</td>
<td>3-4</td>
</tr>
<tr>
<td>2. Do you believe students are more interested in being physically active during their leisure-time because of the program?</td>
<td>4</td>
<td>3-5</td>
</tr>
<tr>
<td>3. How satisfied are you with the results of the program?</td>
<td>3.7</td>
<td>3-4</td>
</tr>
<tr>
<td>4. Do you believe the program was beneficial for the students?</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.8</strong></td>
<td><strong>3-5</strong></td>
</tr>
</tbody>
</table>

Table 4.17. Mean and range of social validity responses from parents and residential staff.

**Informal Evaluations**

In addition to the formal questionnaires, the investigator observed and recorded anecdotally behavioral correlates of satisfaction and dissatisfaction throughout the study. Additionally, the physical education teacher and participants were encouraged to provide feedback to the researcher throughout the study.

**Physical education teacher.** The physical education teacher was enthusiastic about the *Plan for Exercise, Plan for Health* program. One behavioral correlate which demonstrated her enthusiasm for the program was that she continued to want to introduce the intervention to the second and third class although the first class was not increasing...
their physical activity performance. This demonstrated her satisfaction throughout the program. She was also willing to meet after school and discuss the program and her implementation of the program, further correlates of satisfaction with the program. The teacher provided much anecdotal feedback throughout the intervention, which included indicating that she wanted to continue to use the program in future years. She was also interested in continuing to develop this program to be effective for the students. However, she indicated throughout the duration of the study that several factors would have to change (i.e., the homework) in order for this program to be more successful with the population of students that she taught.

Participants. The participants also displayed behavioral correlates of satisfaction with the program throughout the intervention. Specifically, several participants expressed that they were “sad” that the intervention was ending. Participants expressed that they liked the nature of the intervention and that they enjoyed tracking their activity. One element in particular that the participants were enthusiastic about was the use of the talking pedometer. Several participants asked if they could continue to wear their talking pedometers after the completion of the study. One such participant purchased her own talking pedometer to use following the study. Participants also asked if their friends (who were not included in the study) were also able to use talking pedometers with them. Participants were also willing to wear the Fitbit Zips throughout the baseline and intervention phases without any issues. The researcher asked participants for feedback on the Fitbit Zips and talking pedometers each afternoon, and no complaints were voiced.

One element of the intervention that did not receive the same positive recognition was homework assignments. At various times throughout the study, participants
complained about having to do additional homework throughout the intervention. While most participants completed homework assignments (44 of 48 total), there was verbal disagreement on behalf of the participants in regard to this. In regard to homework, Participants 2, 5, and 6 completed all homework activities, Participant 3 and 4 completed seven of eight, and Participant 1 completed 6 of 8. Other behavioral correlates that were considered throughout the program (e.g., students recommending friends or warning friends of the program, students defending the program when it is attacked by peers) were not observed.

**Summary**

Direct and indirect measures of social validity for this study were largely positive. Five of the six participants had scores that ranged from 3.7 to 4.8 (out of 5.0) on the social validity questionnaire, indicating that they were moderately satisfied with the program. Further, the physical education teacher had an average response score of 4.1 (out of 5.0). However, there were several concerns that were raised. For example, one participant was not satisfied with the program, and specifically cited that s/he believed it would have been a better fit for the summer time. Also, the physical education teacher expressed concerns about the student workbook and other elements of the program. Of most concern, from both the students and physical education teacher was the homework activities. The question regarding homework received the lowest average score from the participants (2.7) and a response of “very little” from the physical education teacher. The physical education teacher may have described a key issue with the homework activities, being that there were simply too many activities bundled into each session’s homework. In conclusion, while the intervention may have elements that could use improvement for
future research and practice, the results of the social validity questionnaires and behavioral correlates indicate that the intervention was a socially valid one.
Chapter 5: Discussion

This chapter provides a discussion of the results of the effects of a theory-based physical education curriculum on the leisure-time physical activity of adolescents with visual impairments. The chapter includes sections discussing leisure-time physical activity, intervention effects on social-cognitive theory (SCT) constructs, observed and perceived limitations of the study, implications for practice and suggestions for the future research. Finally, a summary of the study is presented.

**Leisure-time Physical Activity**

Based on previous research, it was hypothesized that the implementation of the Plan for Exercise, Plan for Health program would facilitate an increase in leisure-time physical activity for adolescent-aged individuals with visual impairments. To demonstrate the effects of the intervention, a multiple baseline design was implemented. Participants 3, 4, and 5 had the lowest numbers of steps per day at baseline, averaging 1137, 1151, and 527 steps per day, respectively. Participants 1 and 6 (both residential students) were the most active during baseline, averaging 2225 and 2850 steps per day, respectively. A visual analysis of the multiple-baseline design suggested that the intervention did not demonstrate functional control of the participants’ physical activity. Further, percentage of nonoverlapping data (PND) scores supported the lack of effect on the intervention for each participant. Therefore, it was concluded that the implementation of the Plan for Exercise, Plan for Health program did not have an effect on the
accumulation of daily steps taken during leisure-time physical activity among adolescents with visual impairments. However, these results may have been directly influenced by several limitations of the study, such as seasonality and the truncation of the program for Participants 4, 5, and 6. Because of limitations of this study (e.g., seasonality, truncated program), the results may not indicate the full effectiveness of the intervention for the participants.

Results from this study both refute and affirm previous research pertaining to physical activity for individuals with visual impairments. This section will discuss results in terms of its relation to (a) physical activity interventions utilizing SCT, (b) talking pedometers, and (c) previous physical activity literature for individuals with visual impairments.

Physical Activity Interventions Utilizing SCT

Results of this study conflict with those of previous research which support the use of physical activity interventions based on SCT to increase leisure-time physical activity of typically developing individuals (Hortz & Petosa, 2008) and adolescents with visual impairments (Cervantes & Porretta, 2013). Both Hortz and Petosa (2008) and Cervantes and Porretta (2013) utilized a SCT based physical activity intervention in the school context to increase leisure-time physical activity for different populations. Hortz and Petosa (2008) utilized a group design which included 143 participants in an intervention group and 97 in a comparison group in two rural high schools in Ohio. All participants were typically developing high school students. Both groups received similar physical education curricula throughout the school year, and the intervention group also received a SCT based intervention which emphasized behavioral skill-building. The
results of this study demonstrated that changes in two SCT Constructs (i.e., self-regulation and social situation), mediated changes in the participants’ physical activity (Hortz & Petosa, 2008).

Similar to Hortz and Petosa (2008), the current study embedded a SCT based intervention into a school’s physical education program. While all participants demonstrated increases in self-regulation, and four of six participants demonstrated increases in social support, the current study did not find a functional relation between the SCT intervention and physical activity behavior. Differences in the two studies may contribute to these disparities. Most importantly, the previous study focused on adolescent-aged individuals who were typically developing, whereas the current study sought to determine the effects of this intervention on adolescents with visual impairments. Research suggests that there are several additional barriers to physical activity for those with visual impairments (Jaarsma et al., 2014), which may influence their ability to increase leisure-time physical activity as a result of the intervention. Therefore, population differences seem to be the most significant determinate of disparities in research outcomes between these two studies. Further, limitations of the study, such as seasonality effects and the truncation of the program for half of the participants, may have limited the ability of the results to reflect the effectiveness of the program.

More recently, Cervantes and Porretta (2013) examined the impact of a Social Cognitive Theory based intervention as an afterschool program for adolescents with visual impairments at a school for the blind. This study utilized a range-bound changing criterion single subject design and included four participants (aged 14-19). This program
included nine lesson units that were disseminated over a five week period. Like Hertz and Petosa (2008), the program emphasized behavioral skill-building. Study results found a moderate functional relationship between the treatment and physical activity behavior change (Cervantes & Porretta, 2013).

The current study sought to replicate the results of this the Cervantes and Porretta (2013) study with several altered features. Specifically, the current study (a) embedded the program into the school’s physical education program, (b) included participants of different residential statuses (e.g., part-time day, full-time day, full-time residential), and (c) took place at a different time of year. Examples of direct replications which fail to replicate results are present in the literature (e.g., Dumay & Damian, 2011). Those studies tend to refute the results of previous work. Systematic replications, however, include altered features which may impact the results of the study. For example, Friedling and O’Leary (1979) failed to systematically replicate a study on self-instructional training which they applied to older children. While both the current and the Cervantes and Porretta (2013) studies sought to determine the effects of a SCT based intervention on the leisure-time physical activity of adolescents with visual impairments, the altered features of the current study may have influenced differentiated results.

Because the intervention was embedded into the physical education curriculum, the intervention schedule of the current study was dependent on the physical education class schedule. During the time of the intervention, the physical education schedule changed several times, affecting the intervention schedule. For example, on several instances throughout the study the physical education teacher was informed that students would not be in her class because of statewide testing. It is unlikely that this limitation
would have affected the schedule of the Cervantes and Porretta (2013) study, as afterschool programming schedules tend to remain consistent across days and are not affected by changes in the school day. Having an inconsistent intervention schedule may have influenced participant learning, hence impacting their leisure-time physical activity.

Second, the current study included students of different residential status’ (e.g., day students, residential students), whereas the previous student included only residential students. The decision was made to include different residential status in order to (a) reflect the current common enrollment status of students at schools for the blind and (b) obtain the desired number of participants for the study. The inclusion of non-residential students may have influenced the results of the study because of different physical activity opportunities that are available to those individuals after school. While residential students have access to the facilities accommodating their disability at the school during the afternoon and evening hours, non-residential students tend to be limited to options available at home or in the neighborhood. For example, when participants were asked to describe barriers to physical activity during lesson four, several non-residential students referenced a lack of indoor fitness equipment and unsafe outdoor running areas. Again, these barriers would be less prevalent for residential students who have access to the school for the blind gymnasium and track after school hours.

Another way the study was influenced by including day students in addition to residential students was in regard to attendance. Since residential students stay at school from Sunday evening to Friday, their attendance at school-based programs was fairly predictable (if they are there on Sunday, they will likely be there throughout the week). The attendance of day students was far more unpredictable, particularly in the winter time
with school closings. On several occasions, student attendance impacted the intervention schedule of the first group. This, plus a lack of intervention effect in the first group and the limited intervention timeline provided by the school, resulted in a truncated program for the second (first period) and third (fifth period) groups.

A last difference between the current study and that conducted by Cervantes and Porretta (2013) was the time of year. The Cervantes and Porretta (2013) study was conducted in the fall while the current study was conducted in the winter (both in a Midwest city). Low outdoor temperatures and icy conditions associated with the winter months in the Midwest may have reduced the overall number of opportunities for activities that participants could engage in throughout the study. Cold weather was discussed among all participants when they were asked to describe barriers to being physically active during lesson four of the intervention. This is especially pertinent to those participants who were not of residential status, as they may not have indoor opportunities to participate in during their leisure-time at home during the winter. Again, participants discussed this issue (i.e., no indoor equipment) when describing barriers to physical activity. This would not have been as much of a consideration for the Cervantes and Porretta study, as those participants were all of residential status and the study was conducted at a time of year with more favorable weather.

The results of this study were also influenced by the timeline imposed by the school for the blind in two ways. First, the intervention had to be truncated for the second and third classes because of an extended baseline condition for the first class. This may be considered a significant flaw, as the truncated version of the intervention may have violated some of the assumptions of which the intervention is based. Specifically,
participants did not have a full week to consider the lessons of the week (based on SCT constructs) and complete weekly homework based on those lessons. This was evident in the social validity questionnaires, where homework was a major area of dissatisfaction across participants and the physical education teacher. The decision was made to deliver the program to the first period class over five weeks and the fifth period class over three weeks because of (a) a limited timeline imposed by the school for the blind and (b) an extended baseline condition due to the lack of an intervention effect from the participants in the ninth period class. Because Participants 4, 5, and 6 received a truncated version of the intervention, researcher consumers should take this limitation into consideration when considering the results demonstrated by Participants 4, 5, and 6.

The results of this study were also influenced by the timeline imposed by the school for the blind as it did not allow the research to collect maintenance or generalization data. Increases in physical activity data, because of the intervention, would have been best detected after the completion of the intervention and students implemented the personalized plan that they had developed. Further, our intention, at the outset of the study, was to collect maintenance and generalization data for each participant. However, because of the extended baseline condition in the first group, and the timeline imposed by the school for the blind, we were unable to do so. Because we were unable to collect maintenance (i.e., data after the intervention is discontinued) or generalization (i.e., a time other than the intervention or maintenance) data, the researchers may not have a complete picture of the effectiveness of the program after its completion.

Talking Pedometers
The results of this study also contribute to the literature regarding the use of talking pedometers. Previous research provides validation evidence for talking pedometer use for adults and youth in circuit (Beets, Foley, Tindall, & Lieberman, 2007; Holbrook et al., 2010) and free-living (Albright & Jerome, 2011; Haegele & Porretta, in press) conditions. Few previous intervention research studies have been conducted on the use of talking pedometers for individuals with visual impairments. One such study found that talking pedometers provided motivational benefits for children with visual impairments because the feedback provided by the devices allowed them to set challenging goals (Lieberman et al., 2007). However, this was not the case in the current study. While some participants demonstrated occasional increases in physical activity behavior after the introduction of the talking pedometers, changes were not sustained. This result may provide evidence which agrees with the suggestion made by Patel, Asch, and Volpp (2015) that wearable devices, such as talking pedometers, act as facilitators, not drivers, of health behavior change.

Physical Activity for Adolescents with Visual Impairments

While the results of this study conflict with previous intervention research, data from this study affirm previous research which suggests that adolescents with visual impairments participate in low amounts of physical activity. School-aged individuals with visual impairments tend to be less physically active than their sighted peers as well as those with other disabilities (Longmuir & Bar-Or, 2000; Kozub & Oh, 2004). Data from this study affirm previous findings of low physical activity among individuals with visual impairments during both baseline and intervention phases. Step per day thresholds associated with sedentary behavior and daily step goals provide reference points which
indicate evidence of low physical activity among participants in this study. These figures were not used in order to make decisions about the study results and are described specifically as discussion points.

A recent literature review suggests <5000 steps/day as an appropriate step-defined parameter for sedentary behavior (Tudor-Locke, Craig, Thyfault, & Spence, 2013). Data from this study were only collected during afterschool hours (i.e., not school hours), which does not account for all daily activity. However, a review of studies suggests that afterschool hours tend to account for approximately 47-56% of total steps per day for males and 47-59% of girls (Tudor-Locke, McClain, Hart, Sisson, & Washington, 2009). Using these percentages (Tudor-Locke et al., 2009), a participant would need to complete over 2350 (47% of 5000) steps per afternoon to surpass the sedentary threshold. During baseline, only Participant 6 averaged over 2350 steps per day during the baseline condition. Of additional note, only Participant 6 exceeded an average steps/day rate of 2350 during the intervention phase as well (3590 steps per day). All other participants averaged below 2350 steps/per day during both baseline and intervention phases. These numbers, and the calculations derived above, suggest that five of six participants in this study were engaged in low physical activity during baseline and intervention conditions.

Public health professionals recommend daily step goals of 10,000 steps for adults and 12,000 for youth per day (Choi, Pak, Choi, & Choi, 2007). In this study, average baseline steps per day across participants ranged from 527-2850 during afterschool, leisure-time. Using percentages derived from Tudor-Locke and colleagues (2009), one could approximate that participants would have to reach at least 4700 steps per day during their afterschool hours in order to reach the 10,000 step goal suggested for adults.
No participants in this study averaged near 4700 steps per day in either phase, and only Participant 6 surpassed the 4700 step per day threshold during the baseline phase (once). Further, only five data points total (across participants) exceeded 4700 steps per day throughout the intervention phase of the study. Low steps per day averages and the inability to meet recommended step thresholds provide evidence for low physical activity among individuals with visual impairments during both baseline and intervention phases.

Baseline data demonstrate other similarities to previous research. Gronmo and Augestad (2000) and Kozub and Oh (2004) suggest that school-aged individuals with visual impairments who are educated in schools for the blind tend to be more physically active than those who are educated in public school settings (Gronmo & Augestad, 2000; Kozub & Oh, 2004). This finding may have to do with the availability of adapted equipment and facilities at those schools. Baseline data suggests that Participants 1 and 6, who had residential status and had full-time access to the school, had higher mean steps per day than part (Participants 2 and 3) and full (Participants 4 and 5) day participants. Previous research has also suggests that age could be an indicator of physical activity for individuals with visual impairments, with younger children being more active than older children (Kozub & Oh, 2004; Oh et al., 2004). Again Participants 1 and 6 were the most active during the baseline condition. They were also among the youngest. Lastly, literature suggests that visual impairment level did not influence physical activity (Haegele & Porretta, 2015). This was also evident in the baseline data, where no trends in responding based on the participants’ visual impairment level were evident. While these observations were not the focus of the current study, the can be valuable and could influence future research.
Because individuals with visual impairments are so inactive in comparison to their typically developing peers (Haegele & Porretta, 2015), even small step increases is a step in the right direction for physical activity participation. While a functional relation was not evident, step per day averages increased from 5% to 32% across participants. From an educators perspective, even minimal and modest increases, such as those recorded, can be considered beneficial for their students. This may be particularly true for those with disabilities, including those with visual impairments, who tend to demonstrate very low physical activity levels (Kozub, 2006).

**Summary**

In summary, the SCT based physical activity intervention utilized in this study was not effective in facilitating increases in leisure-time physical activity among adolescents with visual impairments. This conflicts with previous findings of studies conducted pertaining to individuals who are typically developing (Hortz & Petosa, 2008) and those with visual impairments (Cervantes and Porretta, 2013). The results may reflect several limitations that were present in this study, such as seasonality effects, a limited time-line imposed by the school for the blind, and the truncated program for Participants 4, 5, and 6. Because of these limitations, the results may not indicate the true value of the intervention for the participants.

**Intervention Effects of SCT Constructs**

Scholars in adapted physical activity have stressed the importance of using theoretical or conceptual models (e.g., Cervantes & Taylor, 2011; Porretta & Sherrill, 2005) when conducting empirical work. Theoretical or conceptual models are used to develop hypotheses and the models can be either confirmed or revised based on research
results (Haegele & Porretta, 2015). However according to a recent literature review few studies pertaining to physical activity for individuals with visual impairments have included theoretical or conceptual models (Haegele & Porretta, 2015).

One theoretical framework that has been commonly used for understanding health behaviors (e.g., physical activity) is Bandura’s SCT (Motl, 2007). SCT is a general theory of human behavior which posits that individuals are active agents in their own lives (Bandura, 2001) and that changes in behavior are influenced by a bi-directional influence between (a) the behavior, (b) personal factors, and (c) environmental influences (Bandura, 1989). In physical activity research, SCT can serve to identify different personal or environmental influences that can influence an individual’s physical activity.

Because of the importance of theoretical alignment in research, and the utility of SCT in understanding health behaviors, this study’s intervention was aligned with SCT. Based on previous literature, it was hypothesized that the intervention would facilitate increases in each of the SCT constructs that were measured. To demonstrate the effects of the intervention on select SCT constructs, questionnaires were administered to participants prior to and directly after the culmination of the curriculum. Specifically, four SCT constructs were targeted; (a) self-efficacy for overcoming barriers, (b) social support, (c) self-regulation, and (d) outcome expectancies. The following sections will discuss how the SCT intervention impacted each of these constructs.

**Self-Efficacy**

Self-efficacy has received attention as a central determinant of SCT because of its influences on health behaviors including physical activity (Bandura, 1994). According to Bandura (1994), those who have strong confidence in their abilities (self-efficacy)
approach difficult tasks as “challenges to be mastered rather than as threats to be avoided” (p.1). The results of this study, though, demonstrate that the intervention may not be successful for positively influencing participants’ self-efficacy. In the current study, just three of six participants demonstrated an increase in the self-efficacy for overcoming barriers questionnaire between pre and post intervention sessions (4%-50% increases). This result confirms previous results by Cervantes and Porretta (2013), who also found that two of their participants demonstrated increases in self-efficacy as a result of a SCT intervention. This study as well as the Cervantes and Porretta (2013) study included one participant that demonstrated no changes in self-efficacy questionnaire scores.

Further, while three of six participants in the current demonstrated increases in self-efficacy for overcoming barriers- VI (12% to 44% increases), three of four participants in the Cervantes and Porretta (2013) study demonstrated increases. In the Hortz and Petosa (2008) study, self-efficacy for overcoming barriers was not one of the constructs that predicated changes in physical activity among typically developing participants who received a SCT-based curriculum. It should be noted, though, that the participants in the current study who did demonstrate self-efficacy increases also exhibited the highest differences in steps per day in intervention compared to baseline. However, no functional relations were found and the changes were not considered meaningful. These results suggest that the current intervention was not successful in increasing self-efficacy for adolescents with visual impairments.

Self-Regulation
One SCT construct that was impacted by this program was self-regulation. Self-regulation can be defined as one’s ability to guide oneself toward distal outcomes (Hortz & Petosa, 2008). Hortz and Petosa (2008) suggested self-regulation as one of the variables that predicted changes in physical activity for typically developing students after they received the SCT intervention package. In the current study, self-regulation increased for all six participants. Further, the increases were substantial and ranged from 37% to 203%. Self-regulation scores had also increased in the study conducted by Cervantes and Porretta (2013) for three of four of their participants. These results suggest that the SCT intervention may be successful in influencing the self-regulation scores of students with and without visual impairments.

Social Support

According to Bandura (1989a), a great deal of social support is necessary during formative years when preferences and personal standards are being developed. Social support provides incentives, meaning, and worth that can assist people in overcoming barriers to success (Bandura, 1989a). Results from this study demonstrate that four of six participants (66%) increased their social support scores (15% to 42% increases). This is similar to previous increases demonstrated by participants in the Cervantes and Porretta (2013) study, where three of four participants (75%) demonstrated increases. Interestingly, Cervantes and Porretta noted anecdotally that two participants supported each other in their physical activity, and both attained higher social support scores. To this researcher’s knowledge, support did not occur during the current study. While some participants demonstrated increases in social support between pre and post intervention scores, peer supports may have improved upon these scores.
Outcome Expectancies

Outcome expectancies can be thought of as one’s judgments of the likely consequences that a behavior will produce (Bandura, 1984). Results across studies were somewhat consistent for outcome expectancy questionnaires. All four of the Cervantes and Porretta (2013) and five of six of the current study’s participants demonstrated increases in outcome expectancy (6% to 69% increases). These results suggest that there is consistency across studies where the SCT-based intervention may have a positive influence on most, but not all participants with visual impairments.

Summary

In summary, the SCT based intervention used in this study was successful in influencing each of the constructs to a degree. Participants demonstrated a range of magnitudes of change in the SCT constructs. To the knowledge of the researcher, we don’t have empirical support explaining the meaning of the magnitude. At this time, one can only report the percentage change.

Study participants exhibited large increases in the self-regulation, which supports previous literature (Hortz & Petosa, 2008), suggesting that self-regulation can influence physical activity behavior. The results of this study also support previous findings that not all participants who receive this intervention will exhibit increases in self-efficacy. This finding suggests that if self-efficacy truly is the central determinant of health behavior change, including physical activity behavior, the intervention may need to be revised to focus more specifically on this it.
Limitations

When evaluating the results of this study a number of limitations are readily apparent. The first limitation was the time of the year in which the study was conducted (i.e., winter). While there may be indoor physical activity opportunities available to adolescents (e.g., treadmills, stationary bikes), lower outdoor temperatures and icy conditions associated with the winter months in the Midwest reduced the overall number of activities that participants could engage in. This may be especially true for non-residential students, who did not have the school for the blind campus to provide indoor activities after school and were limited to opportunities that were available within their home. Several study participants anecdotally suggested cold weather as a barrier to being physically active. While this study did not examine the effects of seasonality, it cannot be ruled out as a potential extraneous variable which inhibited the ability of the participants to participate. For example, research suggests that the most popular physical activity among individuals with visual impairments is walking (Jaarsma et al., 2014). However, low temperatures and icy conditions may have limited opportunities for participants to walk outside. This suggestion is consistent with findings by Tucker and Gilland (2007), who reviewed 37 studies which sought to determine the effects of seasonality on physical activity. Tucker and Gilland (2007) identified poor or extreme weather as a potential barrier to participate in physical activity. Therefore, it is possible that participants who chose more sedentary activities did not exhibit higher physical activity patterns throughout the study because of low temperatures and icy conditions. This could have influenced step totals during both baseline and intervention conditions. The results of this
study now further our understanding of the limited physical activity opportunities for individuals with visual impairments during the winter months.

A second limitation was the time restriction imposed by the school. Because of the afterschool activity schedule set for the year, there was a short (15-week) window when the study could be conducted. This limitation influenced the study in several ways. First, because of a lack of an intervention effect in the first class and extended baseline conditions of the second and third classes, the intervention phase had to be expedited for the second and third classes. Therefore, rather than introducing the nine-lesson curriculum over a nine-week period, classes were introduced over a three-five week period. This truncated version of the intervention may have violated some of the assumptions of which the intervention was based. Specifically, participants did not have a full week to consider the lessons of the week (based on SCT constructs) and complete weekly homework based on those lessons. Therefore, researcher consumers should take this limitation into consideration when considering the results demonstrated by Participants 4, 5, and 6. Second, the decisions to introduce the intervention to the second and third groups were made prior to an intervention effect with the previous group because of the necessity to complete the program prior to the expiration of our time allotment. Lastly, the extended baseline condition of the study and the imposed time restriction did not allow for any maintenance or generalization data to be collected, which limited our understanding of the impact of the completed program on the participants’ physical activity participation.

Third, the investigator could not ensure the attendance of participants during data collection. During the months that data were collected, there were several school closings
that affected school attendance. The school closings did not affect residential students. However, it did affect both full- and part- day participants who received transportation from their school districts (to/from the school for the blind) that were closed. Therefore, the investigator (a) could not collect step count data and (b) could not schedule intervention sessions on those days. Other reasons participants were absent from school days included (a) doctor’s appointments, (b) illnesses, (c) family death, and (d) family vacations. These issues influenced both day and residential students. For example, Participant 6 missed five consecutive data collection days because of an extended family Christmas vacation. While absences affected both data collection and intervention schedule, they were issues that occurred in naturalistic educational settings. Therefore, they were not able to be controlled by the researcher.

Implications for Practice

School-based physical education programs may be the best setting for individuals with disabilities to learn about physical activity (Pan et al., 2005). This may be especially true for individuals who attend specialized schools, such as those for the blind, where needs can be met in a barrier free environment. Therefore, for professional educators, including those working with students with visual impairments, school-based physical education programs may be the best settings to teach students about being physically active. However, school-based programs have had varying levels of success in promoting leisure-time physical activity (Kriemler et al., 2011). For example, the findings from this study demonstrate that a previously successful theory-based physical activity program (e.g., Cervantes & Porretta, 2013; Hertz & Petosa, 2006) may not be successful with all students or in all environments. However, modest physical activity changes (5-32%) were
found. For professional educators, including those who work with individuals with visual impairments, who are interested in promoting leisure-time physical activity, they may want to adopt segments of or the entire curriculum used in this study. However, they must keep in mind that curricula, including this one, may not be successful for all students, during all times of the year (i.e., seasonality), or in forms that are not true to the original conceptualization (i.e., truncated programs). This may be especially important to consider when working with children or adolescents with disabilities.

For physical activity researchers, this study demonstrates how limitations to the environment and the research setting may influence the results of a physical activity program. Seasonality effects, and the truncation of the original program for three of the participants, may have had substantial influences over the results of the study. These, and other influences, must be accounted for in further physical activity research. Particularly, that research that is being conducted in a school-based environment, where researchers may not have control of certain limitations (i.e., timelines).

**Suggestions for Future Research**

This study demonstrated that a theory-based physical education curriculum may not have influence over leisure-time physical activity behavior among adolescents with visual impairments. In order to further explore this topic, further research is needed. It is suggested that future research:

1. Examine the role that social cognitive theory constructs (e.g., self-regulation, self-efficacy, outcome expectancy value, and social support) play in influencing physical activity behavior for school-aged individuals with visual impairments.
2. Examine the relationship between the use of talking pedometers and walking behavior of individuals with visual impairments. While previous research has explored the perceived motivational value of talking pedometers (Lieberman et al., 2006), the impact of the use of talking pedometers across two similar conditions has not been explored.

3. Examine the role of theory-based interventions during different seasons throughout the year (e.g., fall, winter, spring) to determine the most beneficial timing to introduce interventions.

4. Examine the amount of daily physical activity individuals with visual impairments typically complete during both school and afterschool. This may determine what time of day would be best to promote physical activity for those with visual impairments.

5. Explore interventions that may be applicable to individuals with visual impairments in different age bands. To date, most research on this topic has involved adolescent-aged individuals. It would be of interest to promote and investigate programs designed for elementary-aged individuals as well as adults.

6. Examine differences in leisure-time physical activity among youth of different residential status’ (e.g., full-time residential, part-time day student, full-time day student). Previous literature suggests that school-aged individuals with visual impairments who were educated in schools for the blind tend to be more physically active than those who are educated in public school settings (Gronmo & Augestad, 2000; Kozub & Oh, 2004). Baseline data from this study suggest that those individuals who are of residential status (i.e., Participants 1 and 6) had higher mean steps per day than part (i.e., Participants 2 and 3) and full (i.e., Participants 4-5) day individuals. While this was not the focus of the study, further research can be conducted to compare these populations.
7. Examine interventions for individuals with multiple disabilities. During participant recruitment, it became evident that the population at the school for the blind has shifted from individuals with visual impairments to individuals with multiple disabilities including visual impairments.

8. Continue to examine different theory-based interventions to promote leisure-time physical activity for school-aged individuals with visual impairments. Research suggests that school-aged individuals with visual impairments may be among the least active individuals with disabilities, which can contribute to substantial health concerns (Haegele & Porretta, 2015). Therefore, it is critical for researchers to continue developing programs to promote physical activity.

9. Examine physical activity interventions in inclusive settings. To date, theory-based curricula that promote leisure-time physical activity have been introduced to typically developing students (e.g., Hortz & Petosa, 2009) and students at schools for the blind (e.g., Cervantes & Porretta, 2013). Researchers have yet to explore the utility of a theory-based curriculum, like the one used in this study, in an inclusive physical education class that include participants who are sighted and those with visual impairments. Since this is the physical education setting that is most likely for individuals with visual impairments currently, it would be the most logical environment to promote physical activity in schools.

10. Examine theory-based physical activity interventions for individuals with other physical disabilities that may restrict ambulation, such as cerebral palsy or spina bifida.
Summary

The purpose of this study was to examine the effects of a theory based physical education intervention on the leisure-time physical activity of adolescents with visual impairments. Participants for this study were six adolescent-aged individuals with visual impairments attending a Midwestern school for the blind. The study implemented a multiple baseline across participants, single-subject design and physical activity was objectively measured as steps taken, through the use of Fitbit Zips. In addition to physical activity, questionnaires were used to collect data on selected social cognitive theory constructs. Results of this study demonstrated that the intervention did not exert functional control over participants’ physical activity. Therefore, changes in physical activity behavior were not associated with the introduction of the intervention, suggesting that the intervention had no effect on participants’ physical activity behavior. However, modest changes in physical activity (5%-32%) were found between baseline and intervention phases. These results may have been directly influenced from several limitations of the study, such as seasonality (i.e., the program took place in the winter time where limited leisure-time physical activity opportunities were available) and time limitations imposed by the school. Because of these limitations, the results may not indicate the true effectiveness of the intervention for individuals with visual impairments. Changes in scores for selected social cognitive constructs did occur, suggesting that the intervention did have an effect on these constructs for the participants. Again, a lack of empirical support does not allow us to explain the significance of magnitude of changes, and only percentage changes are reported. With the lack of physical activity research related to individuals with visual impairments (Haegele & Porretta, 2015), and the
influence of physical activity on health-related outcomes (e.g., obesity), further intervention research is needed.
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Appendix A: Demographic Questionnaire
Demographic Questionnaire

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your child’s birthdate?</td>
<td></td>
</tr>
<tr>
<td>2. Is your child male or female?</td>
<td>Male</td>
</tr>
<tr>
<td>Circle one</td>
<td>Female</td>
</tr>
<tr>
<td>3. Which of the following visual impairment classifications best fits your child’s vision level?</td>
<td></td>
</tr>
<tr>
<td>a. No light perception in either eye or light perception with an inability to recognize the shape of a hand.</td>
<td></td>
</tr>
<tr>
<td>b. Able to recognize a hand or a visual acuity of 20/600 or visual field of less than 5 degrees in the best eye.</td>
<td></td>
</tr>
<tr>
<td>c. From 20/600 to 20/200 or a visual field loss of between 20 and 5 degrees.</td>
<td></td>
</tr>
<tr>
<td>d. Better than c.</td>
<td></td>
</tr>
<tr>
<td>4. Which of the following best describes your child?</td>
<td></td>
</tr>
<tr>
<td>Circle one</td>
<td></td>
</tr>
<tr>
<td>Caucasian/Non-Hispanic</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td></td>
</tr>
<tr>
<td>Hispanic / Hispanic American</td>
<td></td>
</tr>
<tr>
<td>Asian/ Asian American</td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>5. Does your child use assistive device while walking? If so, what do they use?</td>
<td></td>
</tr>
<tr>
<td>Circle one</td>
<td></td>
</tr>
<tr>
<td>Guide Dog</td>
<td>Cane</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Self-Efficacy Questionnaire
Self-Efficacy Questionnaire

For each question, respond by circling the word most accurately reflecting your personal belief.

1. I think I can exercise no matter how busy my day is.
   Never   Rarely   Unusual   Some   Often   Always

2. I think I can exercise no matter how tired I feel.
   Never   Rarely   Unusual   Some   Often   Always

3. I think I can exercise even if it is hot outside.
   Never   Rarely   Unusual   Some   Often   Always

4. I think I can exercise even if I have a lot of homework.
   Never   Rarely   Unusual   Some   Often   Always

5. I think I can exercise no matter what others may think.
   Never   Rarely   Unusual   Some   Often   Always

6. I think I can exercise even when I don’t have access to proper facilities.
   Never   Rarely   Unusual   Some   Often   Always

7. I think I can exercise even when I don’t have the best equipment.
   Never   Rarely   Unusual   Some   Often   Always
Appendix C: Self-Efficacy – Visual Impairment
Self-Efficacy- Visual Impairment Questionnaire

For each question, respond by circling the word most accurately reflecting your personal belief.

1. I feel confident of my ability to do physical activity during my free time after school.
   Never   Rarely   Occasionally   Some   Often   Always

2. I think I can be physically active during my free time after school even when I do not have a friend with whom to be active.
   Never   Rarely   Occasionally   Some   Often   Always

3. I think I can be physically active during my free time after school even when school places priority on other things.
   Never   Rarely   Occasionally   Some   Often   Always

4. I think I can be physically active during my free time after school if I have the knowledge and awareness of what to do.
   Never   Rarely   Occasionally   Some   Often   Always

5. I am confident that I can overcome barriers and challenges with regard to physical activity and exercise during my leisure time after school (Focus – perceived barriers to be physically active).
   Never   Rarely   Occasionally   Some   Often   Always

6. I am confident that I can find means and ways to be physically active and exercise during my leisure time after school.
   Never   Rarely   Occasionally   Some   Often   Always

7. I am confident that I can accomplish the physical activity and exercise goals that I set.
   Never   Rarely   Occasionally   Some   Often   Always

8. I am confident that when I am confronted with a barrier to physical activity or exercise I can find several solutions to overcome this barrier.
   Never   Rarely   Occasionally   Some   Often   Always

9. I am confident that I can be physically active or exercise even without the support of my family and friends.
<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Some</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
</table>

10. I am confident that I can be physically active or exercise even if I had no access to a gym or recreation facilities.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Some</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
</table>
Appendix D: Social Support Questionnaire
Social Support Questionnaire

Circle the word in the scale that most closely reflects the amount of social support given to you for exercise.

1. During the past two weeks, friends have offered to exercise with me.
   Never  Rarely  Occasionally  Some  Often  Always

2. During the past two weeks, a friend has exercised with me.
   Never  Rarely  Occasionally  Some  Often  Always

3. During the past two weeks, someone in my family has offered to exercise with me.
   Never  Rarely  Occasionally  Some  Often  Always

4. During the past two weeks, someone in my family has exercised with me.
   Never  Rarely  Occasionally  Some  Often  Always

5. A friend has encouraged me to exercise during the past two weeks.
   Never  Rarely  Occasionally  Some  Often  Always

6. A family member has encouraged me to exercise in the past two weeks.
   Never  Rarely  Occasionally  Some  Often  Always

7. My friends think I should exercise.
   Never  Rarely  Occasionally  Some  Often  Always

8. My family thinks I should exercise.
   Never  Rarely  Occasionally  Some  Often  Always
Appendix E: Outcome Expectancy Questionnaire
Outcome Expectancy Questionnaire

For each question, respond by first circling the number that most accurately reflects how often exercise will result in that particular reason to exercise, then circle the word most accurately reflecting how important that reason to exercise is to you.

<table>
<thead>
<tr>
<th>Never Happens</th>
<th>Rarely Happens</th>
<th>Occasionally Happens</th>
<th>Often Happens</th>
<th>Usually Happens</th>
<th>Always Happens</th>
</tr>
</thead>
</table>

Physical Exercise Will:

1. Help me to be with my friends.  1  2  3  4  5  6

   I enjoy spending time with my friends.

2. Allow me to stay connected with the lives of my friends.  1  2  3  4  5  6

   Being a part of my friends’ lives is important to me.

3. Allow me to become closer to my friends.  1  2  3  4  5  6

   Remaining close with my friends is important.

4. Allow me to share experiences with my friends.  1  2  3  4  5  6

   I value sharing moments with my friends.

5. Give me the opportunity to develop a bond with my friends.  1  2  3  4  5  6

   The bonds of friendship are meaningful to me.

6. Help me meet new people.  1  2  3  4  5  6

   Meeting new people is enjoyable.
<table>
<thead>
<tr>
<th>Physical exercise will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Allow me to find new friends.</td>
</tr>
<tr>
<td>Developing new friendships is valuable to me.</td>
</tr>
<tr>
<td>8. Give me an opportunity to challenge another person to a contest.</td>
</tr>
<tr>
<td>I enjoy engaging in physical contests.</td>
</tr>
<tr>
<td>9. Enable me to compare my physical accomplishments against others.</td>
</tr>
<tr>
<td>It is valuable to compare physical accomplishments.</td>
</tr>
<tr>
<td>10. Help me to find out who is the best athlete.</td>
</tr>
<tr>
<td>It is important to determine who the best athlete is.</td>
</tr>
<tr>
<td>11. Give me an opportunity to beat another person in athletic contest.</td>
</tr>
<tr>
<td>Winning is important to me.</td>
</tr>
<tr>
<td>12. Give me an opportunity to keep a record of athletic victories.</td>
</tr>
<tr>
<td>It is important to accumulate a lot of victories.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Never Happens</th>
<th>Rarely Happens</th>
<th>Occasionally Happens</th>
<th>Often Happens</th>
<th>Usually Happens</th>
<th>Always Happens</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</table>

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<table>
<thead>
<tr>
<th></th>
<th>Never Happens</th>
<th>Rarely Happens</th>
<th>Occasionally Happens</th>
<th>Often Happens</th>
<th>Usually Happens</th>
<th>Always Happens</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Relieve my stress.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Stress reduction is important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>14. Make me more relaxed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I like to stay relaxed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>15. Get rid of my frustrations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>It feels good to release my frustrations.</td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
<td>16. Get me to calm down.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>When I feel out of control, calming myself is helpful.</td>
<td></td>
<td></td>
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<tr>
<td>17. Make me feel more healthy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>I feel good when I feel healthy.</td>
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<tr>
<td>18. Keep me in good condition.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I like to stay in good physical condition.</td>
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<td>Never Happens</td>
<td>Rarely Happens</td>
<td>Occasionally Happens</td>
<td>Often Happens</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Physical exercise will:**

19. Physical exercise will make me more lean. 1 2 3 4 5 6

It is important to me to work on being lean.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
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</tbody>
</table>

20. Help me attain physical mastery without thought. 1 2 3 4 5 6

It feels good to master physical movement without having to think.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

21. Help me to feel exhilarated. 1 2 3 4 5 6

I like to experience physical exhilaration.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
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</thead>
<tbody>
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</tbody>
</table>

22. Give me an opportunity to make bold decisions. 1 2 3 4 5 6

It is important for me to make bold decisions.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

23. Help me to have an adventure. 1 2 3 4 5 6

Being adventurous is fun.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
Appendix F: Treatment Fidelity Checklist
<table>
<thead>
<tr>
<th>Lesson Component</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduced lesson topic: Course Introduction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Instructor discussed course introduction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Instructor discussed lesson 1: completing exercise logs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Instructor explains how to fill out the activity log.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Instructor provides a step by step example of how to fill out the log.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Instructor discussed about the PDPAR.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Students reviewed a completed PDPAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Students practice completing the PDPAR (for the previous day).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Instructor discussed homework assignment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Treatment Integrity Checklist

**Session Number**: 2  
**Observer Initials**: __________  
**Date**: __________

<table>
<thead>
<tr>
<th>Lesson Component</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduced lesson topic: Exercise and Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Instructor explained homework review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Instructor discussed what is exercise and why do we do it?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Instructor discussed about light, medium, and vigorous physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Students indicated whether they enjoy medium or vigorous activities more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Students discuss reasons they exercised the previous week.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Students discussed why they did not engage in physical activity during previous day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Students discussed family members who are active and inactive in their lives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Instructor discussed homework assignment</td>
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<td></td>
</tr>
</tbody>
</table>
## Treatment Integrity Checklist

**Session Number** 3  
**Observer Initials** __________  
**Date** __________

<table>
<thead>
<tr>
<th>Lesson Component</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduce lesson topic: Goal Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Instructor explained the homework review.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Instructor discussed about benefits of goal setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Instructor discussed the 5 components to a goal</td>
<td></td>
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<tr>
<td>5. Students develop a starting point for their goals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Students completed the goal correction activity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Students set a weekly personal physical activity goal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. As a class, students evaluated goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Instructor discussed homework assignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson Component</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
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<td>----</td>
</tr>
<tr>
<td>1. Introduce lesson topic: Reasons not to be Exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Instructor explained homework review.</td>
<td></td>
<td></td>
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<tr>
<td>3. Instructor discussed about reasons not to be active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Instructor discussed about developing strategies to overcome barriers</td>
<td></td>
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</tr>
<tr>
<td>5. As a group, students listed barriers they faced the previous week</td>
<td></td>
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</tr>
<tr>
<td>6. As a group, students listed other reasons that may be common for students.</td>
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<tr>
<td>7. As a group, students identified 3 main barriers and developed strategies to</td>
<td></td>
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<tr>
<td>overcome them</td>
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<tr>
<td>8. Instructor and students discussed a weekly physical activity strategy to</td>
<td></td>
<td></td>
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<tr>
<td>overcome a barrier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Instructor discussed homework assignment</td>
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</tr>
</tbody>
</table>
1. Introduce lesson topic: Keep Track of Your Exercise, Pedometers

2. Instructor discussed keeping track of your exercise.

3. Instructor discussed the benefits of keeping track of exercise

4. Instructor discussed about pedometers

5. Students learned how to use a pedometer

6. Students practiced using pedometers

7. Students set a new personal weekly physical activity goal

8. Instructor and students discussed a weekly physical activity strategy – step goal for each day

9. Instructor discussed homework assignment
## Treatment Integrity Checklist

**Session Number**: 6  
**Observer Initials**: __________  
**Date**: __________

<table>
<thead>
<tr>
<th>Lesson Component</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduce lesson topic: Where to exercise and exercise motivators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Instructor explained homework review (What exercises were done and where).</td>
<td></td>
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<tr>
<td>3. Instructor discussed the importance of knowing <strong>where</strong> to exercise.</td>
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<tr>
<td>4. As a group, students discussed places in the community where they could</td>
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<tr>
<td>participate in exercises.</td>
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<tr>
<td>5. As a group, students discussed reasons why they think it is important to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>exercise.</td>
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<td></td>
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<tr>
<td>6. Instructor introduced additional reasons why people exercise.</td>
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<tr>
<td>7. Students listed specific activities that would lead to specific activity</td>
<td></td>
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<tr>
<td>outcomes</td>
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<tr>
<td>8. Instructor discussed about setting rewards as motivators</td>
<td></td>
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</tr>
<tr>
<td>9. Instructor and students discussed a weekly physical activity strategy –</td>
<td></td>
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<tr>
<td>selecting a reward for meeting activity goals next week</td>
<td></td>
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<tr>
<td>10. Instructor discussed homework assignment</td>
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</table>
Treatment Integrity Checklist

Session Number  __7__  Observer Initials ___________  Date ___________

<table>
<thead>
<tr>
<th>Lesson Component</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduce lesson topic: Friends and Family can help you exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Instructor discussed how friends and family can help you exercise.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Instructor discussed types of family and friend support.</td>
<td></td>
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<tr>
<td>4. As a group, students listed friends and how these friends can support</td>
<td></td>
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<tr>
<td>their physical activity, and what type of support that is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Students set a new weekly physical activity goal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Instructor discussed homework assignment</td>
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</tbody>
</table>
## Treatment Integrity Checklist

**Session Number** 8  
**Observer Initials** __________  
**Date** __________

<table>
<thead>
<tr>
<th>Lesson Component</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduce lesson topic: Exercise Intensity</td>
<td></td>
<td></td>
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<tr>
<td>2. Instructor discussed finding your comfort zone.</td>
<td></td>
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<tr>
<td>3. Instructor discussed about taking pulse</td>
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<tr>
<td>4. Students took their pulse while sitting</td>
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<tr>
<td>5. Students answered questions about how they felt after sitting</td>
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<tr>
<td>6. Students walked around the gym and took their pulse for 1 minute</td>
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<tr>
<td>7. Students answered questions about how they felt after walking</td>
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<tr>
<td>8. Students jogged around the gym and took their pulse for 1 minute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Students answered questions about how they felt after jogging</td>
<td></td>
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</tr>
<tr>
<td>10. Students run/sprint around the gym and took their pulse for 1 minute</td>
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<tr>
<td>11. Students identified what their comfort zone is – what intensity they enjoy participating in the most</td>
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<tr>
<td>12. Instructor and students discussed a weekly physical activity strategy – planning to exercise in their comfort zone!</td>
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</tr>
<tr>
<td>13. Instructor discussed homework assignment</td>
<td></td>
<td></td>
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<tr>
<td>Lesson Component</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>1. Introduce lesson topic: Plan to Keep Going</td>
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<tr>
<td>2. Led by instructor, students discussed the program over the past 8 weeks</td>
<td></td>
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<tr>
<td>and the importance of continuing.</td>
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<td></td>
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<tr>
<td>3. Instructor discussed about avoiding boredom</td>
<td></td>
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<tr>
<td>4. As a group, students listed 3 ways they can mix up their physical activity</td>
<td></td>
<td></td>
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<tr>
<td>program to avoid boredom</td>
<td></td>
<td></td>
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<tr>
<td>5. Instructor discussed exercising in the summer.</td>
<td></td>
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<tr>
<td>6. Students set an exercise goal for the summer.</td>
<td></td>
<td></td>
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<tr>
<td>7. Instructor and students discussed about setting a long-term physical</td>
<td></td>
<td></td>
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<tr>
<td>activity goal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Instructor discussed homework assignment</td>
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</tbody>
</table>
Appendix G: Social Validity Questionnaires
Teacher Social Validity Questionnaire

Please select one of the five choices that best describe the extent to which you agree with each of the statements below.

1. How satisfied are you with your overall experience with the Plan for Exercise, Plan for Health program?
   
   Not at all     Very little     Neutral      Mostly      Completely

2. How satisfied are you with the homework activities associated with the Plan for Exercise, Plan for Health program?
   
   Not at all     Very little     Neutral      Mostly      Completely

3. Would you consider using the homework activities associated with the Plan for Exercise, Plan for Health program again in the future?
   
   Not at all     Very little     Neutral      Mostly      Completely

4. How satisfied are you with the in-class activities associated with the Plan for Exercise, Plan for Health program?
   
   Not at all     Very little     Neutral      Mostly      Completely

5. Would you consider using the in-class activities associated with the Plan for Exercise, Plan for Health program again in the future?
   
   Not at all     Very little     Neutral      Mostly      Completely

6. How satisfied were you with the talking pedometers?
   
   Not at all     Very little     Neutral      Mostly      Completely

7. Would you use talking pedometers again with your students?
   
   Never again    Possibly      Neutral      Probably     Certainly

8. How satisfied are you with the student workbook?
9. If you had the materials, would you use the Plan for Exercise, Plan for Health program again in your school?

Not at all  Very little  Neutral  Mostly  Completely

10. Do you believe you can administer the Plan for Exercise, Plan for Health program to students in the future without the assistance of the researchers from this study?

Never again  Possibly  Neutral  Probably  Certainly

11. Are you satisfied with the time requirements of the Plan for Exercise, Plan for Health program?

Not at all  Very little  Neutral  Mostly  Completely

12. Have you noticed an increase in physical activity in your students?

Not at all  Very little  Neutral  Mostly  Completely

13. Do you believe that the Plan for Exercise, Plan for Health program would be beneficial for physical education teachers at other schools for the blind?

Not at all  Very little  Neutral  Mostly  Completely

14. Overall, how acceptable was the Plan for Exercise, Plan for Health program for you?

Not at all  Very little  Neutral  Mostly  Completely

15. How satisfied are you with the results of the Plan for Exercise, Plan for Health program?

Not at all  Very little  Neutral  Mostly  Completely

16. If there were elements of the Plan for Exercise, Plan for Health program that you found undesirable, please describe them below.
Parent/ Residential Staff Social Validity Questionnaire

Based on your child’s participation in the Plan for Exercise, Plan for Health program and the outcomes from his or her participation, please select one of the five choices that best describe the extent to which you agree with each of the statements below.

*Note:* Leisure-time physical activity refers to activity that is performed during your child’s free time after school hours.

1. Overall, how satisfied are you with the Plan for Exercise, Plan for Health program.
   
<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little</th>
<th>Neutral</th>
<th>Mostly</th>
<th>Completely</th>
</tr>
</thead>
</table>

2. Do you believe students are more interested in being physically active during their leisure-time because of the Plan for Exercise, Plan for Health program?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little</th>
<th>Neutral</th>
<th>Mostly</th>
<th>Completely</th>
</tr>
</thead>
</table>

3. How satisfied are you with the results of the Plan for Exercise, Plan for Health program?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little</th>
<th>Neutral</th>
<th>Mostly</th>
<th>Completely</th>
</tr>
</thead>
</table>

4. Do you believe the Plan for Exercise, Plan for Health program was beneficial for the students?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little</th>
<th>Neutral</th>
<th>Mostly</th>
<th>Completely</th>
</tr>
</thead>
</table>

5. If there are elements of the Plan for Exercise, Plan for Health program that you found undesirable, please describe them below.

________________________________________________________________________

________________________________________________________________________

_______________________________________________
Participant Social Validity Questionnaire

Please select one of the five choices that best describe the extent to which you agree or disagree with each of the statements below.

1. How satisfied are you with your overall experience with the Plan for Exercise, Plan for Health program?
   Not at all    Very little    Neutral    Mostly    Completely

2. How satisfied are you with the homework activities associated with the Plan for Exercise, Plan for Health program?
   Not at all    Very little    Neutral    Mostly    Completely

3. How satisfied are you with the in-class activities associated with the Plan for Exercise, Plan for Health program?
   Not at all    Very little    Neutral    Mostly    Completely

4. How satisfied are you with the talking pedometers?
   Not at all    Very little    Neutral    Mostly    Completely

5. If given the choice, would you participate in the Plan for Exercise, Plan for Health program next school year?
   Not at all    Probably Not    Neutral    Probably    Definitely

6. If given the choice, would you continue to wear the talking pedometer to keep track of your exercise?
   Not at all    Probably Not    Neutral    Probably    Definitely

7. How satisfied were you with the Plan for Exercise, Plan for Health manual?
   Not at all    Very little    Neutral    Mostly    Completely
8. Do you believe that the *Plan for Exercise, Plan for Health* program would be beneficial for other students like you?

*Not at all*    *Probably Not*    *Neutral*    *Probably*    *Definitely*

9. Are you satisfied with the results of the *Plan for Exercise, Plan for Health* program?

*Not at all*    *Very little*    *Neutral*    *Mostly*    *Completely*

10. If there are elements of the *Plan for Exercise, Plan for Health* program that you found undesirable, please describe them below.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________