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PARENTAL VALUES AND CONCERNS ABOUT PARTICIPATION IN PHYSICAL ACTIVITY BY PERSONS WITH INTELLECTUAL DISABILITIES

By

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ABSTRACT

PARENTAL VALUES AND CONCERNS ABOUT PARTICIPATION IN PHYSICAL ACTIVITY BY PERSONS WITH INTELLECTUAL DISABILITES

By

Bomjin Lee

The purposes of this study were: (a) to examine parental values and concerns about participation in physical activity by children (including adults) with intellectual disabilities; and (b) to identify determinants of physical activity participation by children with intellectual disability. The main focus of parental values and concerns was the influence of disability-related factors and demographics on parent's perceptions of likely benefits, important benefits, and concerns related to physical activity participation by their children with intellectual disabilities. The hypothesized correlates of children's physical activity included parental values and concerns, parents' age, parents' disability, parents' physical activity, children's BMI, severity of children's disability, and multiple disability.

The participants were 193 parents of children with intellectual disabilities who were in attendance at the state games of Special Olympics. Parents aged in range from 27- 76 years (the mean age of children was 17.59 years). About 60% were school-aged children and 62% were male children. About 37% of children had multiple disability. Regarding severity of children's disability, 73% were moderate disability, 15% were severe disability, and 12% were mild disability.

A newly developed survey, *Physical Activity Values and Concerns Survey*, was distributed to parents to obtain information about their perceptions of physical activity benefits, barriers, physical activity participation, disability information, and

demographics. Given a small sample size, factor analyses and MANOVA analyses were performed for reducing the number of dependent and independent variables to fit into the data analysis. To identify determinants of children's physical activity, a multiple regression analysis was used.

The results of MANOVA revealed that there was a significant main effect of severity of disability on likely benefits and important benefits of parental values, but not for other independent variables. Parents of children with mild and moderate disability rated psychosocial benefits (including self-acceptance) and winning significantly higher than parents of children with severe disability. No significant main effects were found in parental concerns. Overall, parental values were rated relatively high; whereas, parental concerns were rated relatively low. A multiple regression analysis revealed that children's physical activity was significantly correlated to severity of children's disability, parents' age, and parents' physical activity.

Overall, parents of children with intellectual disabilities seem knowledgeable about physical activity benefits and value their children's participation in physical activity. Due to psychomotor problems, parents of children with severe disability may not value children's physical activity as much as parents of children with mild/moderate disability. Despite low means and no significant main effect, barriers such as nature of program and staffing may be parents' concerns. In addition, children's physical activity can be best predicted by severity of disability, parent's age, and parent's physical activity. This study provides valuable information about parental influence on physical activity participation by children with intellectual disabilities to several stakeholders.

DEDICATION

This dissertation is dedicated to my parents, Young-Sung Kim and Hee-Peong Kim for their sacrifice, love, support, and encouragement.

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As with most significant accomplishments, this work would not have been possible without the assistance of many individuals. First and foremost, I would like to express my sincere appreciation to my advisor, Dr. Gail Dummer, for her endless support and guidance throughout the completion of this dissertation, as well as for her assistance in guiding my professional development throughout the graduate program.

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CHAPTER 1

INTRODUCTION

Overview of the Problem

Persons with intellectual disabilities are sedentary in comparison to the general population due to physical and mental limitations (Pitetti, Rimmer, & Fernhall, 1993). According to a report of the Surgeon General (U.S. Department of Health and Human Services, 1996), persons with disabilities including intellectual disability are less likely to participate in regular physical activity than those without disabilities. In addition, the data on prevalence of physical inactivity indicates that approximately 50% of persons with mental retardation have little participation or no participation at all in the leisure time physical activity (Draheim, Williams, & McCubbin, 2002). The same data also show that only 1% of men and women with mental retardation are engaged in vigorous leisure time physical activity 3 or more times a week.

The consequences of physical inactivity can be well described by the cycle of sedentary lifestyle (Figure 1). This sedentary lifestyle can lead to a poor level of physical fitness (Chanias, Reid, & Hoover, 1998; Fernhall, 1993; Fernhall, Pitetti, Rimmer, et al., 1996; Graham & Reid, 2000; Montgomery, Reid, & Seidl, 1988; Pitetti et al., 1993; Pitetti & Tan, 1991; Rimmer & Kelly, 1991; Schurrer, Weltman, & Brammell, 1985). As a result of poor physical fitness, persons with intellectual disabilities become more susceptible to acute illnesses and encounter a high risk of chronic disease (Fernhall et al., 1996; Pitetti, Yarmer, & Fernhall, 2001).

Poor motor skills, as a result of physical inactivity, result in lack of prerequisites for participating in an advanced form of physical activity such as sports (Dummer,

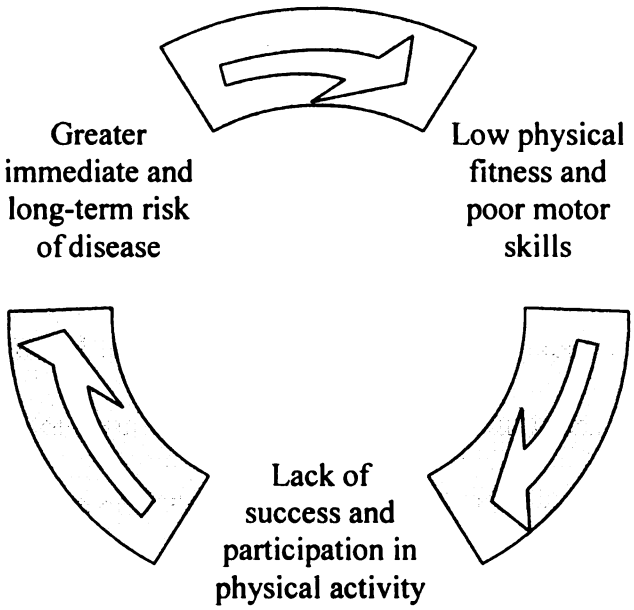

Figure 1. The Cycle of Sedentary Lifestyle.

Haubenstricker, & Stewart, 1996). Research has shown that persons with intellectual disabilities have difficulty in fundamental motor skills, compared to those without disabilities (Berkeley, Zittel, Pitney, Nichols, 2001; Maraj, Li, Hillman, Jeansonne, & Ringenbach, 2003; Welsh & Elliott, 2001; Woodard & Surburg, 2001). Persons with intellectual disabilities who have difficulty in motor skills are more likely to have lack of success in physical activity participation; thus, they are less encouraged to participate, resulting in the continued sedentary lifestyle.

A sedentary lifestyle also reflects fewer opportunities for socialization, fun, improving psychological well-being and the level of independence in persons with intellectual disabilities. Literature shows evidence that persons with intellectual disabilities have a poor level of self-concept compared to those without disabilities (Hosley, Hooper, & Gruber, 1998; White & Zientek, 1991). Also, Weiss and Duncan (1992) suggest that less participation in physical activity equates to fewer socialization opportunities, which in turn, impede the development of self-concept and self-esteem in people without disabilities.

Even if motivated, people with intellectual disabilities are often unable to reverse trends in the cycle of sedentary lifestyle because they rely upon parents or caregivers for support. In general, parents have a significant impact on their children's physical activity behaviors in many ways. For example, parents' attributes such as parental beliefs, attitudes, and values are an important guideline for their decision making to enroll their children to participate in a physical activity program (Brustad, 1993; Dempsey, Kimiecik & Horn, 1993; Kimiecik & Horn, 1998). Also, research has frequently shown that parents' physical activity, as a role model, is closely associated with their children's

physical activity (Anderssen & Wold, 1992; Dempsey et al., 1993; Kimiecik & Horn, 1998; McMurray, Bradley, Harrell, Bernthal, Frauman, & Bangdiwala, 1993; Moore, Lombardi, White, Campbell, Oliveria, & Ellison, 1991). For persons with intellectual disabilities, parental influence would be even greater due to life dependency on their parents. However, the influence of parents on the physical activity of children with intellectual disabilities has not been explored in the research literature; therefore that is the goal of this study.

Significance of the Problem

As a result of lack of physical activity and low levels of physical fitness, persons with intellectual disabilities have a considerable health risk and decreased work capacity, which may contribute to the decreased quality of life in this population. Fernhall et al. (1996) suggest that persons with mental retardation have a high risk of chronic disease due to sedentary lifestyle and low levels of physical fitness. For this reason, persons with intellectual disabilities encounter more illness and days lost from work and school than those without disabilities. Researchers also suggest that sedentary lifestyle is associated with restricted functional ability in persons with intellectual disabilities; thus resulting in lack of independence at home and work (Heath & Fentem, 1997). According to a report of the U.S. Bureau of the Census (U.S. Department of Health and Human Services, 1997), 54 million citizens have a disability. Considering the facts that cognitive disabilities are one of the most prevalent types of disability and prevalence of physical inactivity in this population, the impact of physical inactivity on people with intellectual disabilities is indescribable. For these previous reasons, sedentary liestyle is a significant problem for persons with intellectual disabilities.

In addition to the effects of sedentary lifestyle on one's own health, it also has negative impact on others such as parents and caregivers. If a sedentary individual with an intellectual disability becomes ill, it is obvious that she/he needs more physical care, which may cost extra money (e.g., doctor visits, prescription drugs, and inpatient hospital stays, going to doctors, hiring additional care providers, etc.). According to the National Health Interview Survey on Disability (2002), the estimated lifetime cost for all people with mental retardation is $51.2 billion dollars and about 90% of the cost are spent for medical supplies and insurance for job-related problems (losing jobs, limitation in type and amount of work, etc.). Therefore, sedentary lifestyle has a significant impact on economics not only for persons with intellectual disabilities but also for others (e.g., parents, care providers, insurance companies, social agencies, etc.).

The significance of physical inactivity is even greater for young children with intellectual disabilities due to the fact that physical activity habits of adults are likely to begin at early ages. As a result of being more sedentary, less fit, and less skilled than their peers, children with intellectual disabilities may be less prepared to participate in school and community activities, and may experience fewer benefits when they do participate. For this reason, children with intellectual disabilities who are sedentary are likely to encounter lack of psychological and social skills, which have a negative impact on quality of life. In addition, poor physical fitness can also lead to greater immediate and long-term risk for chronic disease in children with intellectual disabilities (Pitetti et al., 2001).

Statement of the Problem

The purposes of the present study are to: (a) examine parental values and concerns about physical activity participation by children (some include adults) with intellectual disabilities; and (b) identify determinants of physical activity participation by children with intellectual disabilities. This study used a survey approach to evaluate parental values and concerns and used self-report data to determine physical activity participation by parents and their children with intellectual disabilities.

Need for Study

Many attempts have been made to examine the parental influence on physical activity participation by children without disabilities (Anderssen & Wold, 1992; Brustad, 1993; Dempsey et al., 1993; Folsom-Meek, 1984; Kimiecik & Horn, 1998; Kimiecik, Horn, & Shurin, 1996; McMurray et al., 1993; Moore et al., 1991). The main research question of these previous studies is how children's physical activity is influenced by parental attributes such as beliefs, attitudes, and physical activity. However, none of the previously published research has focused on parents of children with intellectual disabilities. Therefore, a study focusing on parents of children with intellectual disabilities is needed for better understanding of parental influence on children's physical activity participation.

Parental belief systems are comprised of many factors such as the value parents place on physical fitness for their children, perception of their children's physical competence, definitions of success, and reasons for children's participation (Kimiecik & Horn, 1998). However, parental values and concerns about physical activity participation by their children with disabilities have not been explored in depth. It is important to

investigate parental values and concerns because they reflect reasons why parents encourage their children with intellectual disabilities to participate in physical activity (Lee & Dummer, 2003). Thus, a study is needed to explore parental values and concerns about physical activity participation by children with intellectual disabilities.

Also, researchers need to know the influences variables such as disability-related factors and demographics on parental values and concerns about physical activity participation by children with intellectual disabilities. Although it is clear that disability factors (e.g., type, severity, and multiple disability) are likely to limit one's physical ability to participate in physical activity, their influence on parents' perceptions of children's physical activity participation is not known. In addition, the influence of demographics (e.g., children's and parents' age, as well as gender) on parental values and concerns has not been investigated. Therefore, a study is needed to examine the influence of disability and demographic variables on parental values and concerns to further document parental influence on physical activity participation by children with intellectual disabilities.

Research Questions

1. What are parental values related to physical activity participation by their children with intellectual disabilities?
    a. Do parental values differ as a function of parents' disability?
    b. Do parental values differ as a function of children's age?
    c. Do parental values differ as a function of children's gender?
    d. Do parental values differ as a function of severity of children's disability?

e. Do parental values differ as a function of children's primary intellectual disability types?

f. Do parental values differ as a function of children's multiple disabilities?

2. What are parental concerns related to physical activity participation by their children with intellectual disabilities?

   a. Do parental concerns differ as a function of parents' disability?

   b. Do parental concerns differ as a function of children's age?

   c. Do parental concerns differ as a function of children's gender?

   d. Do parental concerns differ as a function of severity of children's disability?

   e. Do parental concerns differ as a function of children's primary intellectual disability types?

   f. Do parental concerns differ as a function of children's multiple disabilities?

3. What are determinants of physical activity participation by children with intellectual disabilities?

   a. What is the relationship between parents' age and children's physical activity?

   b. What is the relationship between parents' physical activity and children's physical activity?

   c. What is the relationship between children's age and their physical activity?

d. What is the relationship between children's multiple disabilities and their physical activity?

e. What is the relationship between severity of children's disability and their physical activity?

f. What is the relationship between children's BMI and their physical activity?

g. What is the relationship between parental values and children's physical activity?

h. What is the relationship between parental concerns and children's physical activity?

Limitations

- The participants of this study were parents whose children with intellectual disabilities had participated in Special Olympics or other physical activity programs. Therefore, the sample of this study may not be representative of all parents of children with intellectual disabilities. Parents of children with intellectual disabilities who never participated in Special Olympics or physical activity programs may have different perceptions of parental values and concerns about children's physical activity participation than the parents of this study.
- Physical activity information for parents and children with intellectual disabilities was obtained without the intensity of physical activity participation. Therefore, the accuracy of physical activity levels may not be guaranteed. There are two problems here: (a) the use of self-report data on the amount and nature of physical activity participation and (b) the absence of intensity data. The absence of

intensity data may not be a significant problem because this study focuses only on physical activity participation, not fitness.

- Surveys were distributed to parents at different sites of Special Olympics (parent/family tailgate party, opening ceremonies, parent reception, and sport competition venues). Parents completing surveys in these places may be influenced by a lot of distraction (e.g., food, special events, competition, etc.). Therefore, the investigator could not guarantee that parents would complete the survey without distraction.
- In this study, the influence of hypothesized variables on parental values and concerns was tested with only two independent variables to fit into a MANOVA analysis. The influence of other variables on parental values and concerns was not tested due to a small sample size. This may cause power of research overestimated, which makes it difficult to interpret the results of the data analysis.

Assumptions

The following assumptions pertaining to the participants and instrument were made to draw conclusions from the results.

- The participants of this study were representative of other parents of children with intellectual disabilities who have participated in a physical activity program, including participation in Special Olympics.
- Surveys were completed by a parent independently, without any influence by others.

Definitions

Adaptive skills. Adaptive skills, also called adaptive functioning, refer to an age-appropriate skill in coping and dealing with common life demands (American Psychiatric Association, 1994). The skill areas include communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure, and work. In this study, amount of help needed in adaptive skill domains is used to determine the severity of an individual's disability.

Children. In this study, children refer to both school-aged children and adult children with intellectual disabilities. School-aged children include children and adolescents (under the age of 18 years); whereas, adults children include adults (18 years or older) who live with their parents.

Intellectual disability. Intellectual disability is a substitute term of mental retardation. According to Special Olympics official general rules (Special Olympics International, 2004), persons with intellectual disability (or mental retardation) have a closely related developmental disability. A "closely related developmental disability" means having functional limitations in both general learning (such as IQ) and in adaptive skills (such as in recreation, work, independent living, self-direction, or self-care). In the present study, intellectual disability includes mental retardation/Down syndrome, autism/Asperger's syndrome, and learning disability. Special Olympics International also indicates that persons whose functional limitations are based solely on a physical, behavioral, or emotional disability, or specific learning or sensory disability are not eligible to participate in Special Olympics; therefore, these disabilities such as attention deficit disorder (ADD)/attention deficit hyperactivity disorder (ADHD), cerebral palsy,

hearing/vision loss, and brain injury are not classified as intellectual disability or mental retardation.

Parental concerns. Parental concerns refer to obstacles or barriers to physical activity participation perceived by parents of children with an intellectual disability (Lee & Dummer, 2003).

Parental values. Parental values refer to benefits related to physical activity participation as perceived by parents of children with an intellectual disability (Lee & Dummer, 2003).

Physical activity participation. Performing any bodily movement produced by skeletal muscles that result in an expenditure of energy (U.S. Department of Health and Human Services, 2003). Both voluntary and involuntary movement could be included in physical activity participation. In this study, the level of parents' and children's participation in physical activity is determined by the total minutes of participation in physical activity during the past week. However, the intensity of physical activity participation is not included in this study.

Special Olympics International. Special Olympics International is an international organization dedicated to empowering individuals with intellectual disabilities to be physically fit, productive and respected members of society. Special Olympics at both national and local levels provide year-round sport training and competition to children and adults with intellectual disabilities.

CHAPTER 2

REVIEW OF LITERATURE

This review of selected literature presents rationales of why physical activity is important for persons with intellectual disabilities, as well as how parents influence physical activity participation by their children with intellectual disabilities. In the first section, literature on positive effects of physical activity and exercise on physical fitness of adults with intellectual disabilities is reviewed to provide evidence of the importance of physical activity for persons with intellectual disabilities. The effects of physical activity participation on children and youth with intellectual disabilities are reviewed in this section, as well.

The second section of literature review presents the conceptual models of this study that help to describe and predict parental influence on physical activity participation by children with intellectual disabilities. Two models are presented and compared in this section. First, the family influence model proposed by Kimiecik et al. (1996) highlights the importance of family environment, especially parents, related to participation in physical activity by children without disabilities. This model provides theoretical assumptions for the proposed model of the present study. The next model proposed by the investigator describes how this model evolves from the family influence model and how it guides this study, as a theoretical framework.

The third section presents literature on the parental influence on physical activity participation by children both with and without disabilities. Information about parental influence provides the rationales for why parents' role is important in physical activity participation by children with intellectual disabilities. Most studies reviewed in this

section focus on children without a disability due to lack of research on children with intellectual disabilities.

In addition, the final section of this chapter presents the synthesis of the review of literature. This section provides the rationale for why and how independent and dependent variables are selected for data analyses in this study.

Importance of Physical Activity Participation

This section presents positive effects of physical activity and exercise on physical fitness and psychosocial domains of well-being for persons with intellectual disabilities. Research on physical fitness and adults with intellectual disabilities followed by children and youth with disabilities is reviewed in this section. The dimension of physical activity exercise benefits for adults with intellectual disabilities is limited to improving physical fitness benefits due to lack of research about other variables. For children and youth with intellectual disabilities, the literature review focuses on fitness, psychological well-being, social benefits, and improving skills related to motor functioning, sports, and leisure activities.

Effects of Physical Activity Participation on Adults with Intellectual Disabilities

The criteria for selecting the studies reviewed in this section included: (a) an intervention study of adults with intellectual disabilities (age of 18 years or older) and (b) a study regarding physical activity and exercise effects on physical fitness components. Research with a wide age range of participants (e.g., 16-50 years, 17-61 years, etc.) was also reviewed if the main focus was on adults with intellectual disabilities. Physical fitness components included cardiovascular fitness, muscular strength and endurance, body composition, and flexibility. Table 1 presents a summary of research studies on the

Table 1

Research on Effects of Physical Activity Participation on the Physical Fitness of Adults with Intellectual Disabilities

Author (Date)	Participants	Variables	Intervention	Results
Andrew et al. (1979)	20 adults with developmental disabilities (age 14-34 years)	Physical fitness components (cardiovascular fitness, exercise duration, & flexibility) and motor skills	A 12-week supervised exercise program	An increase in physical and motor functioning
Beasley (1982)	30 adults with mental retardation (age 16-50 years)	Cardiovascular fitness & work performance	A 8-week jogging program	Increased cardiovascular fitness and work performance
Croce (1990)	3 obese adult men with severe mental retardation (age 24-30 years)	Body composition and cardiovascular fitness	A 20-week cardiovascular training & diet program	Reduced body weight (7.73%) and body fat (19.31%)
Croce & Horvat (1992)	3 young adults with mental retardation (21-28 years)	Muscular strength & work productivity	A 8-to-14-week resistance training program	An increase in isometric strength (6.2-10.9%)

Table 1

Continued

Author (Date)	Participants	Variables	Intervention	Results
Fisher (1986)	17 adult women with mental retardation (20 years or older)	Change in weight and tricep skinfold thickness	A 8-week physical activity program plus self-control	Positive changes in body weight
Montgomery et al. (1988)	171 adults with mental retardation (age 20-39 years)	Physical fitness components (cardiovascular endurance, flexibility, body composition, muscular endurance & strength)	A 10-month physical fitness & exercise program (3 days per week)	Increases in most fitness components
Pitetti & Tan (1991)	12 adults with mental retardation (age 22-28 years)	Cardiovascular fitness	A 16-week exercise training program (2.5-2.9 days per week)	Increased peak VO_2 and peak ventilation
Rimmer & Kelly (1991)	24 adults with mental retardation (age 23-49 years)	Muscular strength and endurance	A 9-week progressive resistance training program	An increase in muscular strength and endurance

Table 1

Continued

Author (Date)	Participants	Variables	Intervention	Results
Schurrer et al. (1985)	5 adults with mental retardation (mean age=25.2 years; *SD*=5.9)	Cardiovascular fitness & behavior patterns	A 23-week walk-jogging program	Increases in VO_{2max} (43%), reduction in body weight and favorable behavior
Skrobak-Kaczynski & Vavik (1980)	10 adult men with Down syndrome (age 16-31 years)	Physical fitness (weight control) & trainability	A 12-week circuit training program	A significant weight loss of 1.3kg
Tomporowski & Jameson (1985)	Study 1: 19 institutionalized adults with mental retardation (age 17-39 years)	Development of exercise behavior (adaptation to workloads) & cardiovascular fitness	A 18-week circuit training program	Adapted to increased workloads and produced substantial improvements in cardiovascular fitness resulted from both studies
	Study 2: 19 institutionalized adults with mental retardation (age 15-37 years)	Same as above	A 18-week jogging program	

effects of physical activity participation on physical fitness of adults with intellectual disabilities.

Cardiovascular fitness. Among the physical fitness components, the cardiovascular fitness in adults with intellectual disabilities has been the most popular research topic (Andrew, Reid, Beck & McDonald, 1979; Beasley, 1982; Croce, 1990; Montgomery et al., 1988; Pitetti & Tan, 1991; Schurrer, Weltman, & Brammell, 1985; Tomporowski & Jameson, 1985). The majority of participants in previous research were persons with mental retardation including Down syndrome. Testing protocols for measuring cardiovascular fitness included the Schwinn Air-Dyne ergometer (Pitetti & Tan, 1991), treadmill protocol (Andrew et al., 1979; Schurrer et al., 1985; Tomporowski & Jameson, 1985), Cooper 12-minutie Run/Walk test (Beasley, 1982), and Canadian Standardized Test of Fitness (Montgomery et al., 1988). The durations of the physical activity and exercise programs in previous studies ranged from 8 weeks to 10 months. Also, most of these programs were given 2-3 days a week, except for Beasley's study in which the program was given 5 days a week. The results of previous research studies were consistent, suggesting that persons with intellectual disabilities could improve their cardiovascular fitness by participating in physical activity.

Despite the consistent results of training effects, most of these studies seem to have shortcomings in methodologies which make it difficult to interpret their results. For example, a small sample size can be problematic. A study conducted by Schurrer et al. (1985) included only 5 adults with mental retardation. Such a small sample size may not be appropriate for determining the statistical significance of the results (Fernhall, 1993). Another problem is the absence of control groups as shown in some studies (Schurrer et

al., 1985; Tomporowski & Jameson, 1985). In a review article on physical fitness and adults with mental retardation (Pitetti et al., 1993) suggested that the use of appropriate control groups should be implemented to better design a research study regarding the effects of physical activity on physical fitness of persons with mental retardation. The next problem in previously published studies with adults with mental retardation is failure to specifically describe the exact type of exercise, as well as the duration and intensity of the programs (Andrew et al., 1979; Schurrer et al., 1985; Tomporowski & Jameson, 1985). For example, describing an exercise session as a series of "warm-up, strength exercise, endurance training, and cool-down" is not helpful for professionals who attempt to develop a fitness program for persons with intellectual disabilities. Researchers should provide a more specific and detailed exercise subscription for persons with intellectual disabilities.

Muscular strength and endurance. Researchers have suggested that persons with intellectual disabilities could improve their muscular strength and endurance by participating in physical activity (Croce & Horvat, 1992; Lorenzo, 2001; Montgomery et al., 1988; Rimmer & Kelly, 1991). As described in studies on cardiovascular fitness, all participants of previous research on muscular strength and endurance were adults with mental retardation, as well (see Table 1). Despite a small sample size (n=3), Croce and Horvat found that the participants increased their isometric strength significantly. Also, the study conducted by Rimmer and Kelly revealed that the participants of the experimental group showed significant increases in their isokinetic strength. In addition, although no significant differences were found between the experiment and control group,

Montgomery et al. found that most participants in the experiment group acquired a substantial increase in muscular strength and endurance.

Body composition. Body composition is another popular research topic in persons with intellectual disabilities due to the prevalence of obesity in this population. However, not much research has been conducted to determine the direct effects of physical activity participation on the body composition of adults with intellectual disabilities. In fact, most research studies on body composition and persons with intellectual disabilities focused on the combination of diet and physical activity. For example, Fisher (1986) implemented an 8-week behavioral weight reduction program to lose the body weight of 17 adults with mental retardation. Two groups of participants were formed: (a) a behavioral self-control (changing eating patterns plus reinforcement) along with a physical activity component (walking exercise); and (b) a behavioral self-control only. Results revealed that both groups reduced their body weights significantly after the treatment. However, no significant differences were found between two groups; therefore, the influence of physical activity on the weight reduction was not conclusive. Similar results can be seen in a study by Croce (1990) who investigated the effects of a 20-week cardiovascular training and diet program on the body composition of 3 obese adults with mental retardation.

For better understanding of the effects of physical activity on body composition of adults with intellectual disabilities, an attempt was made by Schurrer et al. (1985). In their study, the body weight along with cardiovascular fitness of 5 adults with mental retardation was assessed after a 23-week walking and jogging program. The participants walked or jogged on a treadmill 4-6 times a week and the intensity was increased

throughout the program period. The results showed that the participants reduced their body weight significantly at the end of the program. Although this study seemed to have some methodological problems (e.g., a small sample size and no control groups), it was an important study to investigate the main effect of physical activity on body composition of adults with intellectual disabilities without diet.

Flexibility. Improving flexibility is another physical activity benefit for adults with intellectual disabilities. Andrew et al. (1979) investigated the effects of a 12-week exercise program on flexibility (and cardiovascular fitness) of 20 adults with mental retardation. In this study, the participant in the experiment group participated in a supervised exercise program comprised of warm-up exercises, strength exercises, endurance training, and cool-down activities for one hour and three times a week. Their results showed that significant increases were found in the participants' flexibility. However, these findings have not been consistent in literature. For example, Montgomery et al. (1988) conducted a similar study to evaluate the effects of two physical fitness programs on flexibility and other fitness components (e.g., cardiovascular fitness, muscular strength/endurance, and body composition) for adults with mental retardation. In this study, a 6-month physical education was compared to a 4-month physical activity workshop. Both groups showed some improvement in flexibility, but no significance was found. The major problem for the insignificant results was the time spent for flexibility exercises in the program. The authors acknowledged that the program devoted the least amount of time per week to flexibility. The importance of the duration of activity, as well as weekly frequency, has been highlighted in literature (Chanias et al., 1998; Fernhall, 1993; Pitetti et al., 1993).

In sum, it seems obvious that adults with intellectual disabilities can improve their physical fitness levels by participation in physical activity, especially cardiovascular endurance and muscular strength/endurance. The quality of physical activity programs to improve physical fitness of adults with mental retardation depends on types of exercise, intensity, and duration. However, effects of physical activity participation on flexibility and body composition of persons with intellectual disabilities seem inconclusive yet. As recommended by Chanias et al. (1998), some fitness components such as body composition and flexibility need more investigations for better understanding for the importance of physical activity for adults with intellectual disabilities.

Effects of Physical Activity Participation on Children with Intellectual Disabilities

This section presents the positive effects of physical activity participation by children with intellectual disabilities. Studies included in this section satisfied the following criteria:

- Studies should include children or adolescents with an intellectual disability.
- Studies should be intervention studies focusing on the effects of physical activity participation or exercise training.
- Studies should focus on benefits of physical activity participation such as improving physical fitness levels, psychosocial benefits, and improving skills for activities of daily living, as well as sport/leisure activities.

Physical fitness. Table 2 shows research studies on effects of physical activity participation on physical fitness of children and youth with intellectual disabilities. Children and youth with intellectual disabilities can improve their cardiovascular endurance by participating in physical activity. Wright and Cowden (1986) trained 50

Table 2

Research on Physical Fitness Benefits of Physical Activity in Children and Youth with Intellectual Disabilities

Author (Date)	Participants	Variables	Intervention	Results
Seagraves (2003)	14 high school students with mental retardation	Work productivity and physical fitness components	A 10-week progressive resistance training program	Improved performance in vocational tasks & increased isometric strength by 38-35%
Stopka et al. (1998)	22 adolescents & young adults with mental retardation (age 13-22 years)	Muscular strength/endurance & physical capacity	A two consecutive 3-week supervised resistance training	Improvement in muscular strength and endurance
Stopka et al. (2002)	18 Special Olympics athletes (age 15-22 years) & 44 coaches (age 19-50 years)	Sit-and-reach flexibility	A 8-week static & PNF stretching exercise program	Improvement in flexibility
Weber & French (1988)	21 adolescents with Down syndrome (age 13-18 years)	Muscular strength	A 6-week weight training program	Improvement in muscular strength
Wright & Cowden (1986)	50 youth with mental retardation (age 12-18 years)	Cardiovascular endurance & self-concept	A 10-week Special Olympics swim program	An increase in cardiovascular endurance and better self-concept

youth with mild and moderate mental retardation to improve their cardiovascular endurance. In their study, 25 participants of the experimental group participated in a 10-week Special Olympics swim program (1 hour a day and two days a week); whereas, the control group adhered to their normal activities of daily living. The 9-Minute Run/Walk test was used to assess the cardiovascular endurance of adolescents with intellectual disabilities. Results of the study revealed that the experimental group improved cardiovascular endurance significantly after the training. Similar results were found in a study conducted by Yilmaz, Ergun, Heper, Konukman, and Zorba (2003) who assessed the effects of a 10-week aquatic exercise and swimming program on adolescents with mental retardation. This study found a significant improvement in adolescents' working capacity by improving heart rate and running speed in the water.

However, improving cardiovascular endurance is not always guaranteed for all children and youth with intellectual disabilities. Evidence does exist that cardiovascular responses to physical activity participation may be disability specific. Millar, Fernhall, and Burkett (1993) attempted to evaluate the effects of a 10-week walking/jogging exercise training program on aerobic capacity of 14 adolescents and young adults with Down syndrome (mean age = 17.7 years). A walking treadmill test was administered before and after the program, measuring peak oxygen uptake, minute ventilation, heart rate, and time and grade to exhaustion. Although the experimental group gained walking capacity, the program did not produce significant improvement in aerobic capacity. The investigators, thus, concluded that the adolescents and young adults with Down syndrome may not be able to improve their aerobic capacity as a result of participating in a walking and jogging program.

Along with the improvement of cardiovascular endurance, children and youth with intellectual disabilities can also improve their muscular strength and endurance as a result of physical activity participation. A study conducted by Seagraves (2003) assessed changes in work productivity and physical fitness component (peak isometric strength) of 14 adolescents with mental retardation after participating in a 10-week progressive resistance training program. Training was given to the experimental group twice a week; whereas, the control group participated in group and individual games. Vocational and strength assessments were collected at three intervals 5 weeks apart plus a retention assessment. The peak isometric strength was assessed bilaterally using a hand-held dynamometer at several sites of upper and lower body. Results indicated that the experimental group increased isometric strength by an average of 38.35%; whereas, the control group increased 4.08%.

Stopka, Zambito, Suro, et al. (1998) also conducted to investigate the effects of a two consecutive 3-week supervised resistance training program on muscular strength and endurance of 22 adolescents and young adults with mental retardation. Training was given twice a week. Muscular strength was evaluated by a three repetition maximum test; whereas, muscular endurance was assessed by a repetition to failure test. The study found that significant increases in muscular strength and endurance of the participants after training. Muscular strength and endurance of children and youth with Down syndrome, unlike cardiovascular endurance, may not be influenced by nature of disability. A study by Weber and French (1988) attempted to determine if 21 adolescents with Down syndrome could improve their muscular strength by participating in a 6-week weight training program. Their results indicated that the participants receiving weight training

had significant gains in muscular strength than those receiving a strength exercise program.

Improving flexibility is another significant effect of participation in physical activity by children and adolescents with intellectual disabilities. Stopka, Morley, Siders, et al. (2002) conducted a study to investigate the effects of stretching exercises on the sit-and-reach flexibility of 18 Special Olympics athletes with mental retardation (mean age = 15.7 years). The performance of these athletes were compared that of 44 coaches without mental retardation (mean age = 22.2 years). After 8 weeks of stretching exercise, both athletes and coaches significantly improved performance in sit-and-reach flexibility.

Although body composition is an important component of physical fitness, not much research has been conducted to investigate the relationship between physical activity and body composition of children and youth with intellectual disabilities. The only published study was Yilmaz et al's study (2003) which evaluated the effects of a 10-week aquatic exercise and swimming program on the body composition, in addition to water working capacity in water, of children with mental retardation. Although the participants improved their work capacity, as a result of participation in the program, their body compositions were not changed. The investigators acknowledged that no changes in body composition may be due to the duration of the program. It was concluded that a prolonged program should be implemented to children with mental retardation for better body composition.

Before drawing any conclusions of the effects of physical activity participation on physical fitness of children and youth with intellectual disabilities, it should be noted that some studies had methodological flow that may affect the results. An example would be

validity of the 9-Minute Run/Walk test (Wright & Cowden, 1986) and the hand-held dynamometer (Seagraves, 2003). These testing protocols have been validated for individuals without disabilities, but not yet for individuals with intellectual disabilities. The importance of establishing validity of instruments used for physical fitness of persons with disabilities has been highlighted in literature (Fernhall, Tymeson, & Webster, 1988). Another potential problem may be the duration and intensity of the programs in previous studies. In Seagraves's study, although the frequencies in a week were given (twice per week), no information about duration of each session and the intensity of the program. More specific information about successful physical activity programs should be noted to help professionals to develop and implement a physical activity program for children with intellectual disabilities.

In addition, as discussed in the previous section of physical activity and adults with intellectual disabilities, more studies should be conducted to effects of physical activity participation on body composition and flexibility of children and adolescents with intellectual disabilities. Although the significance of overweight/obese in children and youth with intellectual disabilities has been highlighted in literature, the role of physical activity remains unclear yet (Pitetti et al., 1993). In addition, very little is known about the effects of physical activity participation on flexibility of children and youth with intellectual disabilities. Since flexibility is a critical element for performing activities of daily living (e.g., reaching, bending, etc.), its relationship with physical activity should be determined and documented.

Psychological benefits. Research has also shown the psychological benefits of physical activity in children and youth with intellectual disabilities (Table 3). Improving

Table 3

Research on Psychological Benefits of Physical Activity in Children and Youth with Intellectual Disabilities

Author (Date)	Participants	Variables	Intervention	Results
Gibbons & Bushakra (1989)	48 children with mental retardation (age 9-13 years)	Perceived competence & peer acceptance	Participation in 1-1/2 day Special Olympics track & field event	Improvement in perceived physical competence & peer acceptance
Simpson & Meaney (1979)	20 children with mental retardation (age 14-20 years)	Self-concept	A 5-week ski program	Better self-concept
Wright & Cowden (1986)	50 youth with mental retardation (age 12-18 years)	Cardiovascular endurance & self-concept	A 10-week Special Olympics swim program	An increase in cardiovascular endurance and better self-concept

self-concept is an important outcome of physical activity participation by children and youth with intellectual disabilities. Wright and Cowden (1986) conducted a study to investigate changes in self-concept and cardiovascular endurance of 50 children and youth with mental retardation who participated in a 10-week Special Olympics swim training program. As reviewed in the previous section (physical fitness), the Piers and Harris Children's Self-Concept Scale was administered to evaluate self-concept of the participants before and after the program. The results of their study showed significant changes in self-concept in addition to improvement in cardiovascular endurance. This study concluded that participation in a Special Olympics swim training program by youth with mental retardation contributed to a significant increase in self-concept, as well as physical fitness.

Improving self-concept of children and youth with mental retardation, as a result of physical activity participation, was also evidenced in a study conducted by Simpson and Meaney (1979). In their study, 20 children and youth with mental retardation were assessed for their self-concept after participating in a 5-week ski program. Their results revealed that the participants with mental retardation significantly improved their self-concept after the program. Along with positive changes in self-concept, children and youth with intellectual disabilities can also improve perceived competence by physical activity participation. Gibbons and Bushakra (1989) investigated the effects of participation in a 1-1/2 day Special Olympics track and field event on perceived physical competence and peer acceptance of 48 youth with mental retardation. This study attempted to compare the Special Olympics participation group (n=24) to the non-participation group (n=24). The Pictorial Scale of Perceived Competence and Social

Acceptance for Young Children was administered to both groups before or after the Special Olympics events. The investigators found that the participants of the Special Olympics event significantly improved their perceived physical competence, as well as peer acceptance. However, the findings of this study may not be generalizable due to the duration of the Special Olympics event. As argued by many researchers (Chanias et al., 1998; Fernhall, 1993; Pitetti et al., 1993), the duration of the physical activity program is an important component of physical activity program for persons with intellectual disabilities and may significantly influence research outcomes.

Social benefits. Table 4 presents research on social benefits of physical activity in children and youth with intellectual disabilities. The role of physical activity in shaping social characteristics of children and youth with intellectual disabilities has been highlighted in literature. Chiang (2003) conducted a study to investigate the effects of a 3- to 6-week therapeutic recreation program on social interaction of 6 male adolescents with autism spectrum disorder. The investigator particularly attempted to compare changes in the loneliness and friendships of adolescents with autism spectrum disorder to the age- and gender-matched adolescents without a disability. The participants were trained to use the Dance Dance Revolution (DDR), a technology-based physical activity device for 3-6 weeks. Following training, the adolescents with autism spectrum disorder taught their peers without a disability for 4 sessions. The results of the study found that the quality of friendship in adolescents with autism spectrum disorder was significantly improved in addition to decreased level of loneliness. The investigator suggested that the leadership role in physical activity has positive impact on socialization of youth with autism spectrum disorder.

Table 4

Research on Social Benefits of Physical Activity in Children and Youth with Intellectual Disabilities

Author (Date)	Participants	Variables	Intervention	Results
Chiang (2003)	6 boys with autism spectrum disorder (age 10-14 years) & 6 typically developed boys (age/gender matched)	Social interaction (loneliness & friendships)	A 3-to-6 week therapeutic recreation program	Improved quality of friendship & decreased level of loneliness
Crain et al. (1984)	13 adolescents with educable mental retardation (age 13-15 years)	Social & physical behaviors	A 10-week dance program	Improvement in social & physical behaviors
Kern et al. (1984)	7 children with autism (age 4-7 years)	Self-stimulation, ball-playing, & academic responding	A 21-day jogging program	Decreased self-stimulatory behavior & increased appropriate responding to ball-playing and academic tasks
Reid et al. (1983)	2 adolescents with pervasive developmental disability (age 17 years) & 1 with autism (age 12 years)	On & off –task behavior, inappropriate behavior/vocalization, intelligible/appropriate speech, & self-stimulatory behavior	A 36-day exercise program	Decreased inappropriate behaviors & increased on-task behavior

Changes in behaviors of children and adolescents with intellectual disabilities are another example of social benefits. Several studies have been conducted to investigate the effects of physical activity participation on social behaviors of children and adolescents with intellectual disabilities. A study done by Crain, Eisenhart, and McLaughlin (1984) attempted to prove the positive effects of a 10-week dance program on social and physical behaviors of 13 adolescents with mental retardation (EMI). The study found that, except 2 participants, all adolescents with mental retardation improved social and physical behaviors.

To be socially accepted, children and youth with intellectual disabilities should decrease inappropriate behaviors. Although not much research has been conducted to reveal the effects of physical activity participation on reducing inappropriate behaviors of children and youth with intellectual disabilities, evidence does exist in literature (Kern, Koegel, & Dunlap, 1984; Reid, Collier, & Morin, 1983). In the former study, the investigators implemented a 21-day jogging program to evaluate changes in self-stimulation and responding to ball playing, as well as academic tasks. This study found that the participants decreased the amount of subsequent self-stimulatory behaviors and showed an increase in appropriate responding to ball-playing, as well as academic task. The latter study also found a decrease in inappropriate behaviors (including self-stimulatory behavior) and an increase in on-task behavior of 3 adolescents with pervasive developmental disability and autism spectrum disorder after participating in a 36-week exercise program.

In addition, social identity is important for children and youth with disabilities and it can be achieved by physical activity participation. Identifying oneself is an

important element in socialization for children and youth with disabilities because it reflects mental representations of his or her personal and social characteristics. Groff and Kleiber (2001) conducted a study to explore the relationship sport participation and identity formation of 11 adolescents with physical disabilities, using qualitative interviews. The analysis of data revealed 4 themes: (a) skill and competence; (b) emotional expression; (c) social interaction/connectedness; and (d) decreased awareness of disability. The study found that the majority of the participants have a heightened sense of competence and opportunities to express their "true" selves. Also the investigators reported that sport participation by youth with physical disabilities decreased the awareness of their disability. The study suggests that involvement in a sports program is closely related to identity formation for those youth with physical disabilities involved.

Improving physical skills. Table 5 shows research on effects of physical activity on improving physical skills in children and youth with intellectual disabilities. Physical skills include motor skills, sport/leisure skills, and skills for activities of daily living. The majority of previous studies focused on improving motor skills in children with intellectual disabilities as a result of physical activity participation (Kim, 1999; Winchester, Kendall, Peters, Sears, & Winkley, 2002; Yamanaka & Furuya, 1994). These studies were consistent with the result that children with intellectual disabilities could significantly improve their motor skills after participating in physical activity programs. An interesting finding in the Winchester et al. study was that a therapeutic horse riding program could also improve motor skills of children with mental retardation. This

Table 5

Research on Effects of Physical Activity on Improving Physical Skills in Children and Youth with Intellectual Disabilities

Author (Date)	Participants	Variables	Intervention	Results
Kim (1999)	34 children with cognitive delays (age 3-7 years)	Standing long jump performance	A 9-week physical education program	Improvement in jumping skill
Ninot et al. (2000)	48 adolescents with mental retardation	Sport skills, perceived competence, & general self-worth	A 8-month sport skills program	Improvement in sport skills
Schleien et al. (1988)	2 children with severe multiple disabilities including mental retardation (age 5 years)	Learning and generalizing 3 leisure skills	A 14-week leisure skill instructional program	Acquisition and generalization of skills
Winchester et al. (2002)	7 children with developmental disabilities (age 4-7 years)	Gross motor function	A 7-week therapeutic horseback riding program	Improvement in gross motor function
Yamanaka & Furuya (1994)	4 preschool children with mental retardation (age 4-5 years) & 3 age-matched normal preschoolers	Play/school activity & running performance	A 11-week running exercise program	Improved quality of movement/play activities and running performance

supports that many types of physical activity can positively influence children and youth with intellectual disabilities on their physical skills.

Children and adolescents with intellectual disabilities can also improve their skills for sports and leisure activities. Ninot, Bilard, Delignieres, and Sokolowski (2000) conducted a study to investigate the effects of an 8-month integrated sport skills program on basketball and swimming skills, in addition to perceived competence, of 48 adolescents with mental retardation. Their results revealed that the participants receiving skill instructions significantly improved their skills in basketball and swimming. In addition, Schleien, Cameron, Rynders, and Slick (1988) evaluated the effects of a 14-week leisure skill instructional program on leisure skill learning of 2 children with multiple disabilities including mental retardation. Performance in 3 leisure skills (toss across, flash-the electronic arcade game, and Simon) was evaluated before and after the program. The results of the study revealed that not only the participants were capable of acquiring the skills, but they also were able to generalize the skills learned.

Conceptual Models

The conceptual models presented in this section provide the framework of this study. Two models are presented and compared. First, the family influence model developed by Kimiecik et al. (1996) is presented to show potential factors that influence physical activity participation by children without disabilities. Based on some factors associated with parent and demographics, a new model was developed by the investigator to describe possible correlates of physical activity participation by children and youth with cognitive disabilities, as well as parental values and concerns.

The Family Influence Model (Kimiecik et al., 1996)

Figure 2 shows the family influence model for children's moderate-to-vigorous physical activity (MVPA). This model suggests that the home environment is the key factor to understanding family influence on a child's MVPA. The home environment, consisting of parent/sibling beliefs, parent/sibling behavior, and family functioning and interaction, directly influences a child's perceptions of parent's and sibling's beliefs about his/her MVPA. Then, the child's perceptions become an important source for his/her own beliefs and MVPA behavior, which are also related to his/her cardiovascular functioning and other cardiovascular disease risk factors.

The family influence model also describes the importance of other variables associated with environment outside the home and demographical and family characteristics. Although home environment is the main focus, this model points out that the home or family influence process does not exist without considering the influence of the significant others (e.g., teachers and coaches), peers, community, and school because of their links to family and children's beliefs and MVPA behavior. This model also highlights the influence of demographical and family characteristics on both parent/sibling and child regarding their beliefs and MVPA behavior. These characteristics include gender of parents, sibling, and child, socioeconomic status, ethnicity, family size or number of members, family type, and living location.

Variables That Affect Children's Participation in Physical Activity

Family environment. The importance of parents' and siblings' role in children's physical activity participation has been highlighted in literature (Dempsey et al., 1993; Moore et al., 1991; Sallis, Prochaska, & Taylor, 2000; Wold & Anderssen, 1992). An

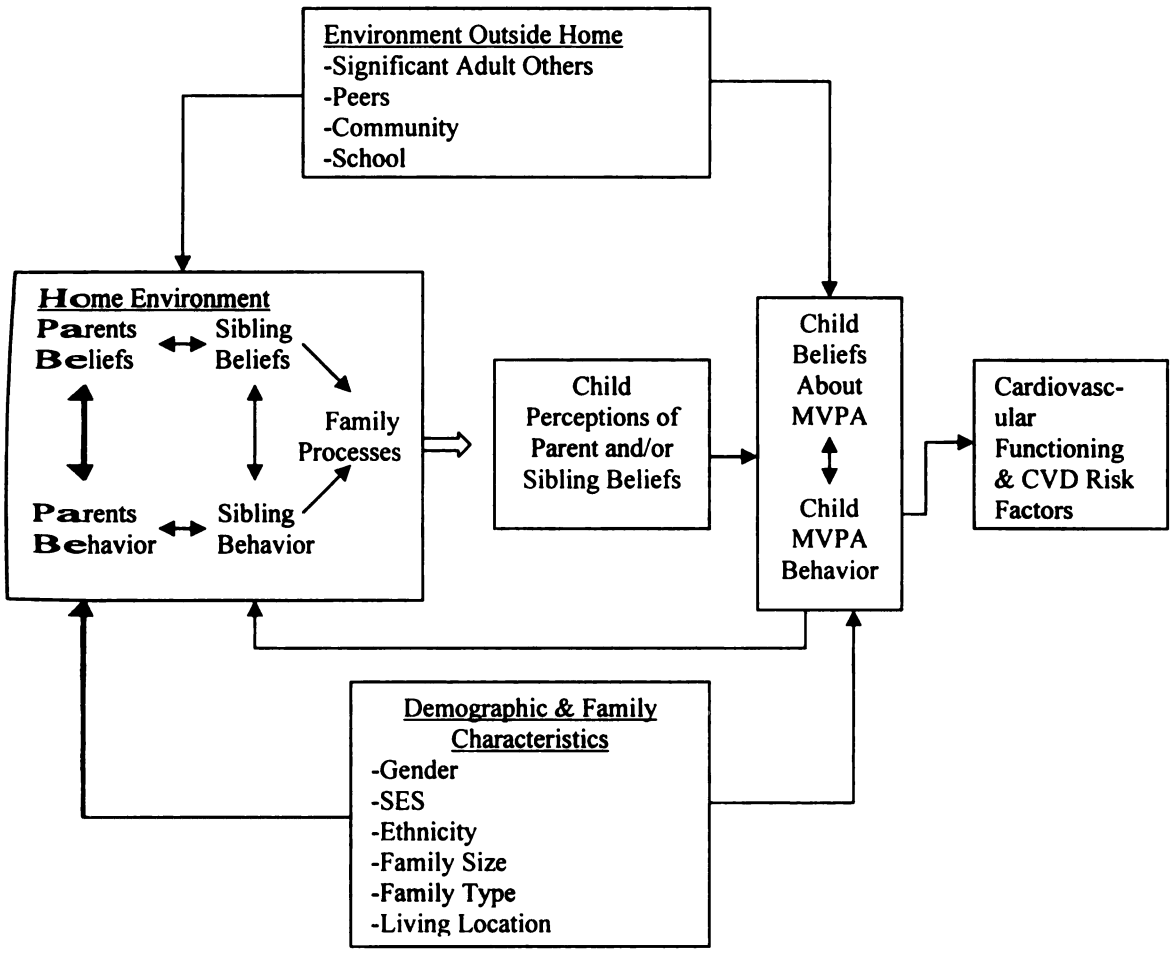

Figure 2. Family Influence Model for Children's Moderate-to-Vigorous Physical Activity (Kimiecik et al., 1996).

important theoretical background of most research studies on parent/sibling and children's physical activity was the role modeling hypothesis, which is the central concept in social learning theory (Bandura, 1977). This hypothesis proposes that children of parents who are physically active are more likely to become physically active than children of parents who are sedentary. A good example can be found in the Framingham Children's study conducted by Moore et al. (1991). During the 1-year data collection, the researchers attempted to determine the relationship between the physical activity level of 100 children without a disability ranging in age from 4 to 7 years and their parents (99 mothers and 92 fathers). The participants' physical activity levels were monitored through a Caltrac accelerometer for an average of more than 10 hours a day for approximately 7 to 9 days. Their results revealed that children with two active parents were almost six times as likely to be active as those with parents who are sedentary.

Another important theoretical framework underlying the family influence model was the Eccles et al. expectancy-value model (Eccles & Harold, 1991). The major assumption of the expectancy-value model is that children's activity choices are dependent upon their expectations of success and focal personal values. This assumption was applied to the family influence model, focusing on parent's beliefs about participation in physical activity by their own child. An attempt to justify the application of the expectancy-value model was made by Dempsey et al. (1993). In their study, 71 fourth- and fifth-grade children and their parents (n=69) completed a survey questionnaire regarding value of MVPA, expectancies, perception of children's physical competence, goal orientations, and self-reported MVPA behavior. The study found that

the parents' perceptions of their children's physical competence were significantly related to children's MVPA participation.

Siblings are another important component of home environment in the family influence model. Considering the amount of time they spend together, the sibling's influence on children's physical activity participation is as important as parents or any other family members. According to a recent review of correlates of youth's physical activity by Sallis et al. (2000), physical activity participation of siblings was one of variables that were consistently associated with adolescents' physical activity behavior. In addition, Wold and Anderssen (1992) investigated the family and peer influence on sport participation by children and youth (n=39,086) in three European countries for a year. They found that siblings' sport participation is a significant indicator for children's participation in sports. The investigators of this study suggested that including siblings, as well as other family members, is important to enhance health promotion for children and youth.

Environment outside home, demographics, and family characteristics. The importance of other variables rather than parents' and siblings' variables in the family influence model is well expressed in the dynamical systems approach (Kamm, Thelen, & Jensen, 1990). According to this theory, human movement is a product of an entire system comprised of numerous components or subsystems which are constantly interacting and changing. From the dynamical systems perspective, children's physical activity participation can be influenced by many variables outside the home. For example, peers can significantly influence children's physical activity participation by serving as role models and supporters (Anderssen & Wold, 1992). Researchers also suggest that

teachers, as well as parents and peers, are another important social agent for children's sport socialization (Greendorfer, Blinde, & Pellegrini, 1986). Assuming that teachers and coaches are the core of physical education and sport programs, their influence on children's physical activity participation should not be ignored.

Research on children and physical activity has frequently shown that demographics such as age and gender of children and adolescents are significantly related to their physical activity choice, effort, and self-efficacy (Meaney, Dornier, & Owens, 2002). Also, Chase (2001) suggested that sex-role stereotyping of physical activity and sports becomes more predominant when children age. In addition, family characteristics such as family size and socioeconomic status also significantly influence children and youth's physical activity participation. Raudsepp and Viira (2000) attempted to examine the socio-cultural variability of physical activities of 475 urban adolescents ranging in age from 13 to 15, using 7-day physical activity recall. They found that family income was negatively correlated with the participants' physical activity levels. Other family variables such as ethnicity, family size/type, and location of living were also considered important for children's physical activity participation, as well as parents' beliefs and their physical activity behavior (Kimiecik et al., 1996).

Lee Model

Although the Kimiecik et al. model presented earlier in this chapter was very useful in suggesting research questions for the current study, their model is too complex for this application. Therefore, the investigator is presenting a simpler conceptual model to guide this study (see Figure 3). In the Lee model, children refer to both school-aged children and adults with intellectual disabilities.

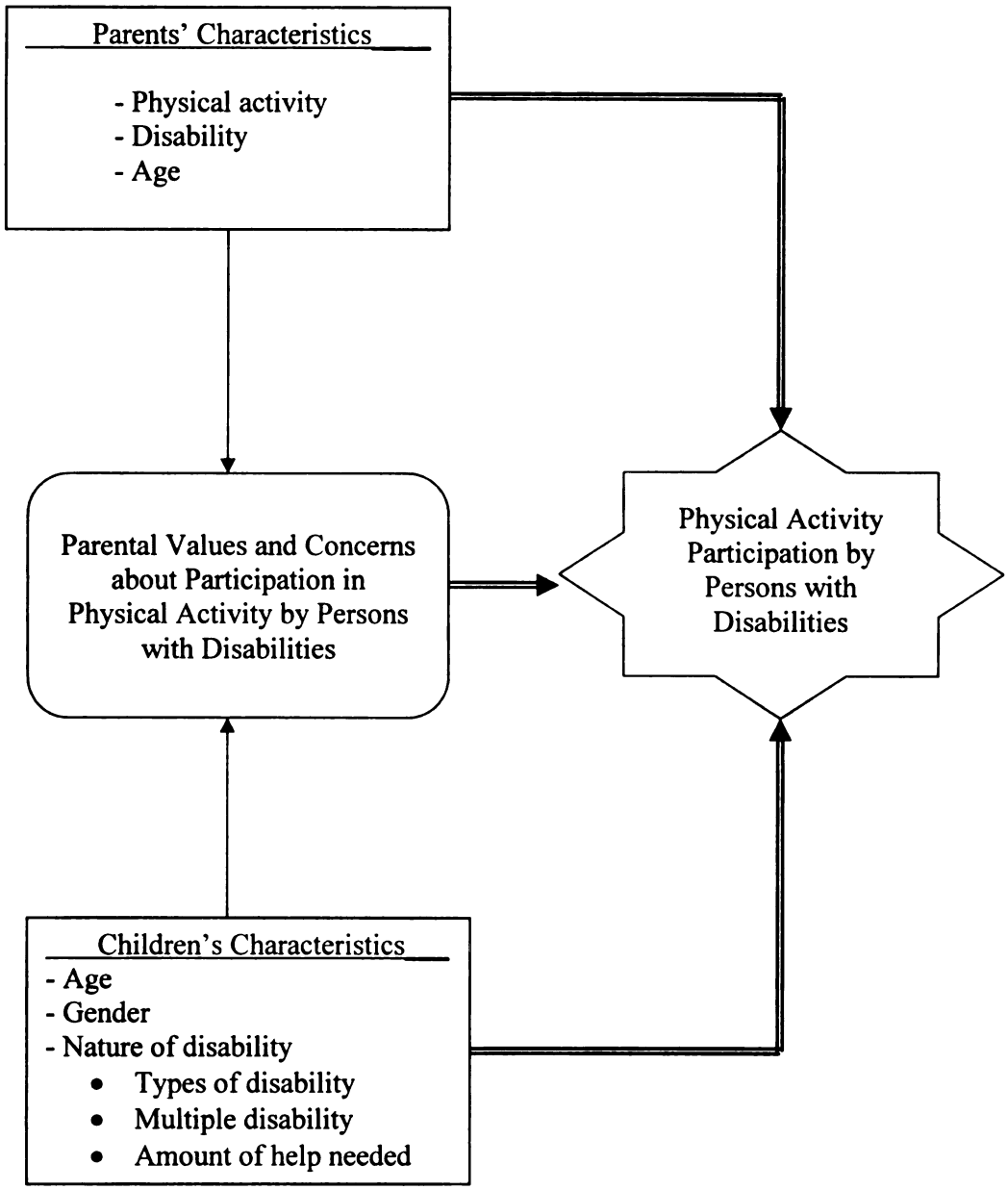

Figure 3. Lee Model of Parental Values and Concerns about Physical Activity Participation by Children with Intellectual Disabilities.

A unique aspect of the Lee model is parental influence on persons with intellectual disabilities, compared to the family influence model which focuses on parents of children who do not have disabilities. Unlike the family influence model, the core of the Lee model is parents' and children's disability related to parental values and concerns about physical activity participation by their children with intellectual disabilities. One of focuses in the Lee model is the influence of parents' disability on their own perceptions of physical values and barriers related to physical activity participation by their children with intellectual disabilities. Also, nature of children's disability is an important factor for parental values and concerns in this model. Parents may perceive their values and concerns differently based on types of intellectual disability (e.g., mental retardation, autism, and learning disability), existence of multiple disabilities, and amount of help needed in adaptive skill domains. In addition, the Lee model also assumes that parents of school-aged children may perceive physical activity values and concerns differently than parents of adults with intellectual disabilities. Although its is important in the family influence model, information related to siblings and family characteristics is not included in the Lee model to avoid the complexity of the application of the family influence model.

Along with parental values and concerns, the Lee model also hypothesizes determinants of physical activity participation by children and adults with intellectual disabilities. Demographic information such as parents' and children's age and gender was considered important for persons with intellectual disabilities. Another important factor in the Lee model is parents' physical activity, which is assumed to be significantly correlated to children's physical activity in previous research (Anderssen & Wold, 1992; Moore et al., 1991). Nature of children's disability is also an important factor for

children's physical activity in the Lee model. Disability-related factors include types of intellectual disability (e.g., mental retardation, autism, and learning disability), existence of multiple disabilities, and amount of help needed in adaptive skill areas (see the data reduction section for more information).

Also, children's body index mass (BMI) is assumed to be correlated to their physical activity participation in the Lee model. The Center for Disease Control and Prevention (U.S. Department of Health and Human Services, 2002) suggests that there is a significant relationship between overweight/obese and physical inactivity. Therefore, it seems logical to assume that persons with intellectual disabilities who have an ideal BMI are more likely to participate in physical activity than those who have a poor BMI. Finally, parental values and concerns about participation are also included, as an important determinant of physical activity participation by persons with intellectual disabilities, in this model. Since parents, in general, play a dominant role in shaping physical activity behavior of children, parents' perceived values and concerns about physical activity may significantly influence amount of participation in physical activity by children and adults with intellectual disabilities.

Although the two models presented in this chapter are distinctive to some extent, they have several similarities in the relationship between parents and their children both with and without a disability. First, parents play a significant role in children's physical activity participation. Especially, parents' physical activity is the key to the parent's belief system including parental values and concerns. Parent' physical activity is also an important factor that influences children's physical activity participation. Second, both models highlight the importance of children's physical activity participation. Regardless

of disability, parents perceive that physical activity is essential for their children because of positive effects of participation in physical activity. Lastly, demographic information is assumed to influence parent's belief system and physical activity in both models. Age associated with parents and children can be the important factors that influence parental values and concerns about physical activity participation by children both with and without a disability. Also, such the demographic information can significantly influence children' physical activity participation, regardless of the presence of disability.

Parental Influence on Children's Physical Activity Participation

Physical activity participation by children both with and without a disability can be significantly influenced by their parents in many ways. Parental attributes such as parental beliefs, attitudes, and encouragements are known to be closely associated with youth physical activity participation. Also, parents' physical activity behavior is likely to be related to children's participation in physical activity. This section presents rationales for why and how parents influence their own child to participate in physical activity. Since only two published studies on parents of youth with a disability are available to date, the majority of research studies reviewed here focus on parents and youth without a disability. Types of parental influence reviewed here include parental beliefs, attitudes, and encouragement and parents' physical activity levels.

Influence of Parental Beliefs/Attitudes

Parental belief systems related to children's physical activity participation were first explored by Dempsey et al. (1993). In this study, the investigators examined parental belief system variables related to children's beliefs and their moderate to vigorous physical activity participation, based on Eccles' expectancy-value model. The hypothesis

underlying their model is that children's moderate to vigorous physical activity is influenced more by their parents' beliefs about values of exercise for their children, success expectancies and goals, and perceptions of their children's physical competence, than by parents' behavior. Seventy one fourth- and fifth-grade children (35 girls and 36 boys) and their parents (n=69) completed questionnaires regarding the belief systems of both children and parents. A self-reported moderate to vigorous physical activity was also assessed by both children and parents. Results revealed that parents' perceptions of their children's moderate to vigorous physical activity competence were significantly related to children's moderate to vigorous physical activity participation. However, the study did not find a significant relationship between parents' moderate to vigorous physical activity and children's moderate to vigorous physical activity participation. This study concluded that parents' perceptions of their children's moderate to vigorous physical activity competence are more important to children's activity levels than parents' physical activity behavior.

The relationship between parental beliefs and children's physical activity participation was more explored by two follow-up studies (Kimiecik et al., 1996; Kimiecik & Horn, 1998). Both studies were guided by the family influence model in which home environment (e.g., parents and siblings) was the main focus. In the former study, Kimiecik et al. attempted to examine relationships among children's beliefs, perceptions of their parents' beliefs, and their moderate to vigorous physical activity. Eighty one children ranging in age from 11 to 15 (26 girls and 55 boys) completed a series of self-reported questionnaire (fitness value, perceived fitness competence, goal orientation, and children's perceptions of parental beliefs). A one-on-one interview was

administered to children to assess their level of moderate to vigorous physical activity. This study found that children's perceptions of their parents' beliefs about them and their own beliefs about moderate to vigorous physical activity were significantly related, although the relationship between children's perceptions of their parents' beliefs and their moderate to vigorous physical activity was not significant. The investigators suggested that parents' beliefs about their child can significantly influence the child's beliefs about his/her moderate to vigorous physical activity.

Assuming that parental belief systems are important for determining children's participation in physical activity, Kimiecik and Horn (1998) also explored the family influence model to examine the role of parental beliefs in children's moderate to vigorous physical activity. The investigators used the sample of children from their previous study (Kimiecik et al., 1996) and 142 parents (79 mothers and 63 fathers). The parents of this study completed questionnaires regarding fitness value for children, parents' perceptions of their children's physical competence, definitions of success, reasons for children's participation, and parents' moderate to vigorous physical activity behavior. Children's moderate to vigorous physical activity was also assessed. Results revealed that parental beliefs about their children's perceived competence and a task orientation were significantly related to the amount of children's moderate to vigorous physical activity participation. Also, mothers and fathers differed in their beliefs about their children's moderate to vigorous physical activity. However, no relationship existed between parent's exercise behavior and children's moderate to vigorous physical activity participation. This study suggested that parental beliefs are an important part of the

psychosocial process underlying children's participation in fitness-oriented physical activity.

Although little is known about parental beliefs/attitudes related to physical activity participation by youth with a disability, a study conducted by Boas, Danduran, and McColley (1999) showed some evidence that differences in parental beliefs/attitudes between parents of youth with chronic disease and those of healthy youth exist. Their study examined parental perceptions about exercise in youth with cystic fibrosis and healthy youth. Sixty-nine parents of children and adolescents with cystic fibrosis (age: 5-18) and 70 parents of healthy children and adolescents at the same age completed a survey questionnaire regarding exercise benefits and barriers to physical activity participation by youth with cystic fibrosis. Parental attitudes were determined by the total score of both benefit and barrier scores. Results revealed that parents of youth with cystic fibrosis rated the barrier portion higher and the benefit portion lower than parents who have healthy children. Their study also found that the presence of a healthy sibling was positively related to participants' scoring on the benefit portion; thereby the total score. The investigators suggested that parents of children with cystic fibrosis perceived fewer benefits of and experience greater barriers to exercise than parents who have healthy children. They also noted that more barriers perceived by parents reflect lack of parental support toward physical activity participation by their own child with cystic fibrosis.

Influence of Parental Encouragement

Parental encouragement levels seem also important to children's physical activity involvement. Brustad (1993) conducted a study examining the influence of parental socialization and children's psychological characteristics on attraction to physical activity.

Eighty-one fourth grade children (39 boys and 42 girls) and their parents participated in this study. All children completed questionnaires assessing perceived physical competence and attraction to physical activity; whereas, parents completed questionnaires regarding parental encouragement, parental enjoyment of physical activity, parental fitness, and importance of physical activity. A path analysis was conducted to test the hypothesized interrelationships among socialization, psychological, and attraction to physical activity variables. The investigators found a link between higher parental encouragement and greater perceived competence for children while perceived physical competence was the most important variable in children's attraction to physical activity. The study concluded that children's attraction to physical activity is significantly influenced by psychosocial factors such as parental encouragement and children's perceived competence, as well as demographic characteristics (e.g., child's gender).

Parental encouragement is also important for physical activity participation by youth with a disability. However, concerning disability-related barriers, parents may perceive physical activity or sport participation by their own child with a disability differently. Nixon (1988) attempted to determine the nature of parental encouragement and the sports involvement of children and adolescents with a disability. He conducted a qualitative study to describe how parents encourage or discourage sport participation by their children with visual impairment. An open-ended and in-depth interview was administered to 24 parents (15 mothers and 9 fathers) of youth with visual impairment (age: 7-19) and 14 professionals and volunteers in disability. The study identified four major types of parental encouragement and discouragement: (a) strong encouragers (5 of 16 families); (b) weak encouragers (6 of 16 families); (c) tolerators (2 of 16 families);

and (d) discouragers (3 of 16 families). Regarding the effects of parents on sports involvement, the limited amount of strong parental encouragement, as well as the limited involvement in organized competitive sport was reported. The investigator also noted that parents may be less intense about encouraging their child with visual impairment to participate in sports because of many reasons (i.e., safety, schoolwork, cost, time, etc.).

More recently and closely related to the present study, Goodwin, Fitzpatrick, and Thurmeier (2004) conducted a qualitative study to examine the decision making process of parents when encouraging their children with developmental disabilities to participate in Special Olympics. The investigators sought parents' meaning of Special Olympics participation by their children with developmental disabilities and factors that influenced the decision making process of parents. The investigators interviewed 12 mothers and 6 fathers (age range from 39 to 69 years) regarding the meaning of children's participation in Special Olympics to parents and families. Their results indicated that parents encouraged their children with developmental disabilities to participate in Special Olympics for several reasons: (a) thoughtful instruction; (b) finding the fit; and (c) sense of place. The parents of their study sought valuable and supportive instruction in Special Olympics participation by their children with developmental disabilities. The parents also sought skill development, promoting goal planning and achievement, internal motivation in their children's participation in Special Olympics. In addition, the parents perceived that Special Olympics provides a safe place for developing behavioral autonomy and for psychologically empowering children and their parents. The investigators suggested that Special Olympics met parents' needs for their children with developmental disabilities by providing an opportunity to receive valuable and supportive instruction, to develop self-

determined behaviors, to improve psychological well-being, and to feel successful to the participants.

Influence of Parent's Physical Activity

Parents' physical activity levels also reflect parental influence on children's physical activity participation. Many researchers attempted to determine the relationship between parents' physical activity behavior and children's participation in physical activity and sport/leisure activity (Anderssen & Wold, 1992; Dempsey et al., 1993; Kimiecik & Horn, 1998; McMurray et al., 1993; Moore et al., 1991). However, results of previous research are not consistent. Some studies found a significant relationship between parents' physical activity levels and children's physical activity participation (Anderssen & Wold, 1992; Moore et al., 1991); whereas, some found no significance in the relationship (Dempsey et al., 1993; Kimiecik & Horn, 1998; McMurray et al., 1993). Despite the mixed research findings, it seems important to review the research literature on the positive effects of parents' physical activity behavior on children's physical activity behavior for better understanding of parental influence.

Moore et al. (1991) conducted a study to investigate the relationship between parents' and children's physical activity levels. The participants of this study were 191 parents (99 mothers and 92 fathers) and 100 children (37 girls and 63 boys) ranging in age from 4 to 7 who participated in the Framingham Children's Study for 1 year. The physical activity levels of both parents and children were assessed for 7.7 to 10 hours a day, using a mechanical device, the Caltrac accelerometer, which was designed to respond to subtle and vigorous movements. A major finding of this study was that when both parents were active, their children were 5.8 times as likely to be active as those of

inactive parents. Their results supported the role modeling hypothesis that children whose parents are more physically active are more likely to be physically active than those whose parents are less physically active.

Another study conducted by Anderssen and Wold (1992) also supports the role modeling hypothesis. In their study, influence from parents and peers on adolescents' self-reported level of leisure activity was examined. A sample of 904 seventh grade youth ranging (498 boys and 406 girls) completed a series of questionnaires regarding perceived leisure activity of parents and peers, perceived direct support for physical activity from parents and peers, direct help from parents in exercising vigorously, and perceived value of physical activity of parents and peers. Results revealed that parents' and peer physical activity and their support are strongly associated with the adolescents' physical activity levels with gender differences. This study suggested that significant others such as parents and peers have a significant impact on youth in promoting physical activity by serving as a role model and supporter.

In sum, research provides evidence that physical activity participation by youth both with and without a disability is significantly associated with parental influence. The relationship between parental beliefs and attitudes and children's physical activity participation has been consistent in literature although parents of youth with a disability may perceive it differently than those of youth without a disability due to disability-related barriers. Also, parental encouragement has an important impact on increasing physical activity participation by youth both with and without a disability. However, the level of parental encouragement may be influenced by nature and severity of children's

disability. In addition, parents' physical activity level should be taken into consideration when investigating parental influence on children's physical activity participation.

Synthesis

The section presents synthesis of review of literature explaining why and how the variables of the study are selected. Independent variables related to literature review are discussed, followed by dependent variables.

Independent Variables

Parents' age. Traditionally, parents' age has not been considered important in children's physical activity. As a consequence, very little is known about the relationship between parents' age and physical activity participation by children with intellectual disabilities. However, some researchers suggest that parents' age may be an important determinant of children's physical activity (Kimiecik & Horn, 1998). Therefore, this study selected parents' age as an important factor that influences physical activity participation by children with intellectual disabilities.

Parents' disability. Parents who have a disability may have additional limitations when parenting their child with a disability. Given the fact that they are: (a) more likely to be a single parent; (b) less likely to be educated; (c) more likely to be under-employed; and (d) more likely to suffer from poverty (National Health Interview Survey on Disability, 2002), parents with a disability may significantly influence their child with a disability, as well as themselves, in many ways. For example, some parents with a disability who are less educated may not know the benefits of physical activity; thus, they may have different perception of parental values than parents who are more educated.

Also, parents who suffer from poverty may not be able to encourage their child with a disability to participate in a physical activity program because of cost.

Parents' physical activity. Parents' previous and current experiences in physical activity can significantly influence parental encouragement for their own child with a disability. Children whose parents are physical active are likely to be physically active (Moore et al., 1991). Research on youth sports also suggests that parents who have experiences in varsity sports tend to expect their children to follow in their footsteps (Cumming & Ewing, 2002). Therefore, parents' physical activity may be an important determinant of children's physical activity.

Children's age. Age is an important factor that affects the levels of physical activity participation in children with a disability (Brown & Gordon, 1987; Longmuir & Bar-Or, 2000; Winnick, 1985). Parents' behaviors and beliefs about physical activity would have a greater impact on the physical activity behavior of young children than they would on the behavior of the adolescents (Horn & Weiss, 1991; Sallis et al., 2000; Weiss, Ebbeck, & Horn, 1997). Therefore, parents of school-aged children may perceive physical activity values and concerns differently than parents of adults with intellectual disabilities.

Children's gender. Although it is important, gender differences in physical activity participation by persons with intellectual disabilities have not been explored in depth (Chanias et al., 1998). As indicated in the family influence model (Kimiecik & Horn, 1998), gender variations in children's physical activity participation should be taken into consideration. Therefore, children's gender is included as a factor that may

influence parental values and concerns about participation in physical activity by their children with intellectual disabilities in this study.

Type of intellectual disability. Research showed that the impact of physical activity participation on persons with disabilities varied across different types of disabilities (Compton, Eisenman, & Henderson, 1989). Although it is not clear, certain type of intellectual disabilities may be more vulnerable to some benefits of physical activity than other types. In the present study, types of children's disability are limited to mental retardation, autism/Asperger's syndrome, and learning disability. Determining differences of parental values and concerns, as well as children's physical activity across these types of disability is one of the main focuses of this study.

Multiple disability. In this study, multiple disabilities refer to having one or more additional disabilities besides an intellectual disability (e.g., mental retardation, autism/Asperger's syndrome, and learning disability) as a primary disability. Although the prevalence of multiple disabilities in persons with an intellectual disability is unknown to date, it is not uncommon to see an intellectual disability coupled with one or two additional disabilities (e.g., mental retardation with hearing loss, seizures, physical impairment, etc.). The recent data from Lee and Dummer's study (2003) on parents of persons with cognitive disabilities showed that 42.9% of parents had a child with intellectual disabilities (n=35) who had one or more additional disabilities. This suggests that without considering the influence of multiple disabilities, the study of parental values and concerns about physical activity participation by persons with intellectual disabilities may not be completed. Therefore, degree of children's multiple disabilities with regard to parental values and concerns should be investigated in this study.

Severity of disability. In this study, severity of disability represents amount of help that children with intellectual disability need in adaptive skill domains. Research suggests that severity of disability is generally more influential in predicting the level of physical activity participation by persons with a disability than other factors (Hedrick & Broadbent, 1996). Also, it seems reasonable to assume that parents of children with a more severe disability have more concerns about children's physical activity participation than parents of children with a less severe disability due to physical limitation. For this reason, amount of help needed in children with intellectual disabilities may significantly influence parental values and concerns, as well as children's physical activity.

Children's BMI. Children's BMI is selected to determine its association with children's physical activity participation. Research suggests that physical activity can be an important tool to control the body composition of persons with intellectual disabilities (Skrobak-Kaczynski & Vavik, 1980). However, lack of research on this area has led to inconclusive effects of physical activity participation on persons with intellectual disabilities. Therefore, it seems important to determine the relationship between children's BMI and their physical activity participation.

Dependent Variables

Parental values. It is important to understand parental values because they reflect parental reasons for why they encourage their child with a disability to participate in physical activity. Although little is known about how parental values influence physical activity participation by children and adults with intellectual disabilities, some evidence indicates that the perceived importance of physical activity by parents is likely to affect parental encouragement for their children without a disability to be physically active

(Brustad, 1993). For children and adolescents with a disability, parental values are even more important. Since parents play a dominant role in shaping the physical activity participation decision of their children with disabilities (Howard & Madrigal, 1990), parental values may be a valuable source to predict physical activity participation by children with intellectual disabilities. Parental values were identified based on a pilot study and extensive review of literature on physical activity values (Kimiecik et al., 1996; Lee & Dummer, 2003; Sechrist, Walker, & Pender, 1987). These values included health and psychosocial benefits, improving physical fitness levels and sport/leisure skills, having fun, and developing skills for activities of daily living.

Parental concerns. Parental concerns in this study refer to obstacles or barriers to physical activity participation by persons with intellectual disabilities. In general, persons with a disability have more obstacles or barriers to physical activity participation, which in turn, significantly influence their physical activity participation (Shifflett, Cator, & Megginson, 1994). Similarly, parents of children with a disability may have more concerns about children's physical activity participation than parents of children without a disability due to mental and physical limitation (Lee & Dummer, 2003). The parental concerns identified in this study include safety/supervision, program philosophy, quality of teaching or coaching, accessibility, availability, cost, transportation, and child care.

Children's physical activity. Along with parental values and concerns, amount of participation in physical activity by persons with intellectual disabilities is also an important variable in this study. In fact, the primary reason to investigate parental values and concerns is to see how parents influence children's physical activity. Therefore, without knowing the actual amount of children's physical activity in relation to parental

values and concerns, this study is meaningless. However, parental values and concerns alone do not explain physical activity participation by persons with intellectual disabilities. Many researchers suggest that physical activity participation by children both with and without disabilities is influenced by many factors (Anderssen & Wold, 1992; Brown & Gordon, 1987; Kimiecik & Horn, 1998; Longmuir & Bar-Or, 2000; Moore et al., 1991; Winnick, 1985). These factors include parents' age and physical activity, as well as children's age, disability, and BMI. Therefore, the importance of investigating possible determinants of children's physical activity cannot be ignored in this study.

CHAPTER 3

METHODS

The purposes of the present study were to: (a) examine parental values and concerns about participation in physical activity by their children with intellectual disabilities; and (b) identify correlates of physical activity participation by children and adults with intellectual disabilities. Hypothesized correlates of children's physical activity included parental values and concerns, parents' age, parents' physical activity, children's age, degree of multiple disabilities, amount of help needed in children, and children's BMI.

Research Design

The present study was descriptive research in which data were obtained from a nonrandom sample of parents of persons with intellectual disabilities who were in attendance at the Michigan Special Olympics Summer Games in 2004. This study used an investigator-developed survey that included questions on values, concerns, and demographic characteristics, as well as portions of the Amherst Health and Activity Study (Sallis, Taylor, Dowda, Freedson, & Pate, 2002) on children's physical activity, and the San Diego Health and Exercise Survey (Sallis, Hovell, Hofstetter, et al., 1989) on parents' physicals activity.

Minimizing Threats to Internal Validity

Likely threats to internal validity in this study included history, testing, instrumentation, expectancy, and mortality. Other threats to internal validity such as selection bias, statistical regression, and selection-maturation interaction did not apply to

this study because there were no experimental groups. Attempts to minimize these threats to internal validity in this study are discussed in the following paragraphs.

History, as a threat to internal validity, refers to the effects of unintended events on the outcomes of the study. For example, a parent may be disturbed by another person or event while completing the survey and this disruption may affect her/his responses to the survey. The likelihood of such a disruption was minimized by administering the survey at a time when parents were not busy. In this study, surveys were administered at four sites of the Michigan Special Olympics Summer Games: (a) a parent/family tailgate party; (b) the opening ceremonies; (c) the concourse area of the primary competition venue; and (d) sport competition venues. Parents were asked to complete the survey during the registration period for the tailgate party, before the opening ceremonies, or prior to their child's competition.

Another possible threat to internal validity was the problem of instrumentation. Instrumentation is a threat in survey studies if questions are not clearly written, if the survey is poorly formatted, or if the survey is so long that respondents become bored or fatigued while answering questions. To minimize the threat of instrumentation, several steps were taken. First, the questions about physical activity of parents and children were taken from published surveys that have yielded valid and reliable results in previous research (Hofstetter, Hovell, Macera, Sallis, Spry, Barrington, et al., 1991; Hovell, Hofstetter, Sallis, Rauh, & Barrington, 1992; Sallis et al., 1989; Sallis et al., 2002; Trost, Pate, Sallis, Freedson, Taylor, Dowda, et al., 2002). Second, the survey items of parental values and concerns related to physical activity participation by children both with and without disabilities were drawn from literature (Grimes & French, 1987; Kimiecik et al.,

1996; Lee & Dummer, 2003; Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004; Rimmer, Rubin, & Braddock, 2000; Sallis et al., 1989; Sechrist et al., 1987; Shifflett et al., 1994). To insure clarity, the survey questions were revised following review by members of the investigator's dissertation committee, university faculty members, and both graduate and undergraduate students. The technical features of the survey (e.g., layout, white space, question numbering and ordering) were reviewed by an expert in survey design and graduate students in a course on survey design.

Expectancy may be a threat in a survey study if leading questions are used. A leading question encourages respondents to give answers that are desired by the investigator. For example, suppose a researcher wants to know the importance of several benefits (i.e., fitness, psychosocial well-being, improving sport skills, etc.) of physical activity participation by children with intellectual disabilities. In this study, parents might perceive all the benefits as equally important unless the questions were asked in a manner that focuses on relative importance of physical activity benefits. Therefore, to minimize the threat of expectancy, a Likert scale was used to determine the relative importance of parental values and concerns. Also, the review of test items by others helped avoid leading questions.

The last likely threat to internal validity was participant mortality. In this study, mortality referred to the loss of data when participants chose not to answer certain questions or when they chose not to participate in the study at all, especially if those choices led to a biased sample or biased results. To minimize the threat of mortality, the investigator and other survey administrators motivated parents to participate in this study by emphasizing potential benefits of this study for parents and their children with

intellectual disabilities, and promising to submit the results of the study for posting on the Special Olympics Michigan website (www.somi.org).

Minimizing Threats to External Validity

A non-representative sample was the most likely threat to external validity in this study. This problem tends to occur when participants are selected on some basis other than random assignment. In the present study, the investigator used a convenience sample of parents of participants in a university-sponsored physical activity program for persons with disabilities when testing the validity and reliability of the survey instrument (described in Appendix A). Also, the investigator used a convenience sample of parents of children with intellectual disabilities who attended the Michigan Special Olympics Summer Games. In both cases, parents had children who had been involved in a physical activity program; therefore, this study was limited in the extent to which the results might be generalized to the general population of parents who have children with intellectual disabilities.

Participants

Two samples of participants were used in this study. The first sample was used in a pilot study of the psychometric properties of the survey instrument and is further discussed in Appendix A. The primary sample included two groups: (a) parents of children with intellectual disabilities who were attendance in the Michigan Special Olympics Summer Games and (b) parents of the Sport Skills Program and Autism Society of Lansing (the pilot sample). The primary sample was used to collect data related to the research questions. All children in this study had an intellectual disability.

Selection Criteria

The sample selection criteria were that: (a) parents must have a child with an intellectual disability (some were adults); and (b) the child, regardless of the child's age, must live at home with his or her parents. Intellectual disability was defined as functional limitations in both general learning (such as IQ) and in adaptive skills. This study used three categories of intellectual disability; that is, mental retardation/Down syndrome, autism/Asperger's syndrome, and learning disability. Behavioral disability such as ADD/ADHD was not considered as an intellectual disability in this study because it did not meet the eligibility for Special Olympics participation (Special Olympics International, 2004). Therefore, ADD/ADHD was excluded as a primary intellectual disability.

Recruitment

The majority of participants (n=163) in this study were recruited during the Michigan Special Olympics Summer Games. These parents were contacted in four ways. Recruitment strategies included:

1. Parents who attended a parent/family tailgate party and parent/family reception were invited to participate in this study. The investigator set up a table and signage by the registration area of the tailgate party. The investigator and trained survey administrators individually contacted parents who were waiting for registration. Parents who met the selection criteria were asked to complete and return the survey.
2. Parents sitting in the bleachers during an hour prior to the start of opening ceremonies were invited to participate in this study. The investigator and survey

administrators contacted the potential parents individually and asked them to complete and return the survey.

3. The investigator also set up a table and signage in the concourse area of the primary competition venue during the games and invited parents to participate in this study.
4. Parents who were sitting in the bleachers of competition venues (i.e., swimming pool, track and field, bowling arena, gym, etc.) were also invited to participate in the study. All parents who met the criteria were contacted by the investigator and survey administrators individually and asked to complete and return the survey.

Regardless of the method of recruitment, parents who agree to participate received a survey packet including a consent form and a survey. The consent form (see Appendix B) described the purpose of research, benefits for participants, confidentiality, and contact information for the investigator.

Sample Size

A power analysis was conducted to estimate a potential sample size. The number of participants needed for survey research with Type I error set at .05, bound of error set at .10, and variance set at .67, was 150 parents (Kalton, 1983). The estimated number of parents at the 2004 Michigan Special Olympics Summer Games was 500 in spectator roles and 225 in coach/chaperone roles. Therefore, the number of parents in attendance at the games was adequate for the purpose of this study. Data about the actual sample are reported in the results chapter.

Instrumentation

The survey instrument used in this study (see Appendix D) included six sections: (a) parental values; (b) parental concerns; (c) child's physical activity; (d) parent's physical activity; (e) participation in the Special Olympics program; and (f) demographic information.

Parental Values

Parental values in this study refer to the parent's understanding of ways in which her/his child with an intellectual disability are likely to benefit from participation in physical activity, as well as the importance the parent assigns to each benefit. The inventory of parental values reflected the factors that were identified in the investigator's previous study (Lee & Dummer, 2003), namely fun, psychological well-being, socialization, sport/leisure skills, skills for activities of daily living, socialization, and health. These factors have also been considered important in other research studies on parental influence and physical activity benefits (Kimiecik et al., 1996; Sechrist et al., 1987). Each factor was represented by one or more benefits of participation in physical activity, i.e., "fun," "more friends," "better self-concept," "improving sport/leisure skills," "improving ability to perform activities of daily living," "improving cardiovascular endurance," and "better general health." All survey items, except for fun, were given with practical examples to avoid ambiguity in definition. For example, *improving cardiovascular endurance* was defined as "stamina, ability to do more work with less fatigue," and *better self-concept* was defined as "feeling good about self." There were 21 survey items related to parental values.

Two major questions were asked about each survey item. The first question dealt with the parent's opinions about ways in which her or his child with a disability was likely to benefit from participation in physical activity (likely benefits); whereas, the other question asked about the importance of that benefit for her or his child with a disability (important benefits). For the likely benefits, each item was rated by a 4-point forced-choice Likert-type scale in which 4 = *strongly agree*, 3 = *agree*, 2 = *disagree*, and 1 = *strongly disagree*. The important benefits, on the other hand, was rated by a 4-point importance scale in which 4 = *extremely important*, 3 = *important*, 2 = *somewhat important*, and 1 = *not important*. Two additional questions were asked to determine whether parents wished to suggest any additional benefits and to list the three most important benefits of physical activity participation by their children with intellectual disabilities.

Parental Concerns

Parental concerns in this study refer to barriers to children's physical activity participation as perceived by parents of children with intellectual disabilities. The inventory of parental concerns consisted of 17 items related to parental concerns and barriers to physical activity participation. These concerns and barriers have been identified in the investigator's previous research on parental values and concerns about physical activity participation by children with intellectual disabilities (Lee & Dummer, 2003) and other research studies on barriers to physical activity participation by children both with and without disabilities (Grimes & French, 1987; Rimmer et al., 2004; Rimmer et al., 2000; Sallis et al., 1989; Sechrist et al., 1987; Shifflett et al., 1994). Parental concerns mentioned in the survey included awareness of programs, availability of

programs, matching program activities to child's interests, accommodation, program philosophy, supervision/safety, cost, transportation, accessibility, quality of teachers/coaches/staff, lack of social acceptance by teachers/coaches/staff, participation with friends, personal assistants, lack of time (for parents and children), and child care. In the section of parental concerns, parents were asked about how much concerns and barriers had influenced their children with disabilities on their physical activity participation. A 3-point forced-choice scale was used to determine how significantly each parental concern or barrier had affected physical activity participation by their children with intellectual disabilities. Each item of parental concerns was scored as 1 = *not a concern,* 2 = *a concern,* and 3 = *prevents participation.* Two additional questions were asked to determine whether parents wished to suggest any additional concerns and to list the three most significant concerns related to physical activity participation by their children with intellectual disabilities.

Children's Physical Activity

The level of physical activity participation by children with cognitive disabilities was determined by a modified 7-day recall physical activity of Amherst Health and Activity Study (AHA) developed by Sallis et al. (2002) at the University of Massachusetts Amherst. The AHA is an adult survey of children's health habits consisting of 50 questions of physical activity and other health habits (e.g., diet). For the present study, only the physical activity section of the AHA was used. Since physical activity participation was the main interest of this study, sedentary activities (e.g., computer, reading, talking on the phone, etc.) were excluded. Therefore, 39 types of physical activity were identified and listed for parents to recall and indicate how many

days and minutes their child participated in each activity. The total minutes of all activities were then converted into physical activity levels. The level of children's physical activity participation was classified into sedentary and active categories based upon physical activity guidelines recommended from the Surgeon General's report on physical activity (U.S. Department of Health and Human Services, 2004).

The data related to children's physical activity were reduced for data analyses. As the first step, the total minutes of physical activity participation by children with intellectual disabilities were obtained by adding their participation in all activities in the past 7 days and minutes (refer to the survey question #8 in Appendix D). Then, a new variable was created, indicating *sedentary* and *active* in physical activity behavior. According to physical activity guidelines for children (U.S. Department of Health and Human Services, 2004), children should engage in a variety of age-appropriate and developmental activities for 30-60 minutes a day, most days of the week; therefore, 210 minutes per week was established as a minimum value for being active children.

Although the AHA has not been used for parents of children with disabilities, a recent study conducted by Sallis et al. (2002) supported the reliability of the instrument. In their study, the test-retest reliability of most parent-reported correlates of physical activity participation by youth without disabilities ranged from .68 to 1.00. Only one variable (diet quality) was .55. Also, the internal consistency of items regarding social variables and peer influences was .74 and .78, which also provided evidence of reliability. For the present study, the test-retest reliability of children's and parents' physical activity was assessed. The results of the test-retest reliability are presented in the section of psychometric evaluation on the instrument (pp. 70).

Parents' Physical Activity

The physical activity section of the San Diego Health and Exercise Survey (SDHES) developed by Sallis et al. (1989) was used to determine the parent's current and past experiences in physical activity involvement. A 3-item 7-day physical activity recall was implemented. More specifically, the participants of this study were asked about how many days and minutes they participated in 25 types of physical activity (e.g., aerobic exercise, fitness activities, sports, recreational activities, and vigorous housework) in the past 7 days. The data reduction methods were same as in children's physical activity (refer to the survey question #12 in Appendix D). The U.S. Department of Health and Human Services (2004) recommended that adults, as well as children, should participate in moderate-intensity physical activity for at least 30 minutes on 5 or more days of the week. Therefore, the total of 150 minutes per week was used as the cut-off point for being active parents in physical activity.

Special Olympics Participation

Two questions specifically related to participation in Special Olympics by persons with intellectual disabilities were added to the survey instrument as requested by the state Special Olympics officials. The section focused on how often an individual with an intellectual disability had participated in Special Olympics ever and in the past year. Twenty-eight types of Special Olympics sports and special programs, including winter and summer activities, were taken from the Special Olympics website (http://www.specialolympics.org). Because these questions were not related to the purposes of this study, the relating data are not presented in this dissertation.

Demographics

Children's age, gender, body size (height and weight), and disability (type and severity) were reported by parents, followed by parents' age, gender, and disability. For children's disability, three types of intellectual disability were listed including mental retardation/Down syndrome, autism, and learning disability. To determine the prevalence of multiple disabilities, additional disabilities were listed including ADD/ADHD, brain injury, vision loss, hearing loss, seizure condition, health condition (i.e., diabetes, heart problem, etc.), and physical disability (i.e., cerebral palsy, spina bifida, etc.). Parents were instructed to choose only one primary disability; however, parents could choose as many secondary disabilities as were applicable to their children. To determine the severity of children's disability, parents were asked about how likely their child needs help in 10 adaptive skill domains including communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academic, leisure, and work. There were three levels of the severity of children's disability, including seldom, occasionally, and usually needs help. For parent's disability, only the presence of their disability was asked. In addition, an open-ended question was available for parents to indicate their comments, suggestions, or recommendations regarding physical activity participation by children with intellectual disabilities.

Psychometric Properties of the Survey

Validity and reliability of the survey instrument were established for the present study. Content validity was the main focus of the instrument in this study. For reliability, the test-retest reliability and internal consistency were established. The reliability of the instrument was further discussed in the pilot study (see Appendix A). Additional

information about the pilot study is also incorporated throughout the methods chapter (e.g., sample, instrument, procedures, etc.).

Validity. The content validity of parental values was assessed and established in this study. The importance of 16 items related to physical activity benefits was evaluated by 8 faculty members in the department of Kinesiology at Michigan State University. The faculty were asked if each item is an important benefit of physical activity participation for children with disabilities, using a 4-point Likert scale in which 1 represents *strongly disagree*; whereas, 4 represents *strongly agree*. A rating of 3 or higher was required for item acceptance. Table 6 shows means and standard deviations of each item. All items were rated higher than 3, providing evidence of content validity for parental values. In addition, 5 additional benefits related to physical activity participation by children with disabilities were added based on the faculty suggestions. These items included joy of moving or doing sport skills, opportunity to participate in activities with friends, be independent and have time away from parents, gain recognition or feel special for accomplishments, and to win or be successful.

Although the parental concerns were not assessed in the pilot study, content validity of the parental concern-related items was supported by literature on barriers to physical activity participation by persons with disabilities (Grimes & French, 1987; Lee & Dummer, 2003; Rimmer et al., 2004; Rimmer et al., 2000; Sallis et al., 1989; Sechrist et al., 1987; Shifflett et al., 1994). The items of parental concerns selected in this study were identical with physical activity barriers found in previous research.

For the frequency of physical activity participation by parents and children with intellectual disabilities, a modified 7-day recall physical activity questionnaire was used

Table 6

Content Validity of Items Related to Parental Values

		Expert Ratings	
Items	*n*	*M*	*SD*
Fun	8	3.75	.46
Opportunity to make more friends	8	3.38	.52
Better social skills	8	3.63	.52
More opportunities to learn from teachers and coaches	8	3.25	.46
Better self-concept	8	3.50	.54
Better self-confidence	8	3.50	.54
Improving psychological skills	8	3.50	.54
Improving fundamental motor skills	8	3.50	.54
Improving sport and leisure skills	8	3.13	.35
Improving ability to perform activities of daily living	8	3.25	1.04
Improving cardiovascular endurance	8	3.75	.46
Improving muscular strength and endurance	8	3.88	.35
Improving flexibility	8	3.50	.54
Improving or maintaining good body composition	8	3.63	.52
Better general health	8	3.88	.35
Reduced risk of chronic disease	8	3.63	.52

Note. Expert rated the importance of each physical activity benefit using a 4-point Likert-type scale in which 1 corresponded to strongly disagree and 4 corresponded to strongly agree.

in this study. The concurrent validity of the 7-day recall physical activity questionnaire was investigated in a study conducted by Dishman and Steinhardt (1988). Their study found that a self-administered recall of physical activity was highly correlated with a concurrent 7-day exercise behavior diary (r=.82; p<.01). Also, Taylor, Coffey, Berra, Laffaldano, Casey, and Haskell (1984) found that a 7-day recall physical activity questionnaire accurately reflected actual physical activity behaviors such as energy expenditure and frequency of conditioning activities.

Reliability. Two types of reliability were assessed in this study; stability and internal consistency. The coefficient of stability and internal consistency was determined by the test-retest method and Cronbach's alpha, respectively. The pilot data (n=30) were used to determine the test-retest reliability (refer to Appendix A); whereas, the primary data (n=193) were used for the internal consistency of the survey items. The test-retest method revealed that the reliability coefficient of parental values/concerns, child/parent physical activity, and demographics ranged from .86 to 1.00 (Table 7). The values of reliability in the present study exceeded the Cronbach's alpha of .70 recommended for a multivariate data analysis (Hair, Anderson, Tatham, & Black, 1998). Therefore, it was concluded that the stability of the survey items in this study was acceptable.

Reliability of the 7-day recall physical activity questionnaire has been frequently measured and accepted in previous research (Dishman & Steinhardt, 1988; Hofstetter et al., 1991; Hoverll et al., 1992; Sallis et al., 2002). These previous studies found that the test-retest reliability of children's physical activity was higher than parents' physical activity (α=.99 and .84, respectively). However, this survey has never been used for parents of children with intellectual disabilities; therefore, an attempt was made to

Table 7

Test-Retest Reliability of Physical Activity Values and Concerns Survey

	n	α
Parental Values		
Likely Benefits	30	.96
Important Benefits	30	.95
Parental Concerns	30	.88
Physical Activity		
Children	30	.99
Parents	30	.86
Demographics		
Children		
Age	30	1.00
Gender	30	.96
BMI	30	.99
Disability		
Type of disability	30	.96
Severity of disability	30	.93
Parents		
Age	30	1.00
Gender	30	1.00
Disability	30	1.00

evaluate the reliability of parents' physical activity in this study, as well as that of children's physical activity. Results of the pilot study revealed a strong degree of the test-retest reliability for physical activity participation by children (α=.99) and their parents (α=.86).

Along with the test-retest reliability, the internal consistency of survey items within the scales of parental values and concerns. Internal consistency reflects how closely the survey items are correlated to the corresponding scale; thereby, an indication of reliability. Results indicated that the Cronbach's alpha of the likely benefits was .92; whereas that of the important benefits was .93. Also, parental concern items were internally consistent within the scale (α=.88).

In addition, the total correlation of each item provides insightful information about the item fit to the scale. The item-total correlations of parental values and concerns and their relationship with internal consistency are presented in Table 8 to 10. Results showed that most items were moderately or highly correlated with the corresponding scale except few (e.g., fun, joy of moving or doing sport skills, and opportunity to participate in activities with friends in the likely benefit scale, as well as fun in the important benefit scale). However, these items with low correlation coefficients did not significantly influence the Cronbach's alpha of each scale; therefore, they were included in the scales.

Overall the Physical Activity Values and Concerns Survey used in this study was proven to be valid and reliable for parents of persons with intellectual disabilities. The evaluation of parental value items in this study showed the content validity of parental values. Validity of parental concerns and physical activity sections were

Table 8

Relationship between Item Correlations and Internal Consistency of Likely Benefits

Likely Benefits	Item-total correlation	α if item deleted
Improve cardiovascular endurance	.74	.92
Better general health	.72	.92
Improve muscular strength and endurance	.71	.92
Improve flexibility	.69	.92
Reduced risk of chronic disease	.69	.92
Improve ability to perform activities of daily living	.68	.92
Improve sport and leisure skills	.67	.92
Improve or maintain good body composition	.65	.92
To win or be successful	.65	.92
Improve fundamental motor skills	.63	.92
Better self-confidence	.61	.92
Improve psychological skills	.61	.92
Gain recognition or feel special for accomplishments	.59	.92
Be independent and have time away from parents	.56	.92
Opportunity to participate in activities with friends	.54	.92
More opportunities to learn from teachers and coaches	.52	.92
Better self-concept	.51	.92
Better social skills	.48	.92
Opportunity to make new friends	.37	.93
Fun	.36	.92
Joy of moving or doing sport skills	.35	.93

Note. Internal Consistency (α) = .93

Table 9

Relationship between Item Correlations and Internal Consistency of Important Benefits

Important Benefits	Item-total correlation	α if item deleted
Improve flexibility	.76	.93
Better self-concept	.72	.93
Improve cardiovascular endurance	.69	.93
Better general health	.69	.93
Improve muscular strength and endurance	.69	.93
Improve fundamental motor skills	.68	.93
Improve psychological skills	.68	.93
More opportunities to learn from teachers and coaches	.68	.93
Better self-confidence	.67	.93
Improve sport and leisure skills	.66	.93
Improve or maintain good body composition	.65	.93
Opportunity to participate in activities with friends	.63	.93
Reduced risk of chronic disease	.61	.93
Improve ability to perform activities of daily living	.60	.93
Better social skills	.60	.93
Be independent and have time away from parents	.59	.93
To win or be successful	.51	.93
Opportunity to make new friends	.49	.93
Gain recognition or feel special for accomplishments	.46	.93
Joy of moving or doing sport skills	.46	.93
Fun	.34	.93

Note. Internal Consistency (α) = .93

Table 10

Relationship between Item Correlations and Internal Consistency of Parental Concerns

Parental Concerns	Item-total correlation	α if item deleted
Amount of supervision or other safety concerns	.69	.88
Acceptance by teachers/coaches/staff	.69	.88
Match of program philosophy or goals to my child's needs	.64	.88
Qualifications of teachers/coaches/staff to work with people who have disabilities	.62	.88
Qualifications of teachers/coaches/staff to teach the skills	.62	.88
Availability of persons assistants	.60	.88
Availability of programs in my community	.57	.88
Match of program schedule to my child's schedule	.56	.88
Match of program activities to my child's interests	.55	.88
Availability of disability accommodations needed by my child	.53	.88
Availability of transportation	.47	.89
Accessibility of the facility or equipment	.47	.89
Match of program schedule to parent's schedule	.44	.89
My awareness of programs in my community	.44	.89
Cost of the program	.41	.89
Participation by my child's friends in the program	.37	.89
Availability of child care for other children in my family	.36	.89

Note. Internal Consistency (α) = .89

supported by previous research. The test-retest reliability and internal consistency revealed that the survey instrument of the study was highly reliable. In addition, the final version of the survey instrument was reviewed by the dissertation committee members and Kinesiology doctoral students.

Procedures

Logistics

The investigator and survey administrators approached parents at a parent/family tailgate party, pre-opening ceremonies, concourse areas and sports competition venues. The following script was used:

"Hi! My name is _____ and I am a researcher (or research assistant) at Michigan State University. I am doing survey research on parental values and concerns about physical activity participation by children with disabilities. This study will be very helpful for physical activity professionals to develop and implement physical activity programs for people with disabilities in future. The survey will take 15-20 minutes. Do you have a child with a disability? Does this child live with you (if yes, continue; if no, stop the interview and thank him/her)? Would you complete the survey, please?"

Once parents agreed to participate in this study, the investigator distributed the survey packet to interested parents and waited for completed surveys.

Informed Consent

Informed consent in the present study consisted of the purpose of study, investigator, survey, voluntary participation, confidentiality, risk/benefits, and contact information (refer to Appendix B). It was instructed that consent would be assumed if parents completed and returned the survey. Confidentiality was emphasized by using

research designs wherein the participants were anonymous during the gathering and use of the data. In addition, the study was approved by the University Committee on Research Involving Human Subjects (UCRIHS, refer to Appendix B).

Survey Administrators

Twenty-two volunteers helped to administer surveys to parents at the Michigan Special Olympics Summer Games. The majority of these volunteers were undergraduate (n=13) and graduate students (n=7). Also, two additional volunteers (1 parent without a disability and 1 coach with a mild disability) were recruited throughout a university-sponsored physical activity program for persons with disabilities. The survey administrators of this study were recruited by several ways: (a) email; (b) telephone; and (c) personal contact. After the volunteers agreed to help, the investigator set up a meeting to train them. A training manual consisting of need-to-know information in survey administration was distributed to survey administrators (refer to Appendix E).

Data Management

Survey administrators were given a latched container (e.g., briefcase, plastic file, padlocked backpack) and instructed to place completed surveys in that container. The survey administrator then returned completed surveys to the investigator at a pre-designated time and place at the conclusion of data collection. All data collected were stored in locked cabinet in locked office. The security of the data was assured by the investigator on a daily basis. The data were accessed only by the investigator and dissertation committee members.

Data Analyses

Research Questions 1 and 2: Parental Values and Concerns

The first step in answering these research questions was to simply describe parental values and concerns. This was accomplished using descriptive statistics such as means, standard deviations, and frequencies of all items related to the likely benefits, important benefits, and parental concerns, followed by descriptive statistics of reduced data of these variables.

The goal of research question 1 and 2 is to determine differences in likely benefits, important benefits, and parental concerns as a function of parents' disability, children's age, children's gender, type of intellectual disability, severity of disability, and multiple disability using separate MANOVA tests for likely benefits, important benefits, and parental concerns. However, in this study, there were too many dependent and independent variables for MANOVA analyses given the sample size (n=193).

The number of dependent variables was reduced using separate factor analyses for the likely benefits, important benefits, and parental concerns scales. Since all items of each scale were internally correlated, an oblique rotation method was used to interpret the factors. As the first step, all dependent variables from the survey were entered into the factor analysis. Secondly, initial factors were extracted for each scale (likely benefits, important benefits, and parental concerns) based on factor loadings with eigenvalues greater than 1.0. A minimum loading of .50 was used as the criterion value in the interpretation of individual survey items for the likely benefits and parental concerns. Because of higher correlation coefficients, a minimum loading of .60 was used as the criterion value in the interpretation of individual survey items for the important benefits.

Next, items loaded on each factor were assessed for common characteristics. If a factor consisted of items with mixed characteristics, logic was used to create new sub factors. Finally, each factor was labeled. More information about factor analyses is presented in the results section.

The number of independent variable was reduced by conducting separate MANOVA analyses for the likely benefits, important benefits, and parental concerns scales using parents' disability, children's age, children's gender, type of intellectual disability, severity of disability, and multiple disability as independent variables and factors from the factor analyses as dependent variables. The two independent variables with the greatest significance for each survey scale were used as independent variables in subsequent analyses.

Finally, to answer research questions 1 and 2, separate MANOVA tests were conducted for the likely benefits, important benefits, and parental concerns scales using the two most significant independent variables for each problem and factors as dependent variables. All statistical tests were performed at .05 level of significance. Data analyses were conducted using the SPSS 11.0 for Windows.

Research Question 3: Determinants of Children's Physical Activity

As the first step in answering research question 3, descriptive statistics were used to describe physical activity by parents and their children with intellectual disabilities. Means, standard deviations, and range were used to describe the past 7-day physical activity in minutes. In addition, frequencies were used to determine the five most frequently mentioned physical activity types and to describe children's level of physical

activity in comparison to people of the same age and sex who do and do not have disabilities.

The main focus of research question 3 was to identify determinants of physical activity participation by children with intellectual disabilities. Possible correlates of children's physical activity included parents' age, parents' physical activity, multiple disability, severity of disability, children's BMI, likely benefits, important benefits, and parental concerns. The strategy was multiple regression analysis. In preparation for regression analysis, a single likely benefits score was created by summing parents' responses to the 21 likely benefits items. The same process was used to reduce parents' responses to the 21 important items to a single score and the 17 parental concerns to a single score.

To increase the power of the regression analysis, a check for multicollinearity across independent variables was conducted for each problem. Independent variables were dropped from the regression analysis in cases where there was significant multicollinearity. Three methods were used to assess multicollinearity: (a) correlation, (b) tolerance value; and (c) variance inflation factor (VIF). As the first step, the inter-correlations of independent variables were obtained through the correlation matrix. For more accurate assessment, the value of tolerance and VIF for each independent variable was obtained. Tolerance is the amount of variability of the selected independent variables not explained by the other independent variables (Hair et al., 1998); thus very small tolerance values reflect high multicollinearity. In addition, the VIF value is the inversed value of tolerance. In this study, the minimum tolerance value to exclude variables was set up at .833, which corresponded to a VIF value of 1.20. Finally, to answer research

question 3, a multiple regression analysis was conducted. All statistical analyses were performed at .05 level of significance. Data analyses were conducted using the SPSS 11.0 Windows.

CHAPTER 4

RESULTS

This section presents the participant characteristics and results of the data corresponding to the research questions in this study. The first research question of the study dealt with the relative importance of parental values related to physical activity participation by persons with intellectual disabilities. The main focus of the first research question was to compare parental values across parents of children with different characteristics (e.g., age, gender, disability). The second research question dealt with the relative importance of parental concerns about participation by persons with intellectual disabilities. The main focus was to compare parental concerns across different groups of parents. The main theme of the final research question was to identify determinants of children's physical activity participation.

A total of 240 surveys were distributed to the parents at the games and 178 were returned (a return rate of 74%). However, after review of survey responses, 15 surveys were excluded from the data analyses because the parents did not meet the selection criteria. Among the data excluded, 13 parents did not report intellectual disability as their child's primary disability (e.g., physical disability, health disability, sensory disability, etc.); whereas, 2 surveys were completed by a grandparent. Additionally, the members of the pilot sample (n=30) were added to the primary study. Therefore, the actual sample size was 193 parents of children with intellectual disabilities.

Participant Characteristics

Table 11 shows the characteristics of the parents in this study. The parents in the primary study ranged in age from 27 to 75 years (M=48.14; SD=9.21). There were 157

Table 11

Parent Characteristics in Frequencies by Gender

	Mother (n=157)	Father (n=32)	Total (n=189)
Parent age (years)			
27-43	40	5	45
44-60	100	21	121
61-76	16	6	22
Parent disability			
With disability	14	2	16
Without disability	143	30	173
Parent physical activity			
Active	115	24	139
Inactive	42	8	50

Note. More missing data were found in parent age (the total of 5 missing data).

mothers (83%) and 32 fathers (17%) participating in this study with 4 missing data. Regarding the distribution of parents at age levels, 64% of mothers and fathers fell into the age range of 44 to 60 years; whereas, 12% ranged in age from 61 to 76 years. For parents' disability, about 9% of parents themselves had disability, including autism/Asperger's syndrome (n=1), ADD/ADHD (n=2), arthritis (n=3), comprehensive problems (n=1), diabetes (n=1), heart condition (n=1), and orthopedic problems (n=4). Three parents did not identify the nature of their disabilities. In addition, physical activity behaviors in parents were determined by parents' self-reports about their own physical activity participation in the past 7 days (see the data reduction section for further information). About 74% of parents were active meaning that they participated in physical activity for at least 30 minutes on 5 or more days of the week; whereas, 26% were inactive.

Table 12 describes the characteristics of children with intellectual disabilities in this study. The children of parents in this study ranged in age from 6 to 45 years (M=17.59, SD=7.53). The mean age of school-aged children was 12.72 years with a standard deviation of 2.84; whereas, that of adults was 24.84 years with a standard deviation of 6.41. There were more males than females in both school-aged children (62%) and adults (56%) with intellectual disabilities. For disability, children in this study had one of three primary types of intellectual disability: (a) mental retardation/Down syndrome; (b) learning disabilities; and (c) autism/Asperger's syndrome. Mental retardation/Down syndrome was the most prevalent type of intellectual disability (60%). It was also more prevalent in adults (52%) than school-aged children (48%). The second most prevalent type of intellectual disability was autism/Asperger's syndrome (27%) in

Table 12

Characteristics of Children with Intellectual Disabilities

	Children of Parents in the Research Sample		
	School-Aged (n= 113)	Adult (n= 76)	Total (n= 189)
Age in Years			
Mean (*SD*)	12.72 (2.84)	24.84 (6.41)	17.59 (7.53)
Range	6-17	18-45	6-45
Gender			
Male	73	45	118
Female	40	31	71
Primary Intellectual Disability			
Mental retardation/Down syndrome	54	59	113
Autism/Asperger's syndrome	41	9	50
Learning disability	18	8	26
Multiple Disability			
Intellectual disability only	68	51	119
Multiple disability	45	25	70
BMI			
Underweight	1	3	4
Normal	44	25	69
Overweight	66	48	114
Severity of disability			
Mild	9	13	22
Moderate	85	53	138
Severe	19	10	29
Physical Activity			
Active	95	56	151
Inactive	18	20	38

which school-aged children were dominant (82%), compared to adults (18%). Learning disability was the least prevalent type of intellectual disability, as a primary disability in this study (13%). Similar to autism/Asperger's syndrome, school-aged children (69%) had more learning disability than adult (31%).

In general, it is not uncommon for a person with intellectual disability to have additional disabilities. Therefore, information about multiple disabilities in children was also obtained in addition to primary disability types. Multiple disabilities in this study referred to any additional disabilities besides the primary intellectual disability, including ADD/ADHD, physical disability, health condition, hearing loss, seizure, vision loss, and brain injury. Overall, 37% of the 189 children had multiple disabilities in this study. Among children with multiple disabilities, the three most common associated conditions were ADD/ADHD (35%), physical disability (18%), and health condition (16%).

The present study also evaluated the level of children's BMI based on their height in inches and weight in pounds. The following formula from the Centers for Diseases Control and Prevention (CDC) website (http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult-formula.htm) was used to calculate the BMI value for each child and adult.

$$\text{BMI} = \frac{\text{Weight in Pounds}}{(\text{Height in inches}) \times (\text{Height in inches})} \times 703$$

Next, the BMI data were transformed to three levels of body composition: (a) underweight; (b) normal; and (c) overweight (including obese in adults), based on the national reference data available on the website of the Center for Disease Control and Prevention (http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-means.htm). As recommended by the Center for Disease Control and Prevention, the categorization of the BMI data was

performed differently based on their age. For both male and female adults with intellectual disabilities, the national reference was used, providing the cut-off points for three levels of below 18.5, 18.5 to 24.9, and 25 BMI or more.

Children with intellectual disabilities, on the other hand, were categorized into one of three groups, based on the BMI for the gender-age-percentiles. The calculated BMI values of children in this study were compared to the national growth charts (Appendix C) specifically designed for boys' and girls' BMI (available at http://www.cdc.gov/growthcharts). Then the data were recoded manually, based on age and gender. According to the Center for Disease Control and Prevention, below the 5^{th} percentile of BMI correspond to underweight, the 85^{th} to 95^{th} percentile to at risk of overweight, and 95% percentile or greater to overweight. Therefore, in this study, children whose BMI was below 5^{th} percentile of the chart were categorized into the underweight group; whereas, those whose BMI was 85^{th} percentile or over were categorized into the overweight group. Children between the 5^{th} and 85^{th} percentile were considered as the normal group.

Approximately 61% of participants in this study fell into the overweight group; whereas, 2% were underweight (see Table 12). For age differences, overweight was more prevalent in school-aged children (58%) than adults (42%) with intellectual disabilities; whereas, underweight was more prevalent in adults (75%) than school-aged children (25%). Additionally, more school-aged children (64%) had normal weight than adults (36%) with intellectual disabilities.

The present study also assessed severity of children's disability by estimating amount of help needed in 10 adaptive skill domains, namely communication, self-care,

home living, social skills, community use, self-direction, health and safety, functional academics, leisure, and work. Help needed in adaptive skill domains was categorized into three categories: (a) seldom; (b) occasionally; and (c) usually need help. Several steps were taken for data reduction related to levels of help needed in children with intellectual disabilities. First, each of the 10 adaptive skill domains was judged on a 3-point scale in which 1 = *seldom needs help*, 2 = *occasionally needs help*, and 3 = *usually needs help*. Second, the sum across these domains for each child was calculated. Third, the amount of help needed across the skill domains was characterized by assigning a range of sum scores to each point of the scale. That is, the sum of 0-15 corresponded to seldom, 16-25 to occasionally, and 26-30 to usually needs help across all 10 adaptive skill domains. Finally, amount of help was labeled again corresponding to severity of disability, namely mild (seldom needs help), moderate (occasionally needs help), and severe (usually needs help).

As indicated in Table 12, the majority of children in this study had a moderate disability (73%), compared to mild disability (12%) and severe disability (15%). Regarding age differences, more school-aged children had a moderate disability (62%) than adults (38%). Similarly, severe disability was more prevalent in school-aged children (66%) than adults (34%) with intellectual disabilities. However, mild disability was more prevalent in adults (59%) than school-aged children (41%) with intellectual disabilities.

Research Question 1: Parental Values

Descriptive data were obtained by asking parents about their values related to physical activity participation by their children with intellectual disabilities. First,

descriptive data about parents' ratings of likely and important benefits are presented. Then the results of a MANOVA analysis showing the influence of the independent variables are presented.

Likely Benefits

Table 13 shows the descriptive statistics of parental value items in the likely benefit scale related to physical activity participation by children with intellectual disabilities. Means of parental values revealed that fun was rated highest (M=3.83; SD=.37); whereas, to win or be successful was rated lowest (M=3.08; SD=.86). In general, the items related to better self-acceptance (e.g., better self-concept, better self-confidence, better social skills, and opportunity to participate in activities with friends) were rated relatively higher than the items of improving skills and health-related fitness. Among the physical fitness components, improving cardiovascular endurance and body composition was rated higher than improving muscular strength and endurance or flexibility in the likely benefits.

A factor analysis with oblique rotation was conducted to reduce the number of dependent variables in preparation for the MANOVA analysis. As the first step, all 21 items related to likely benefits were entered into a factor analysis. Four factors were created based on factor loadings with eigenvalues greater than 1.0. Factor 1 was labeled as health-related physical fitness, Factor 2 as social benefits, Factor 3 as self-acceptance, and Factor 4 as fun. Because of the mixed characteristics of items that loaded on Factor 1, logic was used to create three new factors, namely health-related fitness, skills, and winning. Thus the number of dependent variables was reduced from 21 to 6 for the likely benefits scale. The likely benefit items that loaded on each factor are presented in

Table 13

Parent Ratings of the Physical Activity Benefits Using the Likely Benefits Scale

Items	*n*	Frequencies[a] 1	2	3	4	*M*	*SD*
Fun	193	0	0	32	161	3.83	.37
Better self-concept	193	0	2	50	141	3.72	.47
Better social skills	193	0	2	51	140	3.72	.48
Better self-confidence	192	0	1	53	138	3.69	.54
Opportunity to participate in activities with friends	193	0	7	50	136	3.67	.54
Joy of moving or doing sport skills	190	0	1	59	130	3.62	.66
Improve cardiovascular endurance	191	0	3	64	124	3.60	.63
Be independent and have time away from the parents	192	0	8	64	120	3.57	.63
Improve fundamental motor skills	192	0	3	76	113	3.55	.59
More opportunities to learn from teachers and coaches	193	0	4	81	108	3.54	.54
Improve psychological skills	191	0	7	70	114	3.52	.67
Improve sport and leisure skills	190	0	1	81	108	3.51	.67
Better general health	189	0	5	74	110	3.48	.74
Improve or maintain good body composition	189	0	7	70	112	3.48	.76
Opportunity to make new friends	186	0	5	64	117	3.47	.86
Reduced risk of chronic disease	190	1	11	65	113	3.47	.76
Gain recognition or feel special for accomplishment	192	0	10	81	101	3.46	.65
Improve muscular strength and endurance	190	0	8	79	103	3.45	.72
Improve flexibility	191	1	14	83	93	3.37	.73
Improve ability to perform activities of daily living	189	2	31	81	75	3.15	.87
To win or be successful	188	0	33	91	64	3.08	.86

[a] Parents rated likely benefits using a 4-point Likert-type scale in which *1* corresponded to *strongly disagree* and *4* corresponded to *strongly agree*.

Table 14, and the descriptive data for each factor are presented in Table 15.

Table 15 presents the average means and standard deviations of six composite factors for likely benefits. Results indicated that fun was rated as the most likely occurring benefit; whereas, winning was the least likely occurring benefit to children with intellectual disabilities. The ratings of fun, self-acceptance, and social benefits were relatively higher than health-related physical fitness, skills, and winning.

In addition to the data reduction for the dependent variables, the number of independent variables was also reduced to fit into the MANOVA analysis. As the first step, a separate MANOVA with six dependent variables (health-related fitness, skills, winning, social benefits, self-acceptance, and fun) in the likely benefits was conducted for each independent variable. Then two most significant independent variables, based on the significance of Wilks' Lambda values (Table 16), were severity of disability and multiple disability. Therefore, the influence of severity of disability and multiple disability on the dependent variables were assessed by a 3 (severity of disability) by 2 (multiple disability) MANOVA. The influence of other independent variables was not tested for the likely benefits.

Results of the MANOVA analysis revealed a significant main effect of severity of disability on the likely benefits ($F_{(12, 364)}$=2.14, p=.01, λ=.87), but not for multiple disability ($F_{(6, 182)}$=1.15, p=.34, λ=.96). The obtained effect size for the main effect (severity of disability) was .07 with an observed power level of .94. The Box's test revealed that equality of variance was not satisfied ($F_{(84, 5756.19)}$ = 2.03, p<.01). Subsequent univariate ANOVA tests revealed that the significant omnibus MANOVA test could be attributed to significant differences for parents whose children had mild

Table 14

Factor Analysis Results: Likely Benefits

	Factor Loadings			
	Factor 1	Factor 2	Factor 3	Factor 4
Improve muscular strength and endurance	.835	.039	-.401	.239
Improve flexibility	.831	.187	-.285	.199
Improve cardiovascular endurance	.803	.008	-.563	.234
Improve sport and leisure skills	.790	.184	-.365	.165
Better general health	.780	.021	-.569	.249
Reduced risk of chronic disease	.777	.035	-.439	.258
Improve fundamental motor skills	.760	.369	-.279	.030
Improve ability to perform activities of daily living	.755	.214	-.418	.226
Improve or maintain good body composition	.730	-.149	-.508	.314
To win or be successful	.667	.260	-.402	.344
Gain recognition or feel special for accomplishments	.578	.392	-.305	.443
Opportunity to make new friends	.227	.711	-.327	.332
Opportunity to participate in activities with friends	.355	.704	-.401	.571
Better social skills	.293	.634	-.592	.196
More opportunities to learn from teachers and coaches	.480	.526	-.418	.082
Better self-confidence	.430	.201	-.852	.322
Improve psychological skills	.486	.311	-.806	.103
Be independent and have time away from parents	.431	.095	-.730	.355
Better self-concept	.307	.468	-.659	.360
Joy of moving or doing sport skills	.247	.055	-.255	.810
Fun	.214	.329	-.283	.695
Eigenvalue	8.65	2.26	1.17	1.08
% variance explained	41	11	6	5

Note. A minimum loading of .50 was used as the criterion value in the interpretation of individual factors.

Table 15

Parent Ratings on the Reduced Dependent Variables of Likely Benefits Related to Physical Activity Participation by Children with Intellectual Disabilities

Variables	*n*	*M*	*SD*
Health-related physical fitness (Factor 1A)	193	3.47	.60
Improving cardiovascular endurance			
Improving or maintaining good body composition			
Better general health			
Reduced risk of chronic disease			
Improving muscular strength and endurance			
Improving flexibility			
Skills (Factor 1B)	193	3.40	.60
Improving fundamental motor skills			
Improving sport and leisure skills			
Improving ability to perform activities of daily living			
Winning (Factor 1C)	193	3.40	.66
Gaining recognition or feeling special for accomplishment			
Winning or being successful			
Social benefits (Factor 2)	193	3.60	.46
Better social skills			
Opportunity to participate in activities with friends			
More opportunities to learn from teachers and coaches			
Opportunity to make new friends			
Self-acceptance (Factor 3)	193	3.63	.46
Better self-concept			
Better self-confidence			
Being independent and having time away from parents			
Improving psychological skills			
Fun (Factor 4)	193	3.73	.43
Fun			
Joy of moving or doing sport skills			

Note. Descriptive statistics represent the average means and standard deviations of items under each value based on a 4-point Likert scale in which *1* corresponded to *strongly disagree*; whereas, *4* corresponded to *strongly agree*.

Table 16

Results of a Separate MANOVA for Each Independent Variable in the Likely Benefits Scale

	λ	*F*	Hypothesis *df*	Error *df*	*Sig.*
Severity of disability	.869	2.245	12.000	370.000	.010
Multiple disability	.941	1.945	6.000	186.000	.076
Type of intellectual disability	.927	1.110	12.000	344.000	.351
Children's age	.968	1.011	6.000	182.000	.420
Parents' disability	.980	.605	6.000	182.000	.726
Children's gender	.992	.253	6.000	183.000	.958

Note. Dependent variables included fun, better self-acceptance, social benefits, improving health-related fitness, improving skills, and win.

disability, moderate disability, and severe disability. Results of the significant ANOVA tests for social benefits, self-acceptance, and winning are presented in Table 17.

A post hoc analysis revealed that the group mean of parents whose children had severe disability was significantly lower than that of parents of children with mild disability and moderate disability for the social benefits (*ES*=.10) and self- acceptance variables (*ES*=.06). However, no significant group differences were found between parents of children with mild and moderate disability in these likely benefits. For winning, significant group differences were found only between parents whose children had mild and severe disability (*ES*=.03).

In sum, the parents of this study tend to place more value on fun, social benefits, and self-acceptance than health-related physical fitness, improving skills, and win, as likely benefits of physical activity participation by their children with intellectual disabilities. These likely benefits of children's physical activity participation differed as a function of severity of children's disability, but not for presence of multiple disability.

Important Benefits

Table 18 presents the descriptive statistics of parental values in the important benefit scale related to physical activity participation by children with intellectual disabilities. Fun was rated as the most important physical activity benefit for children with intellectual disabilities (*M*=3.72; *SD*=.59); whereas, to win or be successful was the least important benefit (*M*=2.89; *SD*=1.00) in the important benefit scale. Similar to the likely benefits, the items related to fun and psychosocial benefits (better self-acceptance and social benefits) were rated relatively higher than health-related fitness, improving skills, and winning. Overall, parental value items in the important benefit scale were rated

Table 17

Results of Univariate ANOVA Tests for Significant Likely Benefits Across the Parent Groups of Severity of Disability

	Severity of Disability				
	Mild (n=22)	Moderate (n=142)	Severe (n=29)	F	p
Social benefits	3.71 ± .38	3.65 ± .38	3.27 ± .68	9.94	.000
Self-acceptance	3.78 ± .30	3.65 ± .45	3.39 ± .51	5.76	.004
Winning	3.55 ± .46	3.26 ± .68	3.09 ± .64	3.08	.048

Table 18

Parent Ratings of the Physical Activity Benefits Using the Important Benefits Scale

Items	*n*	Frequencies[a] 1	2	3	4	*M*	*SD*
Fun	192	0	8	35	149	3.72	.59
Better self-confidence	191	1	7	44	139	3.64	.68
Better self-concept	191	2	7	45	137	3.62	.71
Better social skills	191	3	8	40	140	3.62	.73
Opportunity to participate in activities with friends	192	4	11	45	132	3.57	.74
Joy of moving or doing sport skills	191	0	10	62	119	3.53	.69
Improve psychological skills	192	4	13	55	120	3.50	.76
Be independent and have time away from the parents	191	3	15	53	120	3.48	.79
Improve cardiovascular endurance	191	3	14	64	110	3.44	.78
Reduced risk of chronic disease	188	5	13	52	118	3.42	.92
Better general health	189	4	10	65	110	3.42	.85
More opportunities to learn from teachers and coaches	191	1	17	72	101	3.40	.76
Improve fundamental motor skills	191	2	16	72	101	3.39	.77
Improve or maintain good body composition	190	6	13	63	108	3.38	.87
Improve sport and leisure skills	188	0	24	75	92	3.32	.77
Improve muscular strength and endurance	190	5	25	57	103	3.31	.90
Opportunity to make new friends	182	2	9	67	104	3.30	1.03
Gain recognition or feel special for accomplishment	192	7	28	60	97	3.27	.88
Improve flexibility	191	9	32	60	90	3.18	.94
Improve ability to perform activities of daily living	191	14	22	71	84	3.15	.96
To win or be successful	188	11	46	70	61	2.89	1.00

[a] Parents rated important benefits using a 4-point importance scale in which *1* corresponded to *not important* and *4* corresponded to *extremely important.*

relatively lower than those in the likely benefit scale. Also, the comparisons of standard deviations indicated that variance in the important benefits was relatively greater than that in the likely benefits.

A factor analysis with the oblique rotation was also conduced to reduce the number of dependent variables for the MANOVA analysis. The procedure of the data reduction for important benefits was same as that for likely benefits. Based on factor loadings, four factors were created with eigenvalues greater than 1.0. Factor 1 was labeled as health-related physical fitness, Factor 2 as psychosocial benefits, Factor 3 as winning, and Factor 4 as fun. The important benefit items that loaded on each factor are presented in Table 19. Because of the mixed characteristics of items that loaded on Factor 1, logic was used to create two new factors, namely health-related physical fitness and skills. Therefore, the number of dependent variables for the important benefits was reduced from 21 to 5.

Table 20 presents the average means and standard deviations of five composite factors for the important benefits. Results indicated that fun and psychosocial benefits (including items related to self-acceptance) were rated relatively higher than health-related physical fitness, skills, and winning.

As used in the likely benefits, a separate MANOVA was also conducted to reduce the number of independent variables for the important benefits. The procedure of the separate MANOVA used for the important benefits was same as that used for the likely benefits. Based on the significance levels of Wilk's Lambda, two independent variables were selected, namely severity of disability and type of intellectual disability (Table 21). Therefore, the influence of severity of disability and type of intellectual disability on five

Table 19

Factor Analysis Results: Important Benefits

	Factor Loadings			
	Factor 1	Factor 2	Factor 3	Factor 4
Improve flexibility	.877	.412	.371	.277
Improve muscular strength and endurance	.834	.294	.439	.206
Better general health	.817	.487	.231	.077
Improve cardiovascular endurance	.794	.359	.360	.285
Improve or maintain good body composition	.794	.314	.298	.241
Reduced risk of chronic disease	.786	.376	.218	-.012
Improve fundamental motor skills	.768	.390	.318	.313
Improve sport and leisure skills	.704	.296	.546	.343
Improve ability to perform activities of daily living	.622	.408	.558	.027
Better social skills	.386	.868	.100	.381
Improve psychological skills	.504	.818	.315	.245
Better self-confidence	.462	.745	.232	.596
Be independent and have time away from parents	.403	.736	.365	.188
Opportunity to make new friends	.247	.728	.254	.340
Opportunity to participate in activities with friends	.323	.712	.517	.537
Better self-concept	.579	.657	.338	.559
More opportunities to learn from teachers and coaches	.567	.628	.252	.517
Gain recognition or feel special for accomplishments	.313	.312	.869	.093
To win or be successful	.434	.254	.826	.157
Joy of moving or doing sport skills	.332	.329	.237	.784
Fun	.147	.427	.018	.759
Eigenvalue	9.21	2.38	1.35	1.04
% variance explained	44	11	6	5

Note. A minimum loading of .60 was used as the criterion value in the interpretation of individual factors.

Table 20

Parent Ratings on the Reduced Dependent Variables of Important Benefits Related to Physical Activity Participation by Children with Intellectual Disabilities

Variables	*n*	*M*	*SD*
Health-related fitness (Factor 1A)	193	3.36	.73
Improving cardiovascular endurance			
Improving or maintaining good body composition			
Better general health			
Reduced risk of chronic disease			
Improving muscular strength and endurance			
Improving flexibility			
Skills (Factor 1B)	193	3.29	.70
Improving fundamental motor skills			
Improving sport and leisure skills			
Improving ability to perform activities of daily living			
Psychosocial benefits (Factor 2)	193	3.52	.59
Better social skills			
Improving psychological skills			
Better self-confidence			
Be independent and have time away from parents			
Opportunity to make new friends			
Opportunity to participate in activities with friends			
Better self-concept			
More opportunities to learn from teachers and coaches			
Winning (Factor 3)	193	3.08	.84
Gaining recognition or feeling special for accomplishment			
Winning or being successful			
Fun (Factor 4)	193	3.62	.54
Fun			
Joy of moving or doing sport skills			

Note. Descriptive statistics represent the average means and standard deviations of items under each value based on a 4-point importance scale in which *1* corresponded to *not important*; whereas, *4* corresponded to *extremely important*.

Table 21

Results of a Separate MANOVA for Each Independent Variable in the Important Benefits Scale

	λ	*F*	Hypothesis *df*	Error *df*	*Sig.*
Severity of disability	.823	3.798	10.000	372.000	.000
Type of intellectual disability	.932	1.239	10.000	346.000	.265
Multiple disability	.967	1.290	5.000	187.000	.270
Parents' disability	.977	.861	5.000	183.000	.508
Children's age	.987	.490	5.000	183.000	.784
Children's gender	.988	.439	5.000	184.000	.821

Note. Dependent variables included fun, psychosocial benefits, improving health-related fitness, improving skills, and win.

dependent variables was assessed by a 3 (severity of disability) by 3 (type of intellectual disability) MANOVA. The influence of other independent variables was not tested for the important benefits.

Results of the MANOVA analysis indicated a significant main effect of severity of disability on the important benefits ($F_{(10, 334)}$ =3.42, p=.00, λ=.82), but not for type of intellectual disability ($F_{(10, 334)}$=.69, p=.73, λ=.96). The obtained effect size for the main effect (severity of disability) was .09 with an observed power level of .99. The Box's test revealed that equality of variance was not satisfied ($F_{(75, 9755.52)}$ = 2.35, p<.01). A subsequent univariate ANOVA test showed that the significant omnibus MANOVA test could be attributed to significant differences among parents whose children had mild disability, moderate disability, and severe disability. Results of these ANOVA tests are presented in Table 22. The important benefits that were significant across the parent groups of severity of disability included psychosocial benefits and wining.

Additionally, results of multiple comparisons showed that the group mean of parents whose children had severe disability was significantly different than that of parents whose children had mild disability and moderate disability in the important benefits of psychosocial benefits (*ES*=.13) and wining (*ES*=.04). However, no group differences were found between parents of children with mild disability and moderate disability.

In sum, the parents of this study perceived fun and psychosocial benefits more important than health-related fitness, improving skills, and winning when encouraging their own with an intellectual disability to participate in physical activity. These important benefits of children's physical activity were influenced by severity of

Table 22

Results of Univariate ANOVA Tests for Significant Important Benefits Across the Parent Groups of Severity of Disability

	Severity of Disability				
	Mild (n=22)	Moderate (n=142)	Severe (n=29)	F	p
Psychosocial benefits	3.62 ±. 46	3.60 ± .43	3.01 ± 1.00	13.88	.000
Winning	3.41 ± .61	3.10 ± .86	2.74 ± .76	4.22	.016

children's disability. Especially, parents' perceptions of psychosocial benefits and winning were significantly different across the parents whose children differed in severity of disability.

Research Question 2: Parental Concerns

In this study, parental concerns referred to parents' perceptions of barriers to physical activity participation by their children with intellectual disabilities. Means, standard deviations, and frequencies of parental concerns are presented in Table 23. Results indicated that availability of programs in the community was rated as the most significant concern (M=1.68; SD=.72); whereas, availability of child care was rated as the least significant concern (M=1.18; SD=.49). Overall, all parental concern items were rated relatively low ranging in mean from 1.18 to 1.68. Results also showed that physical activity barriers related to availability/accessibility of programs, quality of program staff, and nature of program (e.g., match of program activities to my child's interests and match of program philosophy or goals to my child's needs) were rated relatively higher than items related convenience (e.g., schedule of program, transportation, etc.) and family resources (e.g., child care and cost).

There were 17 dependent variables for parental concerns, too many for a MANOVA analysis given a small sample size in this study. Therefore, a factor analysis with the oblique rotation was conducted to reduce the number of dependent variables. As explained in the likely benefits and important benefits, all parental concern items were entered into a factor analysis. Four factors were created based on factor loadings with eigenvalues greater than 1.0. Factor 1 was labeled as availability/accessibility, Factor 2 as family resources, Factor 3 as staffing, and Factor 4 as convenience. The parental concern

Table 23

Parent Ratings of Barriers to Physical Activity

Participation by Children with Intellectual Disabilities

Items	*n*	Frequencies[a] 1	2	3	*M*	*SD*
Availability of programs	187	78	85	24	1.68	.72
Match of program activities to child's interest	186	77	93	16	1.63	.68
Qualifications of teachers/coaches/staff to work with people with disabilities	190	94	81	15	1.58	.64
Amount of supervision or other safety concerns	187	96	74	17	1.55	.69
Match of program philosophy or goal to child's need	185	95	79	11	1.50	.66
Qualifications of teachers/coaches/staff to teach the skills	187	100	74	13	1.50	.66
My awareness of programs	188	113	58	17	1.47	.68
Acceptance by teachers/coaches/staff	188	108	69	11	1.46	.63
Match of program schedule to parent's schedule	188	115	63	10	1.42	.62
Cost of the program	187	127	46	14	1.37	.65
Availability of personal assistants	187	127	45	15	1.37	.66
Availability of transportation	186	124	53	9	1.35	.61
Match of program schedule to child's schedule	189	131	53	5	1.32	.54
Accessibility of the facility or equipment	180	119	52	9	1.31	.65
Participation by my child's friends in the program	187	127	57	3	1.31	.54
Availability of disability accommodations	185	139	37	9	1.26	.59
Availability of child care	189	160	22	7	1.18	.49

[a] Parents rated concerns using a 3-point significance scale in which *1* corresponded to *not a concern, 2* corresponded to *a concern,* and *3* corresponded to *prevents participation.*

items that loaded on each factor are presented in Table 24. Because of the mixed characteristics of items that loaded on Factor 1, logic was used to create two new factors, namely availability/accessibility and nature of program. Therefore, the number of dependent variables was reduced from 17 to 5 for parental concerns.

Table 25 presents the average means and standard deviations of five composite factors of parental concerns. Results showed that nature of program was rated as the most significant parental concern; whereas family resources were rated as the least significant parental concerns. Overall, nature of program and staffing were rated relatively higher than availability/accessibility, convenience, and family resources.

A separate MANOVA for each independent variable using the reduced dependent variables of parental concerns was also conducted to reduce the data. The steps taken for the separate MANOVA were same as the likely benefits and important benefits. That is, each independent variable (parents' disability, children's age, children's gender, severity of disability, type of intellectual disability, and multiple disability) was entered into a separate MANOVA with the five dependent variables of parental concerns. Based on the significance levels of Wilk's Lambda, two independent variables were selected for parental concerns, namely children's age and severity of disability (Table 26). Therefore, the influence of children's age and severity of disability on five dependent variables of was assessed by a 2 (children's age) by 3 (severity of disability) MANOVA. The influence of other independent variables was not tested for parental concerns.

Results of an omnibus MANOVA analysis by their children with intellectual disabilities revealed that there were no significant main effects of children's age ($F_{(5, 177)}$ =.79, p=.56, λ=.98) and severity of disability ($F_{(10, 354)}$ =1.52, p=.13, λ=.92). The Box test

Table 24

Factor Analysis Results: Parental Concerns

	Factor Loadings			
	Factor 1	Factor 2	Factor 3	Factor 4
Match of program activities to my child's interests	.788	-.074	-.309	.325
Availability of programs in my community	.787	.016	-.371	.224
Availability of disability accommodations needed by my child	.735	.135	-.318	.214
Accessibility of the facility or equipment	.725	.260	-.167	.236
Match of program philosophy or goals to my child's needs	.660	-.222	-.560	.486
My awareness of programs in my community	.505	.425	-.308	.120
Availability of child care for other children in my family	.201	.756	-.233	.291
Cost of the program	.243	.686	-.428	.139
Qualifications of teachers/coaches/staff to work with people who have disabilities	.267	.198	-.923	.289
Qualifications of teachers/coaches/staff to teach the skills	.313	.261	-.859	.262
Acceptance by teachers/coaches/staff	.326	.236	-.841	.482
Amount of supervision or other safety concerns	.622	-.076	-.753	.324
Availability of personal assistants	.511	-.140	-.620	.466
Match of program schedule to my child's schedule	.330	.253	-.395	.754
Participation by my child's friends in the program	.164	-.070	-.291	.746
Match of program schedule to my (parent's) schedule	.187	.599	-.236	.674
Availability of transportation	.462	.123	-.255	.581
Eigenvalue	6.25	1.89	1.51	1.21
% variance explained	37	11	9	7

Note. A minimum loading of .50 was used as the criterion value in the interpretation of individual factors.

Table 25

Parent Ratings on the Reduced Dependent Variables of Parental Concerns Related to Physical Activity Participation by Children with Intellectual Disabilities

Variables	*n*	*M*	*SD*
Nature of Program (Factor 1A)	191	1.56	.60
Match of program activities to my child's interests			
Match of program philosophy or goals to my child's needs			
Availability/Accessibility (Factor 1B)	191	1.43	.49
Availability of programs in my community			
My awareness of programs in my community			
Availability of disability accommodations needed by my child			
Accessibility of the facility or equipment			
Family Resources (Factor 2)	191	1.27	.49
Availability of child care for other children in my family			
Cost of the program			
Staffing (Factor 3)	191	1.49	.54
Qualifications of teachers/coaches/staff to work with people who have disabilities			
Qualifications of teachers/coaches/staff to teach the skills			
Acceptance by teachers/coaches/staff			
Amount of supervision or other safety concerns			
Availability of personal assistants			
Convenience (Factor 4)	191	1.35	.42
Match of program schedule to my child's schedule			
Match of program schedule to my (parent's) schedule			
Participation by my child's friends in the program			
Availability of transportation			

Note. Descriptive statistics represent the average means and standard deviations of items under each concern based on a 3-point scale in which *1* corresponded to *not a concern*, *2* corresponded to *a concern*, and *3* corresponded to *prevents participation in physical activity*.

Table 26

Results of a Separate MANOVA for Each Independent Variable in Parental Concerns

	λ	*F*	Hypothesis *df*	Error *df*	*Sig.*
Children's age	.919	3.209	5.000	181.000	.008
Severity of disability	.923	1.510	10.000	368.000	.134
Parents' disability	.961	1.473	5.000	181.000	.201
Multiple disability	.966	1.299	5.000	185.000	.266
Type of intellectual disability	.953	.829	10.000	342.000	.601
Children's gender	.984	.605	5.000	182.000	.696

Note. Dependent variables included availability/accessibility, nature of program, family resources, staffing, and convenience.

indicated that equality of variance was not satisfied ($F_{(75, 4125.03)} = 1.86, p<.01$).

In sum, the parents of this study rated barriers to children's physical activity participation low. Though, some barrier items related to program availability, a variety of and quality of staff were rated relatively higher than others related to cost, physical access, time schedule, and transportation. The MANOVA analysis for parental concerns did not result in significant group differences across the parents whose children differed in age and severity of disability.

Research Question 3: Determinants of Children's Physical Activity

Table 27 describes physical activity participation by children with intellectual disabilities and their parents. Results indicated that school-aged children spent more time to participate in physical activity than adult children in the past 7 days. It was also found that the minutes parents spent for physical activity participation were fewer than school-aged children and adult children. Results also showed that physical activity of school-aged children had the greatest variance (*SD*=597.90 minutes). The raw data for children's physical activity revealed two outliers (greater than 3 *SD* from the mean). Because these scores seemed implausible, the two scores were removed from the data prior to data analyses for research question #3.

The five most frequently mentioned physical activities for parents were gardening or yard work, walking for exercise, calisthenics, weight lifting, and biking or exercise cycling. For school-aged children with intellectual disabilities, the five most prevalent types of physical activity included indoor or outdoor playground, bicycling or exercise cycling, walking for exercise, basketball, and housecleaning. For adult children with intellectual disabilities, the five most popular types of physical activity included

Table 27

Physical Activity by School-Aged and Adult Children with Intellectual Disability and Their Parents

	School-Aged (*n*=109)	Adult (*n*=76)	Parents (*n*=190)
Minutes of physical activity per week			
Mean	585.55	490.55	444.20
SD	597.90	422.61	545.29
Range	0-5280	0-1900	0-3340
Most frequently mentioned physical activity types (*n*)	Indoor or outdoor playground (*n*=58)	Housecleaning (*n*=43)	Gardening or yard work (*n*=143)
	Bicycling or exercise cycling (*n*=57)	Walking for exercise (*n*=41)	Walking for exercise (*n*=128)
	Walking for exercise (*n*=49)	Social/recreational dancing (*n*=26)	Calisthenics or general exercise (*n*=44)
	Basketball (*n*=45)	Bicycling or exercise cycling (*n*=24)	Weight lifting or training (*n*=37)
	Housecleaning (*n*=44)	Swimming laps (*n*=23)	Biking or exercise cycling (*n*=5)

Note. Two outlier scores for physical activity by school-aged children were removed prior to calculating these descriptive statistics. Only the five most frequently mentioned types of physical activity are listed here.

housecleaning, walking for exercise, social/recreational dancing, bicycling or exercise cycling, and swimming laps. A complete list of physical activities is presented in the survey instrument (Appendix D).

Table 28 presents parents' ratings of children's level of physical activity in comparison to people of the same age and sex who do and do not have disabilities. Approximately 74% of parents of school-aged and adult children with intellectual disabilities perceived that their children's level of physical activity was less than people of the same age and sex who do not have disabilities. Conversely, 26% of parents of school-aged and adult children with intellectual disabilities perceived that their children's level of physical activity was about the same or more than people of the same age and sex who do not have disabilities. However, when compared to people who do have the same disability as the child has, 24% of parents of school-aged and adult children with intellectual disabilities perceived that their children's level of physical activity was less than others; whereas, 76% perceived that their children's level of physical activity was about the same or more than others.

Table 29 presents the correlation matrix of independent variables to check for multicollinearity. Relatively high correlations that were significant were found between parents' age and children's age (r= .69, p=.00), as well as likely benefits and important benefits (r= .78, p=.00). Along with the correlations of the data, the results of multicollinearity statistics also showed that children's age and important benefits had multicollinearity (Table 30). The tolerance values of children's age and important benefits were much smaller than the minimum value (.833). Inversely, the VIF values of these two variables were greater than the cutoff point (VIF=1.20). Therefore, children's

Table 28

Parents' Ratings of Children's Level of Physical Activity in Comparison to People of the Same Age and Sex Who Do and Do Not Have Disabilities

	Compared to those who do not have a disability		Compared to those who have same disability as child	
	Children (*n*=109)	Adults (*n*=76)	Children (*n*=107)	Adults (*n*=75)
Much less than others	35	38	5	6
Somewhat less than others	40	23	20	12
About the same	23	8	34	27
Somewhat more than others	7	5	32	24
Much more than others	4	2	16	6

Note. Parents' ratings are presented in frequencies.

Table 29

Correlation Matrix of Independent Variables for Children's Physical Activity

	Parent age	Parent PA	Child age	Child BMI	SOD[a]	MD[b]	Likely benefit	Import. benefit	Parental concern
Parent age	1	-.027	.689**	.264**	-.116	-.018	.009	.091	.012
Parent PA		1	-.059	-.004	.024	-.034	.010	.090	-.123
Child age			1	.300**	-.086	.044	-.020	.059	-.051
Child BMI				1	-.088	-.162*	.098	.189**	-.026
SOD[a]					1	.062	-.193*	-.173*	.216**
MD[b]						1	-.123	-.142	-.006
Likely benefit							1	.783**	.106
Import. benefit								1	.043
Parental concern									1

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

* Correlation is significant at the 0.05 level (2-tailed).

[a]. Severity of disability

[b]. Multiple disability

Table 30

Results of Multicollinearity Diagnostics for Independent Variables of Children's Physical Activity

	Multicollinearity Statistics	
	Tolerance	VIF
Parent physical activity	.962	1.041
Likely benefits	.963	1.039
Parent's age	.983	1.017
Parental concerns	.905	1.105
Multiple disability	.949	1.053
Severity of disability	.892	1.121
Child BMI	.855	1.170
Child's age	.525	1.904
Important benefits	.367	2.725

Note. The cutoff point for the VIF value is 1.20.

age and important benefits were identified as multicollinearity and excluded from a multiple regression analysis.

A stepwise method of multiple regression resulted in the final model to predict children's physical activity participation. Approximately 32% of variation in children's physical activity was accounted for by the linear composite of severity of disability, parents' age, and parents' physical activity (R^2=.32, SE=433.21). Table 31 demonstrates the significance tests related to the regression model of the study. Results indicated that this model was significant (F=25.92, p<.01). Also, the results of the partial T value of variables in the equation indicated that all predictors were significant at .05 level (see Table 32).

Based on the results of coefficients of the T test, the following equation of multiple regressions was made to predict physical activity participation by children with intellectual disabilities.

Y (Children's physical activity) = 1204.88 (Intercept)
+ .53 (Parents' physical activity)
– 17.81 (Severity of disability)
– 10.93 (Parents' age)

Along with the data analyses, assumptions of multiple regressions were evaluated through the analyses of residuals. The scatterplot for children's physical activity participation using residuals showed no nonlinear pattern to the residuals; therefore, the overall equation was assumed to be linear (refer to Figure 4). The second assumption of multiple regressions is homoscedasticity dealing with the constancy of the residuals across the predictors. In this study, Figure 4 also indicated no pattern of increasing or

Table 31

Significance Tests of Multiple Regression Model for Physical Activity Participation by Children with Intellectual Disabilities

	Sum of Squares	*df*	Mean Square	*F*	*Sig.*
Regression	14591843	3	4863947.610	25.92	.000
Residual	30965029	165	187666.841		
Total	45556872	168			

Note. Predictors included severity of disability, parents' age, and parents' physical activity.

Table 32

Significance Test of Predictors in the Regression Model for Physical Activity Participation by Children with Intellectual Disabilities

	Unstandardized Coefficients		Standardized Coefficients		
	B	*Std. Error*	*Beta*	*t*	*Sig.*
Intercept	1204.88	257.60		4.68	.00
Severity of disability	-17.81	7.10	-.16	-2.51	.01
Parents' age	-10.93	3.93	-.18	-2.78	.01
Parents' physical activity	.53	.07	.52	8.15	.00
Excluded Variables in the regression model					
Likely benefits			.09	1.43	.16
Parental concerns			.05	.80	.42
Children's BMI			.02	.34	.73
Multiple disability			-.11	-1.71	.09

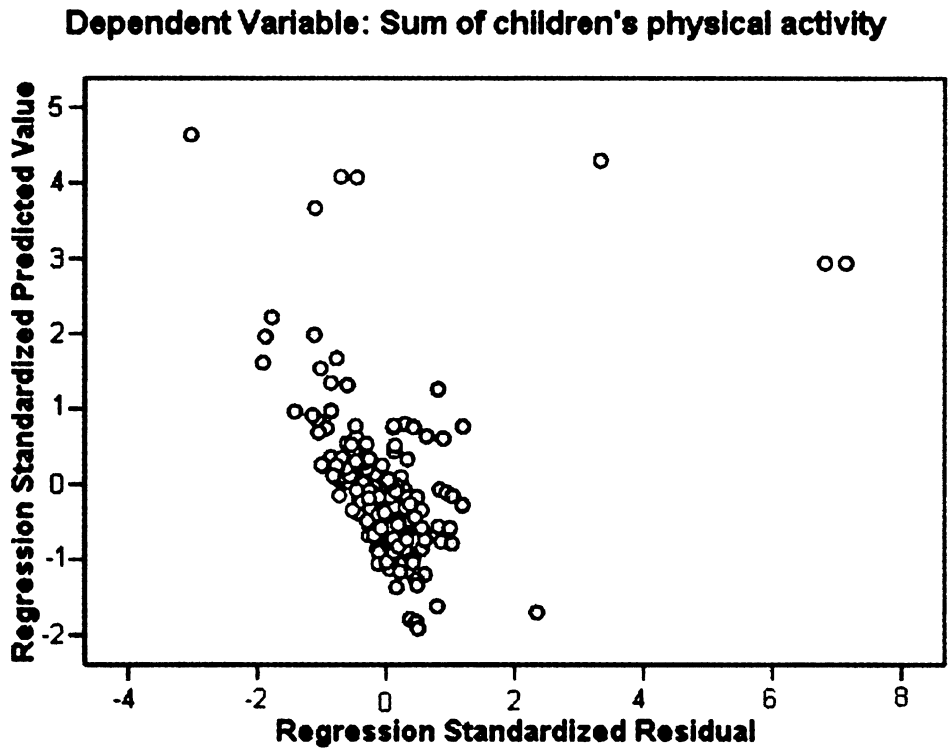

Figure 4. The Scatterplot of Residuals in a Multiple Regression Analysis.

decreasing residuals; thus, this assumption was satisfied. The last assumption was normality of error terms. Figure 5 shows the normal probability plots of the residuals, indicating that the values fall along the diagonal with no substantial or systematic departures. Therefore, the residuals were considered normal.

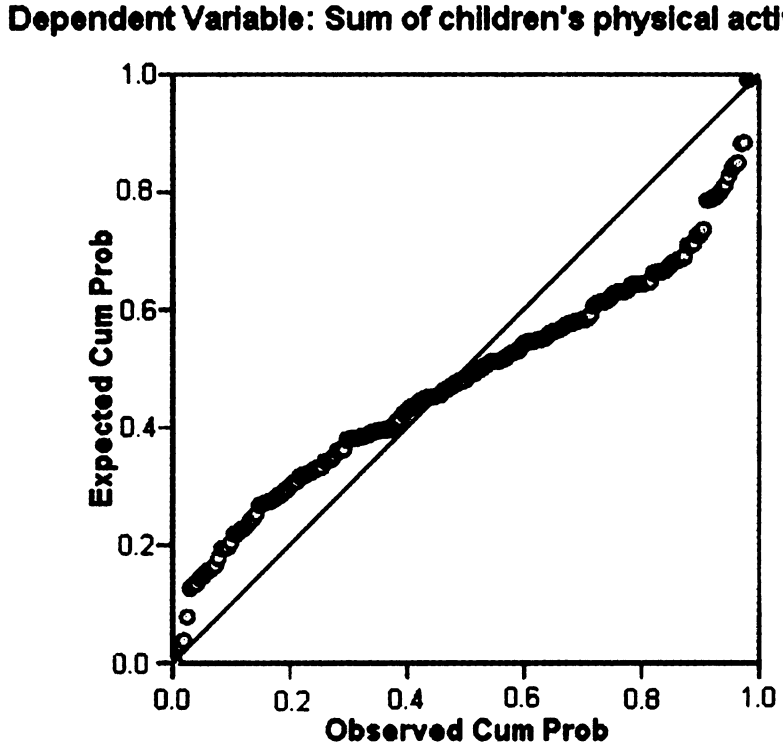

Figure 5. Normal Probability Plot: Residuals for Physical Activity Participation by Children with Intellectual Disabilities.

CHAPTER 5

DISCUSSION

The present study aims to assess parent's perceptions of physical activity values and barriers related to physical activity participation by their children with intellectual disabilities. In this study, a great deal of insightful information about parental values and concerns, as well as physical activity participation by children with intellectual disabilities, was obtained throughout many data analyses. However, without sound interpretation of the data results, this information would be meaningless. Therefore, the present findings of likely benefits, important benefits, parental concerns, and physical activity participation by children with intellectual disabilities are discussed in this section.

Parental Values

Likely Benefits

Results indicated that all items and all factors of likely benefits were rated relatively high. In this study, parents rated fun, self-acceptance, social benefits, health-related physical fitness, skills, and winning greater than 3.40 in a 4-point Likert scale. The high means of likely benefits may reflect parents' knowledge about physical activity benefits associated with children's physical activity participation which parents could have gained from several sources. In this case, the majority of children with intellectual disabilities did participate in physical activity, and their parents may have observed these benefits directly. Another source that parents may learn about physical activity benefits is their own participation in physical activity. In the present study, 72% of parents were active in physical activity; thus, parents may have observed these benefits from their own participation. Additionally, parents may be well-educated about physical activity benefits, either from Special Olympics or other sources (e.g., school, community, etc.). The

findings of the study are supported by previous research on the parents' reasons for physical activity participation by their children with and without disabilities (Goodwin et al., 2004; Lee & Dummer, 2003; Kimiecik & Horn, 1998; McCullagh, Matzkanin, Shaw, & Maldonado, 1993).

Although it is clear that parents of children with intellectual disabilities have expertise in children's physical activity, the biased sample limits generalizability of research findings to a larger population. In this study, the participants were parents whose children with intellectual disabilities already participated in physical activity; thus, the results may not be generalized to parents whose children with intellectual disabilities do not participate in physical activity. Similarly, most parents of this study were active; therefore, the results may not be generalized to parents who are sedentary. Future research should include both active and inactive parents, as well as children, for better understanding of parent's perceptions of likely benefits associated with physical activity participation by their children with intellectual disabilities.

The results of the MANOVA analysis indicated that severity of children's disability affected parent ratings of likely benefits related to social benefits. In this study, parents whose children have severe disability rated social benefits significantly lower than parents whose children have mild/moderate disability. This was somewhat surprising. In general, persons with severe disability have fewer opportunities to participate in physical activity, but they want to be involved in physical activity as much as those with mild/moderate disability (National Organization on Disability, 2000; Wilhite & Kleiber, 1992). For the same reason, parents of children with severe disability may place more value on children's physical activity than parents of children with

mild/moderate disability. Present results may reflect parent' perceptions of severe disability in relation to children's capability in socialization. Parents may not perceive that their children with severe disability are capable of participation in socializing activities such as team sports or group activities as much as children with mild or moderate disability.

The results also indicated that severity of children's disability affected parent ratings of likely benefits related to self-acceptance. In this study, parents whose children have severe disability rated self-acceptance significantly lower than parents whose children have mild/moderate disability. These findings may be explained by parent's perceptions of psychomotor problems associated with their children with severe disability. Persons with psychomotor problems often have poor self-concept, self-esteem, and lack of independence (Sherrill, 2004). Given the fact that persons with severe/profound disability have significant impairments in sensorimotor functioning (American Psychiatric Association, 1994), parents may not perceive that their children with severe disabilities are capable of improving self-concept, self-confidence, independence, and psychological skills.

In addition to social benefits and self-acceptance, severity of children's disability also affected parent ratings of likely benefits related to winning and feeling successful. In this study, parents of children who have severe disability rated winning/feeling successful significantly lower than parents who have mild disability. In disability sport competitions such as Special Olympics, winning is an important motive for persons with intellectual disabilities to participate (Shapiro, 2003). Parents often witness their children's glorious moments to win a medal or ribbon and feel proud of their children with intellectual

disabilities. For this reason, parents can be motivated by winning as much as their children. The importance of winning/feeling successful is supported by the research literature on parental encouragement for children's participation in Special Olympics (Goodwin et al., 2004). However, the present findings of this study suggest that parents of children with severe disability may have different perceptions of winning/feeling successful. Because of considerable impairments in cognitive and physical domains, parents may think their children with severe disability are incapable of sport competitions or successful performance in activities. Also, children with severe disabilities may not understand winning. Therefore, parents of children with severe disability may not perceive winning as important as parents of children with mild disability.

Although it is clear that the likely benefits of parental values differ as a function of severity of children's disability, the findings should not be generalized to other populations of persons with intellectual disabilities due to the biased sample. In this study, evidence existed for the unrepresentative sample distribution of each severity group. For example, about 74% of children had moderate disability; whereas, only 11% had mild disability in this study. According to American Psychiatric Association (1994), approximately 85% of persons with mental retardation have mild disability; whereas, 10% have moderate disability and 5% have severe disability. Therefore, the group means of parents of children with mild, moderate, and severe disability may not be representative of the entire population. This non-representative sample distribution for groups may have contributed to a small effect size (Hair et al., 1998). Sample distribution that is more representative of each group is needed for determining true group differences of parental values across parents of children with mild, moderate, and severe disability.

The results of the MANOVA analysis indicated no significant main effect of multiple disability on the likely benefits of parental values. This was an unexpected result because a strong relationship was expected between multiple disability and severity of disability. Rimmer and Braddock (2002) suggest that having secondary disabilities can significantly increase the level of severity of disability. However, the evidence indicates that this relationship does not exist for this sample. To determine the relationship between severity of disability and multiple disability, an analysis of chi-square was conducted. The results showed no significant association between two variables ($\chi^2_{(2)}$=3.07, p=.22). Also, a separate MANOVA analysis revealed no significant main effect of multiple disability on the likely benefits ($F_{(6, 186)}$=1.95, p=.34, λ=.94). These results may be influenced by the criteria of multiple disability. In this study, multiple disability was defined as having an additional disability in addition to an intellectual disability (mental retardation, autism/Asperger's syndrome, or learning disability). Having mental retardation, autism/Asperger's syndrome, or learning disability, as a secondary disability was not included in multiple disability. However, the considerable number of parents in this study (n=41) reported that their children have an intellectual disability as a secondary disability; thus, these parents were treated as if their children do not have a secondary disability. This might contribute to the overestimation of the sample mean for parents of children who have multiple disability.

It should be noted that the influence of other independent variables (parents' disability, children's age, children's gender, and type of intellectual disability) was not tested due to a small sample size for the MANOVA model. Although it is uncertain, these independent variables are unlikely to have an effect on the results of the study because

separate MANOVA analyses already revealed that the main effect of these independent variables on the likely benefits were not significant. However, the biased sample may have affected the results of the separate MANOVA analyses. Whether the children of parents in this study have multiple disability or not, most of them participated in physical activity in the past. Therefore, parent's perceptions of likely benefits may not be influenced by the presence of multiple disability in children with intellectual disabilities.

Important Benefits

Results indicated high means on all items and factors for the important benefits of parental values. These findings are in line with findings of previous research examining participation motives in parents and their children with and without disabilities (Kimiecik & Horn, 1998; Lee & Dummer, 2003; McCullagh et al., 1993; Shapiro, 2003). Among the important benefits, parents rated fun and psychosocial benefits relatively higher than other physical activity benefits (e.g., improving skills and winning). This may reflect that parents are motivated to encourage their children with intellectual disabilities to participate in physical activity by internal factors such as children's happiness rather than external factors (i.e., winning, recognition, etc.). Wankel (1993) suggests that fun or enjoyment in physical activity participation is strongly associated psychological health and socialization, which eventually contribute to one's happiness. This is an important piece of information for physical activity professionals. Considering children's dependency on their parents, parental emphasis on fun and psychosocial benefits should not be ignored when developing and implementing a physical activity program for persons with intellectual disabilities. Fiorini, Stanton, and Reid (1996) also emphasize that parents' input is a critical component of adapted physical activity program.

The results of the descriptive statistics also showed greater variance for all items of the important benefits in comparison to the likely benefits. This suggests that there are more individual differences in parental values when parents evaluate physical activity benefits for their own child with an intellectual disability. Since nature of disability varies (i.e., type, severity, and multiple disability, onset of disability), it is not surprising that parents perceived physical activity benefits specifically for their children differently.

Results of this study demonstrate that severity of children's disability significantly influences parent ratings of important benefits related to psychosocial benefits. In this study, parents of children who have severe disability rated psychosocial benefits significantly lower than parents of children who have mild/moderate disability. As discussed in the likely benefits, this may also have something to do with parent's perceptions of children's capability in psychomotor domains and socialization. Namely, parents may not perceive that their children with severe disabilities are capable of social interaction with others when participating in physical activity. Similarly, children with severe disability may have significant impairments in many psychomotor domains such as thinking process, attitudes, behaviors, communication, etc. (Sherrill, 2004); therefore, their parents may not value psychosocial benefits as much as parents of children with mild/moderate disability. The influence of severity of disability on physical activity participation by persons with disabilities has been well documented in research literature (Hedrick & Broadbent, 1996; Wilhite & Kleiber, 1992).

The results of the MANOVA analysis also indicated that severity of children's disability affected parent ratings of important benefits related to winning or being successful. In this study, parents of children with severe disability rated winning

significantly lower than parents of children with mild/moderate disability. As discussed in the likely benefits, children with severe disability may not have opportunities to win or feel successful in physical activity participation as much as those with mild/moderate disability, due primarily to their psychomotor problems. Also, children with intellectual disabilities may not understand the meaning of winning. For these reasons, parents may perceive winning relatively less important than other physical activity benefits (e.g., fun, better health, psychosocial benefits, improving skills) for their children with intellectual disabilities. Although no research literature supports the findings of the study, it is obvious that severe disability, among types of disability severity, is the main factor that alters parent's perceptions of winning related to physical activity participation by his/her own child with an intellectual disability.

Ironically, the results of this study indicated no significant group differences in the important benefits between parents of children with mild disability and parents of children with moderate disability. Given the significant mean differences in the important benefits between parents of severe disability and parents of mild/moderate disability, it is logical to have significant group differences between parents of children with mild and moderate disability. These contrasting results may be due to the unrepresentative sample distributions for each severity group. In this study, about 74% of parents had a child with moderate disability; whereas, only 11% had a child with mild disability in the likely benefits and important benefits. According to American Psychiatric Association (1994), approximately 85% of persons with mental retardation have mild disability; whereas, 10% have moderate disability and 5% have severe disability. This biased sample distributions may influence the results of the study. Sampling distribution that is more

representative of each group is needed for determining true group differences of parental values across parents of children with mild, moderate, and severe disability.

The results of the MANOVA analysis also indicated no main effect of type of intellectual disability on the important benefits. In this study, type of intellectual disability included mental retardation, autism/Asperger's syndrome, and learning disability. Although persons with different types of intellectual disability have their own distinctive characteristics in some domains (i.e., emotional disturbance, impulsive behaviors, attention deficit, etc.), they all share one common characteristic, namely cognitive disability. Therefore, it is clear that parent's perceptions of the important benefits of parental values are not influenced by the type of intellectual disability his/her child has. However, the results might have been different if investigating parents of children with different types of disability rather than intellectual disability. Longmuir and Bar-Or (2000) suggest that disability type is a significant factor that influences physical activity levels of adolescents with physical and sensory disabilities. It would be an interesting study if the research design focuses on parent's perceptions of physical activity benefits for children with different types of disability.

It is limited to generalize the research findings to a large population of parents of children with intellectual disabilities because of the biased sample in this study. As discussed in the likely benefits, the most parents of this study had an easy access to physical activity participation for their children with intellectual disabilities. The children of the parents in this study have participated in Special Olympics or other community physical activity programs. Also, the majority of parents were active themselves in this study. Therefore, the results should not be generalized to parents who live an area where

physical activity programs are not readily available for their children with intellectual disabilities, or to parents and children with intellectual disabilities who are sedentary.

It should be noted that the present study did not test the influence of other independent variables (parents' disability, children's age, children's gender, and multiple disability) for the important benefits of parental values due to a small sample size. These independent variables are unlikely to have an effect on the present results because separate MANOVA analyses already revealed that the main effect of these independent variables was not significant. However, a small size may have affected the MANOVA analysis by decreasing the effect size (Hair et al., 1998). A study with a sufficient sample size is desirable to increase power in survey research.

Parental Concerns

Results of the study indicated relatively low means for all parental concern items and factors. In this study, the item means ranged from 1.18 to 1.68 in a 3-point scale. These findings contrast with literature where physical activity barriers for persons with disabilities are reported (Duchane & French, 1998; Heikinaro-Johansson & Sherrill, 1994; Levinson & Reid, 1991; Rimmer et al., 2004; Rimmer et al., 2000). However, given that the majority of parents in this study were recruited at the Michigan Special Olympics Summer Games, it is not surprising that parents do not perceive many barriers to physical activity participation by their children with intellectual disabilities. Special Olympics provides opportunities for persons with intellectual disabilities to participate in qualify physical activity programs. Special Olympics provides coaches, transportation, and free of charge to athletes; therefore, parents are motivated to encourage their children with intellectual disabilities to participate. Goodwin et al. (2004) noted that Special

Olympics meet parent's needs for encouraging their children with intellectual disabilities to participate in physical activity by providing quality services (i.e., quality teaching/coaching, safety).

Despite the overall low ratings, the parents of this study perceived some concerns relatively more significant than others. In this study, parents were more concerned about nature of program (a variety of activities and program philosophy), quality of staff, and availability/accessibility, than about convenience (e.g., schedule of program, transportation) and family resources (e.g., cost and child care). The findings of this study are in line with a similar study on parental concerns about physical activity participation by children with cognitive disabilities (Lee & Dummer, 2003). For parents of children with intellectual disabilities, it should be important that program activities, as well as program goals, match to their child's interest and ability. Without appropriate program activities and philosophy, children with intellectual disabilities may be engaged in an activity they do not want to participate; thus, they become no longer interested in participation. Also, it is important for parents that their children with intellectual disabilities receive quality of teaching or coaching. The research literature also emphasizes that the success of adapted physical activity (including inclusive physical education) depends on the attitudes and teaching competence of physical activity professionals (DePauw & Doll-Tepper, 2000; Duchane & French, 1998; Heikinaro-Johansson & Sherrill, 1994). In addition, the significance of program availability and accessibility as a barrier to physical activity participation by persons with disabilities has been well documented in literature (Levinson & Reid, 1991; Rimmer et al., 2004; Rimmer et al., 2000).

The relatively low ratings on items related to program convenience and family resources suggest that the economic-related barriers were not the primary concerns for parents when they enroll their child with an intellectual disability in a physical activity program. A possible explanation for this is that parents in the research sample fall into upper-middle socioeconomic groups. This may be especially true of these parents who are affiliated with the SSP. Some barriers such as cost of program and transportation can be significant barriers to physical activity participation for people with disabilities who have a low income (Rimmer et al., 2000). However, for the upper-middle class family in socioeconomic status, these economic-related barriers may not be a major concern for parents (Lee & Dummer, 2003). Another reason for low ratings on convenience and family resources may have something to do with Special Olympics. Special Olympics provides opportunities to participate in sports and physical activity programs to persons with intellectual disabilities at no cost. Also, there are many other convenient services provided to the family of Special Olympians, including childcare, family receptions, festivals, transportation, etc. Therefore, parents might not perceive family resources and convenience as significant concerns as nature of program and staffing.

Although the results of the descriptive statistics provide valuable information for many stakeholders (i.e., researchers, physical activity professionals, parents, etc.), the findings should not be generalized to a large population of parents of children with intellectual disabilities due to the biased sample. Most parents in this study had an easy access to Special Olympics or other community physical activity programs for their children with intellectual disabilities. Therefore, the research findings may not be generalized to parents who live in areas where no physical activity programs are readily

available for their children with intellectual disabilities. In addition, this study may also have limitation in generalizing the findings to parents and their children who are sedentary in physical activity because of the biased sample comprised of active parents and their children in this study. A better research design should include parents and children with intellectual disabilities with different characteristics in the location of living and physical activity behavior.

It was surprising that there was no main effect for children's age in relation to parental concerns about participation by children with intellectual disabilities. The research literature shows the influence of demographics (e.g., age and gender) on physical activity participation by persons with disabilities (Compton et al., 1989; Hedrick & Broadbent, 1996; Longmuir & Bar-Or, 2000). The contrasting results may be due to the homogeneous sample. In this study, more than 90% of children with intellectual disabilities had previous experiences in Special Olympics, assuming that their parents also had some degree of involvement with children's physical activity participation (or Special Olympics participation). In addition, Special Olympics offers physical activity programs to persons with intellectual disabilities at all ages. Therefore, it seems logical that parents would not perceive many physical activity barriers as long as their school-aged or adult children with intellectual disabilities have an access to participate in physical activity.

Another surprising result was no main effect for severity of children's disability in relation to parental concerns about participation by children with intellectual disabilities. Although evidence does show the significant influence of severity of disability on the degree of participation in physical activity among persons with disabilities (Hedrick &

Broadbent, 1996), parent's perceptions of physical activity barriers to his/her own child with an intellectual disability were not influenced by severity of disability in this study. As discussed previously, these contrasting results may be due to the biased sample. In this study, the sample mainly consisted of parents whose children with intellectual disabilities had physical activity experiences in Special Olympics or other community physical activity programs. Even for children with severe disabilities, Special Olympics provides a special program such as the Motor Activities Training Program (MATP). Therefore, severity of disability may not be a significant factor that influences children with intellectual disabilities on their participation in Special Olympics. However, results might have been different if investigating parents of children with different characteristics (e.g., disability types, living locations, physical activity behaviors). Researchers suggest that disability-related factors and demographics can significantly influence physical activity participation by persons with disabilities (Compton et al., 1989; Hedrick & Broadbent, 1996; Longmuir & Bar-Or, 2000).

It should be noted that the influence of other independent variables (parents' disability, children's gender, type of intellectual disability, and multiple disability) was not tested due to a small sample size for the MANOVA model. Since the MANOVA analysis showed no main effect for children's age and severity of disability on parental concerns, the influence of other independent variables was not a concern. Separate MANOVA analyses already tested the two independent variables that showed the greatest significance. Therefore, other independent variables are not likely to influence the results of the study. However, a small sample for the MANOVA model may have

affected the results by decreasing effect size (Hair et al., 1998). Researchers are encouraged to repeat the study with a sufficient sample size.

In addition, the violation of the MANOVA assumptions may also influence the effect size of the mean differences. In this study, the Box tests revealed that the equivalence of covariance matrices across the groups was not assumed in the likely benefits scale, as well as the important benefit scale. Since unequal variance is sensitive to normality (Hair et al., 1998), the satisfaction of normal distribution is not guaranteed; therefore decreasing the effect size. A small effect size ranging from .03 to .13 was evident in this study. The likely reason for the non-normal distribution is the sample of parents whose children are physically active. In this study, most children with intellectual disabilities are active in physical activity; thus, their parents may give high ratings to both likely benefits and important benefits. This might result in a skewed distribution. Future research should include a more varied sample (e.g., persons with intellectual disabilities who are active and inactive in physical activity) to meet the MANOVA assumptions and increase the effect size.

Determinants of Children's Physical Activity

Results of this study demonstrate that school-aged children with intellectual disabilities tend to be more active than adults with intellectual disabilities. These findings are supported by the research literature on age differences in physical activity participation by children and youth with disabilities (Brown & Gordon, 1987; Longmuir & Bar-Or, 2000; Winnick, 1985). Given that most school systems offer physical activity programs (i.e., physical education, adapted physical activity, recreational activities, play, etc.), it is not surprising that school-aged children with intellectual disabilities have more

opportunities to participate in physical activity than adults with intellectual disabilities. In addition, the results also indicated that the mean participation in physical activity by parents was 444.20 minutes per week. This may reflect that the parents of this study are active, as well as their children with intellectual disabilities.

It should be addressed that some physical activity information seems over-reported by parents. In this study, only 20% of children with intellectual disabilities were inactive in physical activity. This does contrast with the existing data (Draheim et al., 2002) indicating more than 50% of persons with intellectual disabilities are engaged in little or no physical activity. In addition, parents seem to over-report their own participation in physical activity. In this study, 74% of parents were physically active, which is over-representative when compared to the national average (47%) of recommended physical activity for adults (U.S. Department of Health and Human Services, 2004). The contrasts of children's and parents' physical activity in this study with the existing data may reflect lack of accuracy in the parent-report 7-day recall physical activity questionnaire. The recheck of the questionnaire should be followed to obtain more accurate information about physical activity participation by persons with intellectual disabilities.

The results of descriptive statistics also indicated similar types of physical activity reported for both parents and their children with intellectual disabilities. Interestingly, the five most prevalent types of physical activity in parents and their children with intellectual disabilities share one common characteristic, namely, an individual activity (i.e., walking, housecleaning, exercise cycling, etc.). In this study, basketball played by some school-aged children was the only team sport or activity among the top five popular

types of physical activity. This may reflect lack of programs that offer socializing activities (team sports or group activities). By participating in physical activity with others, persons with intellectual disabilities can receive many social benefits (e.g., fun, teamwork, following rules, leadership, etc.). Therefore, persons with intellectual disabilities should be encouraged to participate in many activities that enhance social benefits of physical activity.

In this study, parent's perceptions of children's level of physical activity are interesting. The majority of parents perceived their children's physical activity level was higher than those who have the same disability as their children, but lower than those who do not have disabilities. This may reflect the influence of children's disability on parent's perceptions. Since parents themselves are often influenced by their children with disabilities (Fiorini et al., 1996), parent's perceptions of children's physical activity may also be influenced by children's disability. For these reasons, parents of children with intellectual disabilities may perceive their children's level of physical activity is relatively lower than those who do not have disabilities. The research findings are supported by previous research on the prevalence of physical inactivity in persons with intellectual disabilities compared to those without disabilities (Pitetti et al., 1993; Draheim et al., 2002).

The results of the multiple regression analysis demonstrate that physical activity participation by children with intellectual disabilities can be best predicted by severity of disability, parents' age, and parents' physical activity. In this study, the results of the multiple regression analysis indicated that the amount of variance explained by these variables was 32%. This is comparable to explained variances found in a similar study on

correlates of parent-reported physical activity for children without disabilities (Sallis et al., 2002). However, it is difficult to interpret the amount of variance explained found in this study because no comparable data are available for children with disabilities. Since R^2 is sensitive to the sample size and number of independent variables (Shavelson, 1996), a follow-up study with a large sample size should be conducted for better understanding of the amount of variance explained for the given regression model.

Results of the study indicated that severity of children's disability was negatively correlated to their own participation in physical activity. This is in line with the findings of previous research regarding the influence of severity of disability on physical activity participation by persons with disabilities (Hedrick & Broadbent, 1996; Wilhite & Kleiber, 1992). It is clear that people who have more severe disability engage in less physical activity than those who have less severe disability. Present results may be explained by several reasons. First, persons with severe disability may have to deal with more barriers (e.g., accessibility of equipment and facilities) due to limited physical capability. Second, persons with severe disability may not be encouraged to participate in physical activity as much as those with mild or moderate disability from parents and significant others (e.g., siblings, teachers, coaches, peers, community organizations). The existing data show that lack of encouragement is the number one reason for why people with severe/profound disability do not participate in community activities (National Organization on Disability, 2000). In addition, despite the Special Olympics programs for persons with severe disabilities (e.g., MATP), their parents may still have many concerns such as safety and transportation. Therefore, these parents may have reported less physical activity participation for their children with severe disabilities.

The results also demonstrate that parents' age matters to physical activity participation by children with intellectual disabilities. In this study, parents' age was negatively correlated to children's physical activity participation, suggesting that children who have older parents less participated in physical activity than children who have younger parents. Older parents might be less physically capable of getting their children to physical activity programs. The recent data from the Center for Disease Control and Prevention (U.S. Department of Health and Human Services, 2004) show that more than 60% of older adults are physically inactive, and many people experience disability from chronic medical conditions as they age. In addition, Kimiecik and Horn (1998) suggest that parents' age should be investigated as may impact on children's moderate-to-vigorous physical activity.

It should be noted that parents' age is closely related to children's age. In this study, children's age was excluded from the data analysis because of significant multicollinearity with parents' age (r=.70, p<.01). These results may reflect a relationship between children's age and their physical activity participation. In general, fewer programs are available for adults with intellectual disabilities than children with intellectual disabilities. Children with intellectual disabilities are usually served in schools for physical activity participation. In addition, schools often serve as a clearinghouse of information regarding community opportunities. However, no central clearinghouse of physical activity information is readily available for adults. The relationship between children's age and their physical activity participation has been well documented in research literature (Brown & Gordon, 1987; Longmuir & Bar-Or, 2000; Winnick, 1985).

The results of the study also indicated that parents' physical activity was significantly correlated to physical activity participation by children with intellectual disabilities. This finding is supported by previous research regarding the relationship between parents' physical activity and children's physical activity (Anderssen & Wold, 1992; Ellis, 2001; Moore et al., 1991). Two reasons may be possible to explain this relationship between physical activity between parents and their children with intellectual disabilities. First, parents may serve as a role model for children's physical activity. If parents value physical activity, their children with intellectual disabilities are likely to value it as well. Second, the significant relationship between parents' and children's physical activity may reflect that they share physical activity participation. Children with intellectual disabilities would be more encouraged to participate in physical activity if their parents are involved with it. Researchers suggest that parental involvement is important in physical activity participation by children with disabilities (Fiorini et al., 1996; Folsom-Meek, 1984).

In this study, the results indicated that other independent variables (e.g., multiple disability, children's BMI, likely benefits, important benefits, and parental concerns) were not significantly correlated to physical activity participation by children with intellectual disabilities. However, research suggests that some variable such as children's BMI is a significant correlate of their physical activity participation (Sallis et al., 2002). This may be due to the sample of parents of children who are physically active. The parents of this study do not represent parents of children with intellectual disabilities who are not active in physical activity; therefore, a study with a large and varied sample is needed to identify true significance of other variables (e.g., multiple disability, BMI,

values, concerns), as a correlate of physical activity participation for persons with intellectual disabilities.

Overall, the findings of the present study support the family influence model proposed by Kimiecik et al. (1996). As emphasized in the family influence model, factors related to parents (e.g., parent's age, and parent's physical activity behavior) significantly influence children's physical activity participation in this study. This suggests parents may be the core of the family influence on physical activity participation by children with intellectual disabilities. However, the present study did not test the influence of siblings on children's physical activity participation, which is another important component in the family influence model. Given the limitation in socialization, the siblings may significantly influence a child with intellectual disability in the family. A desirable research design should focus on the influence of siblings with and without disabilities on physical activity participation by children with intellectual disabilities.

In addition to the importance of parental influence, the results also support the influence of such a disability factor as severity of disability on physical activity participation by persons with intellectual disabilities. In fact, in this study, severity of children's disability was the strongest correlate of their physical activity. However, another disability-related factor, multiple disability, was not significantly correlated to children's physical activity. This may be due to a small sample of children with multiple disability. Researchers suggest that having a secondary disability can increase the degree of disability severity (Rimmer & Braddock, 2002). Therefore, with an increased sample size, the results might have been different.

CHAPTER 6

SUMMARY AND RECOMMENDATIONS

Summary

Persons with intellectual disabilities tend to be sedentary, compared to those without disabilities. Such a sedentary lifestyle is closely associated with low levels of physical fitness, poor skills, low development in psychosocial domains, and lack of independence, which negatively influence quality of life in persons with intellectual disabilities. As an attempt to increase the level of physical activity in this population, it is important to examine how parents influence their children's participation in physical activity. Given the parent's significant role in controlling the physical activity behavior of his/her child with an intellectual disability, parent's perceptions of physical activity values and barriers related to children's physical activity participation should not be ignored.

The purposes of this study were to: (a) examine parental values and concerns about participation in physical activity by their children (including adults) with intellectual disabilities; and (b) identify determinants of physical activity participation by children with intellectual disability. The main focus of parental values and concerns was the influence of disability-related factors and demographics on parent's perceptions of likely benefits and important benefits related to physical activity participation by children with intellectual disabilities. The hypothesized correlates of children's physical activity included parental values and concerns, parents' age, parents' disability, parents' physical activity, children's BMI, severity of children's disability, and multiple disability.

The study was descriptive survey research using a nonrandom sample. The participants of this study included 193 parents who live with a school-aged or adult child with an intellectual disability. Parents aged in range from 27- 76 years. The majority of parents were mothers (83%) and had no disability (98%). The mean age of children with intellectual disabilities was 17.59 years (*SD*=7.53) with 60% of school-aged children and 62% of male children. Regarding children's disability, 73% had moderate disability, and 37% had multiple disability.

A newly developed survey, *Physical Activity Values and Concerns Survey*, was distributed to parents to obtain information about their perceptions of physical activity benefits (likely benefits and important benefits for children with intellectual disabilities) and barriers, parent's/child's physical activity, disability information (e.g., type, severity, and multiple disability), and demographics. Given a small sample size, factor analyses and separate MANOVA analyses were performed for reducing the number of dependent variables and independent variables to fit into the data analysis. To identify determinants of physical activity participation by children with intellectual disabilities, a multiple regression analysis was used.

Results of the study revealed that there was a significant main effect of severity of disability on the likely benefits but not for other independent variables. Parents of children with mild and moderate disability rated social benefits and self-acceptance significantly higher than parents of children with severe disability. For winning, significant group differences only existed between parents of children with mild and severe disability. Relatively high means of items and factors of likely benefits were found in this study.

The results also revealed that there was a significant main effect of severity of disability on the important benefits but not for other independent variables. Parents of children with severe disability rated psychosocial benefits and winning significantly lower than parents of children with mild and moderate disability. The item and factor means of the important benefits were also relatively high.

The results of this study demonstrate that severity of disability is the only variable that influence parent's perceptions of physical activity values related physical activity participation by their children with intellectual disabilities. Overall, parents rated parental values relatively high, reflecting that they are knowledgeable about physical activity values related to physical activity participation by children with intellectual disabilities.

However, no significant main effects were found in parental concerns. This may reflect the influence of the biased sample on the data analyses. The means of parental concern items and factors were rated relatively low. Though, some items of physical activity barriers may be parental concerns in the given scale.

In addition, the results of this study indicated that severity of children's disability, parents' age, and parents' physical activity were significantly correlated to children's physical activity in the multiple regression analysis. Severity of disability and parents' age were negatively correlated to children's physical activity; whereas parents' physical activity has a positive relationship.

This study provides evidence that a study using a large and random sample is needed for better understanding of parental values and concerns about participation by children with intellectual disabilities. Additionally, this study provides valuable information about parental influence on physical activity participation by their children

with intellectual disabilities to many stakeholders such as researchers, physical activity professionals, program providers, and parents.

Recommendations

Based on the results of the present study, several recommendations were made. Recommendations for future research and physical activity professionals are presented here.

For Future Research

- Future research should focus on examining parents of children with other types of disability such as physical disability, sensory disability, health conditions, etc. to further document parental values and concerns as parental influence on physical activity participation by children with disabilities in the research literature.
- Future research should have a large sample size with a sufficient number of participants in groups to determine the influence of variables on parental values and concerns. Researchers should know the importance of an appropriate sample size to obtain a desirable effect size and power when using multivariate analysis (i.e., MANOVA, multiple regressions, etc.).
- Future research should have a random sample. In the presents study, the influence of the biased sample on the data analyses was found. Examples of the biased sample include the active parents and children with intellectual disabilities, as well as recruiting parents at the state games of Special Olympics. Since the biased sample is likely to limit the generalizability of this study, random sampling should be taken into consideration.

- Future research should consider the influence of parent's gender on parental values and concerns. In the present study, parent's gender was not taken into consideration because of the skewed sample distribution of groups. However, a study comparing physical activity values and concerns of mother to those of fathers will provide insightful information about gender differences in parental belief systems.
- Future research should focus on investigating other potential correlates of physical activity participation by children with intellectual disabilities. These correlates include siblings, peers, education, and living location.
- Future research should also focus on evaluating psychometric properties of the Physical Activity Values and Concerns Survey. Although the present study elicits a strong degree of reliability and some evidence of content validity for the instrument, more research focusing on other type of validity such as concurrent validity should be done for establishing better psychometric properties of the instrument.
- Future research should consider using incentives to increase the return rate of mailed surveys. In the pilot study, one of the major reasons for low return rate was the implementation of self-administered and mailed survey without any incentives (i.e., tokens, cash, gift certificates). These incentives will motivate the participants to participate in survey research; thus, increasing the return rate of surveys.

For Physical Activity Professionals

- Physical activity professionals should pay extra attention to facilitating fun and psychosocial benefits when developing and implementing a physical activity program specifically designed for person with intellectual disabilities.
- Physical activity professionals should remember the importance of other physical activity values such as improving health-related fitness and skills for persons with intellectual disabilities so programs for this population should focus on these benefits, as well.
- Physical activity professionals should be aware of parental concerns about participation in physical activity by their children with intellectual disabilities and try to eliminate these concerns for the success of the physical activity program in this population.
- Physical activity professionals should know that children's attraction to a program depends on quality of internal factors such as program philosophy, quality of staff, a variety of activities, and supervision/safety. Therefore, professionals should pay extra attention to these factors when developing or refining a physical activity program for persons with intellectual disabilities.
- Physical activity professionals should encourage parental involvement in physical activity participation by their children with intellectual disabilities. It is important for professionals to educate parents about the importance of their physical activity behavior in children's physical activity and encourage them to participate in physical activity with their own child with an intellectual disability.

- Physical activity professionals should pay more attention to participants with severe disability. Professionals should be flexible in their teaching/coaching and motivate participants with severe disability to participate in physical activity.

For Program Providers/Directors

- Program providers/directors should offer a physical activity program that meet parent's needs or child's needs for their children with intellectual disabilities reflected in parental values.
- Program providers/directors should be aware of parental concerns related to physical activity participation by their children with intellectual disabilities and attempt to eliminate them.
- Program providers/directors should pay extra attention to advertisement of programs. Information about programs should be easy and convenient for parents to obtain (e.g., posting information on internet).
- Program providers/directors should focus on staffing. They should provide in-service training to enhance quality teaching/coaching on regular basis. They should also support teachers/coaches by encouraging them to communicate with parents.
- Program providers/directors should check facility and equipment regularly. They should know that accessible and safe facilities are an important component of quality programs. They should also check equipment for purchase and maintenance. They should remember that enough equipment is necessary to provide a variety of activities to persons with intellectual disabilities.

For Parents

- Parents are recommended to be actively involved in physical activity participation by their children with intellectual disabilities. Parents should know their participation could positively influence their child's participation in physical activity.
- Parents are recommended to communicate with program staff. Parents should provide information about their needs and concerns related physical activity participation by their children with intellectual disabilities to program providers and teachers/coaches.
- Parents are recommended to attend workshops or conferences related to physical activity and learn about physical activity benefits. Parents should know that parent's perceptions of physical activity values are positively influence physical activity participation by their children with intellectual disabilities.
- Parents should understand the negative relationship between severity of children's disability and their participation in physical activity, and encourage their children with severe disability to participate in physical activity.
- Parents, especially older parents are strongly recommended to be physically active. Parents should know that their physical activity behavior is significantly associated with the level of participation in physical activity by their children with intellectual disabilities.

APPENDICES

APPENDIX A

Pilot Study

INTRODUCTION

Establishing reliability of a newly developed instrument is critical in survey research (Thomas & Nelson, 2001). A step should be taken to assess validity and reliability of the instrument before it is actually used in the main research. Without this step, the instrument should not be trustful. This pilot study is one of steps to establish reliability of the survey instrument used in the investigator's primary study. The main focus of the primary study is to investigate parents' perceived values and concerns in relation to physical activity participation by their own child with an intellectual disability. The investigator has developed a new survey instrument called, *Physical Activity Values and Concerns Survey* (PAVCS), for the primary study and plans to collect data from parents of persons with intellectual disabilities at the Michigan Special Olympics Summer Games. However, the investigator must demonstrate that the PAVCS yields reliable responses before it is used in the primary study. Therefore, the purpose of the pilot study was to assess test-retest reliability of the PAVCS as a part of the reliability check for the instrument.

METHODS

Participants

Selection Criteria

The sample selection criteria were that: (a) parents must have a child with an intellectual disability (some were adults); and (b) the child, regardless of the child's age, must live at home with their parents. Types of intellectual disability in the pilot study were same as the ones used in the primary study. That is, intellectual disability included mental retardation/Down syndrome, autism/Asperger's syndrome, and learning disability.

Recruitment

Two parent groups of persons with intellectual disabilities were recruited for the pilot study. First, parents of participants in the Sport Skills Program (SSP) were contacted and asked to participate in this study. The SSP is a university sponsored physical activity program for children and adults with disabilities at Michigan State University. The other parent group was the parents of Autism Society of Lansing (ASL). These parent groups were a convenient sample in terms of geographical distance. Parents who agree to participate received a packet including a consent form and a survey. The consent procedure was same as the primary study.

Sample Size

A power analysis was conducted to determine an appropriate sample size. The number of participants needed for survey research with Type I error set at .05, bound of error set at .10, and variance set at .26, was 26 parents. Table 1 describes the survey distribution and return contributing to the sample size of the pilot study. The estimated number of parents in the groups was 70 families of the SSP and 68 families of the ASL. For the first survey, the total number of surveys distributed was 138, and 39 were returned (the return rate of 28%). Among the surveys returned, 3 were excluded because they did not meet the criteria. For the second survey, 36 surveys were distributed to the parents who completed the first survey, and 30 were returned (the return rate of 83%). Therefore, the actual sample size of the pilot study was 30 parents of children with intellectual disabilities.

The low rate of survey return in this study was due primary to the sample of the ASL. As indicated in Table 1, the return rate of the SSP sample was 40%; whereas, that

Table 1

Survey Distribution and Return in the Pilot Study

	1st Survey Administration			2nd Survey Administration		
	# Surveys distributed	# Surveys returned	# Surveys usable	# Surveys distributed	# Surveys returned	# Surveys usable
SSP	70	28	25	25	21	21
ASL	68	11	11	11	9	9
Total	138	39	36	36	30	30

Note. SSP – Parents of the Sport Skills Program; ASL – Parents of the Autism Society of Lansing

of the ASL was only 16% in the first survey administration. The higher return rate in the SSP sample reflected the investigator's friendship with the parents of the SSP. The investigator has served in the program over the last 5 years as a graduate assistant; therefore, he has known most parents in the SSP sample. However, there was no connection between the investigator and the parents in the ASL sample, which might result in low return rate of the survey. Also, participation in the pilot study was 100% voluntary, and the survey was administered by mail without any incentives. According to Dillman (2000), without using an incentive (e.g., token, cash, gift certification, etc.), the return rate of the survey can be significantly decreased. Therefore, the low return rate of survey in this study may be, in part, explained by the mailed survey administration without an incentive. Also, the failure of survey return in the second survey administration (6 were not returned) contributed to the low return rate of survey in this study.

Sample Characteristics

There were 29 mothers (97%) and 1 father (3%) who lived with their child with an intellectual disability. The mean age of parents was 44.73 years with a standard deviation of 6.91. There were 23 parents who have a school-aged child (77%) and 7 parents who have an adult with intellectual disabilities (23%). The majority of parents did not have a disability themselves (97%). For the distribution of children's primary intellectual disability, 63% were autism/Asperger's syndrome (n=19), 30% were mental retardation (n=9), and 3% were learning disability (n=2).

Instrument

The survey instrument used in the pilot study was same as the primary study (the Physical Activity Values and Concerns Survey). All sections in the instrument were evaluated for reliability, including parental values in the likely and important benefit scale, parental concerns, children's and parents' physical activity, and demographics.

Procedure

Upon receiving the approval of the University Committee on Research Involving Human Subjects (UCRIHS, Appendix B), the investigator contacted the SSP and ASL and obtained the mailing list of parents. A survey packet including a cover letter, consent form, and survey questionnaire was mailed to 70 families of the SSP and 68 families of the ASL. For parents' convenience to return the survey, a self-addressed and stamped envelope was also enclosed in the packet. Two weeks after the first survey was mailed out, a follow-up letter (Appendix G) was sent to encourage parents to complete and return the first survey. The second survey with a reminding letter was mailed to the parents who completed and returned the first survey a week later. A post card for thank you was send to the parents who returned the second survey.

Data Analyses

A test-retest method was used to establish the stability of two parental values scales (likely benefits and important benefits), parental concerns, children's and parent's physical activity, BMI, and demographics. The sum of parental values/concerns, physical activity, and disability was used to determine the Cronbach's alpha. The demographics in the analyses included children's age, gender, and BMI, as well as parents' age, gender, and disability.

RESULTS AND DISCUSSION

The main focus of the pilot study was to assess and establish the test-retest reliability of the PAVCS. Table 2 shows the results of the test-retest reliability of the instrument. Overall, the survey instrument showed a strong degree of reliability with a Cronbach's alpha ranging from .86-1.00. A high coefficient alpha of likely and important benefits (α=.96 and .95, respectively) indicated that parents' responses to parental value items were almost identical over two survey administrations. Although the Cronbach's alpha of parental concerns (α=.88) was slightly lower than that of parental values, it is still considered high in reliability of survey instrument.

The results of physical activity indicated a high coefficient alpha for both children's and parents' physical activity (α=.99 and .86, respectively). These findings were consistent with previous research on a 7-day recall physical activity questionnaire, suggesting that a parent-reported 7-day recall physical activity questionnaire is a reliable instrument to determine the level of physical activity participation by parents and their children with intellectual disabilities. In addition, the results of demographic information clearly indicated a very high coefficient alpha for most items (some were perfect in reliability), providing evidence of strong degree of reliability.

It should be noted that the pilot study was limited in sampling. In this study, the distribution of children's disability showed that parents of children with mental retardation and learning disability appeared to be underrepresented (30% and 3%, respectively), compared with parents of children with autism/Asperger's syndrome (67%). Though, the influence of this sampling error may not be significant because the same criteria for sample selection used in the pilot study and primary study. However, for

Table 2

Test-Retest Reliability of Physical Activity Values and Concerns Survey

	n	α
Parental Values		
Likely Benefits	30	.96
Important Benefits	30	.95
Parental Concerns	30	.88
Physical Activity		
Children	30	.99
Parents	30	.86
Demographics		
Children		
Age	30	1.00
Gender	30	.96
BMI	30	.99
Disability		
Type of disability	30	.96
Severity of disability	30	.93
Parents		
Age	30	1.00
Gender	30	1.00
Disability	30	1.00

better interpretation of the results, an investigation with more representative sampling distribution is desired in future.

In conclusion, the PAVCS is a very reliable survey instrument to examine parental values and concerns about participation in physical activity by persons with intellectual disabilities. Therefore, the use of this survey instrument in the investigator's primary study is appropriate.

APPENDIX B

IRB Approval

MICHIGAN STATE
UNIVERSITY

August 6, 2004

TO: Gail DUMMER
132 IM Sports Circle
MSU

RE: **IRB # 04-345** **CATEGORY:** 1-2, 2-7 EXPEDITED

APPROVAL DATE: **April 26, 2004**

EXPIRATION DATE: **March 26, 2005**

TITLE: Parental values and concerns about physical activity participation by persons with disabilities

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS APPROVED THIS PROJECT'S REVISION.**

REVISION REQUESTED: July 22, 2004

REVISION APPROVAL DATE: August 4, 2004

Revision to include a change to the eligibility criteria.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.
If we can be of further assistance, please contact us at (517) 355-2180 or via email: UCRIHS@msu.edu.

Sincerely,

Peter Vasilenko, Ph.D.
UCRIHS Chair

OFFICE OF
RESEARCH
ETHICS AND
STANDARDS
y Committee on
earch Involving
luman Subjects
n State University
202 Olds Hall
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517/355-2180
517/432-4503
edu/user/ucrihs
ucrihs@msu.edu

PV: jm
cc: Bomjin Lee
39 IM Circle

Informed Consent
Parent Values and Concerns About Participation in Physical Activity by Their Children With Disabilities

Purpose
The purpose of this study is to examine parent values and concerns about participation in physical activity by their school-aged and adult children with disabilities. The results will add to the body of knowledge about ways to encourage persons with cognitive disabilities to be more physically active. The results will also help professionals to develop and implement physical activity and sport programs that are responsive to the interests and needs individuals with disabilities and their families.

Investigators
This study is being conducted by Bomjin "BJ" Lee, a graduate student in the Department of Kinesiology at Michigan State University, as his doctoral dissertation. The faculty investigator is Dr. Gail M. Dummer from the same department and university. Several MSU graduate students and friends of the investigators will help to administer the survey.

Survey
Participants will be asked to complete a written survey. About 20-30 minutes is needed to complete the survey. You will be asked to: (a) indicate your understanding of the benefits of physical activity for your school-aged or adult child; (b) assign importance ratings to those benefits; (c) describe barriers to your child's participation in physical activity; (d) describe your own participation in physical activity; (e) describe your child's participation in physical activity; (f) describe your child's participation in the Special Olympics program; and (g) provide some demographic information.

Voluntary Participation
Participation in this study is voluntary. You may choose not to participate at all, may choose not to answer certain questions, or may discontinue the survey at any time. You indicate your voluntary agreement to participate by completing and returning this survey. Your participation in this study will be greatly appreciated.

Confidentiality
Your privacy will be protected to the maximum extent allowable by law. Specific confidentiality provisions include: (a) you are instructed ***not*** to write your name on the survey, thus no one will have a record of who participated in this study; (b) the survey questions do not probe sensitive areas, and you do have the right to skip any questions you do not wish to answer; (c) completed surveys will be kept in a locked file cabinet in a locked office; and (d) only BJ Lee and Gail Dummer will have access to the completed surveys.

Risks and Benefits
The only known risk of participation is the use of 20-30 minutes of your time. As indicated earlier, the likely benefit is results that will help professionals to develop and implement physical activity and sport programs that are responsive to the interests and needs individuals with disabilities and their families.

Contact Information
If you have any questions concerning participation in this study, please contact BJ Lee or Dr. Gail M. Dummer.

Bomjin "BJ" Lee
Department of Kinesiology
39 IM Sports Circle
Michigan State University
East Lansing, MI 48824
(517) 432-7121
leebomji@msu.edu

Gail M. Dummer
Department of Kinesiology
138 IM Sports Circle
Michigan State University
East Lansing, MI 48824
(517) 355-4744
dummer@msu.edu

If you have questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Peter Vasilenko, Ph.D., Chair of the University Committee on Research Involving Human Subjects (UCRIHS) by phone: (517) 355-2180, fax: (517) 432-4503, e-mail: ucrihs@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

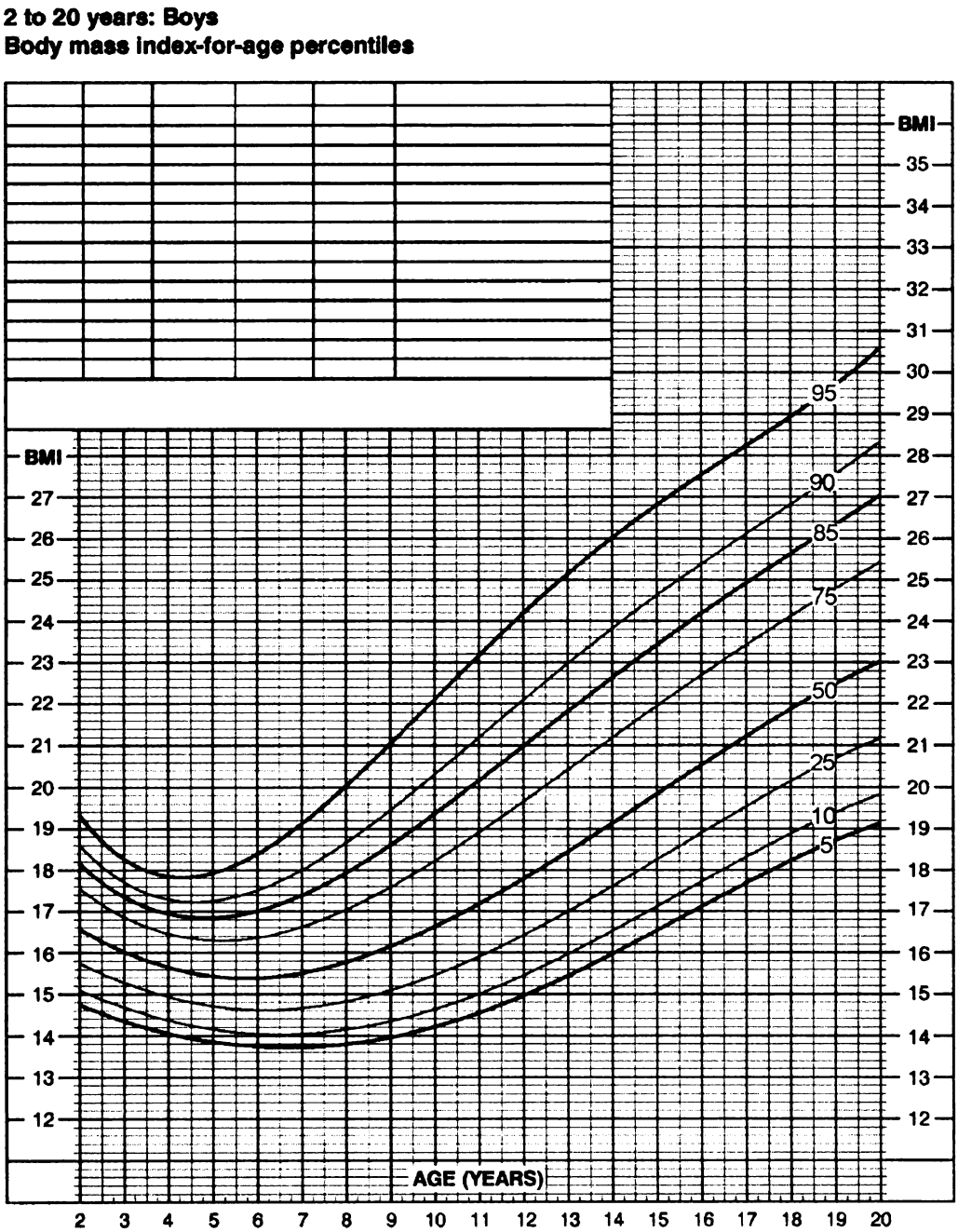
Thank you for your time and cooperation,

_____ _____
Bomjin Lee, Student Investigator Date

_____ _____
Dr. Gail M. Dummer, Faculty Supervisor Date

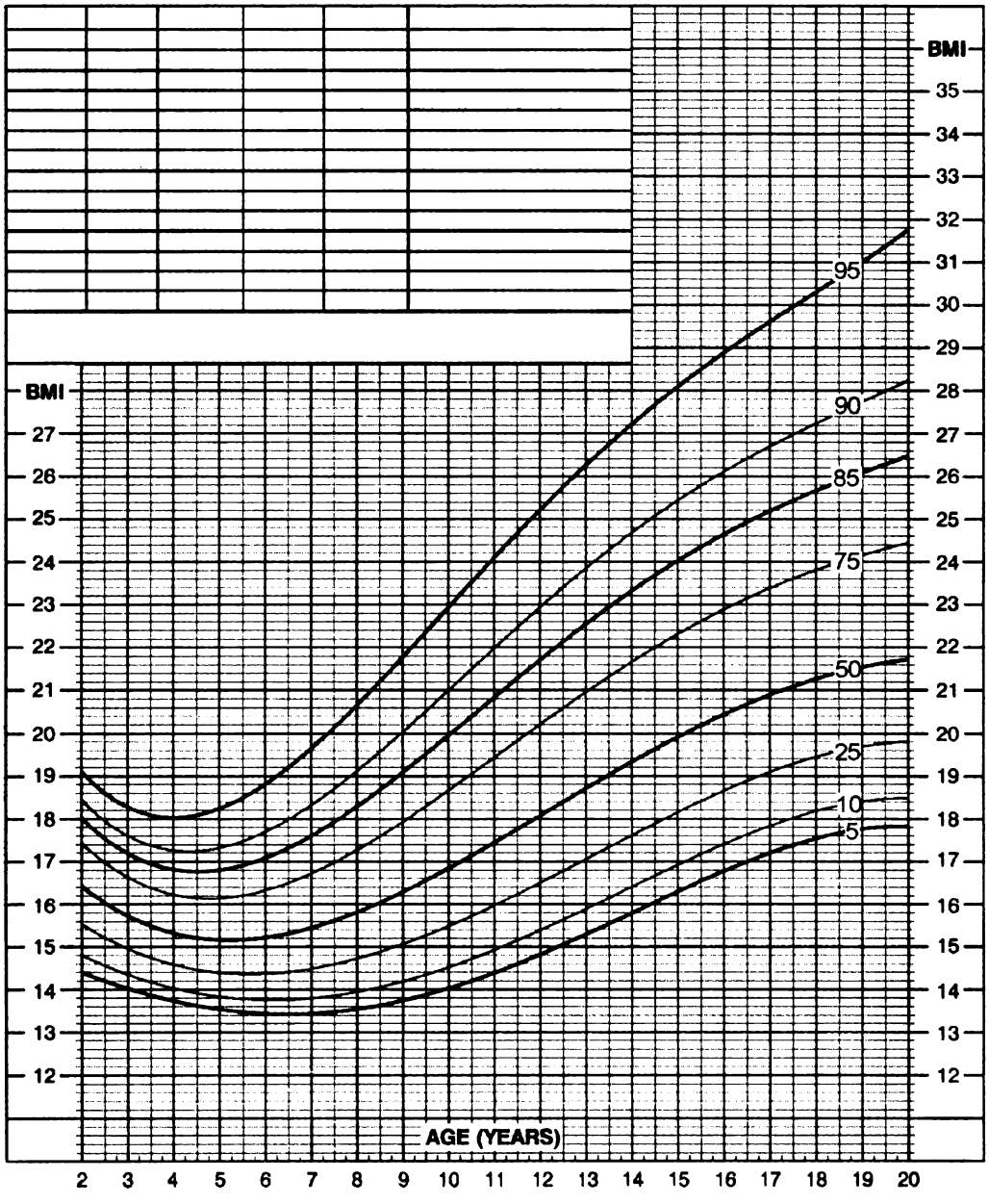
APPENDIX C

BMI Age Specific Charts for Boys and Girls



BMI-Age-Specific Chart for Boys (obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/growthcharts, 2004)

2 to 20 years: Girls
Body mass index-for-age percentiles



BMI-Age-Specific Chart for Girls (obtained from the Centers for Disease Control and Prevention website at http://www.cdc.gov/growthcharts, 2004)

APPENDIX D

Survey Questionnaire

Physical Activity Values and Concerns Survey

Instructions: Please answer the questions in this survey with respect to your school-aged or adult child who has an intellectual disability and who lives in the family home. If you have more than one child with a disability, please select only one of those children as the basis for your survey responses.

Part I. Parent Values

1-2. **Parent Values**. In the left-hand columns please give your opinion about ways in which your child is likely to benefit from participation in physical activity. In the right-hand columns, please indicate how important the various benefits are for your child. Circle one number in each row in the left-hand columns and circle one number in each row in the right-hand columns.

1. My child with a disability is likely to benefit in this way					**2. This benefit is important for my child with a disability**			
Strongly Disagree	Disagree	Agree	Strongly Agree	**Benefit of Participation in Physical Activity**	Not important	Somewhat Important	Important	Extremely important
1	2	3	4	a. Fun	1	2	3	4
1	2	3	4	b. Joy of moving or doing sport skills	1	2	3	4
1	2	3	4	c. Opportunity to make new friends	1	2	3	4
1	2	3	4	d. Opportunity to participate in activities with friends	1	2	3	4
1	2	3	4	e. Better social skills (i.e., sharing, team work)	1	2	3	4
1	2	3	4	f. More opportunities to learn from teachers and coaches	1	2	3	4
1	2	3	4	g. Better self-concept (i.e., feeling good about self)	1	2	3	4
1	2	3	4	h. Better self-confidence (i.e., "can-do" attitude, willing to try new things)	1	2	3	4
1	2	3	4	i. Be independent and have time away from parents	1	2	3	4
1	2	3	4	j. Improve psychological skills (i.e., coping with challenges, self-control)	1	2	3	4

1. My child with a disability is likely to benefit in this way				Benefit of Participation in Physical Activity	2. This benefit is important for my child with a disability			
Strongly Disagree	Disagree	Agree	Strongly Agree		Not important	Somewhat important	Important	Extremely important
1	2	3	4	k. Improve fundamental motor skills (i.e., catching, throwing, kicking, running, jumping, hopping)	1	2	3	4
1	2	3	4	l. Improve sport and leisure skills (i.e., swimming, bowling, bicycling, basketball)	1	2	3	4
1	2	3	4	m. Gain recognition (i.e., medals, ribbons, publicity) or feel special for accomplishments	1	2	3	4
1	2	3	4	n. To win or be successful	1	2	3	4
1	2	3	4	o. Improve ability to perform activities of daily living (i.e., household chores, dressing, grooming)	1	2	3	4
1	2	3	4	p. Improve cardiovascular endurance (i.e., stamina, ability to do more work with less fatigue)	1	2	3	4
1	2	3	4	q. Improve muscular strength and endurance (i.e., ability to lift, push, and pull heavy objects repeatedly)	1	2	3	4
1	2	3	4	r. Improve flexibility (i.e., ability to reach high and low objects)	1	2	3	4
1	2	3	4	s. Improve or maintain good body composition (i.e., not too fat and not too thin)	1	2	3	4
1	2	3	4	t. Better general health (more energy, fewer sick days)	1	2	3	4
1	2	3	4	u. Reduced risk of chronic disease (e.g., heart attack, high blood pressure, diabetes)	1	2	3	4

3. Please describe any additional benefits that your child can obtain through participation in physical activity? How important are these benefits for your child?

4. From the list above (a through u) what are the three most important benefits of participation in physical activity for your child?
   a. Most important benefit _____
   b. Second most important benefit _____
   c. Third most important benefit _____

Part II. Parent Concerns

5. **Parent Concerns**. Persons with disabilities sometimes experience obstacles to participation in a physical activity program. ***During the past year***, to what extent have the following concerns affected your child or your family? Circle one number in each row.

Possible Concerns	Not a concern for my child	A concern for my child	Prevents participation for my child
a. My (parent's) awareness of programs in my community	1	2	3
b. Availability of programs in my community	1	2	3
c. Match of program activities to my child's interests	1	2	3
d. Match of program philosophy or goals to my child's needs	1	2	3
e. Accessibility of the facility or equipment	1	2	3
f. Availability of disability accommodations needed by my child	1	2	3
g. Amount of supervision or other safety concerns	1	2	3
h. Cost of the program	1	2	3
i. Availability of transportation	1	2	3
j. Qualifications of teachers/coaches/staff to teach the skills	1	2	3
k. Qualifications of teachers/coaches/staff to work with people who have disabilities	1	2	3
l. Acceptance by teachers/coaches/staff	1	2	3
m. Participation by my child's friends in the program	1	2	3
n. Availability of personal assistants (i.e., buddy, sign language interpreter, personal care helper)	1	2	3
o. Match of program schedule to my (parent's) schedule	1	2	3
p. Match of program schedule to my child's schedule	1	2	3
q. Availability of child care for other children in my family	1	2	3

6. Please describe any additional concerns related to participation in physical activity by your child?

7. From the list above (a through q) what were the three most significant concerns related to participation in physical activity by your child ***during the past year***?

   a. Most significant concern _____

   b. Second most significant concern _____

   c. Third most significant concern _____

Part III. Child's Physical Activity

Please describe participation in physical activity by your child with a disability over the past 7 days, including activities done at school, work, day care, after school, at home, and on weekends.

We know that you are probably not aware of all the activities your child with a disability does. You will have to make estimates of the amount of time this child spent in various activities. If you simply do not know whether this child has done a particular activity in the past 7 days, then circle the "Don't Know" number.

We prefer that you complete this survey based on your own knowledge of this child's activities.

8. For each activity, please answer three questions:

   a. Did your child with a disability do this activity in the past 7 days? (Circle Yes, No, or Don't Know).
   b. If yes, on **how many days** did your child with a disability do the activity in the past 7 days?
   c. On average, **how many minutes** did your child with a disability do this activity on days when he or she did the activity?

ACTIVITY	No	Yes	Don't Know	How many days in last 7 days?	On average, how many minutes did your child do this activity each day?
Aerobics/aerobic dancing	0	1	2	_____ days	_____ minutes
Ball play (4-square, dodge ball, kick ball, catch)	0	1	2	_____ days	_____ minutes
Baseball/softball	0	1	2	_____ days	_____ minutes
Basketball	0	1	2	_____ days	_____ minutes
Bicycling or exercise cycling	0	1	2	_____ days	_____ minutes
Calisthenics (push-ups, sit-ups, jumping jacks)	0	1	2	_____ days	_____ minutes
Cheerleading, marching band, drill team	0	1	2	_____ days	_____ minutes
Climbing stairs for exercise, Stairmaster	0	1	2	_____ days	_____ minutes
Dance classes (ballet, jazz, modern)	0	1	2	_____ days	_____ minutes
Dancing (social, recreational)	0	1	2	_____ days	_____ minutes
Football	0	1	2	_____ days	_____ minutes
Field hockey	0	1	2	_____ days	_____ minutes
Frisbee games	0	1	2	_____ days	_____ minutes
Gardening, yard work, mowing	0	1	2	_____ days	_____ minutes
Golfing	0	1	2	_____ days	_____ minutes
Gymnastics, tumbling, trampoline	0	1	2	_____ days	_____ minutes
Hiking	0	1	2	_____ days	_____ minutes
Housecleaning (mopping, scrubbing, sweeping)	0	1	2	_____ days	_____ minutes
Ice hockey	0	1	2	_____ days	_____ minutes
Indoor or outdoor playground (swing, slide, monkey bars)	0	1	2	_____ days	_____ minutes
Jumping rope	0	1	2	_____ days	_____ minutes

ACTIVITY	No	Yes	Don't Know	How many days in last 7 days?___	On average, how many minutes did your child do this activity each day?
Laser tag	0	1	2	_____ days	_____ minutes
Marital arts (Tae Kwon Do, Karate, Judo)	0	1	2	_____ days	_____ minutes
Outdoor play (war, climb trees, hide & seek)	0	1	2	_____ days	_____ minutes
Racquet sports (tennis, squash, paddle ball, badminton, etc.)	0	1	2	_____ days	_____ minutes
Rowing or rowing machine	0	1	2	_____ days	_____ minutes
Running, jogging, treadmill	0	1	2	_____ days	_____ minutes
Skate boarding	0	1	2	_____ days	_____ minutes
Skating (ice, roller, in-line)	0	1	2	_____ days	_____ minutes
Skiing (cross-country or NordicTrack)	0	1	2	_____ days	_____ minutes
Skiing (downhill or water)	0	1	2	_____ days	_____ minutes
Soccer	0	1	2	_____ days	_____ minutes
Swimming laps	0	1	2	_____ days	_____ minutes
Volleyball	0	1	2	_____ days	_____ minutes
Walking for exercise (including treadmill)	0	1	2	_____ days	_____ minutes
Walking for transportation	0	1	2	_____ days	_____ minutes
Water play (in pool or lake)	0	1	2	_____ days	_____ minutes
Weight lifting	0	1	2	_____ days	_____ minutes
Wrestling	0	1	2	_____ days	_____ minutes
Other (specify):_____	0	1	2	_____ days	_____ minutes
Other (specify):_____	0	1	2	_____ days	_____ minutes

9. How confident are you in the accuracy of the estimates in the preceding list? (Circle only one).

   a. Very confident
   b. Somewhat confident
   c. Not sure how confident
   d. Slightly confident
   e. Not at all confident

10. How do you rate your child's level of physical activity, compared to other people of the same age and sex ***who do not have a disability***? (Circle only one)

    a. Much less than others
    b. Somewhat less than others
    c. About the same
    d. Somewhat more than others
    e. Much more than others

11. How do you rate your child's level of physical activity, compared to other people of the same age and sex ***who have the same disability as your child***? (Circle only one)

    a. Much less than others
    b. Somewhat less than others
    c. About the same
    d. Somewhat more than others
    e. Much more than others

Part IV. Parent Physical Activity

Now, we are going to ask you, as a parent, about your past and current experiences in physical activity participation.

12. Have you, as a parent, done any of the following activities in the past 7 days? Please mark the frequency in days and duration in minutes for the activities that you did.

ACTIVITY	No	Yes	Don't Know	How many days in last 7 days?	On average, how many minutes did you do this activity a day?
Walking for exercise	0	1	2	_____ days	_____ minutes
Jogging or running	0	1	2	_____ days	_____ minutes
Hiking	0	1	2	_____ days	_____ minutes

ACTIVITY	No	Yes	Don't Know	How many days in last 7 days?	On average, how many minutes did you do this activity a day?
Gardening or yard work	0	1	2	_____ days	_____ minutes
Aerobics or aerobic dancing	0	1	2	_____ days	_____ minutes
Other dancing	0	1	2	_____ days	_____ minutes
Calisthenics (push-ups, sit-ups) or general exercise	0	1	2	_____ days	_____ minutes
Golf	0	1	2	_____ days	_____ minutes
Tennis	0	1	2	_____ days	_____ minutes
Bowling	0	1	2	_____ days	_____ minutes
Biking or exercise cycling	0	1	2	_____ days	_____ minutes
Swimming or water exercise	0	1	2	_____ days	_____ minutes
Yoga	0	1	2	_____ days	_____ minutes
Weight lifting or training	0	1	2	_____ days	_____ minutes
Basketball	0	1	2	_____ days	_____ minutes
Baseball or softball	0	1	2	_____ days	_____ minutes
Football	0	1	2	_____ days	_____ minutes
Soccer	0	1	2	_____ days	_____ minutes
Volleyball	0	1	2	_____ days	_____ minutes
Handball, racquetball, squash	0	1	2	_____ days	_____ minutes
Skating	0	1	2	_____ days	_____ minutes
Skiing	0	1	2	_____ days	_____ minutes
Rowing	0	1	2	_____ days	_____ minutes
Surfing or boogieboarding	0	1	2	_____ days	_____ minutes
Other:_____	0	1	2	_____ days	_____ minutes

13. Think about your answers to Question #12 where you described your physical activity during the past 7 days. During the past 7 days did you:

a. Exercise more than you do during a usual week
b. Exercise about the same amount as you do during a usual week
c. Exercise less than you do during a usual week

14. Compared to others of your age and sex, would you, as a parent, say you are:

a. Much less active
b. Somewhat less active
c. About as active
d. Somewhat more active
e. Much more active

Part V. Special Olympics Participation by Your Child

15. When did your child participate in the Special Olympics program? Circle all that apply.

a. During elementary school
b. During middle school
c. During high school
d. As an adult

16. Check the Special Olympics winter sports in which your child has ever participated. Check all that apply.

Ever	During past year	Winter Sports
		Downhill (Alpine) skiing
		Cross-country (Nordic) skiing
		Figure skating
		Floor hockey
		Snowboarding
		Snowshoeing
		Speedskating
		Other_____

17. Check the Special Olympics summer sports in which your child has ever participated. Check all that apply.

Ever	During past year	Summer Sports
		Aquatics (swimming)
		Athletics (track & field)
		Badminton
		Basketball
		Bocce
		Bowling
		Cycling
		Equestrian
		Soccer (football)
		Golf
		Gymnastics
		Powerlifting
		Roller skating
		Sailing
		Softball
		Table tennis
		Team handball
		Tennis
		Volleyball
		Other_____

18. Check the Special Olympics special programs in which your child has ever participated. Check all that apply.

Ever	During past year	Special Programs
		Motor Activities Training Program (MATP)
		Unified Sports (any sport)

Part VI. Demographic Information

19. What is the age of your child with a disability in years? _____ years

20. What is the gender of your child with a disability? [ ] male [ ] female

21. What is the estimated height of your child with a disability? ___feet ___ inches

22. What is the estimated weight of your child with a disability? _____ pounds

23. What is your child's disability?

	Primary Disability (CHECK ONE)	Secondary Disability (check all that apply)
Mental retardation/Down syndrome		
Autism/Asperger's		
Brain injury		
Learning disability		
ADD/ADHD		
Vision loss		
Hearing loss		
Seizure condition		
Health condition (i.e., diabetes, heart problem, etc.)		
Physical disability (i.e., cerebral palsy, spina bifida, amputation, muscular dystrophy, etc.)		

24. How does your child's disability (or disabilities) affect his/her independence in the following activities?

Ability	Seldom needs help	Occasionally needs help	Usually needs help
Communication			
Self-care			
Home living			
Social skills			
Community use			
Self-direction			
Health and safety			
Functional academics			
Leisure			
Work			

25. Who is completing this survey? [ ] mother [ ] father

26. What is your age, as a parent, in years? _____ years

27. Do you, as a parent, have a disability?

a. Yes
b. No

If yes, what is your disability? _____

Comments

Please feel welcome to offer comments, suggestions, or recommendations regarding any topic related to physical activity programs for your child who has a disability.

THANK YOU for completing this survey!

APPENDIX E

Survey Administrator Training Manual

Survey Administrator's Training Manual

THANK YOU!

First, thank you for volunteering to help me (BJ) collect data for my dissertation. Your help is much appreciated.

THE DISSERTATION

The purpose of this project is to examine parents' values and concerns about participation in physical activity by their children with disabilities. Parents at the 2004 Michigan Special Olympics Summer Games (June 3-5) will complete a survey about their values and concerns, as well as the parent's and child's physical activity habits. A copy of the survey is attached.

Please read the survey and make certain that you understand all of the terminology. For your reference, here are some definitions related to Question #24:

- **Communication**: Understanding what is said to you and communicating with others.
- **Self-care**: Age-appropriate ability in dressing, showering, and managing daily routine (riding school bus, following directions, etc.).
- **Home living**: Age-appropriate ability to do household tasks such as preparing food, cleaning, and yard work.
- **Social skills**: Age-appropriate ability to make and keep friends, and playing with others.
- **Community use**: Age-appropriate ability to use and enjoy community facilities such as stores/malls, libraries, movie theaters, parks, health clubs, etc.
- **Self-direction**: Age-appropriate ability to make choices and decisions, as well as the independence and commitment to follow-up on the choice or decision.
- **Health and safety**: Practicing a healthy lifestyle by proper eating, exercise, and practicing safety, as well as avoiding substances such as alcohol, tobacco, and drugs.
- **Functional academics**: Practical academic skills needed in daily living such as ability to read a recipe, use a telephone, find the right bus, etc.

SURVEY ADMINISTRATOR RESPONSIBILITIES

- Dress appropriately – polo shirt, shorts or pants (no jeans).
- Bring this manual with you at all times.
- Meet BJ at designated place, day, and time (see attachment) to pick-up a packet that will include an identification badge, a green pinnie (wear the pinnie so that parents can identify you), surveys, pencils, and a storage bag.

- Administer the survey

    a. Read this script: *"Hi! My name is _____ and I am a research assistant at Michigan State University. We are conducting survey research on parental values and concerns about physical activity participation by children with disabilities. This study will be very helpful for physical activity professionals to develop and implement physical activity programs for people with disabilities in future. The survey will take 15-20 minutes. Do you have a child with a disability? Does this child live with you (if yes, continue; if no, stop the interview and thank him/her)? Will you complete the survey, please?"*

    b. Distribute the consent information, survey, and pencil to the parent. Chit-chat with the parent about his/her child, the child's events, etc. Gain the parent's trust and cooperation.

    c. Review important elements of the consent form with the parent.

        i. *Participation is voluntary.*
        ii. *Do not write your name on the survey – this will help protect your privacy.*
        iii. *The survey will require about 15-20 minutes.*
        iv. *Honest answers are important.*

    d. Assure the parent that you want him/her to have time to watch his/her child compete. The parent can answer a few questions, watch the child compete, then answer more questions, etc.

    e. Indicate that you will "hang around" the area so that parents can return the completed survey to you. They may also return the survey to other people wearing the green pinnies. ONLY if absolutely necessary, parents may mail the completed survey to BJ. BJ's address is on the envelope and on the last page of the survey.

    f. When the parent returns the completed survey, **THANK THE PARENT!** This is very important!

- Keep track of how many surveys have been distributed and how many of them have been returned (see the attached survey distribution/return form).

- Return completed surveys, pencils, and pinnie to BJ at the designated time and location (see attachment). If you are unable to return the materials to BJ at the Games, please make arrangements for BJ to pick-up the materials upon return to campus.

SPECIAL CONSIDERATIONS

- Notice that some parents may already complete the survey. Ask if they have completed the survey. If so, THANK parents for helping with the study.

- It is important to remember that each parent is unique. The survey administrator should recognize each parent's needs to make the situation as comfortable as possible.

- Some parents do not speak English. Thank them for their time, but do not administer the survey.

- Some parents may have a disability (possibly low cognitive skills) that prevents them from completing the survey easily. Survey administrators should assist the parents with a disability to complete the survey in the most comfortable environment.

- Although the questions of the survey are easy to read, some parents may have difficulty understanding certain questions. Survey administrators should be able to rephrase the questions with easier examples.

QUESTIONS? PROBLEMS?

If you have any troubles or questions about the surveys, please ask BJ Lee. You can contact BJ Lee at 517-432-7121 (work), 517-355-3213 (home), 517-256-2173 (cellular phone), or email at leebomji@msu.edu.

ATTACHMENT #1: LOGISTICS

Parent/Family Tailgate Party

- Parent/Family Tailgate Party will be held in Lot 64 at 4:00-6:30 pm on Thursday, June 3.
- You show up **at 3:30 pm** to receive your packet of survey materials (at the registration table).
- You will walk around the tailgate party, handing out surveys to parents who did not stop at the registration table, answering questions about the survey (or referring parents to me), and collecting completed surveys.
- Completed surveys should be returned to BJ at the conclusion of the event.
- BJ's location will be the registration table at the tailgate party.

Opening Ceremonies

- Parade and opening ceremonies will be held in Bennett Track at 7:00 pm on Thursday, June 3.
- You show up at the main gate of Bennett Track **at 6:00 pm** to receive your packet of survey materials. If you move from the tailgate party, stay with BJ.
- Parents and families will begin entering the Bennett Track around 6:30 pm and they will be sitting or standing around the bleachers.
- You will be waiting for parents entering the area handing out surveys to them, answering questions about the survey (or referring parents to me), and collecting completed surveys.
- Completed surveys should be returned to BJ at the conclusion of the event.
- BJ's location will be the main gate.

Parent Reception

- Parent Reception will be held in the Terrace/Rotunda Room from 7:30-8:30 pm on Friday, June 4.
- One survey administrator will be needed.
- You show up at the site **at 7:00 pm** to receive your packet of survey materials.
- You will be waiting for parents attending the parent reception, handing out surveys, answering questions about the survey (call my cellular phone at 517-256-2173 if you cannot answer the questions), and collecting completed surveys.
- There will be a box available for the survey return in the room. Assure that parents can either drop the completed survey into the box or simply return it to you.
- Completed surveys should be returned to BJ after the event. BJ will come and pick them up around 8:30 pm.

Sport Venues

- Sport competitions will take place from 8:00 am-5:00 pm on Friday (June 4) and Saturday (June 5).
- There will be 10 sport competitions (Aquatics, Athletics, Bocce, Bowling, Gymnastics, Horseshoes, Motor Activities Training Program, Powerlifting, Team Handball, and Volleyball).
- You show up at the assigned time to receive your packet of survey materials from the designated place (Rose Center – BJ will set up a table in the middle of the hallway from 8:00 am-5:00pm on Friday and Saturday. Exception – BJ will be available in Rose Pool from 3:00-4:00 pm, Friday).
- You will go to the assigned sport venue, handing out surveys, answering questions about the survey (call my cellular phone at 517-256-2173 if you cannot answer the questions), and collecting completed surveys.
- Completed surveys should be returned to BJ at the conclusion of the event.
- BJ's location will be determined when you pick up your packet of survey materials.

APPENDIX F

Follow-Up Letter to Non-Responding Parents

September 13, 2004

Dear Parents:

Hi! My name is BJ Lee and I am a doctoral student in the department of Kinesiology at Michigan State University.

A few weeks ago, I sent you a packet of survey regarding the pilot study of my dissertation study on parental values and concerns about physical activity participation by children and adults with intellectual disabilities.

As a professional in adapted physical activity, I would like to know what values and concerns parents have in relation to physical activity participation by their children with intellectual disabilities. I believe **YOU**, as a parent, are the key to participation in physical activity by your child with a disability and your opinions about physical activity should be reflected in the physical activity program.

That is why I developed the Physical Activity Values and Concerns Survey, investigating parental values and concerns about participation in physical activity participation by children and adults with intellectual disabilities. As I mentioned before, your information is extremely important for physical activity professionals who serve for persons with disabilities.

Also, your participation in this pilot study will help establish reliability of the survey, which is a critical part of this study. **SO PLEASE ANSWER THE QUESTIONS IN THE SURVEY AND RETURN IT TO ME.**

If you need an additional copy of the survey, please contact BJ Lee at 517-432-7121 or leebomji@msu.edu.

Thank you so much for your time,

Sincerely,

BJ Lee

REFERENCES

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC, American Psychiatric Association.

Anderssen, N., & Wold, B. (1992). Parental and peer influences on leisure-time physical activity in young adolescents. *Research Quarterly for Exercise and Sport, 63*, 341-348.

Andrew, G. M., Reid, J. G., Beck, S., & McDonald, W. (1979). Training of the developmentally handicapped young adults. *Canadian Journal of Applied Sport Sciences, 4,* 289-293.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Beasley, C. R. (1982). Effects of a jogging program on cardiovascular fitness and work performance of mentally retarded adults. *American Journal of Mental Deficiency, 86,* 609-613.

Berkeley, S. L., Zittel, L. L., Pitney, L. V., & Nichols, S. E. (2001). Locomotor and object control skills of children diagnosed with autism. *Adapted Physical Activity Quarterly, 18*, 405-416.

Boas, S. R., Danduran, M. J., & McColley, S. A. (1999). Parental attitudes about exercise regarding their children with cystic fibrosis. *International Journal of Sports Medicine, 20*, 334-338.

Brown, M., & Gordon, W. A. (1987). Impact of impairment on activity patterns of children. *Archives of Physical Medicine and Rehabilitation, 68*, 828-832.

Brustad, R. J. (1993). Who will go out and play? Parental and psychological influences on children's attraction to physical activity. *Pediatric Exercise Science, 5*, 210-223.

Chanias, A. K., Reid, G., & Hoover, M. L. (1998). Exercise effects on health-related physical fitness of individuals with an intellectual disability: A meta-analysis. *Adapted Physical Activity Quarterly, 15*, 119-140.

Chase, M. A. (2001). Children's self-efficacy, motivational intentions, and attributions in physical education and sport. *Research Quarterly for Exercise and Sport, 72,* 47-54.

Chiang, I. T. (2003). Effects of a therapeutic recreation intervention within a technology-based physical activity context on the social interaction of male youth with autism spectrum disorders. *Dissertation Abstracts International,* 32-75. (UMI No. 3111851).

Compton, D. M., Eisenman, P. A., & Henderson, H. L. (1989). Exercise and fitness for persons with disabilities. *Sports Medicine, 7,* 150-162.

Crain, C., Eisenhart, M., & McLaughlin, J. (1984). The application of a multiple measurement approach to investigate the effects of a dance program on educable mentally retarded adolescents. *Research Quarterly for Exercise and Sport, 55,* 231-236.

Croce, R. (1990). Effect of exercise and diet on body composition and cardiovascular fitness in adults with severe mental retardation. *Education and Training of the Mentally Retarded, 25,* 176-187.

Croce, R., & Horvat, M. (1992). Effects of reinforcement based exercise on fitness and work productivity tin adults with mental retardation. *Adapted Physical Activity Quarterly, 9,* 148-178.

Cumming, S. P., & Ewing, M. E. (2002). Parental involvement in youth sports [Electronic Version]. *Spotlight on Youth Sports, Spring,* 2002, Retrieved October 13, 2003, from http://ed-web3.educ.msu.edu/ysi/

Dempsey, J. M., Kimiecik, J. C., & Horn, T. S. (1993). Parental influence on children's moderate to vigorous physical activity participation: An expectancy-value approach. *Pediatric Exercise Science, 5,* 151-167.

DePauw, K. P., & Doll-Tepper, G. (2000). Toward progressive inclusion and acceptance: Myth or reality? The inclusion debate and bandwagon discourse. *Adapted Physical Activity Quarterly, 17,* 135-143.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York, NY: John Wiley & Sons.

Dishman, R. K., & Steinhardt, M. (1988). Reliability and concurrent validity for a 7-d re-call of physical activity in college students. *Medicine and Science in Sports and Exercise, 20,* 14-25.

Draheim, C. C., Williams, D. P., & McCubbin (2002). Prevalence of physical inactivity and recommended physical activity in community-based adults with mental retardation. *Mental Retardation, 40,* 436-444.

Duchane, K. A., & French, R. (1998). Attitudes and grading practices of secondary physical educations in regular education settings. *Adapted Physical Activity Quarterly, 15*, 370-380.

Dummer, G. M., Haubenstricker, J. L., & Stewart, D. A. (1996). Motor skill performance of children who are deaf. *Adapted Physical Activity Quarterly, 13*, 400-414.

Eccles, J. S., & Harold, R. D. (1991). Gender differences in sport involvement: Applying the Eccles' expectancy-value model. *Journal of Applied Sport Psychology, 3*, 7-35.

Ellis, M. K. (2001). *Factors that influence the physical fitness of deaf children.* Unpublished doctoral dissertation, Michigan State University, East Lansing, Michigan.

Fernhall, B. (1993). Physical fitness and exercise training of individuals with mental retardation. *Medicine and Science in Sports and Exercise, 25*, 442-450.

Fernhall, B., Pitetti, K. H., Rimmer, J. H., McCubbin, J. A., Rintala, P., Lynn-Millar, A., et al. (1996). Cardiorespiratory capacity of individuals with mental retardation including Down syndrome. *Medicine and Science in Sports and Exercise, 28*, 366-371.

Fernhall, B., Tymeson, G. T., & Webster, G. E. (1988). Cardiovascular fitness of mentally retarded individuals. *Adapted Physical Activity Quarterly, 5*, 12-28.

Fiorini, J., Stanton, K., & Reid, G. (1996). Understanding parents and families of children with disabilities: Considerations for adapted physical activity. *Palaestra, 12*, 16-23.

Fisher, E. (1986). Behavioral weight reduction program for mentally retarded adult females. *Perceptual and Motor Skills, 62*, 359-362.

Folsom-Meek, S. L. (1984). Parents: Forgotten teacher aides in adapted physical education. *Adapted Physical Activity Quarterly, 1*, 275-281.

Gibbons, S. L., & Bushakra, F. B. (1989). Effects of Special Olympics participation on the perceived competence and social acceptance of mentally retarded children. *Adapted Physical Activity Quarterly, 6*, 40-51.

Goodwin, D. L., Fitzpatrick, C. H., & Thurmeier, R. (2004, October). *Understanding the decision-making process of parents whose children join Special Olympics.* Paper presented at the symposium of the North American Federation of Adapted Physical Activity, Thunder Bay, Ontario, Canada.

Graham, A., & Reid, G. (2000). Physical fitness of adults with an intellectual disability: A 13-year follow-up study. *Research Quarterly for Exercise and Sport, 71*, 152-161.

Greendorfer, S. L., Blinde, E. M., & Pellegrini, A. M. (1986). Gender differences in Brazilian children's socialization into sport. *International Review for the Sociology of Sport, 21*, 51-63.

Grimes, P. S., & French, L. (1987). Barriers to disabled women's participation in sports. *Journal of Physical Education, Recreation, and Dance, 58*, 24-27.

Groff, D. G., & Kleiber, D. A. (2001). Exploring the identity formation of youth involved in an adapted sports program. *Therapeutic Recreation Journal, 35*, 318-332.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (4th ed.). Upper Saddle River, New Jersey: Prentice Hall.

Heath, G. W., & Fentem, P. H. (1997). Physical activity among persons with disabilities: A public health perspective. *Exercise and Sport Sciences Reviews, 25*, 195-234.

Hedrick, B. N., & Broadbent, E. (1996). Predictors of physical activity among university graduates with physical disabilities. *Therapeutic Recreation Journal, 30*, 137-148.

Heikinaro-Johansson, P., & Sherrill, C. (1994). Integrating children with special needs in physical education: A school district assessment model from Finland. *Adapted Physical Activity Quarterly, 11*, 44-56.

Hofstetter, C. R., Hovell, M. F., Macera, C., Sallis, J. F., Spry, V., Barrington, E., et al. (1991). Illness, injury, and correlates of aerobic exercise and walking: A community study. *Research Quarterly for Exercise and Sport, 62*, 1-9.

Horn, T. S., & Weiss, M. R. (1991). A developmental analysis of children's self-ability judgments in the physical domain. *Pediatric Exercise Science, 3*, 310-326.

Hosley, M. G., Hooper, C., & Gruber, M. B. (1998). Self-concept and motor performance of children with learning disabilities. *Perceptual and Motor Skills, 87*, 859-862.

Hovell, M. F., Hofstetter, C. R., Sallis, J. F., Rauh, M. J. D., & Barrington, E. (1992). Correlates of change in walking for exercise: An exploratory analysis. *Research Quarterly for Exercise and Sport, 63*, 425-434.

Howard, D. R., & Madrigal, R. (1990). Who makes the decision: The parent or the child? The perceived influence of parents and children on the purchase of recreation services. *Journal of Leisure Research, 22*, 244-258.

Kalton, G. (1983). *Introduction to survey sampling*. Newbury Park, California: SAGE Publications.

Kamm, K., Thelen, E., & Jensen, J. L. (1990). A dynamical systems approach to motor development. *Physical Therapy, 70*, 763-775.

Kern, L., Koegel, R. L., & Dunlap, G. (1984). The influence of vigorous versus mild exercise on autistic stereotyped behaviors. *Journal of Autism and Developmental Disorders, 14*, 57-67.

Kim, J. (1999). *The effects of a physical education program on the standing long jump performance of preschool-aged children with cognitive delays.* Unpublished master's thesis, Michigan State University, East Lansing, Michigan.

Kimiecik, J. C., & Horn, T. S. (1998). Parental beliefs and children's moderate-to-vigorous physical activity. *Research Quarterly for Exercise and Sport, 69*, 163-175.

Kimiecik, J. C., Horn, T. S., & Shurin, C. S. (1996). Relationships among children's beliefs, perceptions of their parents' beliefs, and their moderate-to-vigorous physical activity. *Research Quarterly for Exercise and Sport, 67*, 324-336.

Lee, B., & Dummer, G. M. (2003). *Parental values and concerns about participation in physical activity programs by youth with cognitive disabilities.* Retrieved November 28, 2003, from Michigan State University, The Disability Sports Web site: http://edweb6.educ.msu.edu/kin866

Levinson, L. J., & Reid, G. (1991). Patterns of physical activity among youngsters with developmental disabilities. *Canadian Association for Health, Physical Education and Recreation, 57*, 24-28.

Longmuir, P. E., & Bar-Or, O. (2000). Factors influencing the physical activity levels of youths with physical and sensory disabilities. *Adapted Physical Activity Quarterly, 17*, 40-53.

Lorenzo, P.(2001). *Effectiveness of a progressive resistance training program on work productivity and muscular strength among adult males with mental retardation.* Unpublished doctoral dissertation, Michigan State University, East Lansing, Michigan.

Maraj, B. K. V., Li, L., Hillman, R., Jeansonne, J. J., & Ringenbach, S. D. (2003). Verbal and visual instruction in motor skill acquisition for persons with and without Down syndrome. *Adapted Physical Activity Quarterly, 20*, 57-69.

McCullagh, P., Matzkanin, K. T., Shaw, S. D., & Maldonado, M. (1993). Motivation for participation in physical activity: A comparison of parent-child perceived competencies and participation motives. *Pediatric Exercise Science, 5*, 224-233.

McMurray, R. G., Bradley, C. B., Harrell, J. S., Bernthal, P. R., Frauman, A. C., & Bangdiwala, S. I. (1993). Parental influences on childhood fitness and activity patterns. *Research Quarterly for Exercise and Sport, 64*, 249-255.

Meaney, K. S., Dornier, L. A., & Owens, M. S. (2002). Sex-role stereotyping for selected sport and physical activities. *Perceptual and Motor Skills, 94*, 743-749.

Millar, A. L., Fernhall, B., & Burkett, L. N. (1993). Effects of aerobic training in adolescents with Down syndrome, *Medicine and Science in Sports and Exercise, 25*, 270-274.

Montgomery, D. L., Reid, G., & Seidl, C. (1988). The effects of two physical fitness programs designed for mentally retarded adults. *Canadian Journal of Sport Sciences, 13*, 73-78.

Moore, L. L., Lombardi, D. A., White, M. J., Campbell, J. L., Oliveria, S. A., & Ellison, R. C. (1991). Influence of parents' physical activity levels on activity levels of young children. *The Journal of Pediatrics, 118*, 215-219.

National Health Interview Survey on Disability. (2002). *National Center for Health Statistics.* Retrieved October 10, from Centers for Diseases Control and Prevention Web site: http://www.cdc.gov/nchs/Default.htm

National Organization on Disability. (2000). *2000 N.O.D./Harris survey of community participation by people with disabilities*. Harris Interactive, New York.

Ninot, G., Bilard, J., Delignieres, D., & Sokolowski, M. (2000). Effects of integrated sport participation on perceived competence for adolescents with mental retardation. *Adapted Physical Activity Quarterly, 17*, 208-221.

Nixon, H. L. (1988). Getting over the worry hurdle: parental encouragement and the sports involvement of visually impaired children and youths. *Adapted Physical Activity Quarterly, 5*, 29-43.

Pitetti, K. H., Rimmer, J. H., & Fernhall, B. (1993). Physical fitness and adults with mental retardation: An overview of current research and future directions. *Sports Medicine, 16*, 23-56.

Pitetti, K. H., & Tan, D. M. (1991). Effects of a minimally supervised exercise program for mentally retarded adults. *Medicine and Science in Sports and Exercise, 23*, 594-601.

Pitetti, K. H., Yarmer, D. A., & Fernhall, B. (2001). Cardiovascular fitness and body composition of youth with and without mental retardation. *Adapted Physical Activity Quarterly, 18*, 127-141.

Raudsepp, L., & Viira, R. (2000). Sociocultural correlates of physical activity in adolescents. *Pediatric Exercise Science, 12*, 51-60.

Reid, G., Collier, D., & Morin, B. (1983). Motor performance of autistic individuals. In R. L. Eason, T. L. Smith, & F. Caron (Eds.), *Adapted physical activity: from theory to application* (pp. 201-218), Champaign, IL: Human Kinetics Publishers.

Rimmer, J. H., & Braddock, D. (2002). Health promotion for people with physical, cognitive, and sensory disabilities: An emerging national priority. *American Journal of Health Promotion, 16,* 220-224.

Rimmer, J. H., & Kelly, L. E. (1991). Effects of a resistance training program on adults with mental retardation. *Adapted Physical Activity Quarterly, 8*, 146-153.

Rimmer, J. H., Riley, B., Wang, E., Rauworth, A., & Jurkowski, J. (2004). Physical activity participation among persons with disabilities: Barriers and facilitators. *American Journal of Preventive Medicine, 26,* 419-425.

Rimmer, J. H., Rubin, S. S., Braddock, D. (2000). Barriers to exercise in African women with physical disabilities. *Archives of Physical Medicine and Rehabilitation, 81*, 182-188.

Sallis, J. F., Hovell, M. F., Hofstetter, C. R., Faucher, P., Elder, J. P., Blanchard, J., Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1989). A multivariate study of determinants of vigorous exercise in a community sample. *Preventive Medicine, 18*, 20-34.

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise, 32*, 963-975.

Sallis, J. F., Taylor, W. C., Dowda, M., Freedson, P. S., & Pate, R. R. (2002). Correlates of vigorous physical activity for children in grades 1 through 12: Comparing parent-reported and objectively measured physical activity. *Pediatric Exercise Science, 14*, 30-44.

Schleien, S., Cameron, J., Rynders, J., & Slick, C. (1988). Acquisition and generalization of leisure skills from school to the home and community by learners with severe multihandicaps. *Therapeutic Recreation Journal, 22*, 53-71.

Schurrer, R., Weltman, A., & Brammell, H. (1985). Effects of physical training on cardiovascular fitness and behavior patterns of mentally retarded adults. *American Journal of Mental Deficiency, 90,* 167-169.

Seagraves, F. E. (2003). Effects of a physical education curriculum on work productivity and fitness parameters in high school students with mental retardation (Abstract). *Research Quarterly for Exercise and Sport, 74* (1, Suppl.).

Sechrist, K. R., Walker, S. N., & Pender, N. J. (1987). Development and psychometric evaluation of the exercise benefits/barriers scale. *Research in Nursing and Health, 10,* 357-365.

Shapiro, D. R. (2003). Participation motives of Special Olympics athletes. *Adapted Physical Activity Quarterly, 20,* 150-165.

Shavelson, R. J. (1996). *Statistical reasoning for the behavioral sciences* (3rd ed.). Needham Heights, Massachusetts: Allyn and Bacon.

Sherrill, C. (2004). *Adapted physical activity, recreation and sport: Crossdisciplinary and lifespan* (6th ed.). Boston, Massachusetts: McGraw-Hill.

Shifflett, B., Cator, C., & Megginson, N. (1994). Active lifestyle adherence among individuals with disabilities. *Adapted Physical Activity Quarterly, 11,* 359-367.

Simpson, H. M., & Meaney, C. (1979). Effects of learning to ski on the self-concept of mentally retarded children. *American Journal of Mental Deficiency, 84,* 25-29.

Skrobak-Kaczynski, J., & Vavik, T. (1980). Physical fitness and trainability of young male patients with Down syndrome. In K. Berg & B. O. Eriksson (Eds.), *Children and exercise IX* (pp. 300-316). Baltimore, Maryland: University Park Press.

Special Olympics International. (2004). *Sports Offered.* Retrieved on March 25, 2004, from the Special Olympics Website: http://www.specialolympics.org

Stopka, C. B., Zambito, K. L., Suro, D. G., Pearson, K. S., Siders, R. A., & Goff, B. H. (1998). Muscular endurance and physical capacity to perform work of adolescents with mental retardation. *Journal of Sport Rehabilitation, 7,* 197-205.

Stopka, C., Morley, K., Siders, R., Schuette, J., Houck, A., & Gilmet, Y. (2002). Stretching techniques to improve flexibility in Special Olympics athletes and their coaches. *Journal of Sport Rehabilitation, 11,* 22-34.

Taylor, C. B., Coffey, T., Berra, K., Laffaldano, R., Casey, K., & Haskell, W. L. (1984). Seven-day activity and self-report compared to a direct measure of physical activity. *American Journal of Epidemiology, 120,* 818-824.

Thomas, J. R., & Nelson, J. K. (2001). *Research methods in physical activity* (4th ed.). Champaign, IL: Human Kinetics.

Tomporowski, P. D., & Jameson, L. D. (1985). Effects of a physical fitness training program on the exercise behavior of institutionalized mentally retarded adults. *Adapted Physical Activity Quarterly, 2*, 197-205.

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

U.S. Department of Health and Human Services. (2004). *General recommendations for physical activity*. Available from the Centers for Disease Control and Prevention website, http://www.cdc.gov/nccdphp/dnpa/physical/recommendations/index.htm

U.S. Department of Health and Human Services. (2003). *Physical activity terms*. Available from the Centers for Disease Control and Prevention website, http://www.cdc.gov/nccdphp/dnpa/physical/terms/index.htm

U.S. Department of Health and Human Services. (2002). *Prevalence of overweight among children and adolescents: United States, 1999-2000.* Retrieved on December 27, 2003, from the National Center for Health Statistics Website: http://www.cdd.gov/nchs/products/pubs/pubd/hestats/overwght99.htm

U.S. Department of Health and Human Services. (1999). *A report of surgeon general on physical activity and health for persons with disabilities*. Retrieved on September 20, 2004, from the Centers for Disease Control and Prevention website, http://www.cdc.gov/nccdphp/sgr/disab.htm

U.S. Department of Health and Human Services. (1997). *A report of the US bureau of the census on disability and health.* Retrieved on October 12, 2004, from the Centers of Disease Control and Prevention website, http://www.cdc.gov/ncbddd/factsheets/disability_health.pdf

Wankel, L. M. (1993). The importance of enjoyment to adherence and psychological benefits from physical activity. *International Journal of Sport Psychology, 24,* 151-169.

Weber, R., & French, R. (1988). Down's syndrome adolescents and strength training. *Clinical Kinesiology, 42*, 13-21.

Weiss, M. R., & Duncan, S. C. (1992). The relationshiop between physical competence and peer acceptance in the context of children's sports participation. *Journal of Sport and Exercise Psychology, 14*, 177-191.

Weiss, M. R., Ebbeck, V., & Horn, T. S. (1997). Children's self-perceptions and sources of physical competence information: A cluster analysis. *Journal of Sport and Exercise Psychology, 19*, 52-70.

Welsh, T. N., & Elliott, D. (2001). The processing speed of visual and verbal movement information by adults with and without Dawn syndrome. *Adapted Physical Activity Quarterly, 18,* 156-167.

White, S. A., & Zientek, C. E. (1991). Verbal persuasion and self-concept: An exploratory analysis in Special Olympians. *Clinical Kinesiology, 45*, 9-13.

Wilhite, B., & Kleiber, D. A. (1992). The effect of Special Olympics participation on community integration. *Therapeutic Recreation Journal, 26*, 9-20.

Winchester, P., Kendall, K., Peters, H., Sears, N., & Winkley, T. (2002). The effect of therapeutic horseback riding on gross motor function and gait speed in children who are developmentally delayed. *Physical and Occupational Therapy in Pediatrics, 22*, 37-50.

Winnick, J. P. (1985). The performance of visually impaired youngsters in physical education activities: Implications for mainstreaming. *Adapted Physical Activity Quarterly, 2*, 292-299.

Wold, B., & Anderssen, N. (1992). Health promotion aspects of family and peer influences on sport participation. *International Journal of Sport Psychology, 23,* 343-359.

Woodard, R. L., & Surburg, P. R. (2001). The performance of fundamental movement skills by elementary school children with learning disabilities. *Physical Educator, 58,* 198-205.

Wright, J., & Cowden, J. E. (1986). Changes in self-concept and cardiovascular endurance of mentally retarded youths in a Special Olympics swim training program. *Adapted Physical Activity Quarterly, 3*, 177-183.

Yamanaka, T., & Furuya, T. (1994). Use of running exercises for preschoolers with mental retardation as a means of improving play or school activity. *Perceptual and Motor Skills, 78*, 571-578.

Yilmaz, I., Ergun, N., Heper, F., Konukman, F., & Zorba, E. (2003). Effects of an aquatic exercise and swimming program on the body composition and under working capacity of mentally retarded children [Abstract]. *Research Quarterly for Exercise and Sport, 74* (1, Suppl.).