Implementing a Multi-Sport Skills Camp for Girls Ages 8-11 with Autism Spectrum Disorder

By

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Thesis Submitted in Partial Fulfillment
Of the Requirements for the Degree of

Master of Health Sciences

In

Faculty of Health Sciences

Kinesiology

University of Ontario Institute of Technology

April 2015

Implementing a Multi – Sport Skills Camp for Girls Ages 8-11 with Autism Spectrum Disorder

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Abstract

Children with Autism Spectrum Disorder (ASD) display delayed or atypical fundamental motor skills (FMS) in comparison to their peers with typical development (TD). Girls with ASD, although less prevalent than boys, typically display even less adequate FMS than boys with ASD, and are less physically active. The purpose of this study was to implement a one-week multi-sport skills camp intervention to improve motor skills, physical activity (PA), physical self-perceptions, social skills and adaptive behaviour of school aged girls with ASD (n=13). **Motor Skills and Physical Activity**: Results indicated significant improvements in motor skills following the multi-sport camp intervention; improvements were maintained at the 8-week follow up. No significance was found regarding PA. **Physical Self-Perceptions, Social Skills and Adaptive Behaviour**: Results indicated significant improvements in physical self-perceptions, sport/athletic competence and social skills. Significant correlations were also present between motor skills and physical self-perceptions, and between physical self-perceptions and social skills. **Conclusion**: The results of this study indicate that a one-week summer multi-sport skills camp intervention can be effective at improving motor skills, physical self-perceptions and social skills among school aged girls with ASD. These findings warrant further research with greater intervention intensities and larger samples.

Keywords: autism spectrum disorder, girls, fundamental motor skills, physical activity, camp intervention, physical self-perceptions, social skills

Statement of Originality

I, Lindsay M. Smith, hereby declare that this thesis is, to the best of my knowledge, original, except as acknowledged in the text. I further declare that the material contained in this thesis has not been previously submitted, either in whole or in part, for a degree at this or any other university.

Acknowledgements

Thank you to my supervisor, Dr. Meghann Lloyd, for your guidance and support throughout this journey, and for being a mentor in and outside of research. You have provided me several opportunities and opened several doors for me that I would not have been exposed to otherwise, and I will be forever grateful.

Thank you to my supervisory committee members, Dr. Rob Balogh and Dr. Shilpa Dogra, for all the time and effort you have put into helping develop my thesis. Rob, thank you for helping me specifically with the statistical analysis, and the camp curriculum. Shilpa, thank you for your physical activity expertise, and for being more than willing to help any way you could.

Thank you to Special Olympics Canada, for funding the entire thesis and making all resources, equipment and staffing in this project feasible. Without this generosity, the intervention would surely not have been the same.

Thank you to Grandview Children's Centre for helping make such a successful partnership, and for implementing this type of camp into their summer programming. Thank you to Cathy Kelly who jumped all over this idea two years ago and Amy Sinclair for all your help with camp logistics and making this an enjoyable experience.

Thank you to the volunteers for taking the time out of their busy schedules to help with all the assessments (Sean, Emma, Matthew, Alana, Tayler), helping out with the camp (Sean Jones) and being so great with the kids. Thank you also to all UOIT Graduate peers and faculty for being such a great support system, and Kristin Dobranowski for

hitting milestones at similar times, which helped knowing I was not alone. Thank you to previous Master's students Sarah Prosser and Emily Bremer for all of your help along the way, letting me rant, and giving me confidence that I could get through the two years.

Thank you to all my participants and their families who devoted their time to help with this project. Thank you to the parents who brought their children in for all the assessments, for being so enthusiastic about the camp, taking the time to fill out the quite large assessments, and for providing such positive feedback! Thank you to all the girls who participated in the study, you made the intervention a rewarding experience for me and gave me the motivation to get through my Master's.

Finally, thank you to my friends and family, for the unconditional love and support and for always having faith in me. To my friends Danielle Bass and Ashley Jones, thank you for always being a phone call away, available whenever I needed you, and for all the encouragement along the way. To my brother, who I can always count on for a good laugh when I am feeling stressed. To my dad, the guy where actions always speak louder than words, thank you for your utmost support over the years and for inspiring and encouraging me to reach for the stars. To my mom, thank you for being my rock and for not letting a day pass without telling me how proud you were of me. Lastly, to my future husband Josh, thank you for being there for me throughout this process, for being my biggest fan, and always reminding me that I can do whatever I set my mind to do. I love you all more than words can express and I definitely would not be where I am today without you!

List of Abbreviations Used

ADI-R	Autism Diagnostic Interview-Revised
ADOS	Autism Diagnostic Observation Schedule
ANOVA	Analysis of Variance
ASD	Autism Spectrum Disorder
BMI	Body Mass Index
BOTMP	Bruinink-Oserestsky Test of Motor Proficiency
CAPE/PAC	Children's Assessment of Participation and Enjoyment & Preferences for Activities of Children
CSAPPA	Children's Self-Perceptions of Adequacy in and Predilection for Physical Activity
CY-PSPP	Children and Youth Physical Self-Perception Profile
DCD	Developmental Coordination Disorder
DD	Developmental Disability
DSM-5	Diagnostic and Statistical Manual for Mental Disorders – 5th Edition
FMS	Fundamental Motor Skills
HFA	High Functioning Autism
ICF	International Classification System of Functioning, Disability and Health
ID	Intellectual Disability
IDD	Intellectual and Developmental Disability
ITSEA	Infant Toddler Social Emotional Assessment
IQ	Intellectual Quotient
LEAP	Lifestyle Education for Activity Program
LFA	Lower Functioning Autism

MABC-2	Movement Assessment Battery for Children-2
MVPA	Moderate-to-vigorous physical activity
PA	Physical Activity
PDD-NOS	Pervasive Developmental Disorder – Not Otherwise Specified
PDMS-2	Peabody Developmental Motor Scales-2
PQ	Participation Questionnaire
SCT	Social Cognitive Theory
SSIS	Social Skills Improvement Scale
TD	Typical Development
TGMD-2	Test of Gross Motor Developemnt-2
VABS-2	Vineland Adaptive Behaviour Scale -2
WHO	World Health Organization

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Overview

This thesis is divided into six sections:

1. Introduction
2. Literature Review
3. Manuscript 1
4. Manuscript 2
5. Thesis Conclusions
6. Appendices that include ethics approval, consent forms, recruitment flyer, questionnaires, and raw data

Chapter 1: Introduction

Introduction to Thesis

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is characterized by the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) as having difficulties in social communication and reciprocity, developing and maintaining friendships, restricted and/or repetitive behaviour, and deficits in nonverbal communication behaviours (American Psychiatric Association, 2013). ASD has become increasingly more prevalent, affecting approximately 1/68 school age children in the United States of America (Frieden, Jaffe, Cono, Richards, & Iadermarco, 2014). Boys tend to be diagnosed more frequently with a ratio of 4:1 boys to girls, respectively; however, it is not well understood whether there is an underestimation of girls being diagnosed with ASD because they display a much different developmental profile (Carter et al., 2007). More research is needed on the unique characteristic of girls with ASD to enable to the most effective interventions, specifically for girls.

Girls and boys with ASD are often put together for group therapy sessions, interventions and other recreational activities. Regardless of the fact they may learn in different ways (Dworzynski, Ronald, Bolton, & Happe, 2012), due to the small proportion of girls with ASD, it is more cost and time effective to have them grouped together. Substantially more research is available on boys with ASD than the research available on sex differences, or the unique characteristics of girls with ASD (Cridland, Jones, Caputi, & Magee, 2014), so many interventions and therapies are tailored to what evidence is available on boys with ASD. It may be beneficial for girls with ASD to have

a separate learning environment than boys with ASD in order to provide the most optimal opportunity for development.

Physical Activity and Motor skills

Children with disabilities are three times more likely to be less physically active than their peers (Blinde & McCallister, 1999), and are at a greater risk for being overweight or obese (Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006), which can have more negative effects on their health and overall functioning than the disability itself (Johnson, 2009; Rimmer & Rowland, 2008). Participation in physical activity (PA) at a young age is essential as it is a building block to form friendships, develop skills and competencies, express creativity, and achieve mental and physical health for all children (Murphy & Carbone, 2008). Age and sex can have a negative impact on PA, where females and older populations tend to be at the highest risk for inactivity (King et al., 2009). While little is known about the involvement of PA that girls with ASD engage in, it is well established that PA levels in girls with typical development (TD) reduces drastically around puberty (Biddle & Wang, 2003; Colley et al., 2011; Labbrozzi et al., 2012; Pfeiffer et al., 2006; Toscos, Faber, Connelly, & Upoma, 2008); it is important to intervene at the pre-pubertal age to provide all the skills and tools to promote enjoyment of PA. There is a strong positive correlation between motor skill proficiency and PA (Kopp, Beckung, & Gillberg, 2010; Lubans, Morgan, Cliff, Barnett, & Okely, 2010; Stodden, Langendorfer, Roberton, & Kelbley, 2007; Wrotniak et al., 2006); where the more skillful children and youth participate in more activity, and the less skillful children engage in lower levels of PA. Developing the necessary motor skills in order to

participate is crucial, especially among girls with ASD, in order to help promote healthy levels of PA throughout adolescence.

Fundamental motor skills (FMS) are basic motor skills that emerge into activity-specific skills as a child ages; these skills are considered to be influential in a child's physical, cognitive and social development (Lubans et al., 2010). FMS include locomotor, manipulative object control and stability skills (Ulrich, 2000). Cognitive and intellectual impairments can have a significant effect on visuospatial awareness and perceptions (Ross, Kushner, & Roeltgen, 1996), which are senses that are necessary when learning new motor skills, as there is a high perception-action link in motor learning (Sugden & Wade, 2013). Delays in motor skill development has been strongly correlated with IQ and executive functioning, and these delays often become more prominent with age (Hartman, Houwen, Scherder, & Visscher, 2010; Rintala & Loovis, 2013; Westendorp et al., 2014); however, regardless of IQ, children with ASD tend to have significant gross and fine motor delays to their peers with TD (Lloyd, MacDonald, & Lord, 2013; Lui, Hamilton, Davis, & ElGarhy, 2014; Staples & Reid, 2010; Whyatt & Craig, 2012). Girls with ASD tend to have even more impaired motor skills than boys with ASD, and girls with TD (Carter et al., 2007; Kopp et al., 2010; Pieters et al., 2012), although it remains unclear as to why children with ASD tend to have poor motor skills. Parents tend to overlook FMS and focus on social and behavioural aspects in the early years in order to help their children with ASD develop with their peers (McPhilemy & Dillenburger, 2013). However, motor skills have been positively correlated with greater social skills, psychological, physiological and behavioural outcomes in children with ASD (Bremer, Balogh, & Lloyd, 2014; MacDonald, Lord, & Ulrich, 2011). It is

important to intervene with FMS and PA in children with ASD so that they do not fall further behind their peers as they get older, and to provide a foundation for a healthy active lifestyle.

Psychosocial Aspects to Physical Activity

In addition to the vast health benefits, PA is also critical at a young age to form friendships, develop life skills and competencies, and express creativity in the form of active play (Murphy & Carbone, 2008). PA can also provide numerous benefits for girls with a disability such as an increase in physical conditioning and decline in isolation, an increase in psychosocial health and wellbeing, a greater sense of independence and accomplishment, and autonomy (Bedini & Thomas, 2011). It can also increase social support and provide a sense of normalcy among peers; thus, increasing their confidence and leadership skills. Girls who are more physically active have reported having a more positive self-image and greater self-esteem (Wang & Biddle, 2001); however, there is still a large portion of girls who do not participate in PA, especially those with a disability (Blinde & McCallister, 1999). While many studies have established this link among girls with TD (Crocker, Eklund, & Kowalski, 2000; Knowles, Niven, Fawkner, & Henretty, 2009), no studies have examined this effect in girls with ASD.

Studies where participants have demonstrated improvements in motor skills and PA, have observed positive psychological changes, presenting stronger self-esteem and higher confidence levels in girls with TD (Barnett, Cliff, Lubans, Morgan, & Okely, 2010; Blinde & McCallister, 1999). Girls with and without disabilities tend to have lower self-competence of their motor abilities and lower physical self-perceptions (Cairney et al., 2005), which may act as a barrier to PA. Because girls are less active

than boys at any age (Colley et al., 2011; Colley, Gorber, & Tremblay, 2010), and tend to have less refined motor skills than boys (Barnett, van Beurden, Morgan, Brooks, & Beard, 2010; Carter et al., 2007), it is important to provide young girls, especially girls with ASD, the necessary skills in order to participate and promote a healthy activity lifestyle.

Interventions for girls with ASD

Separate interventions designed specifically for girls or boys, or the intersection of disability, sex, PA and sport has rarely been examined (Bedini & Anderson, 2005). There is a need to target girls, especially girls with ASD, with the aim to reinforce staying physically active throughout the adolescent years. There are limited motor or PA intervention studies that focus on girls with ASD; however, Fox (2014) created an exercise intervention for adolescent girls with ASD. Based on results, the intervention was effective at introducing and reinforcing moderate-to-vigorous physical activity (MVPA). Summer camps are popular among school aged children, and give children a way to interact, form friendships with the absence of school, and stay physically active throughout the summer holiday. For youths, with and without disabilities, a summer camp is an optimal environment to stay active, and promote a healthy active lifestyle (Beets, Weaver, Beighle, Webster, & Pate, 2013), along with a social atmosphere to help transfer these learned skills into daily living skills. A summer sport-skills camp may be an ideal setting for a summer intervention for girls with ASD to help increase motor proficiency and help promote adequate levels of PA, without it having an intimidating scientific or laboratory intervention atmosphere.

Summary

Children with ASD experience challenges with their social, behavioural, and communication skills (American Psychiatric Association, 2013). They also tend to demonstrate poor motor skills that are delayed in comparison to their peers (Liu & Breslin, 2013; Liu, Hamilton, Davis, & ElGarhy, 2014; Lloyd et al., 2013). Girls with ASD, tend to have even more impaired motor skills than boys with ASD, or girls with TD (Carter et al., 2007). Girls at any age, regardless of disability, also tend to engage in low amounts of PA (Colley et al., 2011), and active girls tend to have stronger self-esteem (Biddle & Wang, 2003). Because there is such a strong relationship between greater motor skill proficiency and increased levels of PA in children with and without ASD (Barnett, Cliff, et al., 2010; Kopp et al., 2010; Stodden & Goodway, 2007; Wrotniak et al., 2006), it is important that girls with ASD are provided with an opportunity to gain motor skill proficiency in order to gain the numerous benefits from being physically active.

This study will investigate the impact of a multi-sport skills camp intervention at improving the FMS, PA, physical self-perceptions, social skills and adaptive behaviour of school age girls with ASD. The secondary purpose of this study is to determine any correlations between the variables among school age girls with ASD. Results of this study will be divided into two main components: the motor skill and PA outcomes following the camp intervention (refer to Chapter 3), and the psychosocial outcomes following the camp intervention (refer to Chapter 4).

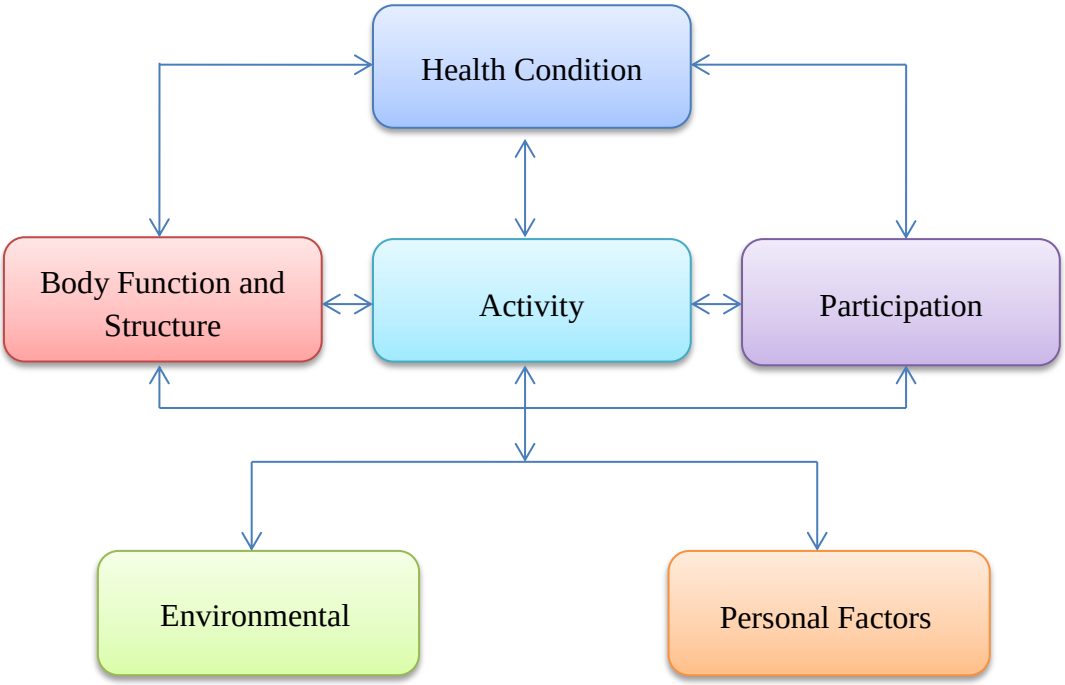
Proposed Research Framework: World Health Organization – International Classification of Functioning, Disability and Health (WHO-ICF)

In 2001, the World Health Organization (WHO) introduced the International Classification of Functioning, Disability and Health (ICF) to provide a consistent standard for the description of health and health-related states for both individual and population levels (WHO, 2001). The ICF describes disability as a term for impairments, activity limitations or participation restrictions recognizing that all humans may experience a health condition or disability at some point during their lifespan. The model takes into consideration the different components of health and some health-related components of well-being with perspectives of the body including body functions and structures. Domains of activity and participation are also incorporated into the model (WHO, 2001). The WHO-ICF also acknowledges the importance of including contextual domains, taking into consideration environmental and personal factors in its classification system (WHO, 2001). The focus of the classification has moved away from being a "consequence of disease" to become a "components of health" classification system. This is an important aspect to the ICF model as it seeks to describe the people first and to avoid individuals being defined by the negative aspects of the disability. The ICF model takes a neutral position allowing individuals with any disease or condition that may impair the ability to function typically, to be reasonably compared (WHO, 2001). The aim of the ICF is to establish a common language for describing health to improve communication between health care professionals and is appropriate to a broad spectrum of applications including personal health care, prevention, health promotion and improvement of participation by removing societal impacts (WHO, 2001).

Girls with ASD, One-Week Multi Sport Camp and the ICF

Figure 1 presents the WHO-ICF model that was used to discuss the classification of the population that will participate in this study. Each category of the model will be discussed with respect to this population.

Figure 1. WHO-ICF model for the classification of health conditions and functioning



Health Condition

All of the participants in the study had a diagnosis of ASD. Different levels of functioning of ASD were included from high, formerly known as Asperger's Syndrome, to moderate functioning. Children with low level functioning ASD, children with a high flight risk, or who are self-injurious or aggressive in nature were excluded from the study as they were considered high safety risk candidates.

Body Function and Structure

The participants in the study experienced varying levels of ID that are often associated with poor motor skills, which can affect the level of active participation in this population. Even with no ID, children with ASD still have significant motor problems. Inactivity may also be a predictor of muscle weakness and/or fatigue, which can further compromise the development of motor skills. Children with ASD often experience motor tics or self-stimulation behaviours that should not be mistaken for movement skills.

Activity

The 'Activity' category of the model describes the different tasks that the individuals with ASD are able to do, and where intervening and manipulating motor skills occurred. These activities are often limited by some aspect of the disorder, often due to poor quality motor skills. By identifying the level of motor skill progression each child was at, a one week multi-sport skills camp was planned appropriately to enhance these individual skills and enable improvements in daily functioning. It is hopeful that by refining the motor skills to more accurate and purposeful movements, it will not only improve daily activities, but also spark more interest in recreational activities and encourage active participation in sport and recreational activities. The Multi-Sport Skills Camp Intervention focused on implementing instruction on the major gross motor skills including: balance, running, jumping, galloping, hopping, kicking, bouncing, catching, throwing, striking, etc. These fundamental motor skills are essential for children to become more active, and are also the building blocks to skills that are practiced in a sport context. Motor skills were assessed using standardized motor assessments in this study prior to attending a camp, and at the two assessments following the camp. It is

hypothesized that increasing motor skills will also improve physical self-perceptions and the confidence levels to perform certain motor skills in each of the participants, which would further encourage participation in PA and recreational activities.

Participation

The participation section of this model refers to what the child actually does and is able to partake in outside of therapy, and where there can be an expected change after an intervention. It is hoped that by participating in specific motor skill drills and activities that incorporate these skills, the children will strive to increase participation and ultimately enhance the child's overall activity. By improving a child's ability or skill, they may be more inclined to practice or perform these skills more regularly. With regular practice, these skills can transform into permanent skills that can improve the child's daily functioning and 'Activity' level of the model. The multi-sport skills camp intervention specialized in fundamental motor skills, and transferring these skills into a sport/recreational activity setting. Various questionnaires were filled out by parents/guardians in order to explore the child's daily functioning, adaptive behaviour, social skills, and PA enjoyment levels and preferences, which provided a greater understanding of the demands from each participant before designing the curriculum. It is hypothesized that as motor skills improve, PA enjoyment levels and preferences will also improve, and children will initiate more interest in being involved in PA and other active recreational games or sports.

Environmental Factors

Environmental factors may include various settings, and factors within these settings that may influence the actual learning of each child. Environmental factors have

potential to be modifiable factors, where the environment can be adapted to stimulate the interest and challenge the children with ASD, and promote individualized learning. All activities performed at camp were the same and consistent for all participants involved and there was at least one camp counsellor or research assistant for every three children to provide closer supervision and personalized instruction for each of the motor skills being practiced. It is hopeful that the day camp setting was an active and enjoyable environment to promote learning for children with ASD and to motivate them to participate with the other children. Children with ASD often experience sensory issues that can inhibit them from participating in certain activities that provide too much visual and auditory stimuli. It is hoped that having provided equipment of different sizes, textures, and colours, that every participant was able to choose various pieces of gym equipment appropriately to provide them the best opportunity to learn the movement skills that are incorporated through the use of this equipment. It was also hoped that by providing these different options, the children will become more inclined to actively participate, thus practicing and refining motor skills to eventually improve 'Activity' and 'Participation' in various tasks.

Personal

Personal factors are not modifiable. All of the children that are in the study were girls between 8 and 11 years of age at the beginning of the camp and are all independently ambulatory. Due to various family structures that provide different levels of support and motivation, and different beliefs and morals, there may be an effect on the child's situation in regards to her health condition and current PA levels. All participants of the study are female, which enabled the study to make sex specific instruction and

games that is a separate learning style from boys. All girls had an equal opportunity to participate in all drills, activities and games provided in the camp. Due to the different sex profiles, girls tend to be more passive in nature and less competitive so a heavy emphasis on team building activities in a non-competitive environment would serve beneficial to this population.

Significance of the Study: Addressing the Gaps in the Literature

This study will add to the scientific literature pertaining to the motor skills, physical self-perceptions, social skills and PA levels in girls with ASD. Previous studies have demonstrated the effectiveness of motor interventions where improvements in motor skill proficiency are apparent within children with ASD (Bremer et al., 2014; MacDonald et al., 2011). However, very few have examined the effect of a motor skill intervention specifically on girls with ASD. Because girls with disabilities tend to experience a double disadvantage, where they are not only at a drawback because of their sex, but also because of their disability, as females tend to be less active and have lower quality motor skills, (Bedini & Anderson, 2005), it is necessary to focus on this population. One of the greatest barriers to PA for girls with disabilities, are their perceived self-competence of the necessary skills to participate (Cairney et al., 2005; Wang & Biddle, 2001). These girls also tend to have a lower self-concept of physical appearance, social acceptance and athletic competence (Bedini & Anderson, 2005; Bedini & Thomas, 2011; Blinde & McCallister, 1999; Wang & Biddle, 2001). These personal factors can have a magnified effect and discourage girls with ASD from being more active and retaining the motor skills that are necessary in order to actively participate in PA and sport.

This study will help fill the gap of the intersection of sex, disability and sport by implementing an all-girls multi-sport skills camp and measuring the effectiveness of this camp on improving motor skills, PA levels and physical self-perception and confidence levels. By gaining the motor skills deemed to be important to stay active, girls may be more inclined to continue being active (Anderson, Wozencroft, & Bedini, 2008). School age girls with ASD, battle typical self-consciousness of their motor competence, similar

to girls with TD their own age; however, the negative contexts may be magnified with the diagnosis of ASD (Biddle & Wang, 2003). PA is effective to help improve confidence and self-esteem, especially among girls (Wang & Biddle, 2001). This study will also examine the relationship between motor skills, PA and physical self-perceptions at all points of the study.

Purpose and Overall Contribution

The overall purpose of this study is to determine whether there will be benefits to girls with ASD in regards to their motor and social skills, adaptive behaviour skill, physical self-perceptions and overall PA levels following a one week multi-sport skills camp. The secondary purpose is to determine which variables are closely related to each other. Although it is known that girls tend to be less active than boys, regardless of disability, the intersection of sex, disability and PA has been rarely examined and requires immediate attention within the literature (Bedini & Anderson, 2005). Studies have shown that by implementing motor interventions for children with and without disabilities, motor skills may be improved, along with the improvement of other aspects, such as self-esteem, that are correlated with physical fitness (Alstot, Kang, & Alstot, 2013; Bedini & Anderson, 2005; Bedini & Thomas, 2011; Kirk & Rhodes, 2011; Wang & Biddle, 2001).

As there is no research supporting the effectiveness of a multi-sport skills camp intervention for girls age 8-11 with ASD, the results from this study will fill a gap in the scientific literature, and may help to shape future therapeutic recreation interventions for girls with ASD.

Hypothesis and Objectives

Objectives of Research

1. To investigate the effect of a multi-sport skills camp intervention on motor skills and physical activity of school age girls with ASD.
2. To investigate the effect of a multi-sport skills camp intervention on physical self-perceptions, social skills and adaptive behaviour of school age girls with ASD.
3. To determine which variables are related following the multi-sport skills camp intervention.

Specific Hypothesis of the Research

1. The camp intervention will result in improvements to the motor skills and physical activity levels of school age girls with ASD.
2. The camp intervention will results in improvements to physical self-perceptions, social skills and adaptive behaviour of school age girls with ASD.
3. All measured variables will relate to one another.

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Chapter 2: Literature Review

Autism Spectrum Disorder

What is now called Autism Spectrum Disorder, was first described by Leo Kanner (1943); he described a group of children as having "autistic disturbances of affective contact". Despite being described as having the inability to relate to people and situations in an ordinary way, and being somewhat clumsy in their gross motor performance, these individuals were relatively healthy (Kanner, 1943, 1971). After undergoing several diagnostic changes, according to the Diagnostic and Statistical Manual of Mental Disorders – 5 (DSM-V), children with ASD are defined as experiencing difficulties in social communication, reciprocity, developing and maintaining relationships, restricted and/or repetitive patterns of behaviour, and deficits in nonverbal communication behaviours (American Psychiatric Association, 2013); Intellectual Disability (ID) can frequently co-occur with ASD (Matson, Rivet, Fodstad, Dempsey, & Boisjoli, 2009). Approximately 1/68 (Frieden, Jaffe, Cono, Richards, & Iadermarco, 2014) or approximately 1% of the general population (Kopp & Gillberg, 2011) of children aged 8 years old are affected with ASD, and 54% are reported as having some degree of ID (Frieden et al., 2014). The prevalence of boys diagnosed with ASD is much greater than girls; 1/42 and 1/189, respectively (Frieden et al., 2014). The average age of diagnosis still remains older than four years, where girls are generally diagnosed much later than boys due to different profiles of characteristics (Frieden et al., 2014).

Females with Autism Spectrum Disorder

There is more available research on boys with ASD, and due to the higher overall prevalence rate, there is limited research on sex differences in children with ASD, or the

unique characteristics of girls with ASD (Cridland, Jones, Caputi, & Magee, 2014). It has been suggested that girls with ASD present with more lower functioning profiles (Nydén, Hjelmquist, & Gillberg, 2000); however this link needs to be further explored. Some studies have attempted to show that there may be a different phenotype in girls with ASD. For example, Kopp and Gillberg (2011) compared boys and girls with ASD to one group of community girls without a clinical diagnosis on the results of the parent-rated Autism Spectrum Screening Questionnaire (ASSQ) and on a new set of items on ASSQ-GIRL, to assist in the detection of girls with ASD. The authors found that questions on the ASSQ-GIRL were much more appropriate of the behaviours typical of girls with ASD, rather than boys with ASD. The most striking of these items included: "avoids demands", "very determined", "careless with physical appearance and dress" and "interacts mostly with younger children" (Kopp & Gillberg, 2011). Girls with ASD tend to play with one or two other girls and may also be capable of "running the show"; whereas boys with ASD are more likely to "lack a best friend" (Kopp & Gillberg, 2011). Girls with typical development (TD) were suggested to be more sensitive and caring toward others, and may frequently invite girls with ASD into their play. In regards to avoiding demands, parents may have less demanding attitudes toward boys than girls, resulting in more frequent avoidance from girls. Girls with ASD are also more likely to avoid demands passively in contrast to boys who may refuse or defy actively (Kopp & Gillberg, 2011). It is important to consider these different developmental profiles before designing any intervention or recreational activities that are beneficial to both boys and girls with ASD.

It has been suggested that girls with ASD may be more severely affected by the disorder or be considered lower functioning (Nydén et al., 2000), which can negatively impact their motor development. Nydén et al. (2000) compared neuropsychological test profiles of boys and girls with ASD and Attention-Deficit – Hyperactive Disorder (ADHD), referred to as the clinic group, and compared results to children without ID or ASD. The authors noted that girls from the clinic group had lower IQ than the girls with TD, and that girls with ASD were more impaired than boys with ASD in respect to executive functioning (Nydén et al., 2000). This is supportive of recent literature that shows girls with ASD may be more severely affected than boys of the same diagnosis (Jacquemont et al., 2014). These results indicate that there is a need to expand the current understanding of the impairments present in girls with ASD. Therefore, it might be beneficial for girls with ASD to have a separate learning environment than boys with ASD in order to maximize their motor development and exploratory learning.

Fundamental Motor Skills

Fundamental motor skills (FMS) are motor skills that emerge throughout childhood following the ability to walk (Barnett, van Beurden, Morgan, Brooks, & Beard, 2008). They are considered to be fundamental as they are assumed to be the basis to more advanced or activity-specific skills (Barnett et al., 2008). FMS include locomotor skills (running, skipping and jumping), manipulative object control skills (throwing and catching), as well as stability skills which contribute to a child's overall physical, cognitive and social development (Lubans, Morgan, Cliff, Barnett, & Okely, 2010). These skills can be considered a gateway to being physically active, and creating a continuous learning environment to adapt and refine motor skills in order to participate in

recreational activities or sport (Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006). Being involved in group activities is not only beneficial to decrease health implications, but also encourages social skills as well. By continuously rehearsing and practicing FMS and engaging in group activities, positive psychological changes are likely to occur, such as autonomy and mastery of specific skills (Blinde & McCallister, 1999; Lubans et al., 2010; Stodden & Goodway, 2007).

Motor skill proficiency that is developed in childhood, formulate from simple FMS that emerge from infancy (Lubans et al., 2010). These skills are refined continuously throughout childhood and adolescence to become sport-specific skills (Barnett et al., 2008). Having the tools, or sport-specific skills, permits an individual to participate with confidence, and allows the individual to experience other physical and psychological health benefits. Lubans et al. (2010) conducted a systematic review to examine the relationship between FMS proficiency and potential health benefits that include psychological, physiological and behavioural outcomes to children and adolescents. Twenty-one articles were included in the review where 8 benefits were consistent in the literature: global self-concept, perceived physical competence, cardiorespiratory fitness, muscular fitness, weight status, flexibility, physical activity (PA), and reduced sedentary behaviour (Lubans et al., 2010). Results demonstrated strong evidence for a positive association between FMS competency and PA in children and adolescence; however, there is a need to test this theory in populations with disabilities, such as children with ASD.

Fundamental Motor Skills and Girls

Fundamental motor skills are important in early childhood, as they can inhibit or enhance PA in adolescence and adulthood. Lloyd, Saunders, Bremer, and Tremblay (2014) conducted a longitudinal study to investigate the long term association of motor skill proficiency at 6 years of age and self-reported PA at age 26 to determine if there are differences between two groups classified as high motor proficiency (HMP) and low motor proficiency (LMP) for motor skill proficiency, PA or sedentary behaviour and if the outcomes were related across ages. The authors noted that motor skill proficiency at age 6 was related to self-reported proficiency at age 16, and self-reported proficiency between ages 16 and 26 (Lloyd et al., 2014). Motor skill proficiency at age 6 was also positively associated with leisure time PA at age 26 in female participants who were noted as having high motor proficiency at age 6 (Lloyd et al., 2014). Given these results, it is important to instill early motor skills in order to promote PA later on in life, especially in females.

Throughout childhood and adolescence, boys are generally more proficient than girls in their object manipulation skills, such as overhand throwing, catching or kicking (Barnett, van Beurden, Morgan, Brooks, & Beard, 2010). Barnett et al. (2010) conducted a longitudinal study to examine sex differences in motor skill proficiency from childhood to adolescence. The authors assessed 138 girls and 128 school age boys on their motor proficiency in three object control skills, and three locomotor skills. Results indicated that childhood object control skills significantly predicted adolescent object control proficiency (Barnett et al., 2010). Although sex was an important factor in this study, it did not predict proficiency in adolescence. The authors also noted that boys consistently

acquired high motor skill proficiency scores in the object control skills in childhood and adolescence, and girls performed the kick and overhand throw poorly at both time points; however, there were no significant sex differences detected in locomotor skills (Barnett et al., 2010). Because object control proficiency at childhood is predictive of proficiency during adolescence and object control skills have a social element to them, it is important especially for all girls to develop proficiency skills during childhood.

Fundamental Motor Skills and Autism Spectrum Disorder

Motor skills of children with ASD are gaining attention in the literature. Staples and Reid (2010) compared the performance of FMS in children with ASD to three comparison groups of children with TD who were individually matched with: (1) chronological age, (2) movement skill development, and (3) cognitive development. The authors recruited 25 children with ASD (9-12 years), and were compared to the 3 groups using the Test of Gross Motor Development – 2 (TGMD-2) (Staples & Reid, 2010). The authors established that when matching for age, the comparison group scored significantly greater than children with ASD. When matching for skill, children with ASD performed similarly to children half their age; and when matching for cognitive abilities, the skills of children with ASD are significantly more impaired (Staples & Reid, 2010). The results suggest that movement skills of children with ASD demonstrate significant delays, and validate the need to improve the motor skills in children with ASD. Due to the drastic sex ratio of ASD, 4 to 1 boys to girls respectively, the conclusions from this study are limited as the motor scores of the boys and girls with ASD were not reported separately. In order to understand the FMS of girls with ASD, the results need to be reported by sex.

Whyatt and Craig (2012) have also studied motor skills in children with a diagnosis of ASD between the ages of 7 and 10. The authors assessed the motor skills using the Movement Assessment Battery for Children-2 (MABC-2) on a total of 18 children with ASD and compared these results to two groups of age-matched children with TD (Whyatt & Craig, 2012). These groups included a receptive vocabulary matched group, and a nonverbal IQ matched group. Results were shown to be consistent with previous work, which indicated a significant general motor impairment in the children diagnosed with ASD compared to the groups of children with TD (Whyatt & Craig, 2012). Results also revealed that two components demonstrated significant deficits for the children with autism. These two components included catching a ball, which incorporates social interactions between children, and static balance (Whyatt & Craig, 2012). Because balance is a fundamental motor skill that enables a child to progress learning new skills, such as hopping on one leg, it is important for these children to adequately learn these skills. As girls tend to have poorer motor skills than boys, it is especially important for girls with ASD to acquire these motor skills so that they are able to participate in activities and sports that require more complex, interceptive actions.

Although poor motor skills are not part of the diagnostic criteria for individuals with ASD, the delays in comparison to peers with TD is significant (Lloyd, MacDonald, & Lord, 2013; Whyatt & Craig, 2012). Liu and Breslin (2013) investigated the comparison between fine and gross motor performance of children with ASD, and age-matched children with TD using the MABC-2. The authors noted that all children with TD exhibited proficient gross and fine motor skills; however, the children with ASD consistently experienced motor difficulty, and most were considered at risk for motor

delay (Liu & Breslin, 2013). Children with ASD scored lower than children with TD on manual dexterity, ball skills, and static and dynamic balance (Liu & Breslin, 2013); all skills that are incorporated into everyday play and games played in gym class. It is important for these children to learn adequate motor skills, so they are able to interact and participate actively with their peers.

Liu, Hamilton, Davis, and ElGarhy (2014) examined the gross motor skill performance of children with ASD and their age matched peers between the ages of 5 and 10. A total of 12 gross motor skills were assessed using the TGMD-2 assessment using two subgroups: locomotion and object control. For the locomotor tasks, 67% of children with ASD had poor standard scores and 40% of children with ASD scored very poor (Liu et al., 2014). For the object control tasks, 60% of children with ASD had poor standard scores and 33% of scores were very poor (Liu et al., 2014). For overall gross motor quotient, 81% of children with ASD were classified as having poor motor skills. Overall, children with ASD scored significantly lower than children with TD, and indicated a large effect size (>0.80) (Liu et al., 2014); however there were no comparisons of motor skills made between boys and girls with and without ASD. It is important to note that all children with ASD demonstrated significant delays in their gross motor proficiency when compared to their age matched peers, although sex differences in this study cannot be made.

Bremer, Balogh, and Lloyd (2014) investigated an early motor skill intervention for young children with ASD to improve motor skill proficiency. A total of 9 children with ASD participated in the study; their motor skills were assessed using the Peabody Developmental Motor Scales-2 (PDMS-2) and the Movement ABC-2 (MABC-2) at

baseline, post-intervention, and at a 6-week follow up. As a group, participants significantly improved on the PDMS-2 object manipulation scores and total motor quotient scores (Bremer et al., 2014). The authors found that a motor skill intervention can be effective at improving the motor skill among young children with ASD. Although this study did not incorporate an older age group, or study girls with ASD specifically, the fact that a motor skill intervention can have significant effects on motor skill proficiency is encouraging, and may have other functional implications for transferring these skills into daily living skills.

Ketcheson (2014) also implemented a motor skill/PA intervention for children with ASD. A total of 34 children with ASD between the ages of 2-5 participated in this study and 19 children with TD as well. Motor skills and PA levels were measured at baseline. Results indicated that prior to that intervention, the children with ASD scored significantly lower than their peers on motor skills. An 8-week day camp intervention was designed to help improve the motor skills of the children with ASD in the study. Following the 8-week motor skill intervention, children with ASD experienced significant improvements in their overall gross motor skills including both locomotor and object control skills (Ketcheson, 2014). Although there were no significant improvements within PA, results from this intervention indicate that motor skills can improve following a specific motor skill intervention, similar to the study by Bremer et al. (2014). These results are encouraging, and should be used to inform early intervention groups to include motor skill programming as a part of comprehensive therapy delivered to all children with ASD.

Fundamental Motor skills and Girls with Autism Spectrum Disorder

All children with ASD tend to experience significant motor delays; however, because boys and girls with ASD portray different developmental profiles (Dworzynski, Ronald, Bolton, & Happe, 2012), it is likely that they also display different motor capabilities. Carter et al. (2007), addressed sex differences in developmental functioning and clinical manifestations in toddlers with ASD. The authors recruited 22 girls and 68 boys between the ages 18-33 months. After an initial phone screening, families were sent questionnaires (ITSEA – Infant Toddler Social Emotional Assessment & socio-demographic status), parent interviews (ADI-R – Autism Diagnostic Interview – Revised & VABS – Vineland Adaptive Behaviour Scales) and direct assessment (Mullen Scales (motor) & ADOS – Autism Diagnostic Observation Schedule) (Carter et al., 2007). The authors noted that all children achieved strongest performance in visual reception and fine motor; followed by gross motor and language functioning (Carter et al., 2007). By taking advantage of their strengths, improvements in their weaknesses may be accomplished. Controlling for language, girls achieved higher visual reception score which is important for demonstrating motor skills; whereas controlling for visual reception, boys scored higher language, motor scores, and higher social-competence ratings (Carter et al., 2007). These results indicate that there are notable differences in the developmental profiles between sexes; girls having notably worse motor skills, but greater visual reception. Based on these results, it is possible that by providing the appropriate visual cues, motor skills in girls with ASD can be improved. Thus, it would be beneficial to intervene by separate sexes as girls portray a different behavioural profile, and would benefit from a specific motor intervention to improve these skills.

An epidemiological study conducted by Pieters et al. (2012) systematically analyzed comorbidities and sex differences of motor problems in children with developmental disorders including ASD, hyperkinetic disorder and/or speech, language or learning disability. Co-morbidities and motor problems were previously diagnosed and found in the medical records of each participant. The authors investigated 3608 profiles of children that were referred to rehabilitation centres for behavioural, developmental and sensorineural disorders. Motor problems were reported in 1/5 of the total sample (Pieters et al., 2012), which may underestimate the poor motor skills that are present in children with ASD because those with mild motor problems may be underreporting motor difficulties. The authors determined that there may be different patterns between sexes, where females with ASD have less proficient motor skills than males with ASD (Pieters et al., 2012). These studies did not however measure social skills or PA.

The purpose of a study conducted by Kopp, Beckung, and Gillberg (2010), was to address some of the limitations in motor control problems in girls with ASD, such as motor control difficulties, the effect of severity of disability, and how certain predictors affect the presence of motor control problems. The authors of the study recruited 113 school age girls with ASD (clinical group) to compare with 57 age and IQ matched girls from the community (community group). Each girl was tested with a standardized test of motor function MABC-2, as well as parent interviews and questionnaires (Kopp et al., 2010). The authors noted that the girls in the clinical group had more motor control dysfunction in comparison to the community group; they also discovered there to be lower participation in Physical Education within the clinical group (Kopp et al., 2010).

Overall, young age, ASD diagnosis and low IQ predicted more motor coordination problems in this study. Because so few studies have examined motor skills in girls with ASD, further research is required for the link between improved motor skills and participation levels in PA within this population.

Importance of Physical Activity in Girls

Participation in leisure and active recreational activities is associated with greater health and wellbeing for all populations (King et al., 2009). Physical activity is important among girls and women especially, for improving psychosocial wellbeing which may include but is not limited to: stress, self-efficacy, cognitive functioning, quality of life, self-esteem and confidence (Reid, Dyck, McKay & Frisby, 2000). There are however, several predictors of change in PA such as age and sex that can have a negative impact on PA. Females and older populations tend to be at a high risk for inactivity, as intensity and amount of PA levels tend to decline with age (King et al., 2009). A nationally representative study indicated that females are less active than males at any age (Colley et al., 2011a, 2011b); girls with disabilities are even less active than those with TD (Blinde & McCallister, 1999), which indicates a need for promoting PA within this population. Factors that may act as barriers to PA in children include age, preferences and physical functioning; as each factor increases, activity and level of participation tend to decrease (King et al., 2009). Familial factors, ethnicity and socioeconomic status may also act as barriers PA. The community physical environment, policies, and attitudes can act as large barriers for children and youth with disabilities (King et al., 2009).

Physical Activity in Children with Autism

Individuals with ASD portray significant impairments in their motor and physical functioning, which may inhibit their ability to participate in PA. Memari et al. (2013) examined PA patterns in children with ASD, and also investigated PA determinant factors. A total of 80 children and adolescents with ASD were asked to wear an accelerometer for a total of seven consecutive days. The results indicated that there was a significant reduction in activity as the children with ASD got older, and girls with ASD were significantly less active than the boys with ASD (Memari et al., 2013). The authors also noted that household structure, sedentary activity, comorbidities and obesity were all considered determinants of PA in children with ASD (Memari et al., 2013). The results of this study indicate a significant need for improving PA programmes, especially for girls and older children with ASD.

Pan, Tsai, and Hsieh (2011) conducted a study examining potential correlates that may influence PA among adolescents with ASD in gym classes. A total of 19 students with ASD, and 76 students with TD wore an accelerometer during their regular gym class time for 38 sessions. The authors found that students with ASD were less likely to be physically engaged during class than their peers, and their PA was positively correlated to their social interactions with peers (Pan et al., 2011). It was also noted that MVPA depended on PA content, the physical environment, and how the directions were delivered by the instructor (Pan et al., 2011); however, additional studies are necessary in order to help remove instructional barriers and to further promote PA among this population. It may also be beneficial to intervene at an earlier age for children with ASD,

in order to avoid the significant PA decline noted around puberty, and to promote greater levels of PA throughout adolescence.

While it is established that children with ASD are less physically active than their peers (Memari et al., 2013; Pan et al., 2011), very little is known about the recreational activities that children with ASD participate in. As engagement in recreation is important for a child's development and health, Potvin, Snider, Prelock, Kehayia, and Wood-dauphinee (2013) conducted a cross-sectional study to compare the recreational engagement of children with ASD and their peers with TD. Participation was measured using the Children's Assessment of Participation and Enjoyment/Preference for Activities of Children (CAPE/PAC) among 30 children with ASD, and 31 children with TD. Results indicated that children with ASD differed from peers in regards to diversity of activity, social aspects of activity, and locations of recreation (Potvin et al., 2013); however, given the social deficits that characterize ASD (American Psychiatric Association, 2013), these results were to be expected. Because recreation is important for a child's physical and social development, clinicians and policy makers should be made aware of these challenges and instigate more inclusion programs or other opportunities for children with ASD.

Crouch, Hilton, and Israel (2008) also examined the differences in after-school participation between school age children with ASD and their peers with TD. Recruitment consisted of 53 children with TD who comprised of the control group, and 52 children with ASD. The participants in the study were assessed using the CAPE, and the Social Responsiveness Scale. The authors found significant differences in participation between the groups, where children with TD were more involved in a

greater number of activities, individuals with whom they participate with, and the variety of environments in which they participate in (Crouch et al., 2008). These findings indicate that after-school participation is significantly different among children with ASD and that the social deficits experienced by individuals with ASD could contribute to the lower participation.

Physical Activity in Girls with Autism Spectrum Disorder

Girls on average, tend to be less active than their male counterparts (Colley et al., 2011b). Children with ASD often experience challenges with attention and motivation, and may require specific learning strategies in order to engage in the recommended daily PA levels (Stodden & Goodway, 2007). Because of the limited literature pertaining specifically to girls with ASD in PA, Fox (2014) created a 6-week individualized exercise program for adolescent girls with ASD to determine if the duration of PA has an effect on which activities the participants chose to engage in, performance on visual processing speed, and strategies to facilitate and sustain safe and consistent aerobic activity. Fox (2014) found that visual supports and individualized plans were effective tools to introduce and sustain moderate-to-vigorous physical activity (MVPA) following the intervention. Results also indicated that there was increased interest in exercise and ability to carry out exercise plan with minimal to no adult assistance (Fox, 2014). These positive results following an intervention indicate that it is possible to improve PA levels among girls with ASD, and this study created a platform for future interventions focusing on girls with ASD.

Physical Self-Perceptions and Confidence in Girls

Females who are physically active have reported to have stronger self-esteem and confidence levels than those who do not actively participate (Blinde & McCallister, 1999). There are still a large proportion of females, especially those with a disability, who do not participate in PA due to poor physical self-perceptions (Hutzler, 2003; Kirkcaldy, Shephard, & Siefen, 2002). Several studies have examined this relationship in girls with TD (Crocker, Eklund, & Kowalski, 2000; Knowles, Niven, Fawkner, & Henretty, 2009); however, few have examined this effect in girls with ASD or other DD. There is a significant lack in the literature pertaining to the link between sex, disability, PA and sport, and a definite need to improve this dynamic (Blinde & McCallister, 1999).

Physical Self-Perceptions and Confidence in Girls with Typical Development

Many youth do not meet current PA recommendations; girls tend to report lower levels of PA than boys from middle childhood onward (Davison, Werder, Trost, Baker, & Birch, 2007). Girls also tend to exhibit greater rates of decline in PA, which may be due to psychological experiences of puberty and in particular timing of pubertal maturation. Baker, Birch, Trost, and Davison (2007) assessed girls between the ages of 11 and 13 years to determine advanced pubertal status at age 11 and if there is a correlation with lower PA levels. The authors noted that early maturers had significantly lower self-reported PA, accumulated fewer minutes of MVPA, and fewer accelerometer counts per day at age 14 than later maturing girls (Baker et al., 2007). It is evident that girls who experience earlier pubertal maturation at age 11 report lower PA at age 13 compared to later maturing peers, and that pubertal maturation may lead to decline in PA among girls (Baker et al., 2007). It would be beneficial to design programs prior to this age to enforce

the importance and enjoyment factor of PA and sport to encourage active participation entering into adolescence and throughout adolescence into adulthood. Entering pubertal maturation is a sensitive time for both girls with and without DD, programs designed to increase PA and address the self-consciousness that girl's experience, may make a difference in the PA levels seen in girls.

Crocker et al. (2000) aimed to determine the relationship between physical self-perceptions and PA in Canadian children between the ages of 10-14 years old. The authors recruited 220 boys and 246 girls with TD. PA of each child was assessed by a 7-day recall using Physical Activity Questionnaire for Older Children (Crocker et al., 2000). Self-perceptions (physical conditioning, sports competence, strength, body appearance and general physical self-worth) were measured by the Physical Self-Perception Profile (PSPP) (Crocker et al., 2000). The authors reported that boys were more physically active than girls, with higher perceptions of sport competence and strength. The relationship between physical self-perceptions, especially physical conditioning and sport skills, are significant correlates of PA in this population (Crocker et al., 2000). It is not known at this time whether these same variables are important correlates of PA in girls with disabilities.

Girls tend to have lower levels of PA, and lower perceptions of their physical self-perceptions (Crocker et al., 2000). Because of this, Davison, Schmalz, and Downs (2010) aimed to develop and validate the Girls Disinclination for Physical Activity Scale (G-DAS) and implement the scale along with an objective of PA in a longitudinal sample of adolescent girls. Through the G-DAS, the authors uncovered several reasons why girls tend to dislike PA. These reasons include: low perceived competence, lack of

opportunities available for them, high perceived exertion, concern about physical appearance, and threats to girls gender identity (Davison et al., 2010). Low perceived competence was the most common reason for the girls to report disliking PA and predicted a decreased likelihood of maintaining sufficient PA across ages 13 to 15 (Davison et al., 2010). Although this is apparent in girls with TD, it is unknown if this applies to girls with ASD as well. It is hypothesized that by developing FMS and PA related skills in girls with and without a developmental disability prior to entering adolescence, it will prevent the decline in adolescent girl's PA levels.

Knowles et al. (2009) examined the influence of maturation on physical self-perceptions and the relationship with PA in early adolescent girls. This is often a psychologically vulnerable time period for girls regarding their self-esteem, and is often the age that PA levels start to decline (Biddle & Wang, 2003). A total of 150 girls with TD completed the Physical Activity Questionnaire for Children and Children and Youth Physical Self-Perception Profile, as well as the Pubertal Development Scale on two separate occasions twelve months apart. The authors noted a decrease in overall PA levels over the twelve months, however maturational status or physical characteristics were not found to be statistically significant (Knowles et al., 2009). Physical self-perceptions partially accounted for the explained variance in PA change; however physical condition was seen as being a more important individual predictor for PA participation. Body mass was also an important predictor of the changes in body attractiveness and physical self-worth (Knowles et al., 2009). Physical self-perceptions had a relatively small contribution in this study to the drop in PA among early adolescent

girls. It may be beneficial to encourage more PA in girl's pre-adolescent age, approximately 8-11 years of age, in hopes that it will slow down the drop off rate of PA.

Biddle and Wang (2003) examined factors that may influence an adolescent girls likelihood of being active. The authors assessed comprehensive profiles of motivational and self-perception variables in 516 (11-16 year old) girls with TD via questionnaires (Biddle & Wang, 2003). Five clusters were formed for comparison (moderate motivation and physical self, very low motivation and low physical self, amotivated, high motivation and physical-self, and moderate motivation and high physical self). The authors found that task orientation was positively correlated with beliefs, and negatively correlated with amotivation (Biddle & Wang, 2003). As predicted, the least physically active clusters included: amotivated, as well as very low motivation and low physical self (Biddle & Wang, 2003). Although differences of PA between groups were small, these results still provide insight and potential areas for intervention to enhance the motivation of adolescent girls for PA.

Slater and Tiggemann (2011) examined sex differences in adolescent participation in sport and PA in teasing experiences and relationships between PA and body image. The authors recruited 714 adolescents ages 12-16 (332 girls, 382 boys) to complete measures on: participation, teasing in sport, self-objectification, body shame, and appearance anxiety. It was noted that the girls participated in organized sports less than boys; they also reported higher levels of teasing from both girls and boys (Slater & Tiggemann, 2011). Teasing and body image concerns may contribute to girls' reduced rates of PA, thus there is a need to promote PA to avoid the decline in PA rates among girls. Because this is present in girls with TD, we also know that girls with developmental

disabilities (DD) have lower rates of PA than girls with TD, so this is also of concern to that population.

Physical Self-Perceptions and Confidence in Girls with Disabilities

Cairney et al. (2005) conducted a study to determine the link between FMS, reduced PA and the influence of self-efficacy in PA in children with DCD. This study followed a cross-sectional design; 590 children from grades 4-8 participated in the study (Cairney et al., 2005). Motor skills were evaluated by the Bruinink-Oserestsky Test of Motor Proficiency (BOTMP-SF); Self-Efficacy was evaluated by the CSAPPPA (Children's Self Perceptions of Adequacy in and Predilection for Physical Activity); and participation was evaluated by the PQ (Participation Questionnaire) (Cairney et al., 2005). From the total number of participants, 7.5% were suspected DCD. The authors concluded that children with DCD scored lower in all areas including organized play and free play; self-efficacy had scored lower in adequacy, predilection and enjoyment factors (Cairney et al., 2005). In general, children with DCD are less likely to be physically active, and self-efficacy can account for a considerable proportion of this link. Similar results of the poor motor skills are also present among children with other Intellectual and Developmental disabilities, such as ASD (Lloyd et al., 2013; Whyatt & Craig, 2012); it is not limited to DCD. Girls with ASD portray motor skills that are of much less proficient compared to boys with ASD; they also tend to have greater vulnerability in regards to self-perceptions, as self-perceptions may act as a barrier to being physically active (Cairney et al., 2005). By using the results of this study, we can establish that this link needs to be further investigated in girls with ASD.

Bauminger, Shulman, and Agam (2004), examined the perceptions of friendship in high-functioning children with ASD and the link between self-perceptions and social relationships in children between the ages of 8 and 17. The authors recruited 16 children with TD paired up with 16 children with ASD, accounting for chronological age, IQ, sex and mother's education (Bauminger et al., 2004). Each child was measured using a friendship picture recognition task and 3 self-report questionnaires including: Qualities of friendship, Loneliness and a Self-perception profile (Bauminger et al., 2004). The authors noted that the children with ASD perceived their friendships to be as close as did children with TD, although in reality, this may not actually be the case. Friendship qualities correlated positively with cognitive competencies and general self-worth, and was negatively correlated with loneliness (Bauminger et al., 2004). Children with ASD also perceived social and athletic competencies lower compared to children with TD (Bauminger et al., 2004). It is likely that if athletic competencies can be improved in children with ASD, it may have a beneficial effect on their social relationships.

A study conducted by Weiss, Diamond, Demark, and Lovald (2003) investigated the relationship between a PA program through Special Olympics (SO), the self-perceptions (perceived physical competence, social acceptance and overall self-worth), and adaptive behaviours of individuals with Developmental Disabilities; although this does not specifically target girls with ASD, ASD is considered a Developmental Disability (DD), and results from this study may be generalized to the ASD population. The authors randomly selected 97 individuals with DD between the ages of 9 and 43, and their parents to participate in the study. Self-concepts and adaptive behaviours (perceived social acceptance) were measured via direct interview and parental report. Results

showed that general self-worth, perceived physical competence, and perceived social acceptance positively correlated to the number of years involved in SO, number of competitions, hours per week and medals received; they were also negatively correlated with IQ (Weiss et al., 2003). Overall, this article highlights the importance and potential benefits of competition and sport for individuals with DD.

No known studies have investigated physical self-perceptions and competence in ability to participate in PA among girls with ASD specifically; however, Bedini and Anderson (2005) examined the perceptions of girls with disabilities regarding physical recreation activity, their perceptions of having a disability as well as their recreation experiences. Participants age 8-17 years were recruited and tested using a 25-item guide interview to include questions about: participation in and perceptions of recreation activities, perceptions of disability, and questions related to interest and assessment of media (Bedini & Anderson, 2005). Analysis of the data portrayed 3 main themes: (1) Meanings of PA, the freedom that PA allowed them, how PA was an equalizer for them and gave them a sense of empowerment, and how opportunities in PA can boost their confidence, (2) Ownership of disability, perceptions of being "normal", improved body image and self-esteem, (3) Access to role models, there are minimal role models who are females with a disability (Bedini & Anderson, 2005). The findings from this study is consistent with other findings in literature on girls with TD (Crocker et al., 2000; Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006); although this population is under-researched, there is a need for more opportunities in order to pursue PA.

Conclusion

Based on the findings from the literature, it is noted that the link between sex, disability, and sport and recreation needs to be further investigated. No study to date has examined the effects that disability, sex, motor skills, and physical self-perceptions combined may have on PA; and if manipulating one of these variables, such as motor skills, will have an effect on PA levels and physical self-perceptions. It has been shown that children with ASD demonstrate poor motor skills, and girls display more impairments in these motor skills than boys (Carter et al., 2007). Therefore, it is important to study boys and girls with ASD separately as girls have a much different developmental profile than boys (Carter et al., 2007). Girls are less physically active than boys at any age (Colley et al., 2011b), and girls with ASD are even less active; because participation enhances self-esteem and self-perceptions, there is a need to have a focus on promoting PA and sport among girls with ASD. The intersection of sex, disability, and sport has rarely been examined, and this proposed research will contribute to the literature.

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Chapter 3: Manuscript 1
Implementing a Multi-Sport Skills Camp for Girls Ages 8-11 with Autism Spectrum Disorder: Impact on Motor Skills and Physical Activity

Abstract

Evidence indicates that children with Autism Spectrum Disorder (ASD) display delayed or atypical gross motor functioning compared to their peers with typical development (TD). Poor motor skills may inhibit their participation in physical activity (PA). Girls with ASD typically have less motor skill proficiency than both their peers with TD and boys with ASD. The purpose of this study was to examine the impact of a one week multi-sport skills camp intervention at improving the fundamental motor skills (FMS) and PA levels of 13 girls with ASD ages 8 through 11. The Test of Gross Motor Functioning-2 (TGMD-2) was used to assess FMS, and a pedometer was used to assess PA levels at the pre-, post- and 8-week follow up test for each participant. The Children's Assessment of Participation and Enjoyment & Preference for Activities of Children (CAPE/PAC) was used to assess preference for various activities at the pre-test, and the 8-week follow up test for each participant as well. Results indicated that the one-week day camp intervention setting was effective at significantly improving FMS as measured by the TGMD-2 including: locomotor standard score ($p=0.001$), object control standard score ($p<0.0001$), and gross motor quotient ($p<0.0001$), over time. Although there were no significant results related to the Pedometer or CAPE/PAC, there were improvements in the CAPE/PAC. Within the PA domain, there were increases in scores for each of the 'diversity', 'intensity', 'with whom', 'where' and 'enjoyment' scores. Within the Social Activities domain the 'diversity' score showed an increase, as well as the 'where' score and 'enjoyment' score within the Skill-Based Activities. The results of this study indicate that a one week multi-sport skills camp intervention can be effective at improving motor skills of girls ages 8-11 with ASD; however, further research with larger samples at greater intervention intensities is necessary.

Introduction

Dr. Leo Kanner (1943) first described what is now known as Autism Spectrum Disorder (ASD), in a group of children who had the inability to relate to people and situations, as having "autistic disturbances of affective contact". ASD is now defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a condition where individuals experience difficulties in social communication and reciprocity, developing and maintaining relationships, restricted and/or repetitive patterns of behaviour, and deficits in nonverbal communication behaviours (American Psychiatric Association, 2013). ASD has significantly increased in prevalence over the last few decades, and now affects approximately 1/68 school aged children (Baio, 2014; Frieden, Jaffe, Cono, Richards, & Iadermarco, 2014). Boys tend to be diagnosed much more frequently with ASD, with a ratio of 4:1 boys to girls (Carter et al., 2007). Of the children diagnosed with ASD, 54% are also reported to having some degree of Intellectual Disability (ID) (Frieden et al., 2014). Children are classified as having an ID if they have an Intellectual Quotient (IQ) of ≤ 70, or borderline ID, which is classified as having an IQ between 71-85 (Frieden et al., 2014).

Although boys are diagnosed more often, it is not well understood whether there is an overall underestimation of girls being diagnosed with ASD because they often display a much different developmental profile (Carter et al., 2007; Dworzynski, Ronald, Bolton, & Happe, 2012; Frieden et al., 2014). It is also suggested that because of the ratio of boys to girls being approximately 4:1 (Frieden et al., 2014), the diagnostic criteria may be biased towards characteristics more often seen in boys with ASD (Dworzynski et al., 2012). Girls with ASD are commonly grouped with the boys in interventions, group

therapies, and other recreational activities. Due to higher overall prevalence, there is also significantly more research on boys with ASD, and limited research on sex differences or the unique characteristics of girls with ASD (Cridland, Jones, Caputi, & Magee, 2014). It is possible that interventions may be more effective when tailored to the developmental profiles of the participants. Therefore, it may be beneficial for girls with ASD to have a separate learning environment than boys with ASD in order to maximize their potential motor development and exploratory learning.

Recent literature has suggested that girls with ASD may be more severely affected than boys with the same diagnosis, as fewer girls are diagnosed (Jacquemont et al., 2014); however, this relationship needs to be further explored as girls may portray a different developmental profile that may differ from the diagnostic criteria. It has also been noted that girls with ASD tend to have greater impairments in their visuospatial planning skills compared to boys with ASD or girls with typical development (TD) (Nydén, Hjelmquist, & Gillberg, 2000). Cognitive and intellectual impairments can have a significant effect on visuospatial awareness and perceptions (Ross, Kushner, & Roeltgen, 1996). These senses and perceptions are necessary when learning new motor skills, as there is a high perception-action link in motor development (Davis, Pitchford, & Limback, 2011; Sugden & Wade, 2013). Fundamental motor skills (FMS) are essential motor skills that progress throughout childhood, and are crucial for determining the future trajectory of more complicated and activity-specific skills (Barnett, van Beurden, Morgan, Brooks, & Beard, 2008). Basic motor skills emerge into more advanced or activity-specific skills as a child develops over time (Lubans, Morgan, Cliff, Barnett, & Okely, 2010). FMS include locomotor, manipulative object control and stability skills that contribute to a

child's overall physical, cognitive and social development (Lubans et al., 2010). Poor motor skills have been strongly correlated with IQ and executive functioning (Hartman, Houwen, Scherder, & Visscher, 2010; Rintala & Loovis, 2013; Westendorp et al., 2014). Regardless of ID, children with ASD tend to have significant gross and fine motor delays compared to their peers with TD (Lloyd, MacDonald, & Lord, 2013; Lui, Hamilton, Davis, & ElGarhy, 2014; Staples & Reid, 2010; Whyatt & Craig, 2012). Girls with ASD tend to have even more impaired motor skills than boys with ASD or girls with TD (Carter et al., 2007; Kopp, Beckung, & Gillberg, 2010; Pieters et al., 2012). Although girls, even with TD, consistently have less proficient motor skills than boys (Barnett, van Beurden, Morgan, Brooks, & Beard, 2010), it is still unclear as to why children with ASD, especially girls, have poor motor skills.

It has been suggested that girls with ASD may have greater visual reception skills than boys (Carter et al., 2007); meaning that girls may be more receptive, and able to learn new skills through the use of visual prompting. Providing visual cues, picture schedules and visual prompts of specific skills may assist girls with ASD in improving their motor proficiency (Breslin & Liu, 2015). For children with ASD, motor skill proficiency may not come naturally, the skills must be taught to the children and thoroughly practiced (Stodden, Langendorfer, Roberton, & Kelbley, 2007). FMS are often overlooked in this population, as parents tend to focus primarily on social, behavioural, and daily living skills early in life (McPhilemy & Dillenburger, 2013). However, greater motor skill proficiency has been correlated with greater social skills, psychological, physiological and behavioural outcomes, as well as cognitive learning in children with ASD (Bremer, Balogh, & Lloyd, 2014; MacDonald, Lord, & Ulrich, 2011).

Therefore, it is important to intervene with motor skills, so that children with ASD don't fall further behind their peers in motor proficiency as they get older.

The majority of the research available on motor skills of children with ASD focuses on toddlers (Bremer et al., 2014; Lane, Harpster, & Heathcock, 2012; Liu, Hamilton, Davis, & ElGarhy, 2014; Lloyd et al., 2013) and school aged children primarily consisting of boys with ASD (Hsieh, Pan, & Tsai, 2011; Pan, 2014; Staples & Reid, 2010); the literature available frequently does not report the results of girls and boys with ASD separately. Thus, little is known on the motor skills and physical activity (PA) levels of school age girls with ASD, indicating that there is a significant gap in the literature.

There is a strong positive correlation between motor skill proficiency and PA (Kopp et al., 2010; Lubans et al., 2010; Stodden et al., 2007; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006), where the more skillful children and youth participate in more activity, and the less skillful children engage in lower levels of PA. An increase in motor proficiency may improve levels of PA, leading to an increase in the opportunity to learn more refined and activity-specific motor skills, ultimately leading to further improvements in motor skills (Stodden et al., 2007). Given this relationship, an intervention setting to improve the FMS of girls with ASD, may have a positive effect on levels of PA.

Participation in PA is crucial to one's physical, emotional and cognitive health, and is associated with greater health and wellbeing for all populations (King et al., 2009; Meydanlýoðlu, 2015). In addition to the vast health benefits, PA is also critical at a

young age to form friendships, develop life skills and competencies, and express creativity in the form of active play (Murphy & Carbone, 2008). Age and sex can have a negative impact on involvement in PA; females and older populations tend to be at a higher risk for inactivity, as the intensity and the amount of PA levels tend to decline with age (King et al., 2009). Girls with ASD tend to participate in less PA than boys with ASD (Memari et al., 2013), much like girls with TD (Colley et al., 2011). Girls with and without a disability tend to have lower self-competence of their motor skills and lower physical self-perceptions (Cairney et al., 2005); this may act as a barrier to PA, along with lack of opportunity. While little is known about the involvement of PA that girls with ASD partake in, it is well established that PA levels in girls with TD drastically decreases around puberty (Biddle & Wang, 2003; Colley et al., 2011; Labbrozzi et al., 2012; Pfeiffer et al., 2006; Toscos, Faber, Connelly, & Upoma, 2008). Because so few studies have researched motor skills of girls with ASD, further research is necessary to establish a link between improved motor skills and greater participation in PA within this population. It is important to provide young girls, especially girls with ASD, the necessary motor skills in order to participate in and promote a healthy level of PA throughout adolescence and into adulthood.

There are limited motor skill or PA intervention studies focusing on girls with ASD; however, Fox (2014) created a 6-week individualized exercise intervention for adolescent girls with ASD to determine the duration of PA and amount of time participants engage in moderate-to-vigorous physical activity (MVPA), performance on executive function tasks, and future strategies to engage this specific population in PA. It was noted that individualized exercise regimens were effective to introduce and reinforce

future MVPA, as well as increase interest in exercise and ability to facilitate exercises with minimal to no adult assistance (Fox, 2014). Summer sport camps are popular for most school aged children; they provide children the opportunity to form friendships outside of the school term, stay physically active throughout the summer holiday, and promote a healthy active lifestyle (Beets, Weaver, Beighle, Webster, & Pate, 2013). A summer sport-skills camp would be an ideal setting for a summer intervention for girls with ASD to help increase motor proficiency and help promote adequate levels of PA. The alternative would be an intimidating scientific or laboratory intervention atmosphere.

The purpose of this study was to examine the impact of participation in a multi-sport skills camp on the motor skills of girls ages 8-11 with ASD. The secondary objective was to determine if there were any correlations between motor skills and the amount of PA.

It is hypothesized that underdeveloped fundamental motor skills are a significant factor that may prevent girls with ASD from engaging in adequate levels of PA. Without these opportunities, social interactions may also be negatively impacted. It is believed that by gaining the necessary skills to participate through a specific sport and motor skills summer camp intervention, girls with ASD will be more inclined and interested to actively participate in recreational activities and other PA opportunities.

Methods

Study Design

This study followed a pre-test, post-test quasi-experimental design with an 8-week follow up assessment. Each participant attended a pre-test prior to the camp, a post-test immediately following the camp, and an 8-week follow up test after the camp. Resources

to aid in the design of the intervention were provided by Special Olympics Canada, and focused on developing FMS and implementing these skills into sport scenarios.

Measures

All measurements were conducted in the researcher's office with the children and their parent, guardian or caregiver present. Parents were asked to complete a Supplemental Information form at the initial assessment in order to provide demographic and diagnostic information about their daughter/dependent, as well as any additional medical conditions or previous interventions that have been received; see Appendix 6.

Participants

Ethical approval was obtained from Grandview Children's Centre's research committee and the University of Ontario Institute of Technology's Research Ethics Board (Appendix 1-2). A total of 16 girls aged 8-11 years (m=10.08 ± 1.06) participated in the study (Table 1). The children were recruited via recruitment letter mailed to clients of Grandview Children's Centre, and those in the Durham Region Applied Behaviour Analysis (ABA) database. Recruitment criteria for the study included all females with Intellectual and Developmental Disabilities in the 8-11 years age range. Girls were excluded from the study if they were aggressive in nature or self-injurious, had uncontrolled seizures, were non-ambulatory, could not follow 2-step instructions, had a high flight risk or had a comorbid diagnosis of Cerebral Palsy (CP), or Spina Bifida. These exclusion criterion were necessary for the health and safety of each participant given the location, staffing ratio and nature of the camp. As seen in Table 1, thirteen of the girls had a diagnosis of ASD, one with Down syndrome, one with Smith-Megenis Syndrome, and one with a Developmental anolomy. Due to a majority of participants having a diagnosis of ASD, only those with ASD (n=13) were included in all statistical

analyses. Two participants had a previous diagnosis of PDD-NOS, which is currently considered to be a diagnosis of ASD, according to the DSM-5. All participants involved in the study provided child assent, and all parents/guardians provided verbal and written informed consent prior to the commencement of the first assessment.

Table 1. Participant Characteristics

Participant	Age (years & months)	Diagnosis	Age of Diagnosis of ASD	Additional Diagnosis and Difficulties	Previous Motor Intervention
1	8 yrs 6 mo	PDD-NOS[1], DCD[2], Selective Mutism	5	Anxiety, Developmental Delay, Communication Difficulties, Low Self-Esteem, Social Isolation	Yes
2	9 yrs 7 mo	ASD[3]	8	ADHD[4], Developmental Delay, Sensory Integration Disorder, Communication Difficulties	Yes
3	10 yrs 6 mo	ASD	6	Social Isolation	No
4	9 yrs 2 mo	ASD	6	Anxiety, Sensory Integration Disorder, Low Self-Esteem	Yes
5	8 yrs 8 mo	ASD	1	Visual Problems, Communication Difficulties, Social Isolation	Yes
6	8 yrs 5 mo	ASD	6	Anxiety, Communication Difficulties, Social Isolation	No
7	8 yrs 2 mo	ASD	4	Anxiety, Sensory Integration Disorder, Other	Yes
8	11 yrs 2 mo	PDD-NOS	9	Developmental Delay, Communication Difficulties, Social Isolation	Yes
9	10 yrs 9 mo	ASD	5	Visual Problems, Low Self-Esteem	Yes
10	10 yrs 5 mo	ASD	3	Learning Disability, Communication Difficulties, Low Self-Esteem, Social Isolation	Yes
11	11 yrs 8 mo	DS	0	Visual Problems, Low Self-Esteem, Social Isolation	Yes
12	10 yrs 10 mo	ASD	2	Communication Difficulties, Low Self-Esteem, Social Isolation	No
13	10 yrs 4 mo	ASD	7	Anxiety, Communication Difficulties, Social Isolation	No
14	10 yrs 3 mo	Smith-Megenis	5	ADD, ADHD, Developmental Delay, Intellectual Disability, Learning Disability	Yes
15	9 yrs 9 mo	ASD	3	Social Isolation	Yes
16	11 yr 1 mo	Genetic Anomoly	0	Developmental Delay, Learning Disability, Sensory Integration Disorder, Confidence	Yes

[1] PDD-NOS - Pervasive Developmental Disorder, Not Otherwise Specified; [2] DCD – Developmental Coordination Disorder; [3] ASD - Autism Spectrum Disorder; [4] ADHD – Attention Deficit Hyperactivity Disorder

Motor Proficiency

The Test of Gross Motor Development (TGMD-2) is a standardized motor proficiency assessment that is validated for children with developmental disabilities ages 3 through 11 (Ulrich, 2000). The TGMD-2 consists of 12 motor skills within two subscales: locomotor (run, gallop, hop, leap, horizontal jump, and slide) and object control (stationary ball strike, stationary dribble, kick, catch, overhand throw, and underhand roll) (Ulrich, 2000). Separate sex norms are provided for object control skills as girls with and without ASD consistently have less proficient object control skills than boys (Carter et al., 2007; Hume et al., 2008; Kopp et al., 2010; Pieters et al., 2012; van Beurden, Zask, Barnett, & Dietrich, 2002), however there are combined norms for locomotor skills. This test is ideally suited for this study as it is internally and externally validated for children with Intellectual and Developmental Disabilities (IDD) (Barnett, Minto, Lander, & Hardy, 2014), is age appropriate and can accurately capture the motor skills of the girls included in this study. All participants provided photo and video consent and were videotaped while performing each skill in order for more accurate scoring of the assessments. The TGMD-2 was completed by each participant at each of the three assessments.

Physical Activity

Pedometers are reliable for assessing PA, and are simple to use (Tudor-Locke, Williams, Reis, & Pluto, 2002). A time stamped pedometer (Omron Pocket Pedometer Model Number HJ-729ITCCAN) was used to measure PA for 7 consecutive days at each of the three assessment periods. The pedometer used for this study measures total steps by day and time, and total aerobic steps by day and time (10 minutes or more of continuous movement, acceleration, and distance). The participants and their parents

were instructed to clip the pedometer onto their right hip when they got up in the morning, and to take it off at night. All participants were given stamped return envelopes to mail back to the principal investigator for convenience after the completion of each 7 consecutive day bout at each of the three assessments. Participants were excluded from the weekend pedometer data if they did not comply with wearing the device during that time. Pedometer data from participants was included in the analysis if there were between 1000 steps and 30000 steps per day for the minimum 3 to 7 days required (Tudor-Locke & Bassett Jr, 2004; Tudor-Locke et al., 2005); all other data was excluded from analyses.

The Children's Assessment of Participation (CAPE) and Preferences for Activities of Children (PAC) (King et al., 2004) was completed by each participant, with the assistance of parents, at the pre-test in early July and at the eight week follow up test in late September or early October. The CAPE/PAC is an appropriate measure for children with and without disabilities to determine the level of involvement of activities and enjoyment of PA (Bult et al., 2010; Chien, Rodger, Copley, & McLaren, 2014). The CAPE focuses on participation, diversity, intensity, enjoyment, and with whom and where the participation occurs, whereas the PAC primarily measures activity preference (King et al., 2004). The 'diversity' score equates to one point for each activity that the participants are involved in out of a potential 55 activities; subdomain scores can range anywhere from 10 activities to 40 activities. The 'intensity' score is on a scale from 1-7 (1= 1 time in past 4 months, 2= 2 times in the past 4 months, 3= 1 time a month, 4= 2-3 times a month, 5= 1 time a week, 6= 2-3 times a week, 7= 1 time a day or more); the 'with whom' score is on a scale from 1-5 (1= alone, 2= with family, 3= with other relatives, 4= with friends, 5= with others); the 'where' score is on a scale from 1-6 (1=

home, 2= relative's home, 3= in your neighbourhood, 4= at school not in class, 5= in your community, 6= beyond your community); and the 'enjoyment' score is based on a scale from 1-5 (1= not at all, 2= somewhat; sort of, 3= pretty much, 4= very much, 5= love it). A higher score for each of the categories is considered to be more beneficial for the participants. These measures combined will describe each participant and how they are involved in recreational activities, social activities, skill-based activities and self-improvement activities (King et al., 2004).

Social Skills and Adaptive Behaviour

Social skills and adaptive behaviour were assessed at the pre- and 8-week follow up test using the Social Skills Improvement System (SSIS) (Gresham & Elliott, 2008) and the Vineland Adaptive Behaviour Scales – 2nd edition (VABS-2) (Sparrow, Cicchetti, & Balla, 2005). Please refer to Manuscript 2 for more information on this part of the study.

Intervention

The Multi-Sport Camp for the participants in the study took place for five days during the hours of 9 am – 4 pm the week of July 28 – August 1, 2014. The camp, the staff and all resources were facilitated by Grandview Children's Centre with the curriculum designed specifically for this study by the principle investigator. The camp also implemented appropriate lunch, water, snack breaks and time for free play. The primary investigator ensured all activities involved fundamental motor skills, and that the learned motor skills were incorporated into active games, activities, and team sport settings. Each day consisted of warm up activities, specific motor skill instruction, and active games (as seen in Appendix 7). A low camper to councellor ratio of 3:1 ensured the safety of all campers and more opportunity for one-to-one support if necessary. Each

councellor consistently provided positive verbal feedback to all campers in order to boost confidence and encouraged each girl to try new skills.

Skills that were taught included locomotor and object control skills (Table 2). The skills taught at camp progressed in difficulty throughout the week and were transferred, when possible, into a team sport activity or game. Each day of camp was overseen by the principal investigator, with the assistance of trained Grandview Children's Centre camp staff, and a research assistant from UOIT. Daily routines involved the opportunity to practice newly learned skills, and the opportunity to utilize these skills in an active game environment. A visual schedule and visual prompts were provided each day for the appropriate activities by the principal investigator (Appendix 8). The structure of motor skills and active game and sport scenarios are outlined in Appendix 7. Positive verbal reinforcement was provided by each staff member at camp to each participant, in order to create an optimal learning environment. All week, the opportunity to practice newly learned or developed skills, and the opportunity to utilize these skills in an active game environment were made available to every girl in the study.

Table 2. Skills taught over the course of the intervention week

Domain	**Skill**	**Domain**	**Skill**
Locomotor	Run	Object Control	Underhand Roll
	Gallop		Dribble
	Leap		Overhand Throw
	Jump		Catch
	Hop		Kick
	Slide		Strike

Statistical Analyses

Part 1. Intervention Impact

Descriptive characteristics were calculated on all variables at the baseline assessment for each participant. A one-way repeated measures ANOVA test was used (with a Greenhouse-Greisser correction) to assess significant differences between the means for each variable in the TGMD-2, and pedometer PA measures at the pre-, post-, and 8-week assessment. If significance was found, post-hoc tests with a Bonferroni correction were used to detect at which time point the significant changes occurred. A paired-sample t-test was used to assess significant differences between the means for each variable on the CAPE/PAC battery at the pre-, and 8-week assessment. Effect sizes were also calculated on each variable of the TGMD-2, pedometer, and CAPE/PAC. These analyses were used to explore the effectiveness of the Multi-Sport skills camp at improving motor skill proficiency and PA for the participants.

Part 2. TGMD-2 Interrater Reliability

In order to ensure interrater reliability was maintained on the coding of the TGMD-2 videos, intraclass correlation coefficients were calculated between the principle investigator and a trained research assistant on 30% of the videos (Table 12).

Part 3. Correlations of Variables

Pearson product correlations were first conducted between the TGMD-2 gross motor quotient scores, and the TGMD-2 Locomotor and Object Control Standard Scores at each of the three assessment periods to determine if locomotion proficiency and object control proficiency were related to each other. The same analysis was then conducted on

the TGMD-2 gross motor quotient and all pedometer data at the pre-, post- and 8-week follow up test in order to explore whether motor skill proficiency is related to participation in PA.

Non-parametric Spearman's rank correlations were conducted between the TGMD-2 gross motor quotient and the CAPE/PAC PA and social activity subdomain scores. Pearson product correlations were also conducted between the TGMD-2 gross motor quotient and the CAPE/PAC PA and social activity subdomain scores in order to determine if motor skill proficiency may have an impact on preference of physical activities, which may be important for designing future interventions.

Part 4. Power Calculation

Given the sample size of 13 participants and an effect size of 0.633, there was 99.7% power to detect statistical differences at an alpha level of 0.05 on our primary outcome measure, the TGMD-2 gross motor quotient.

Results

Part 1. Intervention Impact

Baseline descriptive statistics of the participants from the initial assessment are presented in Table 3. One participant, who was included in the analysis, was absent one day from the intervention. Although there were sixteen participants at the intervention, only those with a diagnosis of ASD (n=13) were included in the statistical analysis. The remaining participants (n=3) still received all the motor skill benefits and overall experience from the summer camp.

Baseline descriptive data (Table 3) describe the participants having poor motor proficiency according to the TGMD-2 norms, and low levels of involvement in PA compared to the daily recommendation for children. The CAPE/PAC data reveals that the participants are involved in 27 of potential 55 activities outlined in the questionnaire. The participants also scored below half for the 'intensity' score, 'with whom' score and the 'where' score; however, the 'enjoyment' scores for each activity were 80% of the potential scores within that category.

Table 3. Baseline descriptive characteristics, motor proficiency, physical activity and activity preferences

	Participants (mean ± SD)
N	*13*
Age (years)	9.76 ± 1.00
Age at ASD Diagnosis (years)	5.00 ± 2.25
TGMD-2 Locomotor Raw Score	32.15 ± 10.65
TGMD-2 Locomotor Standard Score	5.54 ± 2.47
TGMD-2 Object Control Raw Score	27.54 ± 9.81
TGMD-2 Object Control Standard Score	4.92 ± 3.20
TGMD-2 Gross Motor Quotient	71.38 ± 16.04
Average Pedometer Steps/Day	6717.7 ± 805.30
Average Pedometer Weekday Steps/Day	6960.5 ± 981.60
Average Pedometer Weekend Steps/Day	5151.3 ± 849.60
CAPE Diversity Score (0-55)	27.08 ± 8.40
CAPE Intensity Score (1-7)	2.46 ± 0.88
CAPE With Whom Score (1-5)	2.31 ± 0.63
CAPE Where Score (1-6)	2.69 ± 0.48
CAPE Enjoyment Score (1-5)	4.00 ± 0.41
PAC Overall Score (1-3)	2.00 ± 0.40
VABS-2 Adaptive Behaviour Composite Score (20-160)	76.23 ± 18.56
SSIS Social Skills Score (40-132)	76.23 ± 20.19

Motor Skill Proficiency

Significant motor delays were found throughout the sample at baseline (Table 3). The majority of participants had either very poor, poor, or below average gross motor skills and total gross motor quotients (GMQ) on the TGMD-2 (Ulrich, 2000) (Figure 2 and Figure 3). In both locomotor and object control standard scores, all individuals scored below the 50th percentile (Figure 2). Although most participants had higher locomotor standard scores compared to their object control standard scores, a vast majority of participants fell below the 25th percentile for both locomotor and object control standard scores. Two participants fell in the <1 percentile category for Locomotor Skills, and three participants fell in the <1 percentile category for Object Control Skills. Based on the gross motor quotient (Figure 3), two participants reached the minimum requirement for average motor skills (GMQ 90-110); however both were at the bottom end of the average scale (GMQ 91). Almost half of the participants fell into the very poor motor skill segment, indicating attention to motor skills is required (Ulrich, 2000).

Figure 2. Baseline TGMD-2 standard scores and descriptive categories by participant

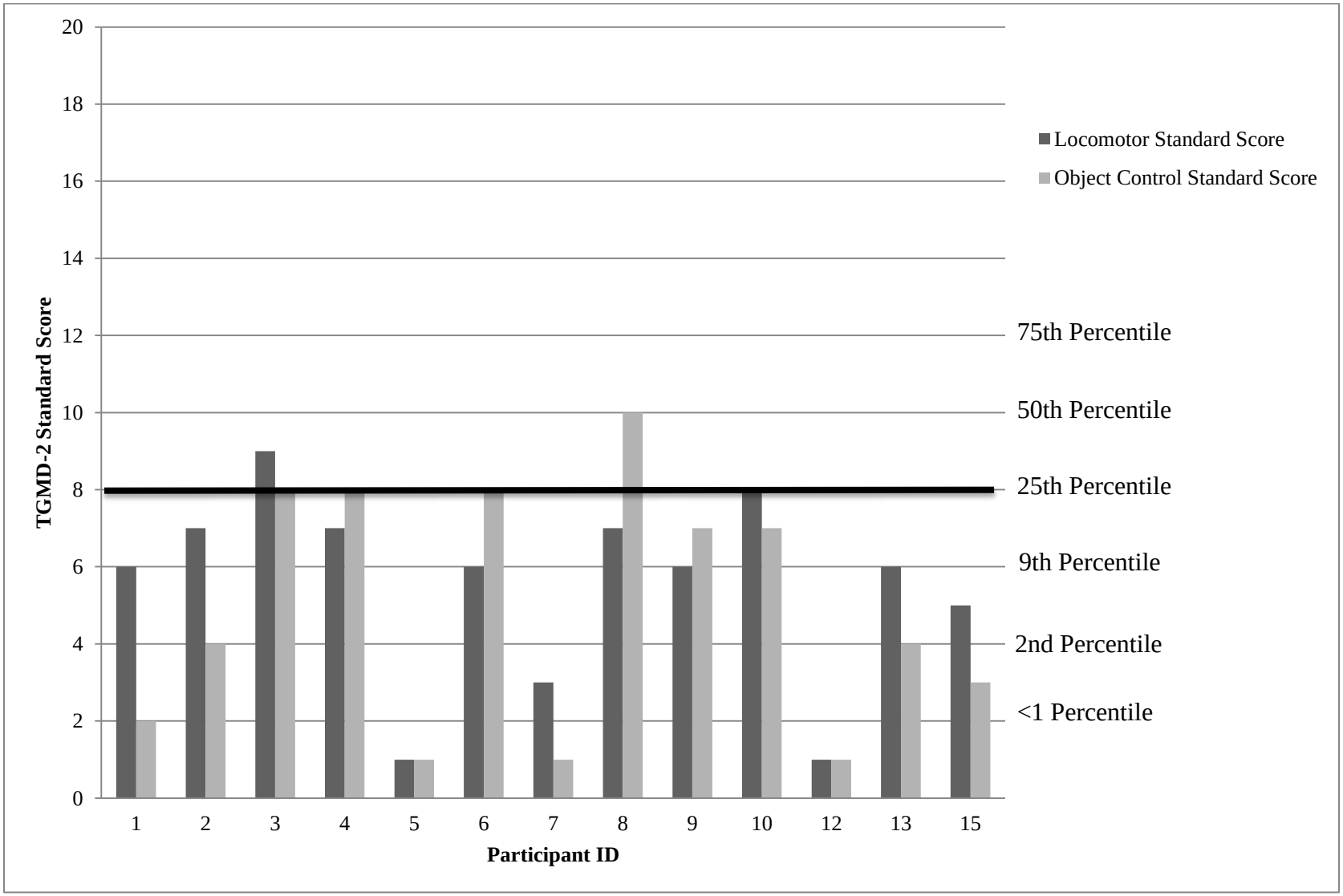
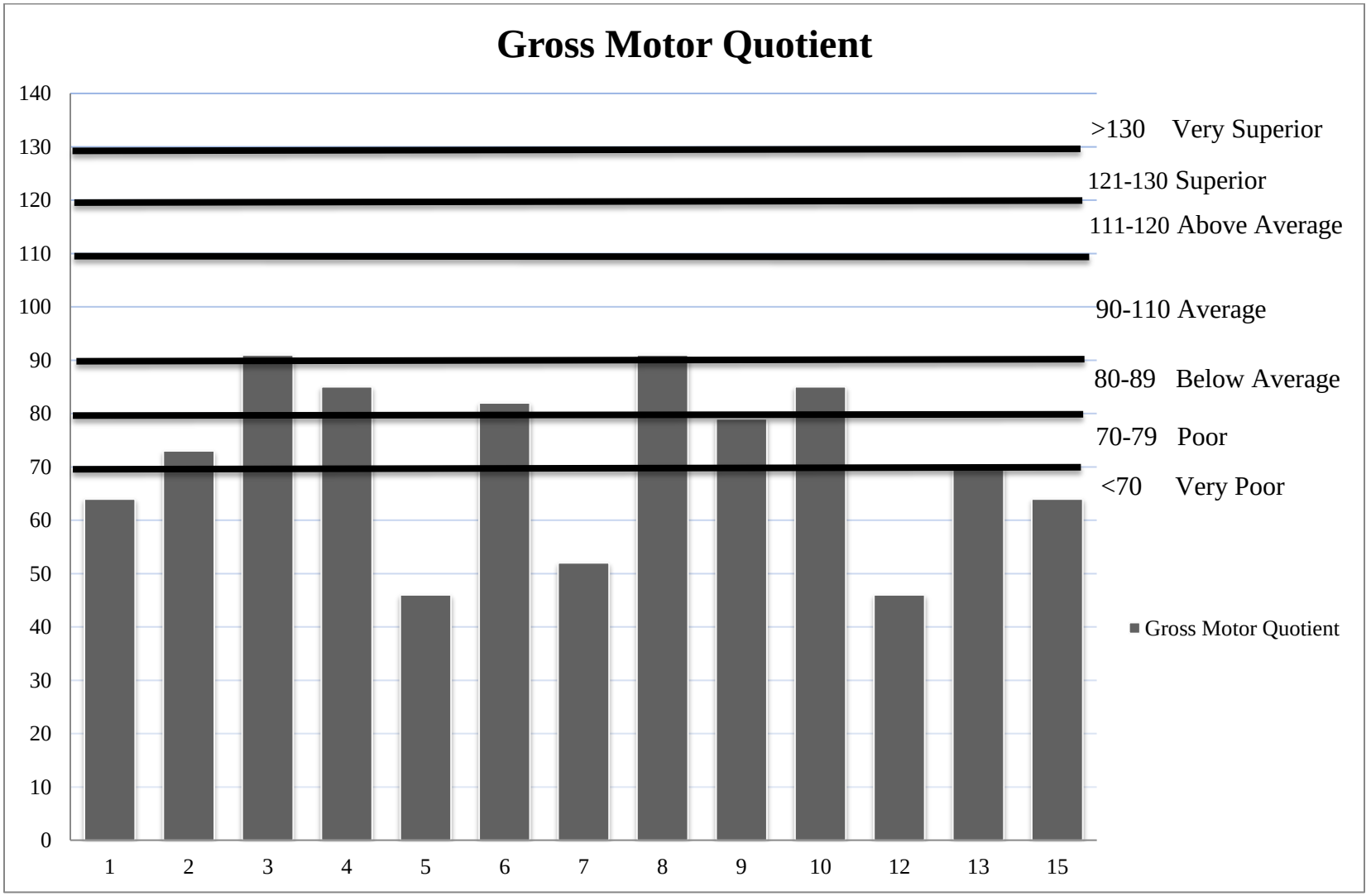


Figure 3. Baseline TGMD-2 Gross Motor Quotient scores and descriptive categories by participant



The results of the one-way ANOVA with repeated measures on the TGMD-2 variables from pre- to post- to 8-week follow-up are presented in Table 4; all motor variables significantly improved. There were significant group changes at all three assessment periods for all gross motor variables for the TGMD-2 (Table 4). Post-hoc analyses with Bonferroni corrections presented in Figure 4-6, revealed significant improvements in the TGMD-2 Locomotor Raw Score (*p=0.006)*, and the Locomotor Standard Score (*p=0.003)* between the pre-test and post-test. The results also revealed the Locomotor Raw Score (*p=0.*004), and the Locomotor Standard Score (*p=0.*009) improved significantly between the pre-test and 8-week follow up. The TGMD-2 Object Control Raw Score (*p<0.0001)*, and Object Control Standard Score (*p=0.011)* significantly improved between the pre-test and post-test; the Object Control Raw Score (*p<0.0001*) and the Object Control Standard Score (*p=0.002*) significantly improved between the pre-test and 8-week follow up. Furthermore, the TGMD-2 Sum of Standard Score (*p=0.001)*, Gross Motor Quotient (*p=0.001)*, and Gross Motor Quotient Percentile Rank (*p=0.001)* all significantly improved from pre-test to post-test. The Sum of Standard Score (*p=0.*001), Gross Motor Quotient (*p=0.*001) and the Gross Motor Quotient Percentile Rank (*p=0.*002) significantly improved again between pre-test and the 8-week follow up test (Figure 6).

Results from the Pedometer data are presented in Table 5. There were no significant changes in any of the variables presented in the Pedometer data (Table 5); however, there was a slight increase in PA during weekend wear time between the pre-test and post-test, but decreased at the 8-week follow up test. The results of a paired-sample t-test on the CAPE/PAC subdomain variables from pre- and 8-week follow-up are

presented in Table 6. Summary CAPE/PAC scores may be found in Appendix 9. The CAPE/PAC data also demonstrated no significant findings; however, there are trends that show increased results within the PAC Overall Preference scores (Appendix 10), and more improved scores within the CAPE PA subdomain scores presented in Table 6.

Table 4. Repeated measures ANOVA for Pre-, Post-, and 8-week follow up TGMD-2 scores

	Pre-Test (mean ± SD)	**Post-Test** (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Locomotor Raw Score	32.15 ± 10.65	35.85 ± 11.33	37.69 ± 8.96	p < 0.0001*	0.525
Locomotor Standard Score	5.54 ± 2.47	7.08 ± 2.90	7.54 ± 3.05	p = 0.001*	0.509
Object Control Raw Score	27.54 ± 9.81	32.15 ± 8.26	34.08 ± 7.21	p < 0.0001*	0.675
Object Control Standard Score	4.92 ± 3.20	6.54 ± 3.18	7.15 ± 2.73	p < 0.0001*	0.528
Sum of Standard Scores	10.46 ± 5.35	13.62 ± 5.69	14.69 ± 5.48	p < 0.0001*	0.633
Gross Motor Quotient	71.38 ± 16.04	80.85 ± 17.08	84.08 ± 16.45	p < 0.0001*	0.633
Gross Motor Quotient Percentile Rank	8.54 ± 10.18	19.00 ± 15.62	23.46 ± 18.08	p < 0.0001*	0.568

*Statistically significant at an alpha level of <0.05

Figure 4. TGMD-2 Raw scores at pre-, post-, and 8-week follow up

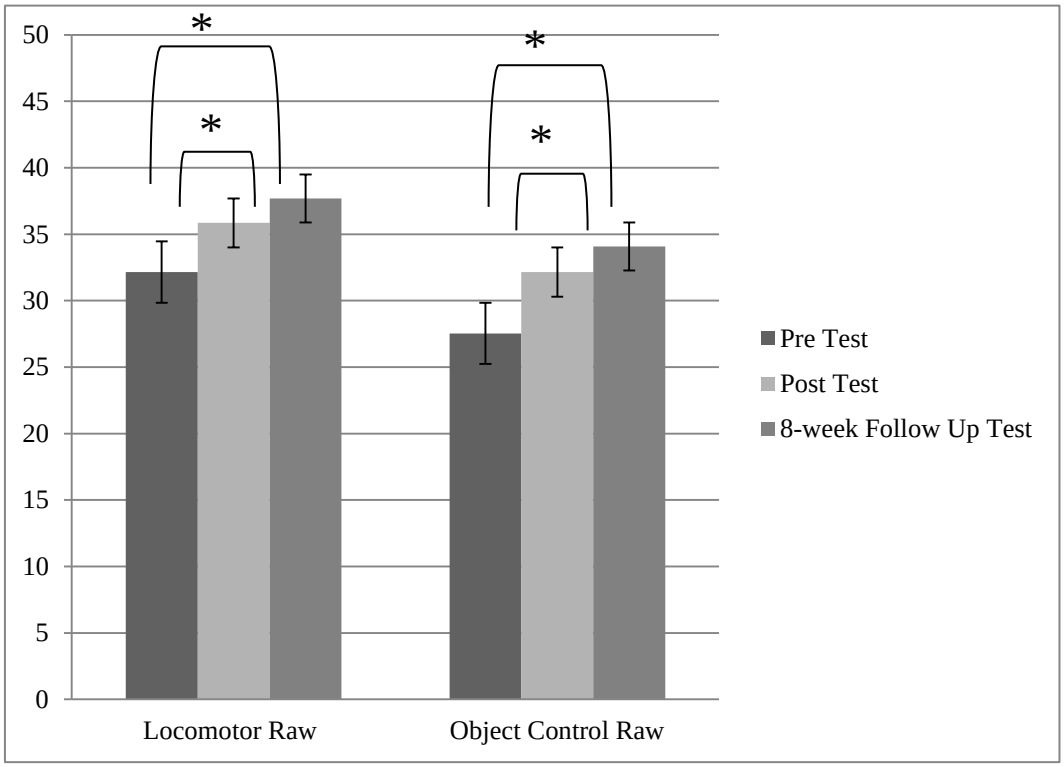


Figure 5. TGMD-2 Standard scores at pre-, post-, and 8-week follow up

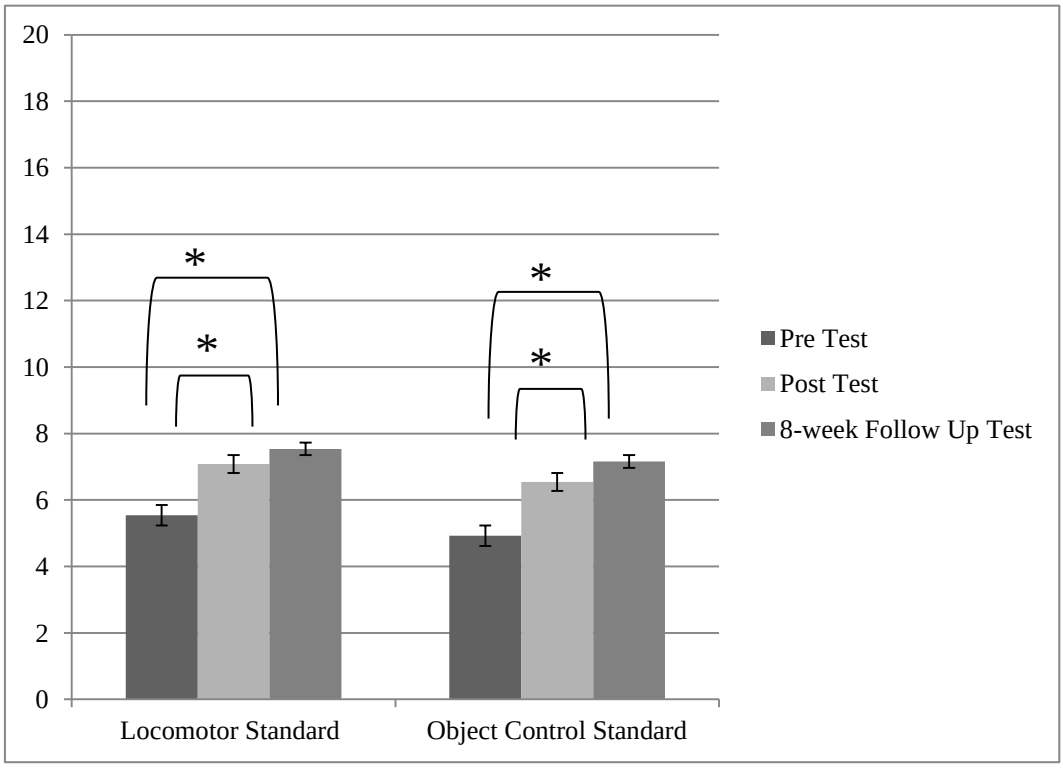
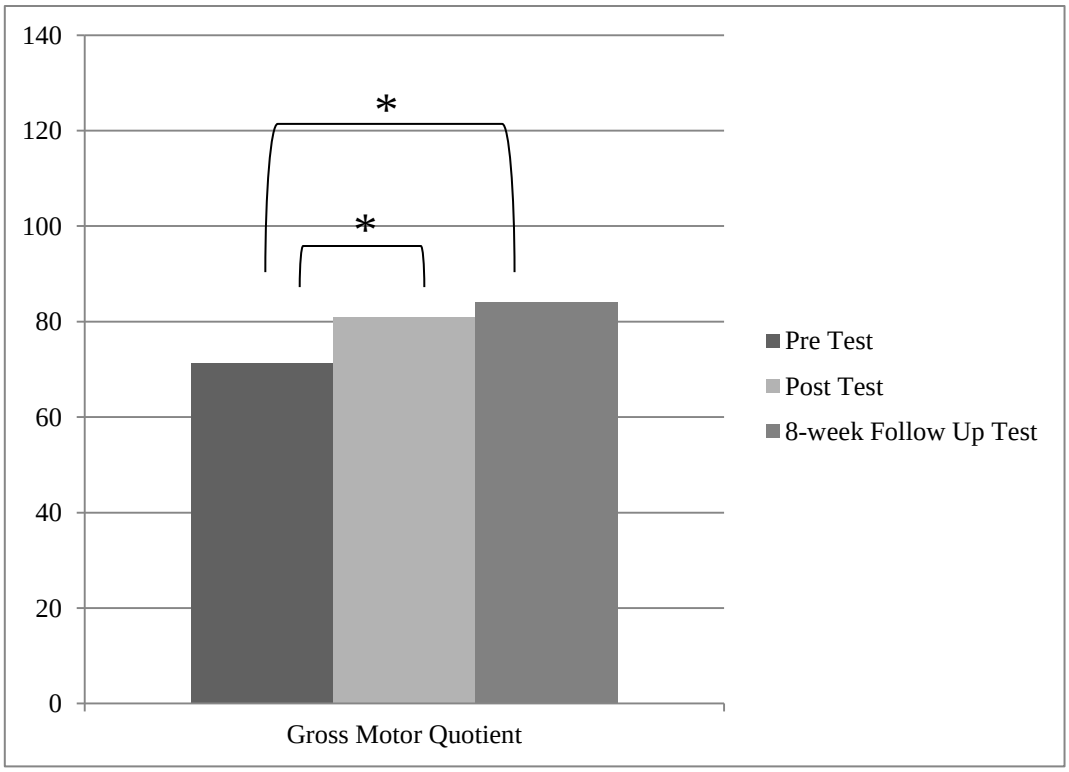


Figure 6. TGMD-2 Gross Motor Quotient scores at pre-, post-, and 8-week follow up



*Significantly different at alpha level of <0.05

Table 5. Average pre-, post-, and 8-week follow up Pedometer data

	Pre-Test (mean ± SD)	**Post-Test** (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Average Pedometer Steps/Day n=9	6717.7 ± 805.3	5489.3 ± 1097.0	6303.4 ± 622.1	0.536	0.096
Average Pedometer Weekday Steps/Day n=9	6960.5 ± 981.6	5320.3 ± 1290	6833.34 ± 691.9	0.418	0.135
Average Pedometer Weekend Steps/Day n=8	5151.3 ± 849.6	6214.0 ± 1574.0	4858.8 ± 1296.3	0.610	0.081

Table 6. Pre-, and 8-week follow up CAPE subdomain scores

Domain	**Pre-Test** (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Recreational Activities Domain (0-12)				
Diversity Score (0-12)	8.62 ± 2.5	7.46 ± 2.5	p = 0.105	0.204
Intensity Score (1-7)	3.85 ± 0.32	3.39 ± 0.33	p = 0.082	0.231
With Whom Score (1-5)	2 ± 0.56	1.92 ± 0.49	p = 0.673	0.015
Where Score (1-6)	1.92 ± 0.49	1.92 ± 0.49	-	-
Enjoyment Score (1-5)	4.31 ± 0.63	4.23 ± 0.44	p = 0.584	0.026
Physical Activities Domain (0-13)				
Diversity Score (0-13)	3.92 ± 2.8	4.17 ± 1.8	p = 0.667	0.017
Intensity Score (1-7)	1.25 ± 1.06	1.42 ± 0.79	p = 0.586	0.028
With Whom Score (1-5)	2.75 ± 1.49	3.00 ± 0.95	p = 0.667	0.017
Where Score (1-6)	2.92 ± 1.38	3.5 ± 1.09	p = 0.253	0.117
Enjoyment Score (1-5)	3.83 ± 1.53	4.25 ± 0.75	p = 0.392	0.067

Table 6. Pre- and 8-week follow up CAPE subdomain scores continued

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Social Activities Domain				
Diversity Score (0-10)	6.54 ± 2.47	6.62 ± 2.36	p = 0.883	0.002
Intensity Score (1-7)	2.77 ± 1.17	2.69 ± 1.18	p = 0.776	0.007
With Whom Score (1-5)	2.62 ± 0.77	2.15 ± 0.38	p = 0.082	0.231
Where Score (1-6)	2.85 ± 0.69	2.85 ± 0.80	p =1.000	0.000
Enjoyment Score (1-5)	4.23 ± 0.44	4.15 ± 0.70	p = 0.584	0.026
Skill-Based Activities Domain				
Diversity Score (0-10)	3.38 ± 1.19	2.85 ± 1.35	p = 0.151	0.164
Intensity Score (1-7)	1.77 ± 0.60	1.46 ± 0.78	p = 0.104	0.205
With Whom Score (1-5)	3.23 ± 1.09	3.15 ± 1.52	p = 0.866	0.002
Where Score (1-6)	3.77 ± 1.0	4.23 ± 1.0	p = 0.139	0.173
Enjoyment Score (1-5)	4.23 ± 0.83	4.46 ± 0.88	p = 0.082	0.231

Table 6. Pre- and 8-week follow up CAPE subdomain scores continued

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Self-Improvement Activities Domain				
Diversity Score (0-10)	4.46 ± 2.18	4.23 ± 2.46	p = 0.553	0.030
Intensity Score (1-7)	2.15 ± 1.14	2.00 ± 1.29	p = 0.549	0.031
With Whom Score (1-5)	2.08 ± 0.64	1.77 ± 0.60	p = 0.165	0.154
Where Score (1-6)	2.69 ± 0.86	2.77 ± 1.09	p = 0.808	0.005
Enjoyment Score (1-5)	3.38 ± 0.77	3.15 ± 0.98	p = 0.273	0.099

Part 2. TGMD-2 Interrater Reliability

Motor skill video coding was conducted by the principle investigator. A trained research assistant coded 30.7% of the videos to establish interrater reliability; results are presented in Table 7.

Table 7. Intraclass correlation coefficients for a sample of TGMD-2 motor skill videos

Videos	Intraclass Correlation Coefficient
Participant 01	0.978
Participant 06	0.986
Participant 08	0.990
Participant 09	0.991
Overall	0.967

Part 3. Correlations of Variables

Pearson product correlation results between TGMD-2 gross motor quotient and pedometer data indicated no significant relationships and are presented in Appendix 11. Spearman's rank correlation results between TGMD-2 gross motor quotient and CAPE PA and Social Activity subdomain scores are presented in Appendix 12; significant relationships were found during the pre-test between TGMD-2 gross motor quotient and PA 'diversity' (r=0.659, *p=0.014*), 'intensity' (r=0.579, *p=0.038*) and 'with whom' scores (r=0.643, *p=0.018*), however no other significant relationships were found. Pearson product correlation results between TGMD-2 gross motor quotient and CAPE PA subdomain scores are presented in Table 8; correlation results between TGMD-2 gross motor quotient and CAPE Social Activity subdomain scores are presented in Table 9. Gross motor quotients were significantly correlated with CAPE PA Diversity (r=0.650, *p=0.016*), 'intensity' (r=0.599, *p=0.030*) and 'with whom' scores (r =0.595, *p=0.032*) at the pre-test, and also significantly correlated with CAPE PA 'diversity' (r=0.593, *p=0.042*), 'intensity' (r=0.602, *p=0.038*), and 'where' scores (r=0.689,

p=0.013) at the 8-week follow up test (Table 8). Gross motor quotients were significantly correlated with CAPE Social Activity 'diversity' (r=0.642, *p=0.018*), and 'intensity' (r=0.567, *p=0.044*) at the pre-test, and also significantly correlated with CAPE Social Activity 'diversity' score (r=0.635, *p=0.020*) at the follow up test (Table 9).

Table 8. Correlations between TGMD-2 and CAPE/PAC Physical Activity subdomain scores at pre-, and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Diversity Score	0.650	0.016*
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Intensity Score	0.599	0.030*
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity With Whom Score	0.595	0.032*
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Where Score	0.207	0.497
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Enjoyment Score	0.138	0.654
8-week	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Diversity Score	0.593	0.042*
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Intensity Score	0.602	0.038*
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity With Whom Score	0.452	0.140
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Where Score	0.689	0.013*
	TGMD-2 Gross Motor Quotient	CAPE Physical Activity Enjoyment Score	-0.137	0.672

*Statistical significance at alpha level <0.05

Table 9. Correlations between TGMD-2 and CAPE/PAC Social Activities subdomain at pre- and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	TGMD-2 Gross Motor Quotient	CAPE Social Activity Diversity Score	0.642	0.018*
	TGMD-2 Gross Motor Quotient	CAPE Social Activity Intensity Score	0.567	0.044*
	TGMD-2 Gross Motor Quotient	CAPE Social Activity With Whom Score	0.453	0.120
	TGMD-2 Gross Motor Quotient	CAPE Social Activity Where Score	0.157	0.609
	TGMD-2 Gross Motor Quotient	CAPE Social Activity Enjoyment Score	0.413	0.161
8-week	TGMD-2 Gross Motor Quotient	CAPE Social Activity Diversity Score	0.635	0.020*
	TGMD-2 Gross Motor Quotient	CAPE Social Activity Intensity Score	0.496	0.084
	TGMD-2 Gross Motor Quotient	CAPE Social Activity With Whom Score	0.464	0.110
	TGMD-2 Gross Motor Quotient	CAPE Social Activity Where Score	0.229	0.451
	TGMD-2 Gross Motor Quotient	CAPE Social Activity Enjoyment Score	0.413	0.160

*Statistical significance at alpha level <0.05

Discussion

Girls in general are more likely to engage in low levels of PA at any age (Colley et al., 2011); because girls with ASD have low motor skill proficiency (Carter et al., 2007; Kopp et al., 2010), it is possible that this might contribute to their low participation in PA (Lubans et al., 2010). The purpose of this study was to investigate the impact of a one-week multi-sport skills camp intervention at improving motor skills, PA, and activity preferences of 8-11 year old girls with ASD. Baseline results indicated that all participants began the study with significant motor delays as measured by the TGMD-2 (Ulrich, 2000). All participants scored below the 50th percentile indicating their motor skills were delayed in comparison to age-matched peers, which is consistent with findings from previous studies that have found children with ASD have poor motor skills (Lloyd et al., 2013; Lui et al., 2014; Staples & Reid, 2010; Whyatt & Craig, 2012). Liu and Breslin (2013) found that girls with ASD had low motor skills proficiency in comparison to peers, and recommended that future studies incorporate more girls with ASD. Out of the thirteen participants in the current study, nine reported to have previously received some type of gross motor intervention prior to the study (Table 1); this indicates that practitioners and/or parents deemed it necessary to intervene in order to improve the motor skills of the girls in the course of their early intervention work. Previous literature has suggested that girls with ASD have even less motor skill proficiency than boys with ASD (Carter et al., 2007; Kopp et al., 2010; Pieters et al., 2012); however, due to the timeframe, feasibility, and overall purpose of this study, we were unable to include boys with ASD to confirm these comparisons. Baseline results also indicated that the locomotor skills were more proficient compared to the object control skills for all

participants in the study, which is consistent with the findings of other studies that suggest girls with TD have poorer object control skills than locomotor skills (Barnett, Cliff, Lubans, Morgan, & Okely, 2010). This is the first study to establish poor motor skills in girls with ASD.

Our results indicate that the motor skills of each participant significantly improved immediately following the camp intervention, and either remained the same or continued to improve at the 8-week follow up test. Previous studies have found that motor skill interventions can be effective at improving the motor skills of children with Developmental Coordination Disorder (DCD) (Pless & Carlsson, 2000), young children with developmental delays (Kirk & Rhodes, 2011), and 4 year old children with ASD (Bremer et al., 2014). However, there have been no studies to examine or implement a motor skill intervention separately for girls with ASD, or for girls specifically between the ages of 8-11 with ASD. No significant differences were found between the post-test results to the 8-week follow up test results; however, there were also no regression, which suggests that there was at least retention of learned motor skills, and continual improvement for some. This is ideal as the pre-test and post-test assesments were conducted in the summer months, and the 8-week follow up assessment was conducted when the participants were back in school, which means the participants still retained their skills as they transitioned back into the school year. The significant improvements in motor skills at the 8-week follow up test period may indicate that the participants were using their learned motor skills and practicing them in physical education class. On the other hand, these improvements may also be due in part to maturational development (Thelen, 1995); however, this can only be determined if there was a control group that

had received no intervention. Furthermore, because children with ASD tend to have delayed motor milestones and are often considered clumsy (Lloyd, MacDonald, & Lord, 2013; Lui, Hamilton, Davis, & ElGarhy, 2014; Staples & Reid, 2010; Whyatt & Craig, 2012), any improvement to their motor skills would provide clinical or real life benefits. Many daily tasks such as playing at a local park, during gym class or at recess with peers, require children to be movers. If girls with ASD can improve their motor skills, they may be more inclined to actively participate in physical education class at school, which gives them greater socialization opportunities with their peers. It is recommended that practitioners consider motor skills to be an area of primary concern that warrants intervention for all children with ASD, particularly girls with ASD.

Pedometers were used to objectively evaluate levels of PA of each participant at each assessment period. More proficient FMS have previously been linked to higher levels of PA, and the focus of the current study was to determine if whether an increase in FMS would translate to an increase in PA (Lubans et al., 2010; Staples & Reid, 2010; Wrotniak et al., 2006). The current minimum PA recommendation for children is 60 minutes per day of moderate-to-vigorous physical activity (MVPA) (Tremblay et al., 2011); this equates to somewhere between 11000 (Vincent & Pangrazi, 2002) and 12000 steps per day (Colley, Janssen, & Tremblay, 2012). Baseline results indicated that all participants had very low steps per day, during the week, as well as on weekends (Table 5), indicating that the girls were very sedentary. The girls in this study had an average of 6303 steps per day, which is well below girls with TD who had an average of 10,327 steps per day and boys with TD who had an average of 12,121 steps per day, as measured in the Canadian Health Measures Survey on a nationally representative sample (Colley et

al., 2011). Girls with ASD from this study are considerably below the recommended daily steps for children, indicating that interventions to increase PA are needed. The average results for steps per day, regardless of total, weekday or weekend measurements, were consistently half of the recommended steps per day for children. Because PA was only assessed using a pedometer, and not an accelerometer, PA cannot be directly compared among the participants. It is also important to note that some parents of participants reported the girls having to remove the pedometer for swimming lessons or leisure swim time, given that most data collection was during the summer months. It is possible in this study that the low steps detected by a pedometer may not give a completely accurate representation of how active the girls with ASD were.

The low level of PA observed is consistent with previous findings, where Pan, Tsai, and Hsieh (2011) also found that children with ASD participated in significantly less PA than their peers in physical education class. The results from the current study warrant future research to explore different ways to increase PA levels among girls with ASD. Some girls also experienced sensory sensitivities, which had a negative impact on wearing time of the pedometer and overall compliance. However, those without adequate pedometer data (n=3) with at least 1000 steps for 3-7 days of the required wear time were excluded from analyses. A smaller, lighter, pedometer that could be attached to a shoe or other areas away from the body may give more accurate results for this population. In the past, Pan (2009) used an accelerometer and direct observation to determine PA among boys with ASD, however, these devices were not available and direct observation was not feasible for the current study.

As mentioned previously, the 8-week follow up assessment was during a different time of the year compared to the first two assessment periods, which may have affected the PA findings. The pedometer data indicated no significant changes, which may be explained, in part, by the seasonal effect in Canada (Tucker & Gilliland, 2007). The first two assessments took place during summer months where outdoor PA tends to be more inviting (Stone & Faulkner, 2014), and the last assessment took place in the fall when the children are back in a structured school environment; however, the addition of a control group to the study would make it possible to account for this. Despite no significant improvements in PA, there were slight non-significant improvements in weekend steps/day between the pre- and post-test. However, weekend steps/day declined at the 8-week follow up assessment, even though there is more free time and greater opportunity to participate in PA on weekends (Garriguet & Colley, 2012). Pan, Tsai, Hsieh, et al. (2011) found that older children with ASD tend to be less active on weekends, which is consistent with our finding. Total average steps taken per day and average weekday steps declined slightly at the first post-test which took place 1-2 weeks after camp, but then increased again at the 8-week follow up assessment to almost match the pre-test. Some parents reported, as seen in Appendix 17, that immediately following the camp, their children needed a "break" (ie. the children were tired from the five days of camp), which may partly explain the decline in steps recorded by the pedometer, although results were similar to the pre-test and below the daily recommendation. Ketcheson (2014) implemented an 8-week motor skill intervention for children with ASD, where motor skills significantly improved; however, she too found no improvements in PA. This may indicate that due to the very low baseline PA levels demonstrated in girls with ASD, it

may take much longer than one summer to have a lasting impact on overall PA, or PA may be influenced by other factors in this population such as sensory issues, short attention span, fear and anxiety in new situations or changed routines, lack of body awareness or overall poor coordination (Rogers, Hepburn, & Wehner, 2003). It is also possible that PA might have increased, but in activities that the pedometer did not pick up (ie. swimming).

The CAPE/PAC provided more detail for the actual activities each participant engaged in. No known previous studies have measured changes in PA using the CAPE/PAC over the use of a pedometer or accelerometer; however, the CAPE/PAC is among the few reliable self-reported questionnaires used to assist in measuring PA among children with disabilities (King, Law, Hurley, Petrenchik, & Schwellnus, 2010). Baseline results indicated that participants engaged in approximately half of the outlined activities in the test; which aligns with the findings from a previous study involving children with ASD (Hochhauser & Engel-Yeger, 2010). This lack of involvement may be due to the fact they do not have the adequate skills to engage in the other activities, have no interest in the other activities, or have not had the opportunity to participate in the activities; however, this needs to be further explored. The low engagement in PA may also be contributed to the core characteristics of ASD, which may be negatively influencing the amount of PA the participants from the current study, choose to engage in; any improvement to this score would be beneficial. Sensory issues, short attention span, and other core characteristics of ASD may contribute to the fact that children with ASD consistently take part in fewer physical activities than their peers with TD (Crouch,

Hilton, & Israel, 2008; Hochhauser & Engel-Yeger, 2010; Potvin, Snider, Prelock, Kehayia, & Wood-dauphinee, 2013).

On average, the girls in the study reported participating in activity less than once per month. This result provides a picture of a fairly sedentary lifestyle. The 'with whom' score was closer to a two, which indicates that participants are either performing these activities alone, or with their immediate family most often, instead of friends, instructors, or other groups. Given that problems with social interactions are a hallmark characteristic for children with ASD (American Psychiatric Association, 2013), these results are to be expected. The 'where' score was between a two and three, which signifies that activities are completed most often at home, at a relative's home, or in an immediate neighbourhood. As immediate and extended family may be more welcoming to the social differences in the children with ASD (Macfarlane, 2001), taking part in activities around the home may be most comfortable for the participants, instead of having to engage in play with their peer who may not be as welcoming (Ranson & Byrne, 2014). Of the activities that the participants partook in, on average the activities were well liked, which is an important finding. Greater intensities of the physical activities the participants enjoy, and exposure to different surroundings for these activities, may result in greater motor skills gained, greater overall PA, and further social interactions; skills that are important and contribute to overall health and wellness (Bandura, 2004).

Between the pre- and 8-week follow up, the two times this measurement was completed, there were no significant differences found in the CAPE/PAC scores. There were however, slight improvements in selected subdomain sections of the CAPE. The Recreational Activities subdomain scores decreased from pre- to 8 week follow up;

however, data was collected in two different seasons, thus the decline in activity may simply be explained by lesser involvement in the fall months compared to summer (Tucker & Gilliland, 2007). Although no significance was found, all scores within the PA subdomain increased, which indicates that there were more diverse activities being participated in, at a greater intensity, with a more diverse group, in more diverse locations, and greater enjoyment levels. The PA levels started out very low among the participants of the study (Table 5). This improvement is possibly clinically relevant, as PA is so low in this population, that any increase to PA will be beneficial to the participants even though the results did not reach statistical significance.

Among the Social Activities subdomain, the diversity of activities the participants chose to engage in improved from pre- to 8 week follow up, however no statistical differences were found. The intensity at which they participate, who they participate with, and overall enjoyment scores slightly declined. Similar results were seen within the Skill-Based Activities subdomain and Self-Improvement Activities subdomain, indicating that the participants in the study may still need to acquire the specific skills to engage in each of the activities, and may need more time to gain confidence in their skills in order to increase the amount of PA they participate in. In order for participants to get accustomed to skill-based or self-improvement skills, parents can encourage the practice of these skills with siblings or other family members in a comfortable environment to gain confidence, before participating with their peers or in the community. Social skill deficits are also core characteristics of ASD (American Psychiatric Association, 2013), so these results are to be expected. Slight increases in ‘diversity’ and slight decreases in ‘intensity’ levels may be explained by the phenomenon where children with ASD tend to

seek acceptance and avoid rejection (Chevallier, Kohls, Troiani, Brodkin, & Schultz, 2012). Engagement in a larger variety of activities may be an attempt at acceptance among peers, and their less intense levels of participation may be their avoidance of rejection. A longer duration of camp, or an inclusion camp that incorporates children with TD, may have had a greater impact on these social skills, allowing for greater levels of intensity of the social activities being engaged in. Because the CAPE/PAC is a self-reported measure, the data should be interpreted with caution. Due to the fact that parents are primarily responsible for signing up their children for various activities, this improvement may also be explained by the parents having more awareness of their child's abilities following the intervention. The participants may also have developed a greater interest, which would help promote the parents to register for additional programs or activities. One parent reported, "she doesn't put up a fight when it's time to go to soccer (as she used to). She will be returning to gymnastics and swimming in the fall. She is also asking to sign up for ballet. (Appendix 17)" This statement indicates that it is possible that following the camp intervention, the girls were inspired to participate in new activities.

The secondary purpose of this study was to investigate which variables are closely related in regards to motor skills, PA, and activity preferences. The results indicated no significant correlations between gross motor quotient scores and PA (Appendix 11), which may be due to low power seen in the pedometer data, having a low sample size, low levels of PA to begin with, as well as poor motor skills seen at the baseline assessment. It is possible that greater levels of motor skill proficiency may help establish a more significant relationship with PA, as positive correlations between motor skills and

PA are well documented within the literature (Kopp et al., 2010; Lubans et al., 2010; Stodden et al., 2007; Wrotniak et al., 2006). Gross motor quotients were not significantly correlated with average steps per day, average weekday steps, or average weekend steps at any of the assessment periods. There were statistically significant positive correlations between the TGMD-2 gross motor quotients and the CAPE/PAC PA subdomain; this is consistent with literature involving children with ASD and TD, suggesting motor skills influence PA levels (Kopp et al., 2010; Lloyd, Saunders, Bremer, & Tremblay, 2014; Stodden et al., 2007). While no statistical significance was observed between gross motor quotients and the pedometer data, and although the CAPE/PAC is self-reported activity participation, the CAPE PA subdomain outlines more specific activities the children involve themselves in, and correlations between the CAPE PA subdomain activities and gross motor quotient may be considered clinically important (King et al., 2004). Statistically significant positive correlations were also seen between the TGMD-2 gross motor quotients and the CAPE/PAC Social Activities subdomain. Motor skills are required in both structured activities and free play; which are common social scenarios for school aged children. These findings are consistent with the literature (Bremer et al., 2014; MacDonald et al., 2011) indicating that motor skill interventions can also have social skill benefits for children with ASD.

Strengths and Limitations

As with all studies, there are strengths and limitations to this study. The first strength is that, to the best of our knowledge, no other specific all-girls multi-sport skills camp intervention has been implemented for school age girls with ASD; therefore, this study fills a gap in the literature and provides a platform for future research in this area.

This community-based camp program was also relatively easy to implement, and was funded by Special Olympics Canada. The camp staff provided by the local children's centre, were able to provide expert supervision and care, and one-to-one supervision was provided if necessary. The camp also offered minimal inconvenience to parents, and provided the opportunity for a typical summer childhood activity for the participants. The camp curriculum was inspired by FUNdamentals by Special Olympics Canada (Special Olympics Canada, 2007), which is a program that focuses on developing basic sport skills while creating a fun environment for PA in individuals with disabilities. The curriculum designed for this study was relatively easy to implement; therefore, this model could be run by other researchers or local community recreation programs looking to implement a motor skill intervention for school aged girls with ASD.

There are also a number of limitations to the study that need to be addressed. The first limitation is the lack of control group. A control group would give us a better representation of the effectiveness of the camp intervention and increase confidence that changes were in fact due to the intervention. Although for the purpose of this study we used a sample of only girls with ASD, it may be ideal to have separate control groups including a group of all girls with ASD, a group with all boys with ASD and a mixed group. This would provide a clear answer whether or not an all-girls intervention group is the most beneficial learning environment for motor skills and sport activities. Additional groups and larger sample sizes would require more staff and resources, which were not feasible for this study. Although we had enough statistical power to detect changes following the intervention for some outcomes, a greater sample size may help

establish internal validity, and multiple groups would add more generalizability of the results.

Other limitations to this study include assessment limitations. The first limitation being that there was no confirmation of any ASD diagnosis using the Autism Diagnostic Observation Schedule (ADOS). Although all participants met the initial recruitment criteria and provided a diagnosis on the initial Supplemental Information Form (Appendix 6), it is suggested that future studies confirm a diagnosis. The CAPE/PAC was a self-report questionnaire that indicated the level of participation each participant engaged in. Although parents were able to help if participants needed assistance, this method may not provide an accurate representation of total PA; however, the CAPE/PAC is a standardized test for children with disabilities that is often used in other studies (King et al., 2004). There was also no measurement of IQ, which is known to be related with poor motor skills (Hartman et al., 2010; Rintala & Loovis, 2013; Westendorp et al., 2014); however, additional measurements were not feasible. The last recognized limitation is that there was no measurement of body mass index (BMI). BMI has been inversely related with PA in children (Chung, Skinner, Steiner, & Perrin, 2012; Green & Cable, 2006; Remmers et al., 2014; Siwik et al., 2013); therefore, it is recommended that future studies involving motor skills or PA include this measure. Despite the various limitations to this study, there were significant improvements in motor skills after only one week of a camp intervention, suggesting that there is a need for further research in this area.

Future Research

Results from this study suggest that future research should further the study of implementing a multi-sport skills camp intervention in order to improve motor skills and PA levels in school aged girls with ASD. It is recommended that a greater sample size be used, while maintaining a small child to instructor ratio. Future studies should also continue to focus on girls in the pre-puberty age range; however, it may be beneficial to implement an intervention for younger girls with ASD to prepare them with proficient motor skills, as well as adolescence girls in order to reinforce staying physically active into adulthood. Although motor skills significantly improved after only one week of camp intervention, a longer duration of multi-sport intervention may be necessary in order for a greater impact on PA levels. Future studies should try to implement one or two other control groups including one group of girls with ASD and/or a group of boys with ASD to determine if an all-girls intervention is the most ideal setting for improving motor skills in girls with ASD. It would be ideal to incorporate a randomized control trial where participants and researchers are blind to the randomization, in order to truly understand the impact of the intervention on the participants.

Most participants of this study were of high functioning ASD as demonstrated by their VABS-2 scores; integrating a more diverse sample covering a greater range of the Autism Spectrum may fill other significant gaps in the literature and help determine the effectiveness of a motor skill intervention. Providing the opportunity for an inclusion group, which would incorporate a group of children with TD along with children with ASD, may also help children with ASD integrate themselves into physical education class settings, and learn from their peers while being involved. A longitudinal study may also

be beneficial, where testing FMS and PA levels throughout adolescence and into adulthood can provide greater insight of the activity levels in girls with ASD, which may help with designing future interventions in order to help girls with ASD at a younger age. Finally, interventions could be tailored appropriately, based on the motor skill proficiency and levels of PA of each age bracket.

Conclusion

The purpose of this study was to examine the impact of a multi-sport skills camp intervention at improving motor skills, PA, and activity preferences of school age girls with ASD. Results indicated that motor skills significantly improved after only one week of intervention. There were no significant results pertaining to PA or preferences for activities; however there were slight improvements in the PA subdomain in the CAPE/PAC, which may be clinically relevant. The secondary purpose of this study was to investigate which variables are closely related in regards to motor skills, PA, and activity preferences. Upon analyses of group results, motor skills were significantly correlated with PA subdomain scores on the CAPE/PAC. These motor skills may have important implications for overall PA levels in girls with ASD. These preliminary findings suggest that a one-week multi-sport skills camp intervention is effective at improving motor skills; however, additional research is required to further examine PA outcomes in longer duration and greater volume intensity interventions, and in larger, controlled samples of girls with ASD.

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Chapter 4: Manuscript 2

Implementing a Multi-Sport Skills Camp for Girls Ages 8-11 with Autism Spectrum Disorder: Impact on Physical Self-Perceptions, Social Skills and Adaptive Behaviour

Abstract

Children with Autism Spectrum Disorder (ASD) often demonstrate poor quality motor skills when compared to their peers; this may inhibit their ability to participate in age appropriate activities. Girls with ASD have lower quality motor skills than their peers, favouring further inactivity. Active girls tend to have greater physical self-perceptions and confidence; another dimension that promotes physical activity (PA). The purpose of this study was to determine if participation in a one-week multi-sport camp is beneficial for improving fundamental motor skills (FMS), physical self-perceptions, and adaptive behaviour of girls with ASD ages 8-11 (n=13). This study also investigated if self-reported physical self-perceptions were related to FMS. The Test of Gross Motor Functioning-2 (TGMD-2) was used to assess FMS, the Children's Self-Perceptions of Adequacy in and Predilection for Physical Activity (CSAPPA) and Children and Youth Physical Self-Perception Profile (CY-PSPP) were used to assess physical self-perceptions of PA at pre-, post- and 8-week follow up. Parents were given the Social Skills Improvement System (SSIS) and Vineland Adaptive Behaviour Scale (VABS-2) to complete at the pre- and 8-week follow up to measure social skills and adaptive behaviour. Results indicated that the camp was effective at improving FMS ($p<0.0001$), physical self-perceptions ($p=0.044$) and social skills ($p=0.005$). Significant correlations were found between FMS and physical self-perceptions ($p=0.049$), and between physical self-perceptions and social skills ($p=0.004$). The results of this study indicate that participation in a multi-sport skills camp can be effective at improving FMS, physical self-perceptions, and social skills of girls ages 8-11 with ASD; however, further research with larger samples and greater intervention intensities is necessary.

Introduction

The Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5), describes Autism Spectrum Disorder (ASD) as a condition where individuals experience difficulties in social communication and reciprocity, developing and maintaining friendships, exhibiting restricted and/or repetitive patterns of behaviour, and difficulties in nonverbal communication behaviours (American Psychiatric Association, 2013).

ASD has increased in prevalence over the last few decades; it is now reported to affect approximately 1/68 school aged children in the United States of America (Frieden, Jaffe, Cono, Richards, & Iadermarco, 2014). Girls are much less likely to be diagnosed with ASD compared to boys (Giarelli et al., 2010); the ratio of boys to girls diagnosed with ASD is 4:1, where boys are diagnosed more frequently than girls (Frieden et al., 2014). It is not known whether there is an underestimation of girls being diagnosed with ASD because girls with ASD display a much different developmental profile (Carter et al., 2007; Frieden et al., 2014), or if there is truly a lower prevalence. It has recently been suggested that given the high male to female ratio, the diagnostic criteria may be biased towards characteristics more often displayed in boys with ASD instead of girls (Dworzynski, Ronald, Bolton, & Happe, 2012). It has also been suggested that girls with ASD, although less likely to receive a diagnosis, are more likely to be more severely affected than boys with ASD (Jacquemont et al., 2014). More research is needed on the unique characteristics of girls with ASD, to ensure the most effective interventions can be implemented, specifically for girls.

Girls and boys with ASD are commonly grouped together for interventions, group therapies, and other recreational activities due to the low number of girls. It is more time

and cost effective to have them grouped together; however, girls and boys with ASD tend to learn differently (Dworzynski et al., 2012). More research is required on girls with ASD in order to provide the most optimal opportunity for development. It may be ideal, for both sexes with ASD, to have separate learning environments; this may provide girls with ASD a less intimidating and competitive learning environment, as girls with ASD are more likely to avoid involvement with peers, and avoid demands passively (Kopp & Gillberg, 2011). There is also substantially more research available on boys with ASD; therefore, many interventions are tailored to what evidence is available on boys with ASD. Although interventions may not be targeted for girls with ASD, any intervention would be beneficial in order to maximize potential exploratory learning.

Participation in physical activity (PA) is crucial to an individual's physical, emotional and cognitive health, and even more so in those with disabilities (King et al., 2009). Alongside the vast health benefits, PA often in the form of play, is also essential at a young age to form friendships, develop social skills and competencies, and express creativity through activity (Murphy & Carbone, 2008). Age and sex can have a negative impact on the involvement in PA; it has been well documented that volume and intensity levels of PA drastically reduce around puberty in girls with typical development (TD) (Biddle & Wang, 2003; Colley et al., 2011; King et al., 2009). However, little is known about the involvement of PA among girls with ASD or the exact reasons for the decline of PA among girls in general. There are several variables such as low levels of confidence, physical self-perceptions and motor competence, as well as lower social competence, that heavily influence the types and intensity of PA girls with and without disabilities choose to involve themselves in (Bedini & Anderson, 2005; Blinde &

McCallister, 1999; Cairney et al., 2005; Crocker, Eklund, & Kowalski, 2000; Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006; Knowles, Niven, Fawkner, & Henretty, 2009). Positive correlations between motor competence, physical fitness and greater participation levels in PA have been established among the general population with TD (Gao, Stodden, & Feng, 2014; Stodden, Langendorfer, & Roberton, 2009); however, this link has not yet been established in girls with ASD.

Fundamental motor skills (FMS) such as locomotor or object control skills are basic motor skills that emerge into more advanced or activity-specific skills as a child ages and are considered to be influential in a child's physical, cognitive, and social development (Lubans, Morgan, Cliff, Barnett, & Okely, 2010). Motor skills are also essential to provide children the ability to participate in PA and other recreational activities with their peers (Lubans et al., 2010). Although it is not part of the diagnostic criteria, children with ASD often demonstrate poor motor skills and significant gross and fine motor delays in comparison to their peers; these delays become more prominent as they age (Lloyd, MacDonald, & Lord, 2013; Whyatt & Craig, 2012). Poor motor skills have been strongly correlated with Intellectual Quotient (IQ) and executive functioning in individuals with developmental delays (Hartman, Houwen, Scherder, & Visscher, 2010; Rintala & Loovis, 2013; Westendorp et al., 2014); however, significant gross and fine motor delays are present among children with ASD, even when intellectual disability (ID) is accounted for (Lloyd et al., 2013; Staples & Reid, 2010). It is hypothesized that having more proficient motor skills will enable children to be more involved with recreational activities, allowing the improvement of social skills by increased interactions with peers. In order to promote lifelong activity in females identified with either high or low motor

proficiency, Lloyd, Saunders, Bremer, and Tremblay (2014) propose that FMS that are learned earlier in life can heavily influence and promote the involvement in PA into adulthood. They found that motor skill proficiency at age 6 was positively correlated with leisure time PA at age 26 in female participants who were found to have greater motor proficiency at a younger age (Lloyd et al., 2014). Although this link has not been established in girls with ASD, it is still important to instill proficient motor skills at an early age in order to promote lifelong PA regardless of the population.

Sex differences in motor skill proficiency, where boys tend to have more refined motor skills than girls, has been well established in the literature for children with TD (Hume et al., 2008; van Beurden, Zask, Barnett, & Dietrich, 2002). Although less studied, it has also been shown within the literature that girls with ASD, tend to have less refined motor skills than boys with ASD, and their female peers with TD (Carter et al., 2007; Kopp, Beckung, & Gillberg, 2010; Pieters et al., 2012). Girls in general, are also less physically active at any age compared to their male counterparts (Colley et al., 2011; Colley, Gorber, & Tremblay, 2010). The evidence indicates that girls with a disability are even more inactive than girls with TD (Frey, Stanish, & Temple, 2008). Because so few studies have assessed interventions to improve the motor skills or PA of girls with ASD (Fox, 2014), further research is required to make a definite link between improved motor skills, PA and adaptive behaviour within this population.

It has been noted that girls with ASD have greater impairments in their visuospatial skills (Nydén, Hjelmquist, & Gillberg, 2000), which is an essential component in motor development (Davis, Pitchford, & Limback, 2011), as there is a strong perception-action to learning new skills (Sugden & Wade, 2013) . Although

children with ASD tend to have less motor skill proficiency compared to their peers (Staples & Reid, 2010; Whyatt & Craig, 2012), girls with ASD appear to have even more compromised motor skills (Carter et al., 2007). Greater motor skill proficiency has been strongly correlated with greater social skills among children with ASD (Bremer, Balogh, & Lloyd, 2014; MacDonald, Lord, & Ulrich, 2011). PA involvement has also been shown to improve self-efficacy and self-perceptions of PA among children with DCD, who display similar motor problems as children with ASD (Cairney et al., 2005). However, no link has been established between motor skills, psychosocial benefits, and levels of PA in girls with ASD. With more refined motor skills, comes greater confidence in abilities, allowing further exploration in activity to further develop activity-specific skills (Stodden & Goodway, 2007); this may create an overall positive effect on confidence and self-efficacy in PA skills. One study by Fox (2014), created a 6-week individualized exercise intervention for adolescent girls with ASD to determine the duration of PA, performance on executive tasks, and future strategies to engage this specific population. Fox (2014) found that the exercise regimen was effective to introduce and reinforce PA, as well as increased self-competence to facilitate exercises with minimal to no adult assistance. Another study by Pan (2009), found that children with ASD who had more frequent social engagements with adults, displayed higher levels of PA. By gaining confidence in the skills to perform PA, it is more likely that these girls will continue PA in the future, as they will not need guidance and instruction from outside sources.

Increased levels of PA has many psychosocial benefits such as self-efficacy, decisional balance, social support, and overall enjoyment in all children (Lewis, Marcus,

Pate, & Dunn, 2002). Girls who are more physically active have reported having stronger self-esteem and greater confidence levels than those who do not actively participate; however, there is still a large portion of girls who do not participate in PA, especially those who have a disability (Blinde & McCallister, 1999). Many studies have studied this relationship in girls with TD (Crocker et al., 2000; Knowles et al., 2009); however, no studies have examined this effect in girls with ASD. Cairney et al. (2005) conducted a study to determine the link between motor skills, reduced PA and the influence of self-efficacy in PA in children with Developmental Coordination Disorder (DCD); children with DCD portray similar motor deficits seen among children with ASD (Dewey, Cantell, & Crawford, 2007; Kopp et al., 2010). The authors found that girls with DCD demonstrated poor quality motor skills compared to the boys. The authors also noted that the participants had increased vulnerability in regards to poor self-perceptions, which may act as one of the greatest barriers to being physically active (Cairney et al., 2005). A positive relationship has also been noted between motor skills, which helps predict levels of PA, and physical self-perceptions of physical ability among children with TD (Robinson, 2011); however this link has not been established for girls with ASD. The intersection of sex, disability, and PA, has rarely been examined, and warrants attention (Blinde & McCallister, 1999).

Difficulties in social settings is one of the trademark characteristics for children with ASD (American Psychiatric Association, 2013). In a recent study, it was noted that girls with ASD tend to demonstrate more developed social abilities, and the ability to develop friendships using these social abilities, compared to boys with ASD (Head, McGillivray, & Stokes, 2014); however, it is possible that the girls in this study may have

exhibited higher functioning ASD. Regardless of sex, children with ASD demonstrated lower social and friendship abilities than children without ASD (Head et al., 2014). As boys and girls with ASD display varying social abilities, it would be beneficial to provide separate interventions for boys and girls with ASD to focus on specific strengths and weaknesses of each sex.

Motor skills and physical function are considered to be important predictors of social competence (Kang et al., 2010). Having higher quality motor skills has been linked to greater social communicative skills in children with ASD (MacDonald et al., 2011), and will likely enable children to be more physically active (Lubans et al., 2010); however, no differences were established between sexes with ASD in MacDonald's study. More recently (Bremer et al., 2014) found that an increase in motor skill proficiency is correlated with an increase in social skills in young children with ASD by implementing a specific motor skill intervention; however, this study sample consisted primarily of boys with ASD who were 4 years of age. This link needs to be studied in older children with ASD and more specifically, girls.

The purpose of this study was to examine the impact of a Multi-Sport Skills Camp at improving the social skills, adaptive behaviour, and physical self-perceptions of girls ages 8-11 with ASD. The secondary objective was to determine whether there were any correlations between motor skills, social skills, and physical self-perceptions and confidence of PA.

It is hypothesized that underdeveloped FMS are a significant factor that may inhibit girls with ASD from engaging in adequate levels of PA, which in turn influences

their social skills. It is also hypothesized that confidence and self-perceptions in PA are positively correlated to motor skill proficiency in girls with ASD. It is proposed that by gaining the necessary skills to participate through specific sport and motor skills summer camp intervention, girls with ASD will likely gain more self confidence in their motor skills, and thus, be more inclined and interested to participate in other PA opportunities, as well as providing a social atmosphere to improve their interactions with peers.

Methods

Participants

Ethical approval was obtained from Grandview Children's Centre's research committee and the University of Ontario Institute of Technology's Research Ethics Board. A total of 16 girls (aged 8-11 years, m=10.08 ± 1.06) participated in the study (Table 10). The children were recruited via invitation letters through mail to clients of Grandview Children's Centre, and those within the Durham Region Applied Behaviour Analysis (ABA) database. To be included in the study, potential participants were required to be female with an Intellectual and Developmental Disability (IDD) between 8-11 years of age. Exclusion criteria included the presence of serious aggression or self-injurious behaviours, had uncontrolled seizures, were non-ambulatory, could not follow 2-step instructions, had a high flight risk or had a comorbid diagnosis of Cerebral Palsy (CP), or Spina Bifida. The exclusion criterion was necessary due to safety concerns at the location of the intervention. Participant characteristics are presented in Table 10; only participants with a diagnosis with ASD were included in the analysis. Two participants had a previous diagnosis of PDD-NOS, which is currently considered to be a diagnosis of ASD, according to the DSM-5. All participants of the study provided assent,

and all parents or guardians provided written informed consent prior to the commencement of any assessments.

Study Design

This study was a quasi-experimental design with a pre-test, post-test and 8-week follow up assessment. This design enabled the effectiveness of a one week Multi-Sport Camp Intervention and the impact on motor skills and PA of the girls with ASD. Each participant attended a pre-test prior to the camp, a post-test immediately following the camp, and an 8-week follow up test after the camp.

Measures

All measurements were conducted in the researcher's office with the children and their parents, guardian or caregiver present. Parents were asked to complete a Supplemental Information form (Appendix 6) at the initial assessment in order to provide demographic and diagnostic information about their daughter/dependent, as well as any additional information on medical conditions or previous interventions that have been received.

Table 10. Participant Characteristics

Participant	Age (years & months)	Diagnosis	Age of Diagnosis of ASD	Additional Diagnosis and Difficulties	Previous Motor Intervention
1	8 yrs 6 mo	PDD-NOS[1], DCD[2], Selective Mutism	5	Anxiety, Developmental Delay, Communication Difficulties, Low Self-Esteem, Social Isolation	Yes
2	9 yrs 7 mo	ASD[3]	8	ADHD[4], Developmental Delay, Sensory Integration Disorder, Communication Difficulties	Yes
3	10 yrs 6 mo	ASD	6	Social Isolation	No
4	9 yrs 2 mo	ASD	6	Anxiety, Sensory Integration Disorder, Low Self-Esteem	Yes
5	8 yrs 8 mo	ASD	1	Visual Problems, Communication Difficulties, Social Isolation	Yes
6	8 yrs 5 mo	ASD	6	Anxiety, Communication Difficulties, Social Isolation	No
7	8 yrs 2 mo	ASD	4	Anxiety, Sensory Integration Disorder, Other	Yes
8	11 yrs 2 mo	PDD-NOS	9	Developmental Delay, Communication Difficulties, Social Isolation	Yes
9	10 yrs 9 mo	ASD	5	Visual Problems, Low Self-Esteem	Yes
10	10 yrs 5 mo	ASD	3	Learning Disability, Communication Difficulties, Low Self-Esteem, Social Isolation	Yes
11	11 yrs 8 mo	DS	0	Visual Problems, Low Self-Esteem, Social Isolation	Yes
12	10 yrs 10 mo	ASD	2	Communication Difficulties, Low Self-Esteem, Social Isolation	No
13	10 yrs 4 mo	ASD	7	Anxiety, Communication Difficulties, Social Isolation	No
14	10 yrs 3 mo	Smith-Megenis	5	ADD, ADHD, Developmental Delay, Intellectual Disability, Learning Disability	Yes
15	9 yrs 9 mo	ASD	3	Social Isolation	Yes
16	11 yr 1 mo	Genetic Anomoly	0	Developmental Delay, Learning Disability, Sensory Integration Disorder, Confidence	Yes

[1] PDD-NOS - Pervasive Developmental Disorder, Not Otherwise Specified; [2] DCD – Developmental Coordination Disorder; [3] ASD - Autism Spectrum Disorder; [4] ADHD – Attention Deficit Hyperactivity Disorder

Motor Skill Proficiency

The Test of Gross Motor Development (TGMD-2) is a standardized motor proficiency assessment that is validated for children with all developmental disabilities ages 3 through 11 (Ulrich, 2000). The TGMD-2 consists of 12 motor skills within two subscales: locomotor (run, gallop, hop, leap, horizontal jump, and slide) and object control (stationary ball strike, stationary dribble, kick, catch, overhand throw, and underhand roll) (Ulrich, 2000). The TGMD-2 provides separate sex norms for object control skills for scoring purposes, as girls with and without ASD consistently have less proficient object control skills than boys (Carter et al., 2007; Hume et al., 2008; Kopp et al., 2010; Pieters et al., 2012; van Beurden et al., 2002), however there are combined norms for locomotor skills. This test is ideally suited for this study as it is internally and externally validated for children with IDD, is age appropriate and can accurately capture the motor skills of the girls included in this study (Barnett, Minto, Lander, & Hardy, 2014). All participants provided photo and video consent and were videotaped while performing each skill in order for more accurate scoring of assessments. The TGMD-2 was completed by each participant at each of the three assessments.

Physical Activity

A time stamped pedometer (Omron Pocket Pedometer Model Number HJ-729ITCCAN) was used to measure PA for 7 consecutive days at each of the three assessment periods. Pedometers are reliable for assessing PA, and are simple to use (Tudor-Locke, Williams, Reis, & Pluto, 2002). This pedometer measures total steps by day and time, and total aerobic steps by day and time (10 minutes or more of continuous movement, acceleration, and distance). The participants and their parents were instructed to clip the pedometer onto the participant's right hip when they got up in the morning,

and take it off at night. All participants were given stamped return envelopes to mail back the pedometer to the principal investigator for convenience after the completion of each 7 consecutive day recording at each of the three assessments. Pedometer data from participants was included in the analysis if there were between 1000 steps and 30000 steps per day for the minimum 3 to 7 days required (Tudor-Locke & Bassett Jr, 2004; Tudor-Locke et al., 2005); all other data were excluded from analyses.

Physical Self-Perceptions

The Children and Youth Physical Self Perception Profile (CY-PSPP) (Whitehead, 1995) is a widely used tool for children and youth to study how self-perceptions have an influence on PA and other psychosocial constructs (Welk & Eklund, 2005). The CY-PSPP is a 36-item questionnaire appropriate for children comprehension, and gives insight on six subscales: sport/athletic competence, condition/stamina competence, attractive body adequacy, strength competence, physical self-worth, and global self-worth (Whitehead, 1995). Each participant, to the best of their ability, completed the questionnaire, with any necessary assistance of their parent/guardian, at each of the assessment periods. Subdomain scores are based on a scale of 1-4, and the total CY-PSPP score is based on a scale of 36-144. Higher scores calculated on the CY-PSPP would indicate a greater self-perception of physical ability of each subdomain, and for the total score.

The Children's Self-Perceptions of Adequacy in and Predilection for Physical Activity (CSAPPA) is an effective measurement tool to generalise self-efficacy in PA and used for children with and without disabilities (Cairney et al., 2005; Cairney et al., 2007; Hay, Hawes, & Faught, 2004; Moreno-Murcia, Matrtinez-Galindo, Perez, Coll, &

Martin-Albo, 2011). The CSAPPA is a 20-item scale and provides the researcher with information regarding each child's adequacy, predilection, and enjoyment towards PA (Hay, 1992). Subdomain scales vary from another, the adequacy sub-scale is defined as the self-perception of possessing the adequate skills to participate in PA and scored from 1-28, the predilection sub-scale refers to the preferences or favouring of either sedentary or active games and is scored from 1-36, the enjoyment sub-scale indicates how much pleasure there is when taking part in PA and is scored from 1-12; and lastly, the total score for CSAPPA is scored from 1-76. Higher scores calculated on the CSAPPA represent greater adequacy, predilection and enjoyment for PA. Each participant completed the questionnaire, with any necessary assistance of their parent/guardian, at each of the assessment periods.

A 4-item feedback questionnaire was also completed by the parent/guardian of each participant at the post-test, immediately following the Multi-Sport Skills camp. The questions included are presented in Table 11. The answers were qualitatively analyzed to support the quantitative measure on motor skills, PA, and physical self-perceptions.

Table 11. 4-item feedback questionnaire

Question #	Question
1	Do you think this multi-sport camp helped your daughter make any improvements in her motor skills? Please explain your answer using an example(s).
2	Do you think this camp helped your daughter gain confidence? Please explain your answer using an example(s).
3	Do you think that your daughter has taken more interest in being physically active since the camp ended? If yes, will she likely join a new or return to a physical recreational activity or sport in the future?
4	Would you recommend this camp to other parents with a daughter with an intellectual/developmental disability? Please explain why.

Social and Adaptive Behaviour

The Social Skills Improvement System (SSIS) (Gresham & Elliott, 2008) was designed to assess children ages 8 to 18 who are suspected of having significant social difficulties or autism spectrum characteristics, and to support the development of interventions for this given population. It is a standardized assessment used to measure a child's social skills, problem behaviours, and academic competence (Gresham & Elliott, 2008). The SSIS has established intervention validity, which refers to the extent to which the assessment results can be used to guide interventions and evaluation outcomes, as well as cross-informant agreement for the rating scales (Gresham, Elliott, Cook, Vance, & Kettler, 2010; Gresham, Elliott, Frank, & Beddow, 2008) The SSIS required parents to rate their child's behaviour across a range of 15 subscales in order to provide a more accurate vision of the social skills assessment. Higher scores calculated on the SSIS parent questionnaire represent greater social skills and social functioning. Lower scores calculated on the maladaptive behaviour domain quantify less undesired behaviours. This assessment was completed by the parents of each participant only at the pre-test and then again at the 8 week follow-up test for the convenience of the parents.

The Vineland Adaptive Behaviour Scales – 2nd edition (VABS-2) (Sparrow, Cicchetti, & Balla, 2005) was used as a parent questionnaire to assess adaptive behaviour in the following areas: communication, daily living skills, and socialization. It is a commonly used tool to identify any deficits in adaptive behaviour and is a standard assessment for children with IDD (Bremer et al., 2014; Darsaklis, Snider, Majnemer, & Mazer, 2013; Eldevik et al., 2009). The VABS-2 is a reliable tool, where validity and reliability has been established among children with ASD, as well as children from other

cultures (Goldberg, Dill, Shin, & Nhan, 2009; Perry & Factor, 1989; Perry, Flanagan, Geier, & Freeman, 2009). The questionnaire asks parents to rate their child's behaviour on a three-point scale in response to specific statements corresponding to the various domains (Sparrow et al., 2005). This assessment was completed by the parents only at the pre-test and then again at the 8-week follow-up test.

Intervention

The Multi-Sport Camp for the participants in the study took place for five days during the hours of 9 am – 4 pm the week of July 28 – August 1, 2014. The camp, the staff and all resources were facilitated by Grandview Children's Centre with the curriculum designed specifically for this study by the primary investigator to facilitate the learning of FMS. The camp implemented appropriate lunch, water and snack breaks, as well as free time play. The primary investigator ensured all activities involved FMS, and that the learned motor skills were incorporated into active games, activities, and team sport settings. Each day consisted of warm up activities, specific motor skill instruction, and active games (as seen in Appendix 7). A small camper to councellor ratio of 3:1 ensured the safety of all campers, and more opportunity for one-to-one support if necessary. Each councellor consistently provided positive verbal feedback to all campers in order to boost confidence, and encouraged each girl to try new skills outside of their comfort zone.

Skills that were taught and refined included all locomotor (running, hopping, leaping, etc) and object control skills (throwing, catching, kicking, etc) (see Appendix 7 for details). The skills taught at camp progressed in difficulty throughout the week, and were transferred when possible into a team sport activity or game. Each day of camp was

overseen by the principle investigator, with the assistance of trained Grandview Children's Centre camp staff, and a research assistant from UOIT. Daily routines involved the opportunity to practice newly learned skills, and the opportunity to utilize these skills in an active game environment. The structure of motor skills and active game and sport scenarios are outlined in Appendix 7. Positive reinforcement and encouragement was provided by each staff member at camp to each participant, in order to create an optimal learning environment. Each participant was provided ample opportunity to practice their newly learned or refined FMS in active games or sport-like settings throughout the week.

Statistical Analyses

Part 1. Intervention Impact

Descriptive statistics were conducted for all variables obtained at baseline. A one-way repeated measures ANOVA test was used (with a Greenhouse-Greisser correction) to evaluate significant differences between means for each variable in the CY-PSPP, CSAPPA, SSIS and VABS-2 at the pre-, post-, and 8-week follow up test. When significant, post-hoc analysis with a Bonferroni correction was used to detect where the differences were. Effect sizes were also calculated on each variable. These analyses were used to explore the effectiveness of the Multi-Sport Skills camp at improving FMS, physical self-perceptions and confidence, as well as social and adaptive behaviour.

Part 2. Correlations of Motor skills, Self-Perceptions and Adaptive Behaviour

Pearson product correlations were first conducted between TGMD-2 gross motor quotient and all variables on the CY-PSPP and CSAPPA at each of the three assessment periods to explore whether having greater confidence in the ability to perform motor

skills, may have an impact on improved FMS. The same analyses were also conducted on the CSAPPA and CY-PSPP variables with all pedometer data at the pre-, post-, and 8-week follow up in order to determine if physical self-perceptions and competence were related to overall PA levels.

Pearson product correlations were also conducted between the CSAPPA and CY-PSPP variables and all variables on the SSIS and VABS-2 at the pre- and 8-week follow up test in order to explore if physical self-perceptions and competence are associated with social skills, and adaptive behaviour portrayed by the participants in the study.

Part 3. Exploring Parent Feedback

A 4-item questionnaire was completed by the parents of every participant immediately following the camp at the post-test (Appendix 17). Responses were qualitatively examined and used to capture clinically and functionally meaningful findings, which may help support the quantitative measures that resulted in either statistical significance, or found no significance regarding the effectiveness of the camp.

Part 4. Power Calculation

Given the sample size of 13 participants, there was 56.7% power to detect statistical difference at an alpha level of 0.05 on the CY-PSPP total score. However, 15 participants would be required for the CY-PSPP to detect differences with a similar alpha level to reach 80% power.

Results

Part 1. Intervention Impact

Baseline descriptive statistics of the participants from the initial assessment are presented in Table 12. All participants included in the analyses were present for the pre-, post-, and 8-week follow up assessment. Although there were a total of sixteen participants that were included at the intervention, only those with a diagnosis of ASD (n=13) were included in the statistical analysis. The remaining participants (n=3) still received all benefits and overall experience from the summer camp. One participant, included in the analysis, was absent one day from the camp due to medical reasons. Two participants were excluded from the CY-PSPP questionnaire, as it was not valid in these candidates, due to their lack of self-awareness. One other participant refused, due to impatience and noncompliant behaviour, to complete the CY-PSPP at the first two assessment times; however, it was completed at the 8-week follow up test.

Table 12. Baseline descriptive characteristics, motor proficiency, physical activity, physical self-perceptions, and social and adaptive behaviour

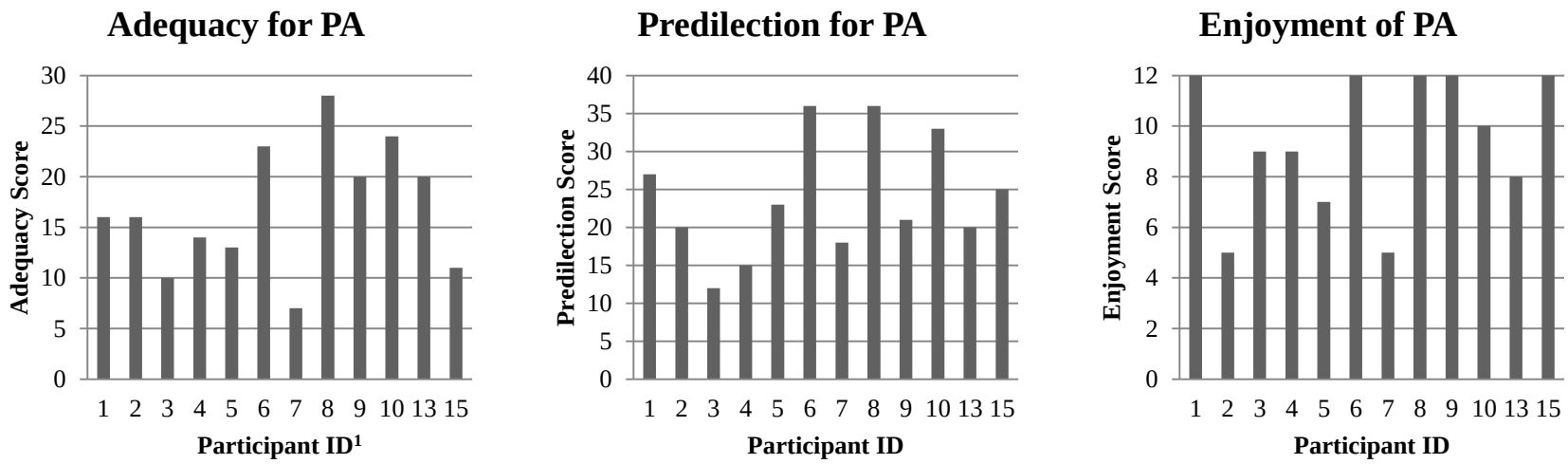
	Participants (mean ± SD)
N	13
Age (years)	9.76 ± 1.00
TGMD-2 Gross Motor Quotient (0-140)	71.38 ± 16.04
Pedometer Average Steps/Day	6717.7 ± 805.30
CSAPPA Adequacy for Physical Activity (0-28)	16.83 ± 6.29
CSAPPA Predilection for Physical Activity (0-36)	23.83 ± 7.87
CSAPPA Enjoyment of Physical Activity (0-12)	9.42 ± 2.71
CSAPPA Total Score (0-76)	50.08 ± 15.02
CY-PSPP Sport/Athletic Competence (0-4)	2.28 ± 0.80
CY-PSPP Condition/Stamina Competence (0-4)	2.22 ± 0.79
CY-PSPP Attractive Body Adequacy (0-4)	3.18 ± 0.69
CY-PSPP Strength Competence (0-4)	2.25 ± 0.68
CY-PSPP Physical Self Worth (0-4)	3.35 ± 0.53
CY-PSPP Global Self Worth (0-4)	3.13 ± 0.65
CY-PSPP Total Score (0-144)	98.5 ± 17.63
SSIS Social Skills Score (40-132)	76.23 ± 20.19
SSIS Problem Behaviour Score (0-147)	127.54 ± 12.49
VABS-2 Communication Score	80.00 ± 19.51
VABS-2 Daily Living Skills Score	81.00 ± 25.67
VABS-2 Social Skills Score	71.00 ± 14.60
VABS-2 Adaptive Behaviour Composite Score (20-160)	76.23 ± 18.56
VABS-2 Maladaptive Behaviour Score	16.77 ± 2.13

Physical Self-Perceptions

Baseline results from the CSAPPA indicate that there were relatively greater scores for enjoyment of PA compared to other subdomain scores (Figure 7). Five participants fell below the 50% score for Adequacy for PA, five participants fell below the 60% score for Predilection for PA, and four participants fell below the 67% score for Enjoyment of PA (Figure 7).

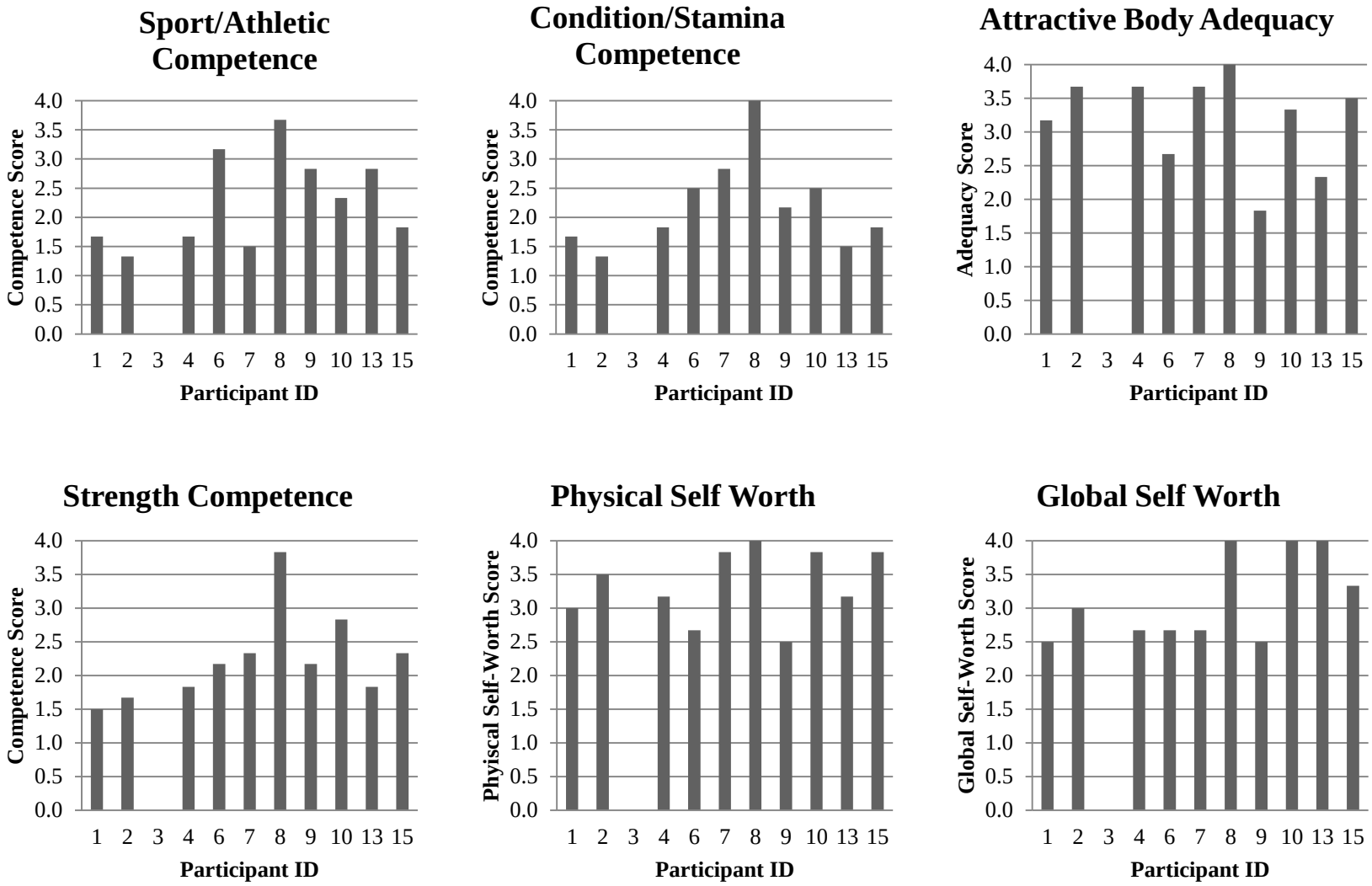
As seen in Figure 8 for the CY-PSPP measure, most participants had a score of approximately 80% of the potential score on the attractive body adequacy, physical self-worth and global self-worth; however, lower scores, approximately 57%, were demonstrated on the subdomains related mostly to PA. Participant 3 refused to complete the questionnaire during the pre- and post-test, however agreed to complete it during the 8-week follow up test. Of the 10 participants who completed the measure, five participants scored below the 50% mark for Sport/Athletic Competence, five scored below the 50% mark for Condition/Stamina Competence, and seven scored below the 60% mark for Strength Competence (Figure 8).

Figure 7. Baseline subdomain CSAPPA scores by participant



[1] ID - Identification

Figure 8. Baseline subdomain CY-PSPP scores by participant



[1] ID - Identification

Social Skills and Adaptive Behaviour

Baseline results from the SSIS indicate generally low social adaptive levels for the Standard Social Skills score (Figure 9). Of the thirteen participants who completed the assessment, two participants fell below the 1st percentile, two participants fell below the 5th percentile, and seven participants fell below the 27th percentile (Figure 9). Only one participant scored over the 49th percentile.

As seen in Figure 10 for the VABS-2 adaptive behaviour composite standard score, most participants scored fairly low on the Adaptive Behaviour Composite Standard Scores. Of the thirteen participants who completed the measure, three participants fell in the 'low' adaptive level; eight participants fell in the 'moderately low' adaptive level, and the two remaining participants fell into the 'adequate' adaptive level (Figure 10).

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Figure 9. Baseline SSIS-parent Social Standard Score by participant

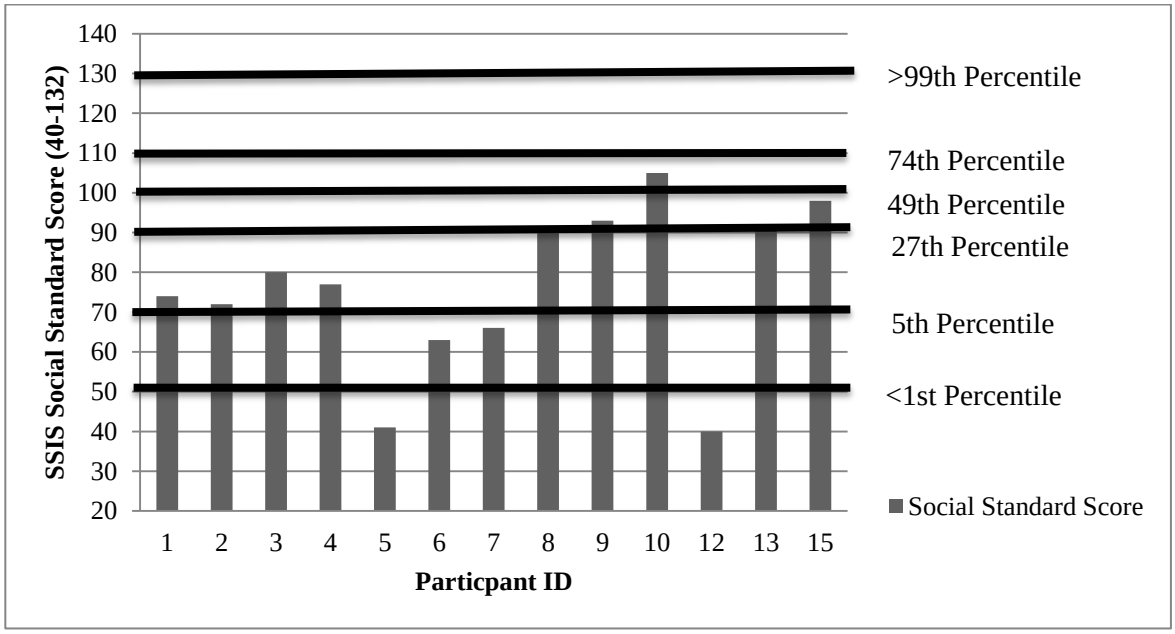
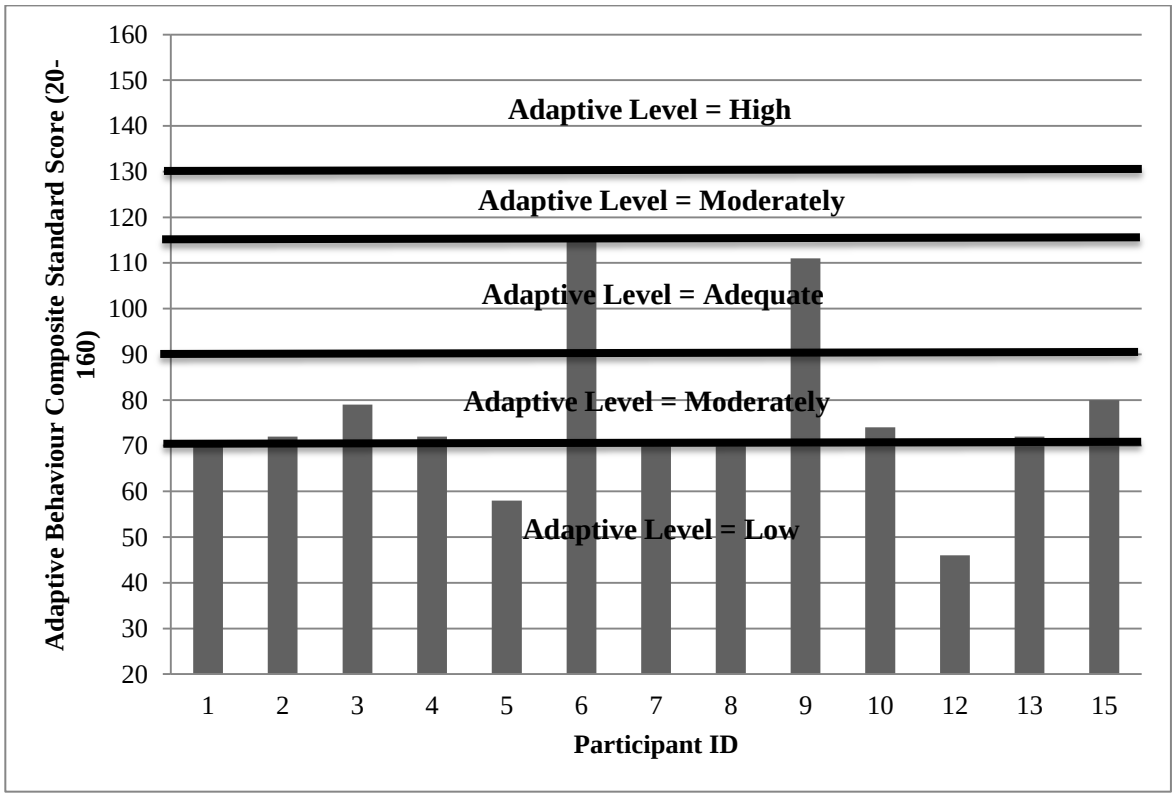


Figure 10. Baseline VABS-2 Adaptive Behaviour Composite Score by participant



Motor Skills and Physical Activity

The results of the one-way analysis of variance with repeated measures on the Pedometer data from pre- to post- to 8-week follow up, indicated no significance. All motor variables from the TGMD-2 significantly improved. Please see Chapter 3 for detailed discussion on the motor and PA outcomes.

Physical Self-Perceptions

The results of the one-way analysis of variance with repeated measures on the CSAPPA variables from pre-, post- to the 8-week follow up test are presented in Table 13; results from the CY-PSPP data are presented in Table 14. There were no significant group changes at all three assessment periods for all variables pertaining to the CSAPPA measure (Table 13). However, there was a 9.6% overall increase in the total score from pre-test to post-test. The Adequacy scores indicated a 15.4% improvement from pre- to 8-week follow up, and Predilection for PA improved 9.1% from pre- to 8-week follow up.

There were significant group changes found for the total score on the CY-PSPP (*p=0.044)*, as well as Sport/Athletic Competence (*p=0.054*) (Table 14). Although there were no significant changes found on each variable on the CY-PSPP measure, Condition/Stamina Competence improved 14.0% between pre- and post- and 21.2% from pre- to 8-week follow up, Strength Competence improved 13.3% between pre- and post- and 16.9% between pre- and 8-week follow up, and Global Self-Worth improved 7.0% from pre- to post and 12.8% from pre- to 8-week follow up.

Post-hoc analyses with Bonferroni corrections revealed that the Global Self-Worth variable on the CY-PSPP significantly improved between the pre-test and the 8-

week follow up test (*p=0.050,* Figure 11*).* Other variables including the Sport/Athletic Competence, Condition/Stamina Competence, Strength Competence and Total Score variables indicated no significance; however, there were still small improvements from the pre-test to the 8-week follow up test (Figure 11 and Figure 12).

Table 13. Pre-, Post-, and 8-week follow up CSAPPA scores

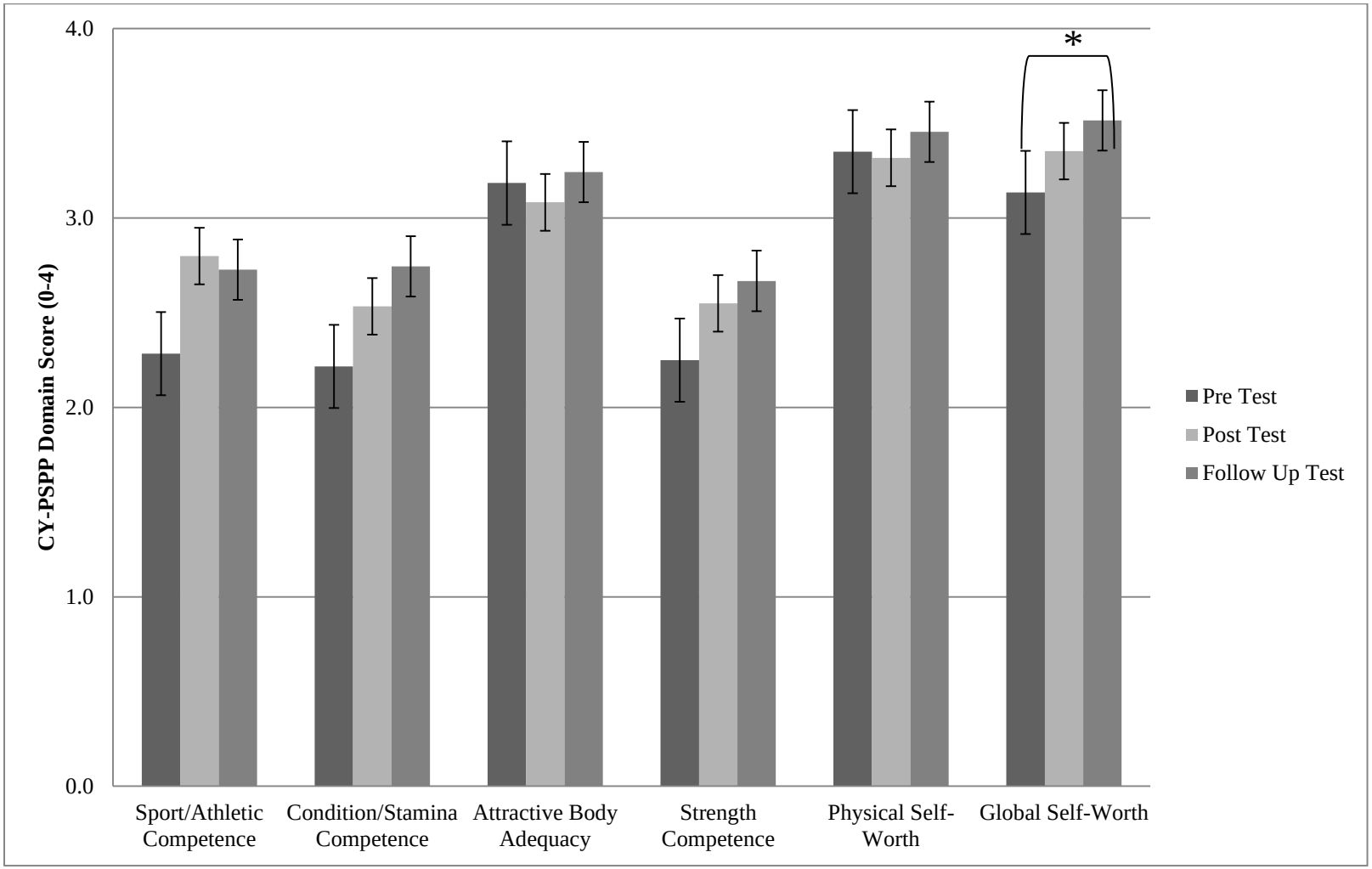
	Pre-Test (mean ± SD)	**Post-Test** (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Adequacy for Physical Activity	16.83 ± 6.29	19.5 ± 5.11	19.42 ± 5.93	p = 0.176	0.153
Predilection for Physical Activity	23.83 ± 7.87	25.92 ± 7.97	26.00 ± 9.54	p = 0.298	0.101
Enjoyment of Physical Activity	9.42 ± 2.71	9.50 ± 1.88	9.17 ± 2.69	p = 0.899	0.010
Total Score of CSAPPA	50.08 ± 15.02	54.92 ± 13.99	54.58 ± 17.41	p = 0.291	0.104

Table 14. Pre-, Post-, and 8-week follow up for CY-PSPP scores

	Pre-Test (mean ± SD)	**Post-Test** (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Sport/Athletic Competence	2.28 ± 0.80	2.80 ± 0.79	2.83 ± 0.69	p = 0.054*	0.298
Condition/Stamina Competence	2.22 ± 0.79	2.53 ± 1.02	2.69 ± 0.98	p = 0.105	0.227
Attractive Body Adequacy	3.18 ± 0.69	3.08 ± 0.49	3.20 ± 0.52	p = 0.811	0.019
Strength Competence	2.25 ± 0.68	2.55 ± 0.53	2.63 ± 0.64	p = 0.205	0.169
Physical Self Worth	3.35 ± 0.53	3.32 ± 0.58	3.47 ± 0.41	p = 0.614	0.053
Global Self Worth	3.13 ± 0.65	3.35 ± 0.56	3.53 ± 0.41	p = 0.074	0.258
Total Score	98.5 ± 17.63	105.80 ± 15.85	109.50 ± 14.22	p = 0.044*	0.307

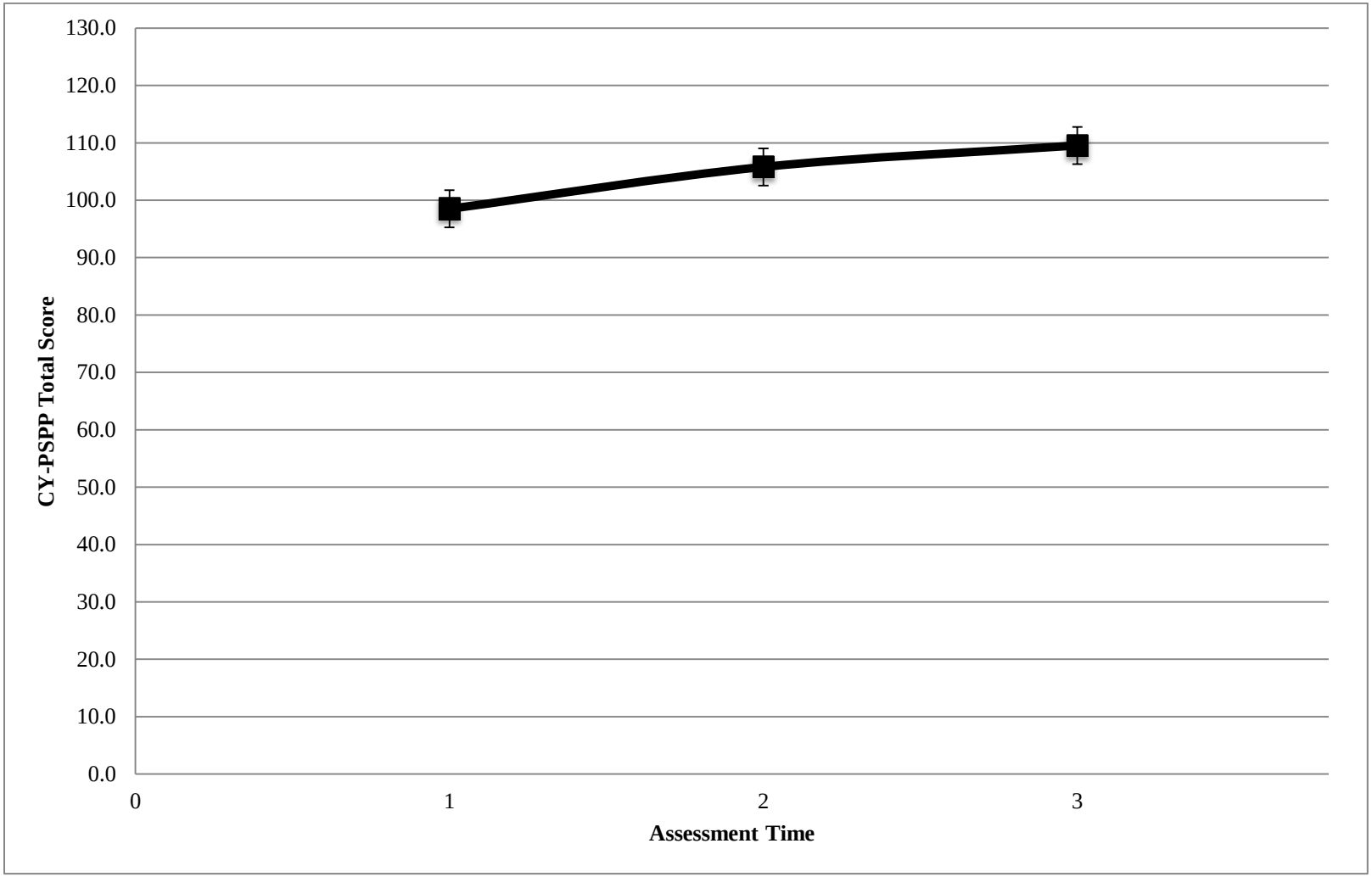
*Statistical significance at alpha level <0.05

Figure 11. CY-PSPP domain scores of complete sample at pre-, post-, and 8-week follow up



*Significantly different at alpha level of <0.05

Figure 12. CY-PSPP total score of complete sample at pre-, post-, and 8-week follow up



Social Skills and Adaptive Behaviour

The results of a one-way analysis of variance on the SSIS variables from pre- to 8-week follow up are presented in Appendix 13. There were no significant group changes found in the SSIS measure; however, there was a 3.4% increase within the Social Skill scores (Appendix 13). Slight increases were noted in the Communication Raw score, Cooperation Raw score, Empathy Raw and Behaviour Level, Engagement Raw score, as well as the Self-Control Raw and Behaviour Level (Appendix 13). There were no significant differences within Maladaptive Social Behaviour domain, however there was a 17.1% decrease in the Bullying Raw score, 2.1% decrease in the Hyperactivity Raw Score, and a 6.4% decrease in the Internalizing Raw score (Appendix 13); although no statistically significant differences were found, it is possible there are functional gains present that are relevant and important for behaviour skills utilized in everyday life.

Results from the VABS-2 data are presented in Table 15, Table 16, and Appendix 14. There were no significant group changes found in the VABS-2 data communication domain, maladaptive and adaptive behaviour domain (Appendix 14); however, there was a 17.5% increase in receptive skills adaptive level, a 13.0% increase in written skills adaptive level, a 7.4% increase in communication adaptive level (Appendix 14) and a 5.1% increase adaptive behaviour composite (Appendix 14). Significant improvements were present among the Domestic Adaptive Level (*p=0.027*, Table 15) within the Daily Living Skills domain, although no other variables within the domain were significant. Significant improvements were present among the Social Skills Domain (Table 16) including: Interpersonal adaptive level (*p=0.005*), coping raw score (*p=0.045*), and all overall Social domain scores (*p=0.005*). Although there were no significant

improvements found among the Play and Leisure Time variable of the Social Skills domain, there was a 12.8% increase from pre- to the 8-week follow up test.

Table 15. Pre- and 8-week follow up VABS-2 daily living skills domain scores

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Personal Raw Score	58.85 ± 13.48	56.92 ± 14.09	p = 0.306	0.087
Personal Adaptive Level	1.92 ± 1.44	1.77 ± 1.01	p = 0.549	0.031
Domestic Raw Score	17.77 ± 12.56	20.08 ± 14.38	p = 0.116	0.193
Domestic Adaptive Level	1.85 ± 1.21	2.31 ± 1.18	p = 0.027 *	0.346
Community Raw Score	42.62 ± 21.75	42.23 ± 24.72	p = 0.886	0.002
Community Adaptive Level	2.15 ± 1.28	2.38 ± 1.45	p = 0.553	0.030
Daily Living Skills Raw Score	34.69 ± 13.41	34.85 ± 13.30	p = 0.918	0.001
Daily Living Skills Standard Score	81.00 ± 25.67	80.69 ± 24.19	p = 0.910	0.001
Daily Living Skills Percentile	19.85 ± 34.11	22.85 ± 35.02	p = 0.341	0.076
Daily Living Skills Adaptive Level	2.00 ± 1.29	2.00 ± 1.16	p = 1.000	0.000

*Statistical significance at alpha level <0.05

Table 16. Pre- and 8-week follow up VABS-2 social domain scores

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Interpersonal Raw Score	40.38 ± 15.75	47.38 ± 18.42	p = 0.065	0.256
Interpersonal Adaptive Level	1.23 ± 0.44	1.85 ± 0.80	p = 0.005 *	0.492
Play and Leisure Raw Score	34.85 ± 16.03	39.31 ± 15.69	p = 0.073	0.244
Play and Leisure Adaptive Level	1.77 ± 1.01	1.92 ± 1.12	p = 0.502	0.038
Coping Raw Score	28.75 ± 14.22	33.58 ± 15.61	p = 0.045 *	0.318
Coping Adaptive Level	2.25 ± 0.75	2.50 ± 1.00	p = 0.275	0.107
Social Domain Standard Score	71.00 ± 14.60	77.77 ± 18.28	p = 0.005 *	0.498
Social Domain Adaptive Level	1.62 ± 0.65	2.00 ± 0.91	p = 0.018 *	0.385

*Statistical significance at alpha level <0.05

Part 2. Correlations of Motor Skills, Self-Perceptions and Adaptive Behaviour

Results of the Pearson product correlations between the TGMD-2 gross motor quotient and CSAPPA scores are presented in Table 17; correlations between CSAPPA total scores and SSIS Domain scores are presented in Table 18; correlations between CSAPPA total scores and VABS-2 Domain scores are presented in Table 19; and correlations between CY-PSPP Global Self-Worth score and VABS-2 Domain scores are presented in Table 20. Although no statistical significance was found, correlations between CY-PSPP Global Self-Worth score and SSIS Domain scores, and correlations between CY-PSPP Sport/Athletic Competence score and SSIS Domain scores can be found in Appendix 15 and Appendix 16.

There were significant positive correlations between the TGMD-2 gross motor quotient and CSAPPA adequacy ($p=0.044$), enjoyment ($p=0.016$) and total score ($p=0.049$) at the 8-week follow up test (Table 17). There were also significant positive correlations at an alpha level of <0.05 between the CSAPPA total score and SSIS Social Raw Score ($p=0.004$), and the SSIS Social Standard Score ($p=0.004$) at the 8-week follow up test (Table 18). Significant negative correlations were found at the pre-test between the CSAPPA total score and VABS-2 Maladaptive Sum of v-Scale scores ($p=0.012$, Table 19); negative correlations were also found at the 8-week follow up test between the CY-PSPP Global Self Worth score and VABS-2 Maladaptive Adaptive Behaviour Level ($p=0.025$, Table 20).

Table 17. Correlations between TGMD-2 gross motor quotient and CSAPPA scores at pre-, post- and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	TGMD-2 gross motor quotient	CSAPPA Adequacy Score	0.395	0.204
	TGMD-2 gross motor quotient	CSAPPA Predilection Score	0.222	0.488
	TGMD-2 gross motor quotient	CSAPPA Enjoyment Score	0.495	0.102
	TGMD-2 gross motor quotient	CSAPPA Total Score	0.371	0.235
Post	TGMD-2 gross motor quotient	CSAPPA Adequacy Score	0.235	0.462
	TGMD-2 gross motor quotient	CSAPPA Predilection Score	0.379	0.224
	TGMD-2 gross motor quotient	CSAPPA Enjoyment Score	0.166	0.605
	TGMD-2 gross motor quotient	CSAPPA Total Score	0.324	0.304
8-week Follow Up	TGMD-2 gross motor quotient	CSAPPA Adequacy Score	0.588	0.044*
	TGMD-2 gross motor quotient	CSAPPA Predilection Score	0.498	0.100
	TGMD-2 gross motor quotient	CSAPPA Enjoyment Score	0.676	0.016*
	TGMD-2 gross motor quotient	CSAPPA Total Score	0.578	0.049*

*Statistical significance at alpha level <0.05

Table 18. Correlations between CSAPPA total score and SSIS domain scores at pre- and 8-week follow up

Assessment	Variable 1	Variable 2	R	p-value
Pre	CSAPPA Total Score	SSIS Social Raw Score	0.324	0.305
	CSAPPA Total Score	SSIS Social Standard Score	0.330	0.295
	CSAPPA Total Score	SSIS Social Percentile	0.446	0.197
	CSAPPA Total Score	SSIS Problem Behaviour Raw Score	0.097	0.764
	CSAPPA Total Score	SSIS Problem Behaviour Standard Score	0.084	0.796
	CSAPPA Total Score	SSIS Problem Behaviour Percentile	-0.175	0.586
	CSAPPA Total Score	SSIS Autism Spectrum Behaviour Level	-0.355	0.258
	CSAPPA Total Score	SSIS Autism Spectrum Raw Score	-0.267	0.401
8-week Follow Up	CSAPPA Total Score	SSIS Social Raw Score	0.765	0.004*
	CSAPPA Total Score	SSIS Social Standard Score	0.763	0.004*
	CSAPPA Total Score	SSIS Social Percentile	0.564	0.090
	CSAPPA Total Score	SSIS Problem Behaviour Raw Score	-0.539	0.071
	CSAPPA Total Score	SSIS Problem Behaviour Standard Score	-0.496	0.101
	CSAPPA Total Score	SSIS Problem Behaviour Percentile	-0.400	0.198
	CSAPPA Total Score	SSIS Autism Spectrum Behaviour Level	-0.351	0.263
	CSAPPA Total Score	SSIS Autism Spectrum Raw Score	-0.483	0.111

*Statistical significance at alpha level <0.05

Table 19. Correlations between CSAPPA total score and VABS-2 domain scores at pre- and 8-week follow up

Assessment	Variable 1	Variable 2	R	p-value
Pre	CSAPPA Total Score	Communication Standard Score	0.303	0.338
	CSAPPA Total Score	Daily Living Skills Standard Score	0.351	0.263
	CSAPPA Total Score	Social Skills Standard Score	0.225	0.483
	CSAPPA Total Score	Adapted Behaviour Composite Standard Score	0.329	0.297
	CSAPPA Total Score	Maladaptive Behaviour Sum of v-Scale Scores	-0.694	0.012*
8-week	CSAPPA Total Score	Communication Standard Score	0.445	0.147
	CSAPPA Total Score	Daily Living Skills Standard Score	0.545	0.067
	CSAPPA Total Score	Social Skills Standard Score	0.537	0.072
	CSAPPA Total Score	Adapted Behaviour Composite Standard Score	0.536	0.073
	CSAPPA Total Score	Maladaptive Behaviour Sum of v-Scale Scores	-0.433	0.159

*Statistical significance at alpha level <0.05

Table 20. Correlations between CY-PSPP gobal self-worth scores and VABS-2 domain scores at pre- and 8-week follow up

Assessment	Variable 1	Variable 2	R	p-value
Pre	CY-PSPP Global Self-Worth	Communication Standard Score	0.143	0.693
	CY-PSPP Global Self-Worth	Daily Living Skills Standard Score	0.097	0.789
	CY-PSPP Global Self-Worth	Social Skills Standard Score	0.145	0.689
	CY-PSPP Global Self-Worth	Adapted Behaviour Composite Standard Score	0.145	0.689
	CY-PSPP Global Self-Worth	Maladaptive Behaviour Adaptive Behaviour	-0.055	0.879
8-week	CY-PSPP Global Self-Worth	Communication Standard Score	-0.058	0.865
	CY-PSPP Global Self-Worth	Daily Living Skills Standard Score	0.258	0.444
	CY-PSPP Global Self-Worth	Social Skills Standard Score	0.324	0.330
	CY-PSPP Global Self-Worth	Adapted Behaviour Composite Standard Score	0.197	0.561
	CY-PSPP Global Self-Worth	Maladaptive Behaviour Adaptive Behaviour	-0.666	0.025*

*Statistical significance at alpha level <0.05

Part 3. Exploring Parent Feedback

Examples of parent feedback by question regarding motor skills, confidence and PA, are presented in Table 22. Complete data pertaining to the 4-item feedback questionnaire that was completed by the parents can be found in Appendix 17. All names were translated to Participant ID to protect the confidentiality of each participant.

Table 21. Examples of Parent verbatim quotes by question

1. Do you think this multi-sport camp helped your daughter make improvements in her motor skills? Please explain your answer using example(s).
Yes. She plays rec. soccer and didn't really participate before. She still just runs around during the game (doesn't touch the ball), but she does participate in the practice now and is able to kick the ball further. She can also play tee ball and actually hit the ball.
Yes. She is now willing to try sports. Right after camp, wanting to play sports, that she usually wouldn't want to play. Much more active, then she has ever been. Motor skills, control of ball, handling ball much more precise.
Yes. She has been more surefooted & coordinated in her motions & sports activities as well as general mobility.
Yes I do believe it helped my daughters motor skills because once camp was done she began running while playing music videos. And this is something I have never seen her do before. It was terrific.
For sure! She has continued to show us some of the skills she learned during the week at camp. She wants to demonstrate her balance, and jumping skills over and over. She had a fantastic week!
2. Do you think this camp helped your daughter gain confidence? Please explain your answer using an example(s).
Yes. Wanting to play, not worrying about what others have to say. Feeling confident that she can actually perform the activity. As before she wouldn't try as she felt she couldn't do the sport and would fail herself and others.
I think it has improved her confidence. She has been more actively involved with friends when it comes to sports. She felt good before, but now she has the confidence to participate. In soccer she showed us how much faster she was running after the ball. She was also more confident going in goal to stop shots.
Yes. [name] showed increased confidence following camp, everyday she came home very proud of her performance at the various sports at camp.
Yes! She gained confidence of making friends. Her social skills improved a lot. She follows instruction very well.
The camp helped [name] to attempt new sports, exercise, movements because a counselor helped break down the steps to learn the "sport". Also the counsellors helped [name] to initiate (try) sports because she lacks confidence to try something she hasn't been exposed to! Ie. she knows how to shoot a basketball but she has never played in a game. She learned to guard a certain part of the court and be offensive in another part of the court. Our daughter gets a lot of satisfaction and pride in herself when she completes "something new".

Table 22. Examples of Parent Feedback Continued

3. **Do you think that your daughter has taken more interest in being physically active since the camp ended? If yes, will she likely join a new or return to a physical recreational activity or sport in the future?**
Yes, she doesn't put up a fight when it's time to go to soccer (as she used to). She will be returning to gymnastics and swimming in the fall. She is also asking to sign up for ballet.
I believe she has become more active. She enjoys running and playing catch and soccer more now than before.
She has always enjoyed physical/recreational activities and programs; this program may have given her a bit more of a "push" to try or continue on with sporting activities.
Yes! She is more physically active at home than before. She is swimming at home and will enroll her in skating this winter.
4. Would you recommend this camp to other parents with a daughter with an intellectual/developmental disability? Please explain why.
Yes!! [name] had a lot of fun and actually participated. In regular camps, she mostly just watches the other children. I think if she was able to participate in something like this more often, she would increase her skills and confidence even more. I think participating with other girls with developmental delays makes her less self-conscious about joining in. The low camper : counselor ratio was amazing too. Thank you!!
I cannot say enough good things about this camp. It was extremely organized and so much fun. Everyone was warm & welcoming I can't thank you guys enough for the wonderful time you gave my daughter.
I would for sure. My daughter had a fantastic week. She felt safe and cared for and created many lasting memories. She learned lots of new skills and gained confidence in different athletic activities and participating with different people. Thank you!!
Yes – As it showed my daughter that she can still participate regardless of her level of ability and skills.
Yes, any program such as this that gives positive reinforcement and builds personal confidence & skills, be they interpersonal, or physical can only be a benefit to any and or all who participate. I saw children who were more outgoing as they were when they began. It was the positive nature of the program & the staff that helps this come out in the children.
Absolutely. [name] was super-excited to meet other girls with autism and I think that she felt that it was easier to feel comfortable amongst her peers, something that I think that all children can benefit from.

Discussion

Girls with and without ASD tend to have lower motor skill proficiency and are less physically active in comparison to boys (Carter et al., 2007; Colley et al., 2011; Kopp et al., 2010). As motor skills and PA are strongly correlated, low motor skill proficiency among girls with ASD may inhibit the amount of PA they choose to engage in (Barnett, van Beurden, Morgan, Brooks, & Beard, 2008). Because active girls tend to have higher self-esteem and confidence, it is important to provide girls with ASD the necessary skills to participate in PA in order to have other positive effects on their psychosocial development. The purpose of this study was to investigate the effectiveness of a multi-sport camp intervention at improving motor skills, PA, physical self-perceptions, social and adaptive behaviour in girls with ASD. Our results indicate that the motor skills of each participant significantly improved immediately following the camp, and were maintained at the 8-week follow up; more information regarding the discussion of motor skills can be found in Manuscript 1. The results also demonstrated numerous overall improvements in physical self-perceptions, social skills and adaptive behaviour skills. The secondary objective was to determine whether there were any relationships between motor skills, social skills, adaptive behaviour, physical self-perceptions and confidence among school aged girls with ASD. Our results indicate that there were significant positive correlations present between motor skills and physical self-perceptions of physical abilities, as well as positive correlations between physical self-perceptions of physical abilities and social skills.

Previous studies have examined the effectiveness of social skill interventions for children with ASD (Cotugno, 2009; Harris, 1993; Houghton, Schuchard, Lewis, &

Thompson, 2013), as well as motor skill interventions that have positive effects on social skills for children with ASD (Bremer et al., 2014; MacDonald et al., 2011). Although there was one study highlighting self-efficacy towards PA for girls with DCD (Cairney et al., 2005), there have been no studies to examine or implement a motor skills or PA intervention separately for girls with ASD. Additionally, by focusing on psychosocial aspects of development, this study helped to fill a significant gap of our understanding of PA in girls with ASD.

To the best of our knowledge, no previous studies have examined the impact of a motor skill intervention on psychosocial development, social skills and adaptive behaviour of school age girls with ASD. The two physical self-perception and self-efficacy profiles indicated that on average the participants scored approximately at the 50^{th} percentile of the scale at baseline, suggesting that the girls possess poor physical self-perceptions and self-competency for PA. At baseline, all participants also presented with delayed social skills and adaptive behaviour. There were also numerous problematic and maladaptive behaviours reported within the social and adaptive behaviour questionnaires; however, this was the expected profile for participants diagnosed with ASD (American Psychiatric Association, 2013). Baseline results also indicated that all participants began the study with motor skills below the 25^{th} percentile, which are considered to be below average, poor, or very poor motor skills (Chapter 3, Figure 2 and Figure 3). Previous research has suggested that ASD diagnosis, age, and low IQ may act as predictors for more significant motor problems (Kopp et al., 2010); this indicates that those with lower levels of functioning may experience more difficulties when transferring motor skills into

functional tasks that require higher motor proficiency, such as engaging in play with peers.

Results in this study demonstrated that the participants experienced no significant improvements pertaining to physical self-perceptions and self-efficacy of PA scored by the CSAPPA from pre- to post-, or post- to the 8-week follow up. There were however, numerous gains within the self-perception measures. It is possible that these improvements may provide clinical or functional implications even without statistical significance, as many daily tasks such as playing at a local park, during gym class or at recess, require confidence in the ability to perform the task at hand. These functional implications are encouraging as one parent reported, "With making new friends that looked up to her in regards to sports she did gain confidence by trying new sports & finding out she could play them she also gained confidence in herself. She can now take part in more sports at school gym class without being self-conscious on her performance," (Appendix 17). However, due to low power to detect statistical differences, a greater sample size in future studies is needed. Greater sample sizes or inclusion groups involving girls with TD may demonstrate more distinguishable improvements in physical self-perceptions of PA. Dishman et al. (2004) conducted a study evaluating the effects of the Lifestyle Education for Activity Program (LEAP) on variables derived from the social-cognitive theory (SCT) as mediators of change in PA among adolescent girls with TD. Dishman et al. (2004) utilized a randomized control trial and found significant improvements in self-efficacy in PA, goal setting and PA, immediately following the PA intervention. The results from this study help support any functional implications or improvements observed in the current study; this may include

physical self-perceptions and/or self-efficacy for PA, which could be relevant and important for girls with ASD as self-competence in motor skills is often a barrier to PA for this population.

Significant improvements were found in some variables on the perception profile scored by the CY-PSPP; most notably, Sport/Athletic Competence and total overall score. As the motor skills of the participants increased, it is important to note that the self-efficacy for PA and Sport/Athletic Competence increased as well; these significant improvements may lead to imperative functional implications, providing the girls in this study the self-confidence and ability to participate in typical school aged activities amongst their peers. Functional gains were also seen in Condition/Stamina Competence, Strength Competence, Physical Self-Worth and Global Self-Worth, demonstrating increasing percentages of change; a lack of statistical changes may be due to small sample size, or low dosage amounts, and varying levels of functioning. Attractive Body Adequacy score at the follow up test did not change and, given that the scores started relatively high, this indicates that the girls had a high self-image and self-esteem prior to camp. Although, body image may not be a primary concern for school aged girls with ASD, this intervention was not aimed at improving body image. Girls who had previously participated in sports, and who were considered to be higher functioning tended to have greater self-perceptions of their abilities to participate. Overall, there was an increase in physical self-perceptions among all participants over the three assessment periods. The results from the current study are encouraging; however, a control group would be necessary to determine with greater confidence if these increases were due to the effectiveness of the camp intervention.

Children with ASD, by definition, experience significant delays in their social and communicative skills (American Psychiatric Association, 2013). No significant group improvements in social skills were found using the SSIS following the camp intervention; however, there were small improvements among social skills, cooperation, empathy and self-control, as well as declines within bullying, hyperactivity and internalizing within the problematic behaviours noted on the SSIS, indicating clinically possible functional gains. Children with ASD tend to develop adaptive behaviour skills at a slower rate than their peers (Klin et al., 2007), and this area is often the focus of interventions. One parent said, "[name] was happy and excited to go to a new environment (the camp) which is new for her (often she has a lot of anxiety surrounding attending events with groups of people she is not familiar with). She felt more confident speaking with the other girls and made new friends, (Appendix 17)." This suggests that there were small improvements in social skills, as the girls were able to make new friends, which is often challenging for this population. The fact that improvements were seen using a one week multi-sport camp intervention is encouraging.

Results indicated improvements within Social Skills and Daily Living Skills domains reported on the VABS-2 (Table 15 and Table 16). Regarding any adaptive behaviour changes within the participants, one parent claimed, "[her] social skills improved a lot. She now follows instructions very well (Appendix 17)," indicating that there are also functional gains as perceived by the parents, apart from any statistically significant improvements. Previous studies involving children with ASD that have implemented other variations of motor skill interventions have also found significant improvements in social skills, and decreases in maladaptive behaviours following the

intervention (Bremer et al., 2014; MacDonald et al., 2011). Although the sample in the current study was all female, the significant gains in social skills, and decreases in problematic behaviours following a motor skill intervention support the work from previous studies, and are very encouraging.

All variables including Interpersonal, Coping and Social Skills within the Social Skills domain significantly improved, with the exception of the Play and Leisure variable (Table 16). This may be explained by the fact that children with ASD tend to require structure and routines, and tend to have difficulties in spontaneous play and conversation capabilities (Bauminger-Zviely, Karin, Kimhi, & Agam-Ben-Artzi, 2014; Strid, Heimann, & Tjus, 2013). Depending on the participant, these core characteristics may be too difficult to change after only one week of intervention. However, the results from this study indicated an 8.5% improvement within the Play and Leisure variable (Table 16), suggesting that improved motor skills may aid in the functional abilities and age appropriate activities girls with ASD chose to engage in. Researchers have indicated that children with ASD are often excluded by their peers, as they are not well understood (Potvin, 2011). Any improvements to social skills for children with ASD would offer important clinical implications that may help provide the social foundation for them to be accepted among their peers.

Within the Daily Living Skills domain, only the Domestic variable significantly improved, which includes household tasks each of the participants take part in. Previous studies have noted that domestic tasks are important activities for children (Adolfsson, Malmqvist, Pless, & Granuld, 2011), that also encourage independence (Dunn,

Magalhaes, & Mancini, 2014). There are several physical components incorporated into household tasks such as motor skills, stability, and endurance (Tuero, De Paz, & Marquez, 2001); because motor skills improved in the current study following the intervention, this may have had functional implications for daily tasks at home for girls with ASD. Although no other statistically significant results were found within this domain, a longer follow up time may have provided more information.

The secondary purpose of the study was to investigate which variables were closely related, including motor skills, physical self-perceptions, social skills and adaptive behaviour. Significant positive correlations were detected between motor skills and physical self-perceptions at the follow up test (Table 17); indicating that the participants with greater motor skill proficiency have greater adequacy for PA, enjoyment of PA, and overall greater self-perceptions of their involvement in PA after the intervention. Because motor skill proficiency started so low, the relationship between motor skills and self-perceptions in physical abilities may not have been detected. Lu et al. (2014) recently conducted a study involving boys and girls with TD and determined that self-efficacy for PA and social norms significantly predicted PA among girls with TD. Although this study did not involve girls with ASD, the results indicate that the findings from the current study are encouraging. With more refined motor skills, comes greater confidence in abilities, allowing further exploration in activity to further develop activity-specific skills (Stodden & Goodway, 2007); this may create an overall positive effect on confidence and self-efficacy in PA skills. Johnson, Barbieri, Breaux, and Carrasco (2014) implemented a PA intervention among school age children and found significant improvements in self-efficacy of PA, as well as improved behavioural adherence. Greater

motor skill proficiency and having greater perceived competence in the skills to engage in PA are necessary to participate among peers; although the camp intervention was not an inclusion camp, parents reported, "I would definitely recommend to parents in the same situation because of the social bonding developed through this program. Also it keeps them active in a non-competitive way and exposed to sports. (Appendix 17)" This is especially important for children with ASD as they are often excluded from their peers and exhibit poor motor skills (Bauminger, Shulman, & Agam, 2003; Dean, Adams, & Kasari, 2013; Lloyd et al., 2013; Whyatt & Craig, 2012). Greater perceptions of having the adequate skills to participate is also a contributing factor in order to engage in active games in a social setting apart from school (Cairney et al., 2005). These results support the findings in the current study, as the functional implications that result from greater motor skill proficiency and stronger self-competency, are imperative for girls with ASD.

Positive correlations were also detected between physical self-perceptions and social skills at the 8-week follow up test (Table 18). The participants within this study were more likely to perform their motor skills and be socially engaged with their peers when they were confident and had greater perceived PA abilities; which is consistent with previous findings (Blinde & McCallister, 1999; Crocker et al., 2000; Kang et al., 2010; Knowles et al., 2009; MacDonald et al., 2011). Although physical self-perceptions and social skills improved after only one week of camp intervention and were positively correlated, a longer duration may be necessary to have more distinct correlations among other variables including PA, adaptive and maladaptive behaviour. A negative relationship between physical self-perceptions and problem behaviours were found (Table 19 and Table 20), indicating that greater perceived self-competence in PA was related to

less problem behaviours at both the pre- and 8 week follow up test. Problem behaviours are common among children with ASD, as they are often misunderstood and experience difficulties expressing themselves in an appropriate manner (Hagopian, 2007). Chung and Elias (1996) found a significant relationship between self-efficacy, problem behaviours and participation in after school activities among adolescents with TD. Those who had greater self-efficacy and confidence, displayed fewer problem behaviours and engaged in more activities. This indicates that for children with ASD, motor skill interventions may have an impact on other areas of developmental functioning, providing area for further study.

Other external factors that may have contributed to the results of the study include the fact that a majority of the counsellors were female. The camp provided a safe learning environment, as girls tend to need to feel emotionally safe to participate (Casey et al., 2014). As some girls within the study were approaching the pre-pubescent age, minimal male camp staff may have reduced flirtatious advances initiated by the girls in the study, causing distraction from the objective of the camp intervention. Having a majority of female counsellors for an all-girls camp may have also been motivating, and the counselors served as role models for the young girls in the camp by actively participating themselves. Observing older girls being active and participating in sports may inspire younger girls to participate (Vescio, Wilde, & Crosswhite, 2005).

Jaffee and Ricker (1993) found that if a girl with TD does not participate in sport by the age of 10, there is only a 10% chance she will be physically active when she is 25. Girls, regardless of age or disability, tend to engage in low levels of PA, in comparison to

the daily recommendation (Colley et al., 2011); they also demonstrate poor quality motor skills in comparison to boys, with or without ASD (Barnett, van Beurden, Morgan, Brooks, & Beard, 2010; Carter et al., 2007). As FMS and PA appear to be related (Kopp et al., 2010; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006), our goal is to ultimately improve FMS in order to have an impact on overall PA among girls with ASD to promote a healthy activity lifestyle. Apart from the staff demographics, parent support and encouragement may also be a contributing factor to the results of the study. Motivating the participants to want to be involved at a multi-sport camp may have been a challenge. Several parents reported their daughter's unwillingness to participate prior to the commencement of camp; however, there were also several reports from parents indicating improved motor skills, confidence, and social skills among the girls with ASD (Table 22). When parents were asked if they would recommend the camp intervention for future, the general response was similar, "I would for sure. My daughter had a fantastic week. She felt safe and cared for and created many lasting memories. She learned lots of new skills and gained confidence in different athletic activities and participating with different people. Thank you!! (Appendix 17)" Overall, the camp seemed to be a success.

Strengths and Limitations

To the best of our knowledge, no other multi-sport skills camp interventions have been implemented for girls with ASD; therefore, this study fills a gap in the literature, and stimulates future research questions in this area. This community-based camp program was relatively easy to implement, and all funding required was generously provided by Special Olympics Canada. The trained camp staff provided by the local children's centre, were able to provide expert supervision and care, and one-to-one

supervision was provided, if necessary. The camp also offered minimal inconvenience to parents, as it was of no charge for them, and took place between standard working hours. The camp itinerary was inspired by FUNdamentals by Special Olympics Canada (Special Olympics Canada, 2007), which is a program that focuses on developing basic sport skills while creating a fun environment for PA in children ages 6-9 with disabilities. The curriculum designed for this study was also relatively easy to implement and can be easily replicated and executed by other researchers or practitioners looking to implement a motor skill intervention for school aged girls with ASD.

As with all studies, there are limitations to our findings that need to be addressed. Our biggest limitation is the lack of a control group. A control group would provide a useful comparison for the effectiveness of the camp intervention setting. The purpose of the study was for only girls with ASD; given the opportunity for greater resources, a control group consisting of all girls with ASD, and/or a control group with all boys with ASD would provide more insight if an all-girls intervention is the most beneficial learning environment. In the case of this study, additional group and larger sample sizes would require more staff and resources, which were not feasible. Another limitation to this study is the small sample size, which resulted in a small amount of statistical power to detect statistical differences for some outcomes. Although our sample is not large enough to establish internal validity, and our findings may not be generalizable to all girls with ASD, the fact there were still statistical differences in physical self-perceptions and social skills, warrants replication and/or future research in this area. There may also be some element of participant/parent bias, where parents who registered their children for the camp may have been more inclined to promote PA, self-confidence and motor skills

within their children regardless, and were more willing to volunteer for the study. This may not provide an accurate representation of all girls with ASD; future research is recommended using a larger sample size that is more representative of all girls with ASD.

Other limitations that need to be address involve assessment drawbacks. Although all participants included in the study met initial recruitment criteria, and provided a diagnosis on the initial Supplemental Information Form (Appendix 6), there was no confirmation of any autism diagnosis using the ADOS (Lord et al., 2012). Knowing the level of functioning for the participants may also assist in designing adapted activities within the camp curriculum to address children with higher functioning autism (HFA) who may have greater motor skills than those with lower functioning autism (LFA). Due to exclusion criteria, for the safety of the children during camp, a majority of participants within the study were considered to have HFA. While there were a few who would be considered to have LFA, it is recommended for future studies to include children with LFA, moderate functioning, and HFA. Several assessments including the CSAPPA, CY-PSPP and CAPE/PAC were self-reporting measures completed by the girls with ASD. Although parents were able to help if participants needed assistance, this method may not provide an accurate representation of the desired outcomes as answers may be overestimated to be socially acceptable (Adams et al., 2005); however, all participants had variability between their answers indicating they did not answer each question the same way and understood what the questions were. There was also no measurement of body mass index (BMI), which has been inversely related with PA in children (Chung, Skinner, Steiner, & Perrin, 2012; Green & Cable, 2006; Remmers et al., 2014; Siwik et al., 2013); therefore, it is recommended that future studies involving

motor skills or PA aspects include this measure. Despite the various limitations to this study, there were significant improvements in social skills and physical self-perceptions after only one week of a camp intervention, suggesting that there is a need for further research in this area.

Future Research

Future research should continue to study the effectiveness of a motor skill intervention in a day camp setting at improving the social skills, self-efficacy and physical self-perceptions of PA among school age girls with ASD as very little is known about this population. It is recommended that if a greater sample size is used, to maintain a low child to instructor ratio. Future studies should also continue to focus on school age girls with ASD (ie. 8-11 years); however, it may be beneficial to intervene with these girls at an earlier age to improve self-efficacy in their motor skills to become more active throughout school, as well as reinforcing social skills to interact with peers. It is also recommended to implement an intervention for adolescent girls with ASD, in order to reinforce staying physically active into adulthood, and living a balanced lifestyle. Future studies are recommended using a true control group consisting of all girls or all boys with ASD that does not receive the intervention. In addition, the inclusion of a mixed sexes group would be useful in order to determine if an all-girls intervention is the most ideal setting to improve psychosocial skills. Another option would be to provide the control group with a social skill camp intervention, rather than a multi-sport skills camp intervention that the experimental group would be receiving. It would be ideal to incorporate a randomized control trial where participants and researchers are blind to the randomization in order to truly understand the impact of the intervention on the

participants. A longitudinal study design may also be beneficial; testing motor skills, social skills, and physical self-perceptions and self-efficacy of PA throughout adolescence may provide greater insight of the barriers to PA girls with ASD experience.

Most participants of this study were considered to be high functioning ASD; integrating a more diverse sample covering a greater range of the Autism Spectrum may fill other significant gaps in the literature, and help determine the effectiveness of a multi-sport skills camp intervention and how to tailor future interventions. Based on our results, the participants of the study improved their social skills and physical self-perceptions after the completion of the intervention; however, it would be beneficial to determine if there were consistent results from an inclusion camp intervention, where girls with ASD learn amongst girls with TD. Furthermore, it may be beneficial to incorporate specific confidence builder activities, and social skill training within the curriculum to optimize the functional outcomes for the participants.

Conclusions

The purpose of this study was to examine the impact of a multi-sport skills camp intervention at improving physical self-perceptions and self-efficacy of PA, social skills and adaptive behaviour. Results indicated that the camp intervention was effective at significantly improving physical self-perceptions and self-efficacy of sport ability, as well as interpersonal, coping, and social skills. These functional gains may have important implications for overall functioning and daily living skills of school age girls with ASD. The secondary objective was to determine whether there were any relationships between motor skills, social skills, adaptive behaviour, physical self-perceptions and confidence.

Our results demonstrated significant correlations between motor skills and physical self-perceptions, and between physical self-perceptions and social skills. Significant negative correlations were also detected between physical self-perceptions and maladaptive behaviours. Our results also indicate that motor skills and physical self-perceptions can help predict and promote PA. These preliminary findings suggest that a multi-sport skills camp intervention can be effective at making improvements in physical self-perceptions and social skills; however, additional research is necessary to further examine PA outcomes in greater intensity interventions, and in larger, controlled samples of girls with ASD.

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Chapter 5: Thesis Conclusions

Summary

Autism Spectrum Disorder (ASD) is a condition where individuals experience difficulties in social communication and reciprocity, developing and maintaining friendships, exhibiting restricted and/or repetitive patterns of behaviour, and difficulties in nonverbal communication behaviours (American Psychiatric Association, 2013). ASD has become increasingly more prevalent over the last few decades, and now affects approximately 1/68 school aged children within the United States of America (Frieden, Jaffe, Cono, Richards, & Iadermarco, 2014). Boys are diagnosed with ASD much more frequently than girls (Giarelli et al., 2010), with a ratio of approximately 4:1 (Frieden et al., 2014). Because there are fewer girls diagnosed with ASD, interventions are often tailored appropriately to what evidence is available on boys with ASD, and girls tend to be grouped amongst boys for these interventions and group therapies.

Several interventions focus on improving the social aspects for children with ASD (Matson & Smith, 2008); however, children with ASD have significant motor delays compared to their peers that also need to be addressed (Lloyd, MacDonald, & Lord, 2013; Staples & Reid, 2010; Whyatt & Craig, 2012). Girls with ASD tend to have even more impaired motor skills than boys with ASD, as well as girls with typical development (TD) (Carter et al., 2007; Kopp, Beckung, & Gillberg, 2010; Pieters et al., 2012). Fundamental Motor Skills (FMS) are essential skills that progress throughout childhood and contribute to a child's overall physical, cognitive and social development (Lubans, Morgan, Cliff, Barnett, & Okely, 2010); these skills are crucial for determining the future trajectory of more complicated or activity-specific skills (Staples & Reid, 2010). There

has been a strong correlation between motor skill proficiency and physical activity (PA) (Kopp et al., 2010; Stodden & Goodway, 2007; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006); where more skillful children participate in more activity, and the less skillful children engage in lower levels of PA.

It is well established within the literature that girls participate in less PA than boys at any age (Colley et al., 2011); however little is known about the involvement of girls with ASD. Although exact reasons for the decline of PA among girls remains unknown, there are several variables such as lack of confidence, lower physical self-perceptions and lower motor competence, as well as social competence that heavily influence the levels of PA of all girls chose to involve themselves in (Bedini & Anderson, 2005; Blinde & McCallister, 1999; Cairney et al., 2005; Crocker, Eklund, & Kowalski, 2000; Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006; Knowles, Niven, Fawkner, & Henretty, 2009). Active girls tend to have greater physical self-perceptions and confidence (Blinde & McCallister, 1999), which can be considered a motivational aspect to get involved in PA. It is critical that girls with and without ASD have adequate FMS, to gain confidence in their skills, in order to gain the benefits of PA. The primary objective of this study was to investigate the impact of a multi-sport skills camp intervention at improving FMS, PA, physical self-perceptions, social skills and adaptive behaviour of school aged girls with ASD. The secondary objective was to determine which variables were most related to each other.

The results of this study indicated that a multi-sport skills camp intervention for school aged girls with ASD was able to significantly improve fundamental motor skills at

both the post-test and 8-week follow up test. At baseline, the participants as a group had motor skills significantly below age and sex norms, and participated in much lower levels of PA compared to the daily recommendation for children. There were no significant changes in the amount of PA each participant engaged in; however, a longer duration of camp may have a greater influence on this result. No statistically significant improvements were also seen within the CAPE/PAC; however, there were improvements within the PA subdomain, indicating greater diversity of activities. Motor skill proficiency and diversity of physical activities, as well as social activities that the participants chose to involve themselves in after the intervention were positively correlated; this relationship warrants further investigation among school age girls with ASD. These findings demonstrate that the one-week multi-sport skills camp intervention was effective at significantly improving motor skills in girls with ASD, and demonstrated plausible clinical implications, including any improvements in diversity or intensity of engaging in PA.

In regards to physical self-perceptions, the participants as a group demonstrated significant improvements in their confidence in sport/athletic competence, as well as overall physical self-perceptions. This indicates that the multi-sport skills camp intervention was effective at improving the self-perceptions of PA in school aged girls with ASD, as well as their sport and athletic competence. Pertaining to social skills and adaptive behaviour, there was also no statistical differences found; although small group improvements were seen within social skill domains. Because social skill deficits are a core characteristic of ASD, a longer duration of camp or greater intensities of intervention may be necessary in order to have a significant impact. These results

however, may indicate clinically relevant improvements in their social skills, which could include developing the necessary skills and self-control to interact appropriately with peers or adults within the community. This may ultimately benefit the girls with ASD with furthering their independence and improving daily living skills.

Results from the secondary purpose of the study indicated positive correlations were made between motor skills and physical self-perceptions, as well as between physical self-perceptions and social skills; which suggests that as motor skills increase, confidence in motor skills also increases, encouraging the participants to be more social with their peers as they are often excluded (Bauminger, Shulman, & Agam, 2003, 2004). Children with ASD tend to experience difficulties when it comes to spontaneous play and conversation abilities (Bauminger-Zviely, Karin, Kimhi, & Agam-Ben-Artzi, 2014), and being engaged in recreational activities with their peers would provide social interactions for children with ASD. The more practice children with ASD are provided, the greater the opportunity for further development of social skills. It is hopeful that the girls from this study utilize their improved motor skills, greater confidence in their skills, and improved social skills to join future recreational activities or sport opportunities to create a healthier active lifestyle.

One-Week Multi-Sport Camp and the WHO-ICF

The main intention of implementing a multi-sport skills camp intervention was to improve the motor skills of girls with ASD, which would enable greater participation in PA and other recreational activities that require proficient motor and movement skills. When implementing a motor intervention for girls with ASD, the activity and

participation factors outlined by the WHO-ICF must be considered (WHO, 2001). The activity factor includes what the participants in the study are able to do. Activities are often limited by poor motor skills that are common in children with ASD (Liu, Hamilton, Davis, & ElGarhy, 2014; Whyatt & Craig, 2012), and especially in girls (Carter et al., 2007). The 'activity' section was especially relevant to the current study, as locomotor, object control and activity specific skills were being manipulated through intervention. The multi-sport camp intervention was designed to target gross motor skills, and more complex activity-specific skills to not only improve functioning in daily activities, but also to spark more interest in sports and recreational activities and encourage active participation. The 'participation' section of the model refers to what PA the participants of the study engage in outside of the intervention setting, and is the area that the desired outcomes of PA would be demonstrated. 'Personal' factors that may involve age, sex, support and motivation, and different morals and beliefs, as well as 'environmental' factors, which may include various settings that may influence the learning of each participant, are also incorporated into the WHO-ICF. These factors are important for the development of the activity in order to improve the participation; however, there were no changes to either of these factors, and these factors were not the focus of the current study.

Baseline results indicated that all participants in the study demonstrated considerably poor locomotion and object control skills, which was to be expected given all girls had a diagnosis of ASD, and engaged in low levels of PA in comparison to the daily recommendation of PA, and the PA levels of their peers with TD (Colley et al., 2011). Low motor skill proficiency can limit the amount of activities that the girls in the

study engage in, therefore, intervening on the motor skills within the 'activity' domain, was necessary in order to improve the 'participation' in PA. Following the intervention, motor skill proficiency significantly improved in all participants, and parents also reported improvements in their movement skills at home and in activity settings. Although there were no improvements in PA measured by the pedometer, the participation section of the model, there were improvements in diversity, intensity and social aspects of PA involvement measured by the CAPE/PAC, indicating that by intervening on the motor skills in the activity section, there are small functional gains demonstrated within the participation section of the WHO-ICF model. Ketcheson (2014) also found no improvements in PA following an 8-week motor skill intervention for children with ASD; more time may be required in order to have a significant impact on the participation levels among children with ASD. Although no significant improvements were found in the current study, parents reported their daughters expressing interest and engaging in different recreational activities and active games at home or in the neighbourhood, which indicates small functional gains in participation in PA for girls with ASD.

Recommendations

Our findings from this study warrant further investigation regarding the effectiveness of a summer multi-sport skills camp intervention at improving the motor skills, PA, physical self-perceptions, social skills and adaptive behaviour in girls with ASD. The investigation of specific factors that may help predict and promote PA among girls with ASD would also benefit the literature, due to the low activity levels that were

demonstrated by girls with ASD in the current study. It is recommended that future studies implement a control group or mixed sex group, greater sample sizes, greater ranges of age groups, and a longitudinal study design, controlling for ID. Enabling the schools, summer camp organizations and teen group organizations to incorporate a similar motor skill program would benefit a greater amount of girls with ASD, as well as their peers. Skills that are learned from this type of intervention are likely to transfer to daily skills, including a decrease in maladaptive behaviour, improvements in physical self-perceptions, and increased social skills, which all help promote independence and preparatory skills for adolescence into adulthood (Bremer, Balogh, & Lloyd, 2014; Cairney et al., 2005; Johnson, Barbieri, Breaux, & Carrasco, 2014; MacDonald, Lord, & Ulrich, 2011; Pan, 2009).

It is recommended a motor skill or PA intervention similar to this to be a core intervention for girls with ASD, or any girls with a developmental disability. Most motor skill interventions include both sexes to be cost and time effective; however, an all-girls intervention setting provides a much less competitive environment without the presence of boys, for girls to effectively learn motor skills and activity-specific skills. One parent stated that her daughter, "was super excited to meet other girls with autism and I think that she felt it was easier to feel comfortable amongst her peers, something I think all children can benefit from," which indicates the atmosphere of the camp was an appropriate environment for the girls in the study, and would be beneficial for future programs. Implementing a similar intervention at an earlier age, may help to close the gap of motor skill proficiency between girls with ASD, and their peers. Incorporating inclusion programs into schools or after school programs may also provide girls with

ASD to learn from and practice with their peers; this may improve not only their motor capabilities and involvement in PA, but also their social interactions with their peers. It is also crucial to incorporate suitable supervision and instruction when implementing a similar program. Very few organizations provide mandatory adapted physical education and adapted PA educator training programs (Sherrill, 2004). In order for girls with ASD to be accommodated, it is important for all instructors/teachers to have ample awareness of the challenges that children with ASD endure. Providing the girls with the necessary learning environment to improve their motor skills, it may enable them to participate with their peers and avoid falling further behind their peers in regards to motor skill proficiency.

It is also recommended for future interventions to make typical object control skills used in recreation (ie. overhand throwing, kicking, catching, etc) a high priority, to help close the gap of motor skill proficiency with their peers. The participants in this study had notably lower object manipulation skills compared to their locomotor skills, similar to girls with TD (Barnett, van Beurden, Morgan, Brooks, & Beard, 2010); however, after completing the intervention, both locomotor and object control skills significantly improved among the girls in the current study. The results of this study indicate that after only one week, it is possible to improve object manipulation skills. By doing so, it may also help with the confidence levels in girls, aiding in their perceived self-competence in the motor skills they are capable of. Several participants from this study were hesitant to try new or more challenging motor skills in fear of failure. After positive encouragement and repetitive practice, many were able to learn the skill, and were more likely to be involved with the group when the skills were incorporated into a

sport or activity setting. Low perceived self-perceptions and competence of skills can be barriers to PA and sport among girls; however, by improving the skills, girls may be more likely to be physically active.

Participation in PA can help promote health, social interactions and overall, a healthy active lifestyle. Because motor skills are so closely correlated with PA, it is important for girls to learn adequate motor skills at young age, due to the decline in PA seen among all girls around adolescence. When girls have greater motor skill proficiency at a young age, it is more likely that they will be more physically active when they reach adulthood (Lloyd, Saunders, Bremer, & Tremblay, 2014). While this study targeted school age girls, future interventions are suggested to target younger age groups, as well as older age groups of girls with ASD; which may have potential lifelong physical and psychosocial health benefits.

Conclusion

In conclusion, results from this study indicate that a one-week summer multi-sport skills camp intervention can be effective at improving motor skills, physical self-perceptions and social skills of school aged girls with ASD. These improvements may lead to an overall improvement in health status, as well as overall daily functioning for girls with ASD. To the best of our knowledge, this is the first study to examine the effectiveness of a summer multi-sport camp intervention in this population; therefore, these results make a significant contribution to the school aged literature for girls with ASD. It is recommended that continuous interventions involving activity-specific skills,

sport-like settings, and general PA, be available for pre-adolescent and adolescent girls with ASD.

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Chapter 6: Appendices

Appendix 1: Certificate of Approval from the University of Ontario Institute of Technology Research Ethics Board

UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY

RESEARCH ETHICS BOARD
OFFICE OF RESEARCH SERVICES

Date: February 26th, 2014

To: Lindsay Smith (Graduate PI) and Meghann Lloyd (Supervisor)

From: Bill Goodman, REB Chair

REB File #: 13-083

Project Title: Implementing a Multi-Sport Skills Camp for Girls 8-11 with Intellectual and Developmental Disabilities

DECISION: APPROVED

START DATE: February 26th, 2014 EXPIRY: February 26th, 2015

The University of Ontario, Institute of Technology Research Ethics Board (REB) has reviewed and approved the above research proposal. This application has been reviewed to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) and the UOIT Research Ethics Policy and Procedures.

Please note that the (REB) requires that you adhere to the protocol as last reviewed and approved by the REB.

Always quote your REB file number on all future correspondence.

Please familiarize yourself with the following forms as they may become of use to you.

- **Change Request Form**: any changes or modifications (i.e. adding a Co-PI or a change in methodology) must be approved by the REB through the completion of a change request form before implemented.
- **Adverse or unexpected Events Form**: events must be reported to the REB within 72 hours after the event occurred with an indication of how these events affect (in the view of the Principal Investigator) the safety of the participants and the continuation of the protocol. (I.e. un-anticipated or un-mitigated physical, social or psychological harm to a participant).
- **Research Project Completion Form**: must be completed when the research study has completed.
- **Renewal Request Form**: any project that exceeds the original approval period must receive approval by the REB through the completion of a Renewal Request Form before the expiry date has passed.

All Forms can be found at http://research.uoit.ca/faculty/policies-procedures-forms.php.

REB Chair Dr. Bill Goodman, FBIT bill.goodman@uoit.ca	Ethics and Compliance Officer compliance@uoit.ca

University of Ontario, Institute of Technology
2000 Simcoe Street North, Oshawa ON, L1H 7K4
PHONE: (905) 721-8668, ext. 3693

Appendix 2: Letter of Support from Grandview Children's Centre

Wednesday January 8, 2014

UOIT Research Ethics Board
2000 Simcoe Street North
Oshawa, Ontario
L1H 7K4

Dear UOIT Research Ethics Board,

It is my pleasure to write a letter in support of the proposed "Multi-Sport Skills Camp for Girls with Intellectual and Developmental Disabilities" being submitted to the University of Ontario Institute of Technology Research Ethics Board by Lindsay Smith who is a Graduate Student of Dr. Meghann Lloyd's. Dr. Lloyd is an assistant professor at the University of Ontario Institute of Technology (UOIT) and research associate at Grandview Children's Centre. This is Lindsay's thesis project for her Master's.

This camp is being implemented to encourage girls with developmental disabilities to increase their motor skills, enhance their physical self-perceptions, and encourage the participation in physical activity and sport. The Multi-Sport Skills Camp will be facilitated by Grandview Children's Centre. When approved by UOIT's REB a letter of invitation will be delivered to all participants who meet the inclusion criteria through our client database and we will be advertising for the camp though all regular channels we use to communicate with parents (e.g. social media, flyers, website).

I fully support this endeavour and the efforts of Dr. Meghann Lloyd and Lindsay Smith as they seek ethics approval for this study and we look forward to working with UOIT. Any programs that can help children get active and improve their motor and social skills, will benefit their overall health.

Sincerely,

Lorraine Sunstrum-Mann ECEDH, RN, BA, MBA
Executive Director
600 Townline Road South
Oshawa , Ontario
L1H 7K6
905 728 1673 ext 2258
toll free 1-800-304 6180
lorraine.sunstrum-mann@grtc.ca

Appendix 3: Parent/Guardian Informed Consent Form for Study Participation

Informed Consent:
Multi-Sport Skills Camp for Girls age 8-11 with Intellectual and Developmental Disabilities

Date: July 12, 2014

Investigators:

Lindsay M Smith — Faculty of Health Sciences, University of Ontario Institute of Technology, 905-721-8668, ext. 2953, lindsaym.smith@uoit.ca

Dr. Meghann Lloyd — Faculty of Health Sciences, University of Ontario Institute of Technology, 905-721-8668, ext. 5308, meghann.lloyd@uoit.ca

Dear Parents,

I am currently a Master student in Health Sciences at the University of Ontario Institute of Technology (UOIT), and inviting you and your daughter to participate in a voluntary research study. The purpose of the study is to explore the fundamental motor skills (e.g. running, kicking, jumping, catching), the self-confidence girls have to participate in sports, and looking at if the confidence and self-esteem play a role in the girls playing on a sport team or joining recreational activities. I am requesting your permission for your child to participate in a one week Multi-Sport Skills camp July 28 – August 1, 2014. The camp will be facilitated by Grandview Children's Centre, but instructed by myself, along with trained camp counsellors provided by Grandview. Each day of the camp will consist of warm up activities, specific skill instruction (ie. Balance, throwing, catching, kicking a ball, etc), active recreational activities and sports that apply these specific motor skills, lunch breaks and snack breaks, as well as some time for free play. There will be one pre-test prior to the camp and two post-tests after the girls have participated in camp. The focus of teaching these motor skills are to enhance confidence and how the girls feel about themselves, and encourage the girls to be more physically active in and outside of their school environment.

Background and Rationale:

The purpose of this study is to determine whether or not improving fundamental motor skills will also have an effect on the girl's social skills, confidence levels, and the amount of physical activity and active recreational they will be involved in. We will measure motor skills, social skills, and the outlook how each girl sees her athletic ability, active recreational involvement and

enjoyment, as well as encourage the development of fundamental motor skills throughout the duration of camp.

Why is this work important?

Children with Intellectual and Developmental Disabilities (IDD) often demonstrate poor motor skills and coordination compared to their peers. Because fundamental motor skills are often considered to be important in a child's physical, cognitive, social development, by improving them, a foundation for a healthy active lifestyle is encouraged. Due to the lower prevalence of girls with IDD, and different developmental profiles, separating the girls from boys will likely optimize each girl's learning potential. It is important that we focus on girls individually to understand their strengths and weaknesses as they commonly get grouped with boys. Disability, gender and physical activity and sport have rarely been examined together. In saying this, there is a need to target girls, especially girls with IDD, in hopes that they will stay physically active throughout their teenage years into adulthood. One of the greatest barriers for girls with any kind of developmental disability, is how they see their ability of doing the necessary skills to participate. Girls with IDD also tend to have less confidence with their physical appearance, social acceptance and athletic ability. Participation at a young age is important as it is the building blocks to form friendships, develop skills and competencies, express creativity, achieve mental and physical health, and determine purpose in life. The benefits of physical activity for girls with ASD include improving athletic ability, a decline in isolation, an increase in social health and wellbeing, and a greater sense of independence and accomplishment. It can also increase social support and provide a sense of normalcy among their peers; overall increasing their confidence and leadership skills. Active girls also tend to have a more positive self-image and greater self-esteem.

Study Procedures:

This study includes assessments of motor skills, social behaviour, physical self-perceptions and confidence levels, and the participation level and enjoyment factor of physical activity. Prior to the camp, we will ask you to complete a few questionnaires to provide demographic information as well as any background information about your child that may benefit us; the questionnaires will take approximately 30-45 minutes to complete. They will be provided to you on-site at the pre-test. In the event they are not completed during the pre-test, we ask that you return them when you and your child arrive for camp, or in the stamped return envelope provided for you. Upon arrival to the pre-test, we will measure your child's motor skills with the assistance of video recording, assist them to complete two physical self-perception and confidence profiles, and ask you and your child a series of questions based on participation levels of physical activity. A pedometer will be sent home to be worn for 7 consecutive days, and returned on the day camp begins. These assessments will be repeated 3 times over the course of the study.

The following table provides an overview of the study timeline:

Month	Activity
January - June	Recruitment, information sharing and consent
Early July	Pre-Test -Supplemental Information Form completed at home by parents -Motor Skills measured at UOIT by TGMD-2 -Social Behaviour Questionnaires completed by parents (SSIS & VABS-2) -Physical Self-Perception Profiles (CY-PSPP & CSAPPA) completed by child at UOIT -CAPE/PAC completed by parent and child at UOIT -Pedometer sent home for 7 consecutive day trial, and returned at camp
Late July	Multi-Sport Skills Camp -One full week; ~9-4 [July 28 – August 1] -Focus on locomotor and object control skills, and applying the learned skills in a game/sport setting
Early August	Post-Test -Motor Skills measured at UOIT by TGMD-2 -Physical Self-Perception Profiles (CY-PSPP & CSAPPA) completed by child at UOIT -Pedometer sent home for 7 consecutive day trial, and returned at earliest convenience
Late September – Early October	Post-Test 2 (8 week follow up) -Motor Skills measured at UOIT by TGMD-2 -Social Behaviour Questionnaires completed by parents (SSIS & VABS-2) -Physical Self-Perception Profiles (CY-PSPP & CSAPPA) completed by child at UOIT -CAPE/PAC completed by parent and child at UOIT -Pedometer sent home for 7 consecutive day trial, and returned at earliest convenience - 4 item questionnaire for parents regarding child progress, improvements, and recommendations

More details about each portion of the study are included below:

- Motor skill proficiency (ie. Skills like throwing and kicking) will be measured using a standardized assessment tool called the “Test of Gross Motor Development-2 (TGMD-2).

- Social behaviour will be assessed with two standardized questionnaires called the "Vineland Adaptive Behaviour Scale-2 (VABS-2" and the "Social Skills Improvement Scale (SSIS)". You will be asked to complete the VABS-2 in order to rate your child's social behaviour and level of adaptive functioning, and the SSIS to help us better understand your child's social behaviour. These questionnaires will be completed at the pre-test, and the 8 week follow up post-test.

- Physical self-perceptions and confidence will be assessed with two standardized questionnaires called the "Children and Youth Physical Self Perception Profile (CY-PSPP)" and the "Children's Self-Perception of Adequacy in and the Predilection for Physical Activity (CSAPPA)".

- Enjoyment and preferences of physical activity will be assessed using a standardized questionnaire called the "Children's Assessment and Participations and Enjoyment & Preferences for Activities of Children (CAPE/PAC)".

- Physical activity will be measured using a pedometer that will be sent home at each assessment. The child is asked to wear the pedometer for 7 consecutive days, where day one will be the day after the pre-test.

- A four item questionnaire will be completed at the first post-test after the camp regarding any child progress and improvements that has been noticed, as well as any future recommendations for the intervention.

- The Multi-Sport Skills Camp is an instructional play-based camp that will be facilitated be Grandview Children's Centre, and will be hosted by the City of Oshawa. This camp will run for one week (5 consecutive days) from approximately 9-4. The camp will be run by myself (Lindsay Smith), as well as several trained counsellors from Grandview Children's Centre. Each day at the camp will consist of warm up activities, specific skill instruction (ie. Balance, throwing, catching, kicking a ball, etc), active recreational activities and sports that apply these specific motor skills, lunch breaks and snack breaks, as well the opportunity for free play.

- Data gathered from this study may be combined with data from future studies in order to benefit children with developmental disabilities.

Risks and Benefits:
Your child's participation in this study does not pose any risk that differs from what they would normally encounter in daily life. All physical activities are similar to standard physical education, and sport/recreation camp activities. As with any physical activity, there is a risk of falling; however, all the equipment is standard physical education equipment and safety is our first priority. All study personnel are trained in First Aid and CPR, and in the event of an injury, the facility's standard emergency procedures will be followed. If the possibility of swim time is available, all children will be properly supervised by currently certified lifeguard/water safety instructor staff employed by the City of Oshawa, and will also be under the supervision of trained Grandview Children's Centre Camp Counsellors. In the event that your child suffers injury as a direct result of participating in this study, normal legal rules for compensation will apply.

Your child will potentially benefit from this study by receiving valuable motor skill instruction, which may help improve their social skills, enhance their confidence and self-perceptions, which may ultimately encourage them to participate more in physical activity and recreational sport. The research findings will also help to shape future camps facilitated by Grandview Children's Centre, and other organizations, that will potentially help other girls with intellectual and developmental disabilities. Upon request, we may also provide you with a report on your child as to their own personal results.

Are There Any Consequences for Not Participating?
No, this research study is completely voluntary. You may withdraw your child from the study at any time by notifying the researchers, and you are not required to provide a reason for doing so. Because this is facilitated by Grandview Children's Centre, not participating in this study, or withdrawing your child partway, will in no way affect their services from Grandview Children's Centre. Withdrawing from the study prior to the end of the intervention will mean that you and your child will not receive information regarding their final results.

Confidentiality:
The data collected in this study used for current and potentially future research will be secured safely. All information that you and your child provide will be numbered and will not contain names. Overall results may be published for scientific purposes, but participant identity will remain confidential. Limits of this confidentiality include situations of suspected child abuse, concerns of harm to self or others, or any request for information by court order.

Right to Withdraw:
You are free to withdraw your child at any time without penalty; your child may continue to attend camp with the other children in the study without cost. If you choose to withdraw, any data that has been collected from your child will be destroyed and will not be used in any analyses, publications or further research.

Dissemination:
At your request, you can receive a copy of the results from this study following its completion. You can request a summary of your child's personal results once she has completed her final assessment session.

Questions about the study:

If you have any questions about this study, please contact Lindsay Smith at 905-721-8668, ext. 2953, or Dr. Meghann Lloyd at 905-721-8668, ext. 5308. This study has been reviewed and is [pending] approved by the University of Ontario Institute of Technology Research Ethics Board (REB #13-083), which is a committee of the university whose goal is to ensure the protection of the rights and welfare of people participating in research. The Board's work is not intended to replace a parent/guardian or child's judgement about what decisions and choices are best for you. If you have any questions about your child's rights as a research participant you may contact the University of Ontario Institute of Technology Research Ethics Board at 2000 Simcoe St. N., Oshawa, ON, L1H 7K4, 905-721-8668, ext. 3693 or compliance@uoit.ca

Informed Consent to Participate: Multi-Sport Skills Camp for Girls Age 8-11 with Intellectual and Developmental Disabilities

I, _____,
(Your Name)

the parent/guardian of _____ :
(Your Child's Name)

☐ **Give consent** to my child's participation in the above study.

☐ **Give consent** for my child to be video recorded during the motor skill testing.

☐ Give consent for data from this study to be used in future studies to help children with developmental disabilities

OR

☐ **Do not** give consent to my child's participation in the above study.

I have read an understood the attached information sheet or had the attached information sheet verbally explained to me, and have received a copy of this consent form. I have been fully informed of the details of the study and have had the opportunity to discuss my concerns. I understand that I am free to withdraw my child at any time or not answer questions.

☐ I am willing to receive further information regarding future research studies that my child may be eligible for.

Email: _____

Phone: _____

_____
Name of Child

_____ _____
Name of Parent/Guardian Contact Phone Number

_____ _____
Signature of Parent/Guardian Date

Appendix 4: Child Assent Form

Implementing a Multi-Sport Skills Camp for Girls with Intellectual and Developmental Disabilities (8-11 years)

Child Assent Form

Hi Erin Fielding, your mom has said it is okay for you to be part of my research project and the sport skills camp; but first I want to ask you it is okay with you. The reason we are doing this project is to help us understand more about what girls like you like about being active and playing sports, the things that help you play sports and be active, and what kind of things we can do so you have more fun when you play sports.

We will ask you to show us how you run, throw, jump, kick and other skills, as well as answer a few questions about different activities you are involved in. You will also get to go to camp with other girls your age this summer to get practice on these skills through different games, activities and sports in the camp.

You don't have to participate if you don't want to, and the information you tell us won't be shared with anyone except you and your parents. You can decide to stop the study at any time.

Do you want to participate in this project? _____ yes _____ no

Is it okay if we video-tape you when you show us your motor skills? _____ yes _____ no

Appendix 5: Recruitment Flyer for Study Participation

Appendix 6: Supplemental Information Form for Parents/Guardians

Supplemental Information Form

This form includes questions about your child that will help to describe the information we learn through this study and identify factors that may relate to children's rate of progress and development. Please feel free to ask questions if you would like further clarification.

1. Child's name:
   _____

2. Birth date: _____ (day, month, and year)

3. What is your child's diagnosis?

   _____

4. At what age did your child receive their diagnosis?
   _____

5. Please indicate the number of siblings your child has and her birth order:
   # siblings: _____ birth order: _____

6. Has a doctor/physician or other health care provider told you that there are specific types of physical activity your child should not participate in? If yes, please specify.

   _____

7. Has your child also been diagnosed with any of the following?

- ☐ Anxiety
- ☐ Attention Deficit Disorder
- ☐ Attention Deficit Hyperactivity Disorder
- ☐ Development Delay
- ☐ Epilepsy
- ☐ Intellectual Disability
- ☐ Learning Disability
- ☐ Operational Defiant Disorder
- ☐ Seizures
- ☐ Sensory Integration Disorder
- ☐ Visual Problems
- ☐ Other:_____

8. Please indicate if your child experiences any of the following:

- ☐ Communication difficulties
- ☐ Low Self-Esteem
- ☐ Social Isolation
- ☐ Other (please specify): _____

9. Has your child ever received any motor interventions (i.e. physical therapy, occupational therapy)? If yes, please specify from what age and the duration.

_____

_____

_____

10. Is your child currently receiving any other form of therapy (i.e. speech-language, Applied Behaviour Analysis (ABA)-based services, etc.)? If yes, please specify the type and duration.

_____

_____

_____

11. Please list any medications your child is currently taking:

_____

_____

12. Please self-declare your child's ethnicity using the options below:
(consistent with Statistics Canada, 2011)

- ☐ Aboriginal
- ☐ Arab/West Asian
- ☐ Black
- ☐ Chinese
- ☐ Filipino
- ☐ Japanese
- ☐ Korean
- ☐ Latin American
- ☐ South Asian
- ☐ Southeast Asian
- ☐ White
- ☐ Undeclared
- ☐ Other:

13. Do any of your other children have a Developmental Disability (ie. Autism Spectrum Disorder, Down Syndrome) or an Intellectual Disability? If yes, please indicate their age and diagnosis.

    _____

14. Please indicate the approximate time (in hours) per day on average your child is sedentary for a typical weekday and weekend (ie. The time your child is not active, sitting time, TV time, etc).

    Weekday: _____ Weekend: _____

15. Please indicate the age of parents at your child's birth:

    Mother: _____ Father: _____

16. Please indicate the highest level of education completed by each parent:

    Mother: _____ Father: _____

17. Please estimate the annual household income (optional):

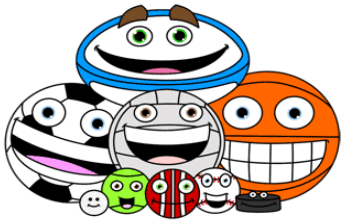
    □ Under $20,000
    □ $20,000 - $39,000
    □ $40,000 - $59,000
    □ $60,000 - $79,000
    □ $80,000 - $99,000
    □ Over $100,000

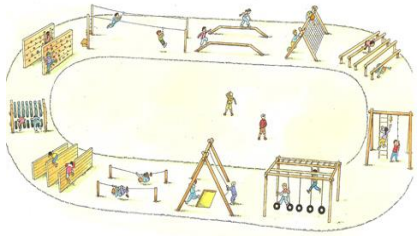
Appendix 7: Session Overview & Week Outline

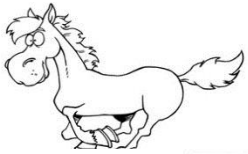
Session Overview - Typical Day at Camp	
Time	Activity
9:00 am – 9:15 am	Free play / arrival / attendance
9:15 am – 9:30 am	Active Warm Up
9:30 am – 10:30 am	Skill Instruction/Active Games to practice skills
10:30 am – 10:45 am	Snack/Washroom Break
10:45 am – 12:00 pm	Skill Instruction/Active Games to practice skills
12:00 pm – 12:30 pm	Lunch Break/Washroom Break
12:30 pm – 12:45 pm	Free play/Playground
12:45 pm – 2:30 pm	Skill Instruction/Active Games to practice skills
2:30 pm – 2:45 pm	Snack/Washroom Break
2:45 pm – 3:45 pm	Skill Instruction/Active Games to practice skills
3:45 pm – 4:00 pm	Cool Down/ Closing Circle
4:00 pm	Pick-up

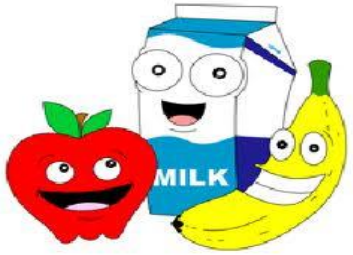
	Monday	Tuesday	Wednesday	Thursday	Friday
Motor Skills	Balance Running Skipping	Kicking	Dribbling Throwing Catching	Striking stationary object	All locomotor and object control skills
Sports	Track & Field	Soccer	Basketball	Baseball	SPECIAL OLYMPICS DAY

Appendix 8: Visual Prompts







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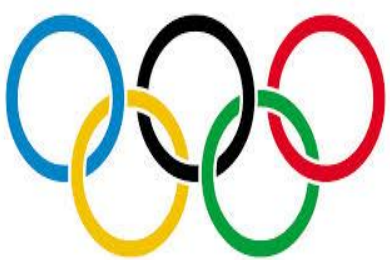
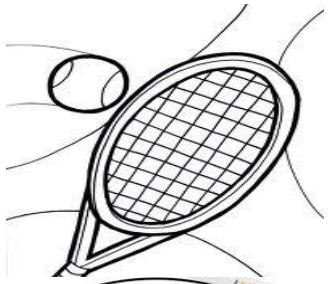
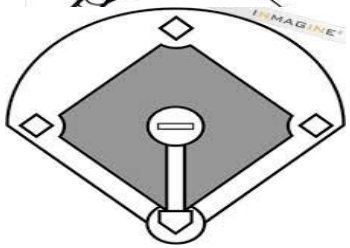



Review



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Appendix 9: Pre-, and 8-week follow up CAPE Summary Scores

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Total Intensity Score (0-385)	129.85 ± 40.1	115.69 ± 41.4	p = 0.193	0.137
Total With Whom Score (1-275)	66.5 ± 30.9	57.38 ± 23.8	p = 0.257	0.106
Total Where Score (1-330)	74.0 ± 25.6	66.85 ± 25.7	p = 0.164	0.164
Total Enjoyment Score (1-275)	110.54 ± 36.8	102.92 ± 42.0	p = 0.317	0.083
Overall Diversity Score (0-55)	27.08 ± 8.4	24.85 ± 8.4	p = 0.215	0.125
Overall Intensity Score (1-7)	2.46 ± 0.88	2.08 ± 0.86	p = 0.137	0.175
Overall With Whom Score (1-5)	2.31 ± 0.63	2.23 ± 0.44	p = 0.673	0.015
Overall Where Score (1-6)	2.69 ± 0.48	2.54 ± 0.52	p = 0.337	0.077
Overall Enjoyment Score (1-5)	4.00 ± 0.41	4.08 ± 0.49	p = 0.337	0.077

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
CAPE Informal Domain				
Diversity Score (0-40)	23 ± 6.7	20.31 ± 7.0	p = 0.079	0.235
Intensity Score (1-7)	2.69 ± 0.75	2.62 ± 0.87	p = 0.753	0.009
With Whom Score (1-5)	2.31 ± 0.63	2.23 ± 0.44	p = 0.673	0.015
Where Score (1-6)	2.46 ± 0.52	2.38 ± 0.65	p = 0.584	0.026
Enjoyment Score (1-5)	4.08 ± 0.49	4.0 ± 0.58	p = 0.337	0.077
CAPE Formal Domain				
Diversity Score (0-15)	4.46 ± 1.7	4.08 ± 2.0	p = 0.457	0.047
Intensity Score (1-7)	1.46 ± 0.67	1.46 ± 0.78	p = 1.000	0.000
With Whom Score (1-5)	3.54 ± 1.13	3.54 ± 1.45	p = 1.000	0.000
Where Score (1-6)	4.23 ± 0.73	4.46 ± 0.78	p = 0.337	0.077
Enjoyment Score (1-5)	4.0 ± 0.82	4.15 ± 0.80	p = 0.165	0.154

Appendix 10: Pre-, and 8-week follow up PAC Summary Scores

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Recreational Activities Sum (1-36)	25.92 ± 4.8	26.54 ± 5.33	p = 0.679	0.015
Recreational Activities Preference Score (1-3)	2.23 ± 0.44	2.15 ± 0.56	p = 0.673	0.015
Physical Activities Sum (1-39)	23.69 ± 5.47	23.92 ± 5.19	p = 0.853	0.003
Physical Activities Preference Score (1-3)	1.85 ± 0.38	1.85 ± 0.38	-	-
Social Activities Sum (1-30)	22.31 ± 5.2	22.85 ± 4.2	p = 0.577	0.027
Social Activities Preference Score (1-3)	2.31 ± 4.8	2.31 ± 4.8	p = 1.000	0.000
Skill-Based Activities Sum (1-30)	19.77 ± 5.0	20.15 ± 5.5	p = 0.748	0.009
Skill-Based Activities Preference Score (1-3)	2.00 ± 0.58	2.15 ± 0.56	p = 0.165	0.154
Self-Improvement Activities Sum (1-30)	16.92 ± 5.0	17.62 ± 5.0	p = 0.337	0.077
Self-Improvement Activities Preference Score (1-3)	1.62 ± 0.5	1.85 ± 0.7	p = 0.190	0.138
PAC Overall Sum (1-30)	108.62 ± 21.1	110.15 ± 21.6	p = 0.733	0.010
PAC Overall Preference Score (1-3)	2.00 ± 0.4	2.00 ± 0.4	-	-

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**
Informal Domain Activities Sum (1-120)	81.69 ± 15.5	81.15 ± 13.7	p = 0.850	0.003
Informal Domain Activities Preference Score (1-3)	2.15 ± 0.4	2.00 ± 0.4	p = 0.165	0.154
Formal Domain Activities Sum (1-45)	27.69 ± 6.8	27.85 ± 7.0	p = 0.871	0.002
Formal Domain Activities Preference Score (1-3)	1.92 ± 0.5	1.85 ± 0.6	p = 0.337	0.077

Appendix 11: Pearson product correlations between TGMD-2 gross motor quotient and Pedometer data at pre-, post-, and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	TGMD-2 Gross Motor Quotient	Average Steps/Day	0.404	0.369
	TGMD-2 Gross Motor Quotient	Average Weekday Steps	0.521	0.230
	TGMD-2 Gross Motor Quotient	Average Weekend Steps	-0.330	0.469
Post	TGMD-2 Gross Motor Quotient	Average Steps/Day	0.217	0.605
	TGMD-2 Gross Motor Quotient	Average Weekday Steps	0.131	0.757
	TGMD-2 Gross Motor Quotient	Average Weekend Steps	0.300	0.470
8-week	TGMD-2 Gross Motor Quotient	Average Steps/Day	0.275	0.510
	TGMD-2 Gross Motor Quotient	Average Weekday Steps	0.143	0.735
	TGMD-2 Gross Motor Quotient	Average Weekend Steps	0.470	0.347

Appendix 12: Spearman's rank correlations between TGMD-2 GMQ and CAPE/PAC Physical activity subdomain at pre-, and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Diversity	0.659	0.014*
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Intensity	0.579	0.038*
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity With Whom	0.643	0.018*
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Where	0.200	0.512
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Enjoyment	-0.003	0.992
8-week	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Diversity	0.383	0.219
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Intensity	0.358	0.253
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity With Whom	0.534	0.074
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Where	0.284	0.371
	TGMD-2 Gross Motor Quotient	CAPE/PAC Physical Activity Enjoyment	0.078	0.809
Pre	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Diversity	0.463	0.111
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Intensity	0.424	0.149
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity With Whom	0.492	0.087
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Where	0.112	0.717
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Enjoyment	0.442	0.131
8-week	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Diversity	0.315	0.294
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Intensity	0.294	0.330
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity With Whom	0.287	0.342
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Where	0.402	0.173
	TGMD-2 Gross Motor Quotient	CAPE/PAC Social Activity Enjoyment	0.343	0.251

Appendix 13: Pre-, and 8-week follow up SSIS data

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**	**Observed Power**
Social Skills Raw Score	72 ± 24.25	74.62 ± 23.05	p = 0.333	0.078	0.153
Social Skills Standard Score	76.23 ± 20.19	78.85 ± 18.09	p = 0.244	0.111	0.204
Problem Behaviour Sum of Raw Scores	37.46 ± 10.01	37.54 ± 10.51	p = 0.971	0.000	0.050
Problem Behaviour Standard Score	127.54 ± 12.49	127.46 ± 13.02	p = 0.976	0.000	0.050
Autism Spectrum Behaviour Score	2.92 ± 0.28	2.92 ± 0.28	-	-	-
Autism Spectrum Raw Score	22.31 ± 7.09	23.00 ± 7.25	p = 0.474	0.044	0.105

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**	**Observed Power**
Communication Raw Score	11.92 ± 4.03	12.08 ± 3.50	p = 0.801	0.078	0.153
Communication Behaviour Score	1.46 ± 0.66	1.31 ± 0.48	p = 0.337	0.077	0.152
Cooperation Raw Score	11.38 ± 3.38	11.85 ± 2.7	p = 0.408	0.058	0.124
Cooperation Behaviour Score	1.77 ± 0.60	1.85 ± 0.56	p = 0.584	0.026	0.081
Assertion Raw Score	12.31 ± 4.09	11.62 ± 4.43	p = 0.415	0.056	0.122
Assertion Behaviour Score	1.62 ± 0.51	1.38 ± 0.51	p = 0.082	0.231	0.415
Responsibility Raw Score	11.38 ± 4.82	10.38 ± 4.77	p = 0.217	0.124	0.224
Responsibility Behaviour Score	1.85 ± 0.56	1.69 ± 0.48	p = 0.337	0.077	0.152
Empathy Raw Score	8.54 ± 5.16	10.54 ± 5.01	p = 0.163	0.156	0.278
Empathy Behaviour Score	1.38 ± 0.51	1.62 ± 0.65	p = 0.273	0.099	0.185
Engagement Raw Score	8.85 ± 4.49	9.08 ± 4.52	p = 0.632	0.020	0.074
Engagement Behaviour Score	1.31 ± 0.48	1.31 ± 0.48	p =1.000	0.000	0.050
Self-Control Raw Score	7.62 ± 3.99	9.00 ± 5.20	p = 0.101	0.208	0.372
Self-Control Behaviour Score	1.54 ± 0.52	1.62 ± 0.77	p = 0.584	0.026	0.081

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**	**Observed Power**
Externalizing Raw Score	12.15 ± 4.76	12.23 ± 4.90	p = 0.934	0.001	0.051
Externalizing Behaviour Score	2.54 ± 0.52	2.62 ± 0.51	p = 0.584	0.026	0.081
Bullying Raw Score	2.69 ± 2.53	2.23 ± 2.49	p = 0.337	0.077	0.152
Bullying Behaviour Score	2.15 ± 0.38	2.23 ± 0.44	p = 0.338	0.077	0.152
Hyperactivity Raw Score	11.00 ± 2.76	10.77 ± 3.00	p = 0.787	0.006	0.058
Hyperactivity Behaviour Score	2.69 ± 0.48	2.85 ± 0.38	p = 0.165	0.154	0.275
Internalizing Raw Score	12.08 ± 3.45	11.31 ± 3.55	p = 0.299	0.089	0.170
Internalizing Behaviour Score	2.69 ± 0.48	2.69 ± 0.48	p =1.000	0.000	0.050

Appendix 14: Pre- and 8-week follow up VABS-2 data

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**	**Observed Power**
Receptive Raw Score	29.23 ± 6.07	31.92 ± 7.46	p = 0.056	0.272	0.494
Receptive Adaptive Level	1.77 ± 0.73	2.08 ± 0.86	p = 0.165	0.154	0.275
Expressive Raw Score	82.77 ± 31.81	85.46 ± 28.73	p = 0.657	0.017	0.070
Expressive Adaptive Level	2.46 ± 1.27	2.08 ± 0.86	p = 0.209	0.128	0.231
Written Raw Score	29.85 ± 13.11	32.08 ± 14.90	p = 0.178	0.146	0.261
Written Adaptive Level	2.38 ± 1.12	2.69 ±1.32	p = 0.264	0.103	0.190
Communication Domain Standard Score	80.00 ± 19.51	84.77 ± 24.90	p = 0.383	0.064	0.133
Communication Domain Adaptive Level	2.15 ± 0.80	2.31 ± 1.18	p = 0.584	0.026	0.081

	Pre-Test (mean ± SD)	**8-week follow-up** (mean ± SD)	**p-value**	**Effect size**	**Observed Power**
Adaptive Behaviour Composite Sum of v-Scale	232.0 ± 54.41	243.23 ± 61.72	p = 0.179	0.145	0.259
Adaptive Behaviour Composite Standard Score	76.23 ± 18.56	80.08 ± 21.29	p = 0.174	0.148	0.265
Adaptive Behaviour Composite Percentile	15.31 ± 29.08	21.23 ± 32.51	p = 0.225	0.120	0.218
Adaptive Behaviour Composite Adaptive Level	1.92 ± 0.86	1.92 ± 0.86	p = 1.000	0.000	0.050
Internalizing Raw Score	9.23 ± 3.66	9.08 ± 3.04	p = 0.824	0.004	0.055
Internalizing Adaptive Level	2.46 ± 0.52	2.46 ± 0.66	p = 1.000	0.000	0.050
Externalizing Raw Score	5.69 ± 3.04	6.08 ± 2.87	p = 0.433	0.052	0.116
Externalizing Adaptive Level	1.54 ± 0.52	1.54 ± 0.52	p = 1.000	0.000	0.050
Other Raw Score	19.54 ± 8.94	20.38 ± 8.92	p = 0.577	0.027	0.083
Maladaptive Behaviour Raw Score	10.38 ± 7.18	11.46 ± 9.40	p = 0.276	0.098	0.183
Maladaptive Behaviour v-Scale Score	16.77 ± 2.13	16.92 ± 2.72	p = 0.613	0.022	0.077
Maladaptive Behaviour Adaptive Level	1.46 ± 0.52	1.62 ± 0.77	p = 0.337	0.077	0.152

Appendix 15: Correlations between CY-PSPP Sport/Athletic Competence Sub Domain scores and SSIS Domain scores at pre- and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	CY-PSPP Sport/Athletic Competence	SSIS Social Raw Score	0.068	0.852
	CY-PSPP Sport/Athletic Competence	SSIS Social Standard Score	0.071	0.845
	CY-PSPP Sport/Athletic Competence	SSIS Social Percentile	0.384	0.348
	CY-PSPP Sport/Athletic Competence	SSIS Problem Behaviour Raw Score	-0.509	0.133
	CY-PSPP Sport/Athletic Competence	SSIS Problem Behaviour Standard Score	-0.506	0.136
	CY-PSPP Sport/Athletic Competence	SSIS Problem Behaviour Percentile	-0.428	0.217
	CY-PSPP Sport/Athletic Competence	SSIS Autism Spectrum Behaviour Level	-0.240	0.505
	CY-PSPP Sport/Athletic Competence	SSIS Autism Spectrum Raw Score	-0.192	0.595
8-week Follow Up	CY-PSPP Sport/Athletic Competence	SSIS Social Raw Score	0.253	0.435
	CY-PSPP Sport/Athletic Competence	SSIS Social Standard Score	0.232	0.492
	CY-PSPP Sport/Athletic Competence	SSIS Social Percentile	0.518	0.153
	CY-PSPP Sport/Athletic Competence	SSIS Problem Behaviour Raw Score	0.179	0.597
	CY-PSPP Sport/Athletic Competence	SSIS Problem Behaviour Standard Score	0.200	0.555
	CY-PSPP Sport/Athletic Competence	SSIS Problem Behaviour Percentile	0.169	0.619
	CY-PSPP Sport/Athletic Competence	SSIS Autism Spectrum Behaviour Level	0.176	0.604
	CY-PSPP Sport/Athletic Competence	SSIS Autism Spectrum Raw Score	0.305	0.362

Appendix 16: Correlations between CY-PSPP Global Self-Worth Subdomain scores and SSIS Domain scores at pre- and 8-week follow up assessments

Assessment	Variable 1	Variable 2	R	p-value
Pre	CY-PSPP Global-Self Worth	SSIS Social Raw Score	0.303	0.395
	CY-PSPP Global-Self Worth	SSIS Social Standard Score	0.311	0.382
	CY-PSPP Global-Self Worth	SSIS Social Percentile	0.516	0.190
	CY-PSPP Global-Self Worth	SSIS Problem Behaviour Raw Score	-0.407	0.243
	CY-PSPP Global-Self Worth	SSIS Problem Behaviour Standard Score	-0.406	0.245
	CY-PSPP Global-Self Worth	SSIS Problem Behaviour Percentile	-0.531	0.114
	CY-PSPP Global-Self Worth	SSIS Autism Spectrum Behaviour Level	-0.471	0.169
	CY-PSPP Global-Self Worth	SSIS Autism Spectrum Raw Score	-0.336	0.343
8-week Follow Up	CY-PSPP Global-Self Worth	SSIS Social Raw Score	0.383	0.245
	CY-PSPP Global-Self Worth	SSIS Social Standard Score	0.410	0.211
	CY-PSPP Global-Self Worth	SSIS Social Percentile	0.651	0.057
	CY-PSPP Global-Self Worth	SSIS Problem Behaviour Raw Score	-0.408	0.212
	CY-PSPP Global-Self Worth	SSIS Problem Behaviour Standard Score	-0.398	0.225
	CY-PSPP Global-Self Worth	SSIS Problem Behaviour Percentile	-0.415	0.204
	CY-PSPP Global-Self Worth	SSIS Autism Spectrum Behaviour Level	-0.412	0.209
	CY-PSPP Global-Self Worth	SSIS Autism Spectrum Raw Score	-0.379	0.250

Appendix 17: Parent Verbatim Feedback

Feedback
1. Do you think this multi-sport camp helped your daughter make improvements in her motor skills? Please explain you answer using example(s).
Yes. She plays rec. soccer and didn't really participate before. She still just runs around during the game (doesn't touch the ball), but she does participate in the practice now and is able to kick the ball further. She can also play tee ball and actually hit the ball.
Yes. She is now willing to try sports. Right after camp, wanting to play sports, that she usually wouldn't want to play. Much more active, then she has ever been. Motor skills, control of ball, handling ball much more precise.
Maybe a small amount. It is hard to say because she didn't participate much when we came to watch her on Olympic day but she did hit the t-ball with more strength and accuracy leading to an "in the park home run" which she had never done before.
I haven't really seen much of an improvement or change in the way she approaches sports. I believe the program was too short to make any significant changes in motor skills.
Yes I do believe it helped my daughters motor skills because once camp was done she began running while playing music videos. And this is something I have never seen her do before. It was terrific.
For sure! She has continued to show us some of the skills she learned during the week at camp. She wants to demonstrate her balance, and jumping skills over and over. She had a fantastic week!
I'm guessing that it did but I haven't observed any differences.
Yes, I definitely think the camp helped [name] with her gross motor skills. She demonstrated her improved skills on the last day of camp during the basketball game when the majority of her shots went into the net. Before she would only get it in the odd time.
Yes. She has been more surefooted & coordinated in her motions & sports activities as well as general mobility.
[name] improved her basketball skills in regards to learning how to shoot the ball at the net to get it in and learning new passing techniques. She also improved her gross skills (& handeye coordination) in basketball. She can now hit the ball & even hit it with more power.
Yes! She got more active at home than before.
I have not noticed specific improvements at home but when I was watching her on the last day of camp, she scored & came close to scoring at basketball which she has had a lot of difficulty in the past.
Our daughter, [name] wore a large plaster cast on her dominant arm, but she still attempted to play sports. She has never played

baseball so it was great to see her swing a bat and learn what base to run too. It was great to see her play basketball with her weaker arm. Her weaker arm definitely got stronger because of using it for different sports. Her hand-eye coordination improved because of trying different activities ie. Badminton rackets with a ball in the middle. The multi-sports camp gave Ella the opportunity to strengthen exercise (move) her body doing sports she has never attempted before.
2. Do you think this camp helped your daughter gain confidence? Please explain your answer using an example(s).
Yes, she is more confident at soccer (as stated above) and was proud to show off her new sills to her dad and I.
Yes. Wanting to play, not worrying about what others have to say. Feeling confident that she can actually perform the activity. As before she wouldn't try as she felt she couldn't do the sport and would fail herself and others.
Yes I do think this improved her confidence. My daughter was able to see that her sports skills are actually average to good on a continuum when compared to other girls where as in gym class she was always comparing herself to the boys and other students in her class that have a stronger sports background.
It might have slightly gained her confidence because she has more an understanding of how to play the different types of sports. She still feels that she doesn't know/or is not good enough to play sports.
I'm not sure if she gained confidence but I know she really enjoyed going and being around other kids and adults.
I think it has improved her confidence. She has been more actively involved with friends when it comes to sports. She felt good before, but now she has the confidence to participate. In soccer she showed us how much faster she was running after the ball. She was also more confident going in goal to stop shots.
Yes I do.. she was happy and proud that she got to learn baseball and soccer and she had friends at the camp.
Yes. [name] showed increased confidence following camp, everyday she came home very proud of her performance at the various sports at camp.
This will be hard to judge she has always been a positive forward style of individual so to say she has gained any more confidence would be, as above difficult to ascertain.
With making new friends that looked up to her in regards to sports she did gain confidence by trying new sports & finding out she could play them she also gained confidence in herself. She can now take part in more sports at school gym class without being self-conscious on her performance.
Yes! She gain confidence of making friends. Her social skills improved a lot. She follow instruction very well.
Absolutely. [name] was happy and excited to go to a new environment (the camp) which is new for her (often she has a lot of anxiety surrounding attending events with groups of people she is not familiar with). She felt more confident speaking with the other girls and made new friends. She has been singing songs from camp for her Oma & Opa and doing the motions.

The camp helped [name] to attempt new sports, exercise, movements because a counsellor helped break down the steps to learn the "sport". Also the counsellors helped [name] to initiate (try) sports because she lacks confidence to try something she hasn't been exposed too! Ie. she knows how to shoot a basketball but she has never played in a game. She learned to guard a certain part of the court and be offensive in another part of the court. Please see notes about baseball above as she had no exposure to baseball so every concept was new. Our daughter gets a lot of satisfaction and pride in herself when she completes "something new".
3. Do you think that your daughter has taken more interest in being physically active since the camp ended? If yes, will she likely join a new or return to a physical recreational activity or sport in the future?
Yes, she doesn't put up a fight when it's time to go to soccer (as she used to). She will be returning to gymnastics and swimming in the fall. She is also asking to sign up for ballet.
Yes – wanting to play basketball and golf. I am hoping she will want to continue. She will be encouraged to join her gym class while others are participating.
Not yet – she said she "needed a brake after a week of sports camp. However, she is excited to return to horse back riding, kickboxing and cheerleading in September.
I don't think she has gained more interest in sports, but I will try to keep introducing her to the idea of sports. I will join more camps of these types to keep her exposed.
I believe she has become more active she enjoys running and playing catch and soccer more now than before.
She absolutely loves sports. I think she has taken more of an interest in how others are doing in an athletic event. I think she will continue to seek out athletic opportunities.
She definitely has more interest and has asked me to start playing sports with her in the backyard. There are not many options for special kids for sports but I am signing her up for a martial arts class at Grandview and if there were sports ones we would do them.
[name] has always been physically active, however I think it helped broaden her exposure to different sports and would impact her decision to try them at school if she had the chance.
She has always enjoyed physical/recreational activities and programs; this program may have given her a bit more of a "push" to try or continue on with sporting activities.
She is quite physically active. She will return to playing soccer and figure skating. She may be interested in playing basketball at school. Now that she has played it at camp.
Yes! She is more physically active at home than before. She is swimming at home and will enroll her in skating this winter.
She hasn't specifically requested to do other physical activities but she has definitely been more open to the idea of signing up for more activities (such as horseback riding & trampoline).

I would say no but only because [name] has a broken arm. She continues to play basketball. The biggest change we have witnessed is her creative ideas setting up sports games/activities/obstacle courses for her friends/sister. She uses balls, hola hoops, pylons whatever she can find to set up games. She is the coach and instructs her team! This is new and we think it is due to her involvement at the game.
4. Would you recommend this camp to other parents with a daughter with an intellectual or developmental disability? Please explain why.
Yes!! [name] had a lot of fun and actually participated. In regular camps, she mostly just watches the other children. I think if she was able to participate in something like this more often, she would increase her skills and confidence even more. I think participating with other girls with developmental delays males her less self-conscious about joining in. The low counsellor:camper ratio was amazing too. Thank you!!
Yes – As it showed my daughter that she can still participate regardless of her level of ability and skills.
Yes I would – I think it would be of greater value for girls with intellectual or developmental disabilities, especially girls with no sport experience or very limited ability (sports skills). The reason for this is because it combines fun (games) with learning skills so they don't realize they are learning and I definitely noticed and have experienced myself that learning in a noncompetitive fun atmosphere helps with self-confidence & making friends.
I would definitely recommend to parents in the same situation because of the social bonding developed through this program. Also it keeps them active in a non-competitive way and exposed to sports, plus staff is aware of how to deal when outbursts happen.
I cannot say enough good things about this camp. It was extremely organized and so much fun. Everyone was warm & welcoming I can't think thank you guys enough for the wonderful time you gave my daughter.
I would for sure. My daughter had a fantastic week. She felt safe and cared for and created many lasting memories. She learned lots of new skills and gained confidence in different athletic activities and participating with different people. Thank you!!
Absolutely. The camp was great, the staff were great and she really loved it. Us parents were excited to meet other families with special girls.
Absolutely! The camp was fabulous and gave the girls a chance to meet other girls with similar challenges and make new friends. It provided a positive atmosphere where the girls felt confident and were willing to try new sports.
Yes, any program such as this that gives positive reinforcement and builds personal confidence & skills, be they interpersonal, or physical can only be a benefit to any and or all who participate. I saw children who were more outgoing as they were when they

began. It was the positive nature of the program & the staff that helps this come out in the children.
Yes, anytime there is an opportunity to have any child with or without disabilities interact with other children with similar qualities it can only help, with regards to socialization and helping them learn new play skills. By learning new things she can now go into other new situations with more confidence that she will not fail. Go in with an open mind that she may actually have a good time & succeed at the task. I would recommend this camp!
Yes! Its help motivate my daughter physically and socially. P.S thanks for giving her the opportunity to join the camp.
Absolutely. [name] was super-excited to meet other girls with autism and I think that she felt that it was easier to feel comfortable amongst her peers, something that I think that all children can benefit from.
Yes. UOIT (Lindsay) partner successfully with Grandview. The support from Grandview was essential as the support team did a fantastic job supporting each girl. We hope [name] can be involved in a camp like this again. It is her only exposure to sports. Thank you for running this camp. [name] is more positive – and it certainly helped get through a challenging summer with a cast!

Appendix 18: Raw Data Tables

TGMD-2 data by participant at pre-test

Variable	Participants															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Age (Year-Month-Day)	08-06-08	09-05-18	10-06-12	09-02-14	08-08-03	08-05-05	08-02-08	08-02-11	10-09-08	10-05-20	11-07-13	11-09-04	10-03-25		09-09-06	11-00-29
Locomotor Raw Score	35	38	43	38	9	34	26	37	37	41	20	11	36		33	21
Locomotor Standard Score	6	7	9	7	1	6	3	7	6	8	1	1	6		5	1
Locomotor Percentile	9	16	37	16	<1	9	1	16	9	25	<1	<1	9		5	<1
Locomotor Age Equivalent (Year-Month)	5-9	6-3	8-6	6-3	<3-0	5-6	4-3	6-0	6-0	7-3	3-3	<3-0	6-0		5-6	3-3
Object Control Raw Score	20	26	38	35	13	34	18	39	37	36	26	11	28		23	25
Object Control Standard Score	2	4	8	8	1	8	1	10	7	7	4	1	4		3	3
Object Control Percentile	<1	2	25	25	<1	25	<1	50	16	16	2	<1	2		1	1
Object Control Age Equivalent (Year-Month)	4-0	5-3	8-0	7-3	<3-0	7-0	3-9	8-3	7-9	7-6	5-3	<3-0	5-9		4-6	5-0
Summary of Standard Scores	8	11	17	15	2	14	4	17	13	15	5	2	10		8	4
Gross Motor Quotient	64	73	91	85	46	82	52	91	79	85	55	46	70		64	52
Gross Motor Quotient Percentile	<1	3	27	16	<1	12	<1	27	8	16	<1	<1	2		<1	<1

TGMD-2 data by participant at post-test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Age (Year-Month-Day)	08-07-09	09-08-17	10-07-01	09-03-14	08-09-11	08-05-24	08-03-05	08-03-07	10-10-05	10-06-11	11-08-10	11-10-01	10-04-29		09-10-16	11-02-00
Locomotor Raw Score	40	38	44	41	7	41	37	41	39	44	17	15	39		40	25
Locomotor Standard Score	8	7	10	8	1	9	7	9	7	10	1	1	7		8	2
Locomotor Percentile	25	16	50	25	<1	37	16	37	16	50	<1	<1	16		25	<1
Locomotor Age Equivalent (Year-Month)	6-9	6-3	10	7-3	<3-0	7-3	6-0	7-3	6-6	10-0	<3-0	<3-0	6-6		6-9	4-0
Object Control Raw Score	25	33	39	38	18	35	27	41	43	36	24	17	35		31	26
Object Control Standard Score	4	7	8	9	1	8	5	11	11	7	3	1	7		6	4
Object Control Percentile	2	16	25	37	<1	25	5	63	63	16	1	<1	16		9	2
Object Control Age Equivalent (Year-Month)	5-0	6-9	8-3	8-0	3-9	7-3	5-6	9-6	>10-9	7-6	4-9	3-6	7-3		6-3	5-3
Summary of Standard Scores	12	14	18	17	2	17	12	20	18	17	4	2	14		14	6
Gross Motor Quotient	76	82	94	91	46	91	76	100	94	91	52	46	82		82	58
Gross Motor Quotient Percentile	5	12	35	27	<1	27	5	50	35	27	<1	<1	12		12	<1

TGMD-2 data by participant at follow up test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Age (Year-Month-Day)	08-08-18	09-09-04	10-08-28	09-04-30	08-11-05	08-07-15	08-04-20	08-04-20	10-11-16	10-07-26	11-09-22	11-17-11	10-06-07		09-11-13-	11-03-03
Locomotor Raw Score	39	38	43	37	13	42	41	43	42	46	7	25	41		40	26
Locomotor Standard Score	8	7	9	6	1	9	9	10	9	12	1	2	8		8	2
Locomotor Percentile	25	16	37	9	<1	37	37	50	37	75	<1	<1	25		25	<1
Locomotor Age Equivalent (Year-Month)	6-6	6-3	8-6	6-0	<3-0	8-0	7-3	8-6	8-0	>10-9	<3-0	4-0	7-3		6-9	4-3
Object Control Raw Score	30	36	41	38	17	39	33	41	40	38	25	23	34		33	24
Object Control Standard Score	6	8	9	9	1	10	7	11	8	8	3	3	6		7	3
Object Control Percentile	9	25	37	37	<1	50	16	63	25	25	1	1	9		16	1
Object Control Age Equivalent (Year-Month)	6-0	7-6	9-6	8-0	3-6	8-3	5-6	9-6	8-9	8-0	5-0	4-6	7-0		6-9	4-9
Summary of Standard Scores	14	15	18	15	2	19	16	21	17	20	4	5	14		15	5
Gross Motor Quotient	82	85	94	85	46	97	88	103	91	100	52	55	82		85	55
Gross Motor Quotient Percentile	12	16	35	16	<1	42	21	58	27	50	<1	<1	12		16	<1

CY-PSPP data by participant at pre-test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Sport Athletic Competence Raw Score	10	8		10		19	9	22	17	14			17	14	11	15
Sport Athletic Competence (Scale of 4)	1.67	1.33		1.67		3.17	1.5	3.67	2.83	2.33			2.83	2.33	1.83	2.5
Condition/Stamina Competence Raw Score	10	8		11		15	17	24	13	15			9	15	11	16
Condition/Stamina Competence (Scale of 4)	1.67	1.33		1.83		2.5	2.83	4	2.17	2.5			1.5	2.5	1.83	2.67
Attractive Body Adequacy Raw Score	19	22		22		16	22	24	11	30			14	17	21	24
Attractive Body Adequacy (Scale of 4)	3.17	3.67		3.67		2.67	3.67	4	1.83	3.33			2.33	2.83	3.5	4
Strength Competence Raw Score	9	10		11		13	14	23	13	17			11	15	14	24
Strength Competence (Scale of 4)	1.5	1.67		1.83		2.17	2.33	3.83	2.17	2.83			1.83	2.5	2.33	4
Physical Self Worth Raw Score	18	21		19		16	23	24	15	23			19	17	23	23
Physical Self Worth (Scale of 4)	3	3.5		3.17		2.67	3.83	4	2.5	3.83			3.17	2.83	3.83	3.83
Global Self Worth Raw Score	15	3		16		16	16	24	15	24			24	16	20	23
Global Self Worth (Scale of 4)	2.5	18		2.67		2.67	2.67	4	2.5	4			4	2.67	3.33	3.83
Total Raw Score	81	87		89		95	101	141	84	113			94	94	100	125
Total (Scale of 4)	2.25	2.42		2.47		2.64	2.81	3.92	2.33	3.14			2.61	2.61	2.78	3.47

CY-PSPP data by participant at post test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Sport Athletic Competence Raw Score	10	17		11		21	14	23	12	21			18	12	21	
Sport Athletic Competence (Scale of 4)	1.67	2.83		1.83		3.5	2.33	3.83	2	3.5			3	2	3.5	
Condition/Stamina Competence Raw Score	12	8		8		22	21	23	13	18			8	16	19	
Condition/Stamina Competence (Scale of 4)	2	1.33		1.33		3.67	3.5	3.83	2.17	3			1.33	2.67	3.17	
Attractive Body Adequacy Raw Score	21	20		22		17	18	18	14	15			17	12	23	
Attractive Body Adequacy (Scale of 4)	3.5	3.33		3.67		2.83	3	3	2.33	2.5			2.83	2	3.83	
Strength Competence Raw Score	12	12		11		16	14	20	16	20			17	15	15	
Strength Competence (Scale of 4)	2	2		1.83		2.67	2.33	3.33	2.67	3.33			2.83	2.5	2.5	
Physical Self Worth Raw Score	18	19		19		18	17	22	14	24			24	12	24	
Physical Self Worth (Scale of 4)	3	3.17		3.17		3	2.83	3.67	2.33	4			4	2	4	
Global Self Worth Raw Score	19	19		19		21	19	19	13	24			24	15	24	
Global Self Worth (Scale of 4)	3.17	3.17		3.17		3.5	3.17	3.17	2.17	4			4	2.5	4	
Total Raw Score	92	95		90		115	103	125	82	122			108	82	126	
Total (Scale of 4)	2.55	2.64		2.5		3.19	2.86	3.47	2.28	3.39			3	2.28	3.5	

CY-PSPP data by participant at follow up test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Sport Athletic Competence Raw Score	11	15	10	12		23	15	18	17	23			14	16	21	14
Sport Athletic Competence (Scale of 4)	1.83	2.5	1.67	2		3.83	2.5	3	2.83	3.83			2.33	2.67	3.5	2.33
Condition/Stamina Competence Raw Score	12	10	20	9		19	16	24	19	18			6	14	22	15
Condition/Stamina Competence (Scale of 4)	2	1.67	3.33	1.5		3.17	2.67	4	3.17	3			1	2.33	3.67	2.5
Attractive Body Adequacy Raw Score	18	23	22	21		19	18	18	18	20			20	14	23	23
Attractive Body Adequacy (Scale of 4)	3	3.83	3.67	3.5		3.17	3	3	3	3.33			3.33	2.33	3.83	3.83
Strength Competence Raw Score	12	12	18	12		16	13	13	18	23			13	15	20	14
Strength Competence (Scale of 4)	2	2	3	2		2.67	2.17	2.17	3	3.83			2.17	2.5	3.33	2.33
Physical Self Worth Raw Score	18	24	20	23		19	18	24	19	21			21	17	22	19
Physical Self Worth (Scale of 4)	3	4	3.33	3.83		3.17	3	4	3.17	3.5			3.5	2.83	3.67	3.17
Global Self Worth Raw Score	17	18	20	20		21	22	24	21	24			24	14	21	21
Global Self Worth (Scale of 4)	2.83	3	3.33	3.33		3.5	3.67	4	3.5	4			4	2.33	3.5	3.5
Total Raw Score	88	102	110	97		117	102	121	112	129			98	90	129	106
Total (Scale of 4)	2.44	2.83	3.06	2.69		3.25	2.83	3.36	3.11	3.58			2.72	2.5	3.58	2.94

CSAPPA data by participant at pre test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Adequacy	16	16	10	14	13	23	7	28	20	24	19		20	22	11	16
Predilection	27	20	12	15	23	36	18	36	21	33	19		20	19	25	33
Enjoyment	12	5	9	9	7	12	5	12	12	10	9		8	9	12	12
Total	55	41	31	38	43	71	30	76	53	67	47		48	50	48	61

CSAPPA data by participant at post test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Adequacy	15	19	14	14	17	22	16	28	17	25	12		19	12	28	
Predilection	20	25	20	12	24	35	25	36	27	35	14		17	18	35	
Enjoyment	8	9	9	7	11	12	10	12	9	8	3		7	5	12	
Total	43	53	43	33	52	69	51	76	53	68	29		43	35	75	

CSAPPA data by participant at follow up test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Adequacy	14	17	16	13	15	23	17	27	25	26	9		12	15	28	16
Predilection	20	31	17	12	25	35	27	35	29	36	17		9	21	36	29
Enjoyment	8	8	9	7	8	10	9	12	12	12	3		3	8	12	7
Total	42	56	42	32	48	68	53	74	66	74	29		24	44	76	52

SSIS data by participant at pre test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Communication raw score	11	10	9	11	8	9	10	13	16	20	17	6	15	13	17	19
Communication behaviour level	1	1	1	1	1	1	1	2	2	3	2	1	2	2	2	2
Cooperation raw score	12	14	12	10	6	12	9	11	13	13	13	5	18	10	13	16
Cooperation behaviour level	2	2	2	1	1	2	1	2	2	2	2	1	3	1	2	2
Assertion raw score	8	16	15	13	6	11	12	16	14	15	7	6	9	15	19	21
Assertion behaviour level	1	2	2	2	1	1	2	2	2	2	1	1	1	2	2	3
Responsibility raw score	10	13	15	10	1	9	12	16	13	15	10	3	17	10	14	16
Responsibility behaviour level	2	2	2	2	1	1	2	2	2	2	2	1	3	2	2	2
Empathy raw score	13	4	10	11	3	2	3	10	11	17	13	3	8	14	16	18
Empathy behaviour level	2	1	1	2	1	1	1	1	2	2	2	1	1	2	2	3
Engagement raw score	6	9	9	11	3	4	4	12	15	15	19	3	10	16	14	19
Engagement behaviour level	1	1	1	1	1	1	1	2	2	2	2	1	1	2	2	2
Self-Control raw score	10	1	7	7	3	10	10	11	10	11	14	1	13	10	5	20
Self-Control behaviour level	2	1	1	1	1	2	2	2	2	2	2	1	2	2	1	3
Social Skills sum of raw scores	70	67	77	73	30	57	60	89	92	106	93	27	90	88	98	129
Social Skills standard score	74	72	80	77	41	63	66	91	93	105	94	40	91	90	98	124
Social Skills percentile score	5	4	10	7	<1	1	2	25	31	62	33	<1	27	23	44	95
Externalizing raw score	14	13	12	11	9	21	13	16	7	6	8	20	7	20	9	8
Externalizing behaviour level	3	3	3	2	2	3	3	3	2	2	2	3	2	3	2	2
Bullying raw score	2	3	3	2	1	8	3	1	1	0	0	8	2	4	1	1
Bullying behaviour level	2	2	2	2	2	3	2	2	2	2	2	3	2	3	2	2
Hyperactivity raw score	11	11	10	14	11	12	15	16	7	6	7	17	7	14	6	9
Hyperactivity behaviour level	3	3	3	3	3	3	3	3	2	2	2	3	2	3	2	3
Internalizing raw score	13	15	13	12	6	17	11	9	8	8	3	14	16	10	15	1
Internalizing behaviour level	3	3	3	3	2	3	3	2	2	2	2	3	3	3	3	2

SSIS data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Problem Behaviour sum of raw score	43	42	35	36	27	57	41	39	26	21	20	52	34	50	34	16
Problem Behaviour standard score	134	133	125	126	115	152	132	129	113	107	106	146	123	143	123	101
Problem Behaviour percentile score	97	96	93	94	85	99	96	95	83	73	71	98	92	98	92	57
Autism Spectrum raw score	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	2
Autism Spectrum behaviour level	26	28	19	20	28	30	30	19	16	9	13	32	17	23	16	4

SSIS data by participant at follow up

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Communication raw score	13	10	9	11	12	12	12	11	16	19	15	5	11	16	16	11
Communication behaviour level	2	1	1	1	1	1	1	1	2	2	2	1	1	2	2	1
Cooperation raw score	10	11	12	11	9	12	13	11	13	12	14	7	18	11	15	12
Cooperation behaviour level	1	2	2	2	1	2	2	2	2	2	2	1	3	2	2	2
Assertion raw score	8	11	16	11	9	11	5	18	17	15	5	5	9	13	16	21
Assertion behaviour level	1	1	2	1	1	1	1	2	2	2	1	1	1	2	2	3
Responsibility raw score	13	13	15	7	2	12	6	11	14	14	12	1	14	8	13	12
Responsibility behaviour level	2	2	2	1	1	2	1	2	2	2	2	1	2	1	2	2
Empathy raw score	11	6	12	9	4	18	8	11	16	16	12	1	10	5	15	18
Empathy behaviour level	2	1	2	1	1	3	1	2	2	2	2	1	1	1	2	3
Engagement raw score	5	9	10	12	7	4	5	11	17	14	13	1	8	10	14	14
Engagement behaviour level	1	1	1	2	1	1	1	1	2	2	2	1	1	1	2	2
Self-Control raw score	11	3	6	5	5	7	18	11	12	13	13	1	17	2	8	15
Self-Control behaviour level	2	1	1	1	1	1	3	2	2	2	2	1	3	1	1	2
Social Skills sum of raw scores	71	63	80	66	48	78	67	84	105	103	84	21	87	65	97	103
Social Skills standard score	75	69	83	71	56	81	72	86	104	102	86	40	89	70	97	102
Social Skills percentile score	5	2	13	3	<1	11	4	17	60	55	17	<1	22	3	42	55
Externalizing raw score	18	14	12	14	9	16	8	13	13	5	10	22	5	14	10	5
Externalizing behaviour level	3	3	3	3	2	3	2	3	3	2	2	3	2	3	2	2
Bullying raw score	4	1	1	2	1	4	3	0	3	0	0	9	1	3	0	0
Bullying behaviour level	3	2	2	2	2	3	2	2	2	2	2	3	2	2	2	2
Hyperactivity raw score	11	13	9	10	11	11	9	13	12	6	5	18	7	13	10	5
Hyperactivity behaviour level	3	3	3	3	3	3	3	3	3	2	2	3	2	3	3	2
Internalizing raw score	13	12	10	15	8	14	9	7	10	6	6	15	18	8	10	0
Internalizing behaviour level	3	3	3	3	2	3	2	2	3	2	2	3	3	2	3	1

SSIS data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Problem Behaviour sum of raw score	48	44	30	40	30	44	36	31	41	16	29	59	37	31	32	9
Problem Behaviour standard score	141	136	118	127	118	136	126	120	132	101	117	154	127	120	121	92
Problem Behaviour percentile score	97	97	88	96	88	97	94	89	96	57	87	>99	94	89	90	31
Autism Spectrum raw score	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2
Autism Spectrum behaviour level	26	31	18	21	26	25	29	19	18	9	18	36	26	16	15	12

VABS-2 data by participant at pre test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Receptive raw score	29	28	34	33	20	35	25	31	29	33	33	15	33	34	35	34
Receptive v-Scale score	11	10	11	12	8	13	9	9	9	11	11	4	11	11	13	11
Receptive Adaptive Level	2	2	2	2	1	3	1	1	1	2	2	1	2	2	3	2
Receptive Age Equivalent (Years-Months)	3-5	2-11	5-6	4-11	1-7	6-6	2-5	3-11	3-5	4-11	4-11	1-3	4-11	5-6	6-6	5-6
Expressive raw score	78	95	98	91	35	108	104	95	108	104	70	18	35	26	107	77
Expressive v-Scale	10	11	11	10	6	21	16	11	18	13	7	4	6	5	18	8
Expressive Adaptive Level	2	2	2	2	1	5	3	2	4	3	1	1	1	1	4	1
Expressive Age Equivalent (Years-Months)	3-7	5-11	6-7	5-4	1-11	22	8-7	5-11	22	8-7	3-2	1-0	1-11	1-5	12-3	3-6
Written raw score	26	31	37	29	0	44	26	34	47	34	12	8	38	28	34	13
Written v-Scale score	12	11	13	11	5	21	12	10	19	11	6	6	14	10	12	7
Written Adaptive Level	2	2	3	2	1	5	2	2	4	2	1	1	3	2	2	1
Written Age Equivalent (Years-Months)	6-11	7-10	9-2	7-6	1-10	11-9	6-11	8-6	14-0	8-6	4-11	4-3	5-2	7-1	8-6	5-1
Communication v-Scale score	33	32	35	33	19	55	37	30	46	35	24	14	31	26	43	26
Communication standard score	77	75	81	77	54	122	84	72	102	81	62	45	74	65	96	65
Communication percentile score	6	5	10	6	0	93	14	3	55	10	1	0	4	1	39	1
Communication Adaptive Level	2	2	2	2	1	4	2	2	3	2	1	1	2	1	3	1
Personal raw score	47	67	66	55	43	76	39	56	81	68	43	41	59	60	67	50
Personal v-Scale score	9	12	11	9	8	21	8	8	23	12	6	7	9	9	12	7
Personal Adaptive Level	1	2	2	1	1	5	1	1	5	2	1	1	1	1	2	1
Personal Age Equivalent (Years-Months)	3-6	6-7	6-6	4-2	3-2	14-0	2-9	4-5	20	7-5	3-2	3-0	4-10	4-11	6-7	3-9
Domestic raw score	9	23	28	9	6	47	5	15	30	23	11	4	22	8	10	6
Domestic v-Scale score	10	13	14	9	9	24	9	8	14	12	7	5	12	7	9	5
Domestic Adaptive Level	2	1	3	1	1	5	1	1	3	2	1	1	2	1	1	1
Domestic Age Equivalent (Years-Months)	3-5	8-0	9-6	3-5	2-6	20	2-2	5-6	9-10	8-0	4-6	1-10	7-7	2-11	3-11	2-6

VABS-2 data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Community raw score	21	56	62	34	11	71	22	55	67	58	23	6	47	37	44	29
Community v-Scale score	9	13	15	10	7	22	9	12	18	13	7	5	10	9	11	7
Community Adaptive Level	1	1	3	2	1	5	1	2	4	3	1	1	2	1	2	1
Community Age Equivalent (Years-Months)	2-6	9-0	10-10	6-1	3-1	15-9	4-10	8-11	13-9	8-6	4-11	2-2	7-6	6-6	7-0	5-10
Daily Living Skills v-Scale score	28	38	40	28	24	67	26	28	55	37	20	17	31	25	32	19
Daily Living Skills standard score	68	85	89	68	62	146	65	68	120	83	57	52	73	63	74	55
Daily Living Skills percentile score	2	16	23	2	1	99	1	2	91	13	0	0	4	1	4	0
Daily Living Skills Adaptive Level	1	2	3	1	1	5	1	1	4	2	1	1	2	1	2	1
Interpersonal raw score	35	20	51	52	27	40	24	48	63	63	62	14	48	48	40	42
Interpersonal v-Scale score	8	6	9	10	7	9	7	8	12	12	12	4	9	9	9	7
Interpersonal Adaptive Level	1	1	1	2	1	1	1	1	2	2	2	1	1	1	1	1
Interpersonal Age Equivalent (Years-Months)	2-3	0-7	4-7	4-8	1-4	2-10	0-11	3-10	7-6	7-6	7-5	0-4	3-10	3-10	2-10	2-11
Play and Leisure Time raw score	29	22	34	42	10	42	28	55	59	53	46	9	43	28	27	40
Play and Leisure Time v-Scale score	8	7	8	11	5	11	8	14	19	13	10	4	10	7	8	8
Play and Leisure Time Adaptive Level	1	1	1	2	1	2	1	3	4		2	1	2	1	1	1
Play and Leisure Time Age Equivalent (Years-Months)	3-1	2-2	3-10	5-4	0-11	5-4	2-11	10-6	14-0		6-6	0-10	5-7	2-11	2-10	4-11
Coping raw score	25	22	38	26	10	30	27	35	54		31	0	38	23	40	53
Coping v-Scale score	12	10	13	11	8	13	12	12	17		11	5	13	10	14	16
Coping Adaptive Level	2	2	3	2	1	3	2	2	3		2	1	3	2	3	3
Coping Age Equivalent (Years-Months)	4-7	2-1	7-6	4-7	2-1	5-6	4-8	6-7	12-9		5-7	0-1	7-6	3-11	8-5	12-6
Socialization v-Scale score	28	23	30	32	20	33	27	34	48		33	13	32	26	31	31
Socialization standard score	69	61	73	76	55	78	68	80	105	64	78	43	76	66	75	75
Socialization percentile score	2	0	4	5	0	7	2	9	63	1	7	0	5	1	5	5
Socialization Adaptive Level	1	1	2	2	1	2	1	2	3	1	2	1	2	1	2	2

VABS-2 data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Adaptive Behaviour Composite sum of raw scores	214	221	243	221	171	346	217	220	327	228	197	140	223	194	245	195
Adaptive Behaviour Composite sum of standard scores	70	72	79	72	58	115	71	71	111	74	64	46	72	63	80	64
Adaptive Behaviour Composite percentile score	2	3	8	3	0	84	3	3	77	4	1	0	3	1	9	1
Adaptive Behaviour Composite Adaptive Level	1	2	2	2	1	4	1	2	3	2	1	1	2	1	2	1
Internalizing raw score	9	12	7	7	10	14	15	5	7	6	6	8	15	6	5	
Internalizing v-Scale score	21	22	20	20	21	23	23	19	20	19	13	20	23	19	19	
Internalizing Adaptive Level	3	3	2	2	3	3	3	2	2	2	1	2	3	2	2	
Externalizing raw score	9	3	9	3	5	10	3	6	5	2	5	11	4	10	4	
Externalizing v-Scale score	19	16	19	14	17	20	16	18	17	15	17	20	17	20	16	
Externalizing Adaptive Level	2	2	2	1	2	2	1	2	1	1	1	2	1	2	1	
Other raw score	23	19	21	7	9	36	24	16	16	10	9	34	25	25	14	
Maladaptive Behaviour raw score	23	19	21	7	9	5	13	2	5	2	3	14	11	4	4	
Maladaptive Behaviour v-Scale score	20	19	20	16	17	15	18	14	15	14	14	18	17	15	15	
Maladaptive Behaviour Adaptive Level	2	2	2	1	2	1	2	1	1	1	1	2	1	1	1	

VABS-2 data by participant at follow up

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Receptive raw score	35	40	33	32	21	41	34	30	35	35	37	13	32	33	34	34
Receptive v-Scale score	13	18	11	11	8	18	13	9	12	12	13	4	10	11	12	11
Receptive Adaptive Level	3	2	2	2	1	4	3	1	2	2	1	1	2	2	2	2
Receptive Age Equivalent (Years-Months)	6-6	18	4-11	4-7	1-9	18	5-6	3-7	6-5	6-6	8-6	1-2	4-7	4-11	5-6	5-6
Expressive raw score	78	108	99	83	40	98	74	98	108	108	92	14	100	87	103	83
Expressive v-Scale	10	20	11	10	7	12	9	11	18	15	10	4	12	9	13	9
Expressive Adaptive Level	2	2	2	2	1	2	1	2	4	3	2	1	2	1	3	1
Expressive Age Equivalent (Years-Months)	3-7	22	7-0	4-0	2-1	6-8	3-5	6-7	22	10-6	5-6	0-9	7-6	4-7	8-4	4-0
Written raw score	27	50	33	34	0	48	26	36	47	38	11	6	38	26	34	16
Written v-Scale score	11	24	11	13	5	23	11	11	19	13	6	6	13	9	12	7
Written Adaptive Level	2	5	2	3	1	5	2	2	4	3	1	1	3	1	2	1
Written Age Equivalent (Years-Months)	7-0	22	8-1	8-6	1-10	15-3	6-11	9-0	14	9-6	4-10	3-10	9-6	6-11	8-6	5-6
Communication v-Scale score	34	62	33	34	20	53	33	29	49	40	29	14	35	29	37	27
Communication standard score	79	140	77	79	56	117	77	70	107	90	70	45	81	70	84	67
Communication percentile score	8	99	6	8	0	87	6	2	68	25	2	0	10	2	14	1
Communication Adaptive Level	2	5	2	2	1	4	2	1	3	3	1	1	2	1	2	1
Personal raw score	36	53	66	58	39	73	38	61	78	71	44	44	66	65	57	35
Personal v-Scale score	8	9	11	10	8	17	8	8	20	14	6	7	11	11	9	4
Personal Adaptive Level	1	1	2	2	1	3	1	1	4	3	1	1	2	2	1	1
Personal Age Equivalent (Years-Months)	2-3	4-0	6-6	4-7	2-0	11-3	2-10	5-0	16-0	8-10	3-2	3-2	6-6	6-1	4-6	2-8
Domestic raw score	8	27	25	7	4	46	8	17	39	30	11	0	32	8	18	2
Domestic v-Scale score	10	14	13	8	7	23	10	9	17	14	7	3	15	7	12	4
Domestic Adaptive Level	2	3	3	1	1	5	2	1	3	3	1	1	3	1	2	1
Domestic Age Equivalent (Years-Months)	2-11	9-4	8-6	2-8	1-10	17-6	2-11	6-5	12-0	9-10	4-6	0-7	10-4	2-11	6-6	1-2

VABS-2 data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Community raw score	20	71	57	37	8	58	14	38	73	64	18	0	58	26	51	21
Community v-Scale score	9	22	13	10	7	16	8	8	21	16	6	3	13	8	12	6
Community Adaptive Level	1	5	3	2	1	3	1	1	5	3	1	1	3	1	2	1
Community Age Equivalent (Years-Months)	4-6	15-9	9-2	6-6	2-5	9-6	3-6	6-6	9-6	12-0	4-2	0-1	9-6	5-5	8-4	4-8
Daily Living Skills v-Scale score	27	45	37	28	22	56	26	25	58	44	19	13	39	26	33	14
Daily Living Skills standard score	66	100	83	68	59	123	65	63	128	84	55	47	87	65	76	48
Daily Living Skills percentile score	1	50	13	2	0	94	1	1	97	14	0	0	19	1	5	0
Daily Living Skills Adaptive Level	1	3	2	1	1	4	1	1	4	2	1	1	3	1	2	1
Interpersonal raw score	34	57	60	52	24	47	24	55	68	64	50	12	49	47	70	65
Interpersonal v-Scale score	8	11	11	10	7	10	7	10	15	13	8	4	9	9	16	13
Interpersonal Adaptive Level	1	2	2	2	1	2	1	2	3	3	1	1	1	1	3	3
Interpersonal Age Equivalent (Years-Months)	2-2	5-11	6-7	4-8	0-11	3-8	0-11	5-6	10-0	7-10	4-6	0-3	3-11	3-8	11-6	8-5
Play and Leisure Time raw score	30	41	40	35	12	58	25	52	58	55	40	13	48	27	44	47
Play and Leisure Time v-Scale score	9	10	9	9	5	19	8	12	18	15	8	4	11	7	11	10
Play and Leisure Time Adaptive Level	1	2	1	1	1	4	1	2	4	3	1	1	2	1	2	2
Play and Leisure Time Age Equivalent (Years-Months)	3-2	5-3	4-11	3-11	1-1	13-0	2-7	8-4	13	10-6	4-11	1-2	7-0	2-10	5-10	6-7
Coping raw score	20	34	47	28	16	33	50	39	59		41	2	38	23	37	34
Coping v-Scale score	11	12	15	11	10	12	17	12	21		13	5	13	10	13	11
Coping Adaptive Level	2	2	3	2	2	2	3	2	5		1	1	3	2	3	2
Coping Age Equivalent (Years-Months)	3-5	6-6	10-6	5-5	2-10	6-5	11-6	7-7	20		8-6	0-4	7-6	3-11	7-5	6-6
Socialization v-Scale score	28	33	35	30	22	41	32	34	54	28	29	13	33	26	40	34
Socialization standard score	69	78	82	73	59	92	76	80	121	69	71	43	78	66	91	80
Socialization percentile score	2	7	12	4	0	30	5	9	92	2	3	0	7	1	27	9
Socialization Adaptive Level	1	2	2	2	1	3	2	2	4	1	2	1	2	1	3	2

VABS-2 data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Adaptive Behaviour Composite sum of raw scores	214	318	242	220	174	332	218	213	356	243	196	135	246	201	251	195
Adaptive Behaviour Composite sum of standard scores	70	104	78	72	59	110	71	69	123	79	64	44	80	65	82	64
Adaptive Behaviour Composite percentile score	2	61	7	3	0	75	3	2	94	8	1	0	9	1	12	1
Adaptive Behaviour Composite Adaptive Level	1	2	2	2	1	3	2	1	4	2	1	1	2	1	2	1
Internalizing raw score	10	13	8	6	8	12	11	3	6	7	1	11	13	8	10	0
Internalizing v-Scale score	21	22	20	19	20	22	21	17	19	29	15	21	22	20	21	13
Internalizing Adaptive Level	3	3	2	2	2	3	3	1	2	2	1	3	3	2	3	1
Externalizing raw score	10	6	6	5	3	10	2	8	6	4	4	11	4	10	4	1
Externalizing v-Scale score	20	18	18	17	16	20	15	19	18	17	17	20	17	20	16	14
Externalizing Adaptive Level	2	2	2	1	1	2	1	2	2	1	1	2	1	2	1	1
Other raw score	28	29	19	4	16	28	16	17	16	11	12	38	25	26	18	5
Maladaptive Behaviour raw score	28	29	19	4	9	5	16	0	6	2	6	14	12	5	5	0
Maladaptive Behaviour v-Scale score	21	21	19	15	17	15	19	12	16	14	16	18	18	15	15	12
Maladaptive Behaviour Adaptive Level	3	3	2	1	1	1	2	1	1	1	1	2	2	1	1	1

CAPE Summary Score data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1 Doing Puzzles - Diversity		1		1	1	1		1				1		1		1
1 Doing Puzzles - Intensity		7		3	4	6		1				5		7		5
1 Doing Puzzles - With Whom		1		2	1	1		4				2		1		3
1 Doing Puzzles - Where		1		1	1	1		1				1		1		1
1 Doing Puzzles - Enjoyment		5		3	3	4		3				2		3		4
2 Board or Card Games - Diversity	1	1	1	1		1	1	1	1	1	1		1	1		1
2 Board or Card Games - Intensity	4	7	2	6		5	3	6	3	6	4		1	6		4
2 Board or Card Games - With Whom	2	2	2	2		2	2	5	4	5	2		2	3		2
2 Board or Card Games - Where	1	1	1	1		1	1	1	4	3	1		1	2		1
2 Board or Card Games - Enjoyment	5	5	3	3		4	5	5	4	5	5		4	4		5
3 Crafts, drawing, colouring - Diversity	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1
3 Crafts, drawing, colouring - Intensity	6	7	6	1	6		7	5	7	4	6	7	7	7	6	6
3 Crafts, drawing, colouring - With Whom	1	1	1	1	2		1	1	1	4	1	2	1	1	2	5
3 Crafts, drawing, colouring - Where	1	1	1	1	1		1	1	1	5	1	1	5	1	1	5
3 Crafts, drawing, colouring - Enjoyment	4	5	5	2	5		5	3	5	4	5	4	5	4	5	5
4 Collecting things - Diversity		1	1	1		1		1		1	1					
4 Collecting things - Intensity		6	5	5		2		3		1	3					
4 Collecting things - With Whom		1	1	1		2		5		3	1					
4 Collecting things - Where		5	1	1		6		6		6	3					
4 Collecting things - Enjoyment		3	4	3		5		5		5	5					
5 Computer or video games - Diversity	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
5 Computer or video games - Intensity	7	7	4	7	7	5		7	7	7	6	7	7	7	7	3
5 Computer or video games - With Whom	1	2	1	1	1	2		1	1	1	1	2	1	2	1	2
5 Computer or video games - Where	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
5 Computer or video games - Enjoyment	5	5	3	5	5	3		5	5	5	5	5	5	5	4	3

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
6 Talking on the phone - Diversity	1		1	1		1				1	1		1		1	1
6 Talking on the phone - Intensity	5		6	3		5				6	5		6		7	4
6 Talking on the phone - With Whom	3		4	3		4				3	2		3		1	2
6 Talking on the phone - Where	1		1	1		1				1	2		1		1	1
6 Talking on the phone - Enjoyment	5		2	1		4				4	5		2		5	2
7 Going to a party - Diversity	1	1	1	1		1		1	1	1	1	1	1	1		1
7 Going to a party - Intensity	3	3	2	1		2		3	3	2	2	3	1	1		3
7 Going to a party - With Whom	4	4	4	3		2		5	4	2	4	3	4	4		3
7 Going to a party - Where	5	4	5	2		1		6	6	6	5	2	3	5		2
7 Going to a party - Enjoyment	5	5	5	5		5		5	4	5	5	4	5	5		5
8 Hanging out - Diversity	1		1			1		1	1	1	1		1	1		1
8 Hanging out - Intensity	6		6			5		5	7	7	6		6	7		5
8 Hanging out - With Whom	4		2			4		4	4	5	2		4	3		3
8 Hanging out - Where	3		1			1		1	4	3	5		5	3		2
8 Hanging out - Enjoyment	5		4			4		5	4	5	5		4	4		4
9 Visiting - Diversity	1		1	1	1	1	1	1		1	1		1	1	1	1
9 Visiting - Intensity	4		1	5	5	5	2	6		4	3		5	4	4	6
9 Visiting - With Whom	4		2	3	3	4	2	5		3	2		3	3	3	5
9 Visiting - Where	3		2	2	1	1	5	1		2	6		2	2	2	5
9 Visiting - Enjoyment	5		4	2	1	5	4	5		5	5		5	4	3	5
10 Writing letters - Diversity	1			1		1	1								1	
10 Writing letters - Intensity	2			1		6	1								4	
10 Writing letters - With Whom	2			4		3	2								1	
10 Writing letters - Where	1			1		1	1								1	
10 Writing letters - Enjoyment	5			4		5	3								2	

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
11 Entertaining others - Diversity	1		1	1		1	1	1	1	1	1				1	
11 Entertaining others - Intensity	5		3	7		5	2	6	7	4	5				5	
11 Entertaining others - With Whom	2		2	2		4	2	5	2	3	2				1	
11 Entertaining others - Where	1		1	1		1	1	1	1	2	1				1	
11 Entertaining others - Enjoyment	5		3	5		4	5	5	5	5	5				3	
12 Playing with pets - Diversity	1	1	1			1		1			1		1	1		
12 Playing with pets -Intensity	7	7	7			7		7			7		7	7		
12 Playing with pets - With Whom	1	1	1			2		1			2		2	2		
12 Playing with pets - Where	1	1	1			1		1			1		1	1		
12 Playing with pets - Enjoyment	5	5	5			3		5			5		5	4		
13 Writing a story - Diversity	1					1	1								1	
13 Writing a story - Intensity	1					4	3								1	
13 Writing a story - With Whom	1					1	1								1	
13 Writing a story - Where	1					1	1								5	
13 Writing a story - Enjoyment	5					4	4								4	
14 Pretend or imaginary play - Diversity	1		1	1		1		1	1	1	1	1	1			1
14 Pretend or imaginary play - Intensity	6		6	1		4		7	7	6	6	7	6			6
14 Pretend or imaginary play - With Whom	4		1	2		2		1	4	3	1	2	1			1
14 Pretend or imaginary play - Where	3		1	1		1		1	4	3	1	1	1			1
14 Pretend or imaginary play - Enjoyment	5		5	2		3		5	5	3	5	4	4			4
15Playing with things or toys - Diversity	1	1	1	1	1			1	1	1	1	1	1	1	1	1
15 Playing with things or toys - Intensity	7	7	7	5	7			5	5	3	7	7	6	7	5	7
15 Playing with things or toys - With Whom	1	1	1	2	1			5	1	5	1	2	1	1	1	1
15 Playing with things or toys - Where	1	1	1	1	1			1	1	3	1	1	1	1	1	5
15 Playing with things or toys - Enjoyment	5	5	5	2	5			5	4	5	5	5	5	3	5	4

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
16 Martial arts - Diversity			1	1												
16 Martial arts - Intensity			5	5												
16 Martial arts - With Whom			5	5												
16 Martial arts - Where			5	5												
16 Martial arts - Enjoyment			4	1												
17 Swimming - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17 Swimming - Intensity	5	3	5	5	5	7	2	5	6	5	4	6	7	5	5	7
17 Swimming - With Whom	5	5	2	5	2	2	2	5	2	5	2	2	2	5	2	5
17 Swimming - Where	5	5	5	5	5	1	6	3	1	5	6	5	3	5	2	5
17 Swimming - Enjoyment	5	5	5	1	5	4	5	5	5	2	5	5	5	3	4	4
18 Gymnastics - Diversity	1	1							1							
18 Gymnastics - Intensity	5	4							6							
18 Gymnastics - With Whom	5	5							1							
18 Gymnastics - Where	5	5							1							
18 Gymnastics - Enjoyment	5	5							5							
19 Horseback riding - Diversity		1	1					1								
19 Horseback riding - Intensity		3	4					1								
19 Horseback riding - With Whom		5	5					5								
19 Horseback riding - Where		5	5					6								
19 Horseback riding - Enjoyment		5	5					5								
20 Racing or track and field - Diversity			1			1		1					1	1		
20 Racing or track and field - Intensity			4			2		1					7	1		
20 Racing or track and field - With Whom			5			2		5					5	5		
20 Racing or track and field - Where			4			6		6					4	4		
20 Racing or track and field - Enjoyment			3			4		5					2	3		

CAPE Summary Score data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
21 Team sports - Diversity	1					1		1		1						
21 Team sports - Intensity	5					6		6		6						
21 Team sports - With Whom	5					5		5		5						
21 Team sports - Where	5					5		5		5						
21 Team sports - Enjoyment	5					4		5		5						
22 Learning to sing - Diversity	1	1								1					1	
22 Learning to sing - Intensity	5	5								5					5	
22 Learning to sing - With Whom	4	5								5					5	
22 Learning to sing - Where	4	4								5					6	
22 Learning to sing - Enjoyment	5	1								2					3	
23 Art lessons - Diversity				1												
23 Art lessons - Intensity				1												
23 Art lessons - With Whom				2												
23 Art lessons - Where				5												
23 Art lessons - Enjoyment				3												
24 Learning to dance - Diversity														1		
24 Learning to dance - Intensity														5		
24 Learning to dance - With Whom														5		
24 Learning to dance - Where														5		
24 Learning to dance - Enjoyment														5		
25 Tutor - Diversity										1					1	
25 Tutor - Intensity										6					5	
25 Tutor - With Whom										5					5	
25 Tutor - Where										5					5	
25 Tutor - Enjoyment										1					4	

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
26 Playing musical instrument - Diversity	1			1	1	1	1		1		1			1		1
26 Playing musical instrument - Intensity	5			1	7	5	5		6		5			7		5
26 Playing musical instrument - With Whom	1			1	1	2	2		5		1			1		5
26 Playing musical instrument - Where	1			4	1	1	1		4		1			1		6
26 Playing musical instrument - Enjoyment	5			2	5	4	3		5		5			5		5
27 Music lessons - Diversity																
27 Music lessons - Intensity																
27 Music lessons - With Whom																
27 Music lessons - Where																
27 Music lessons - Enjoyment																
28 Community organizations - Diversity	1		1			1		1	1	1			1	1	1	1
28 Community organizations - Intensity	5		4			5		5	5	5			5	5	5	3
28 Community organizations - With Whom	5		5			5		5	4	5			4	2	4	5
28 Community organizations - Where	5		5			5		3	6	5			5	5	4	5
28 Community organizations - Enjoyment	5		3			4		5	3	5			5	4	4	5
29 Religious activity - Diversity		1										1			1	
29 Religious activity - Intensity		3										5			5	
29 Religious activity - With Whom		5										2			4	
29 Religious activity - Where		5										5			5	
29 Religious activity - Enjoyment		3										4			5	
30 School clubs - Diversity	1		1	1				1		1						
30 School clubs - Intensity	5		6	5				5		6						
30 School clubs - With Whom	4		4	4				5		4						
30 School clubs - Where	4		4	5				4		4						
30 School clubs - Enjoyment	5		4	3				5		5						

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
31 Dancing - Diversity	1		1		1	1				1	1		1	1		1
31 Dancing - Intensity	7		6		7	7				6	6		6	6		6
31 Dancing - With Whom	4		1		2	1				2	2		2	3		5
31 Dancing - Where	1		1		1	1				1	1		1	2		5
31 Dancing - Enjoyment	5		5		5	3				5	5		4	5		3
32 Walk or hike - Diversity	1	1	1		1	1	1	1			1		1	1	1	1
32 Walk or hike - Intensity	3	6	5		6	3	6	5			5		6	5	6	6
32 Walk or hike - With Whom	2	2	2		2	2	2	5			2		2	2	2	5
32 Walk or hike - Where	5	3	5		5	3	3	3			5		5	3	3	5
32 Walk or hike - Enjoyment	4	5	4		5	4	4	4			5		3	3	5	5
33 Bicycling, etc - Diversity	1	1		1		1		1		1		1	1	1	1	
33 Bicycling, etc - Intensity	4	3		2		6		6		2		5	4	7	6	
33 Bicycling, etc - With Whom	2	2		2		2		5		1		2	2	2	2	
33 Bicycling, etc - Where	3	3		3		3		3		1		3	5	3	3	
33 Bicycling, etc - Enjoyment	5	3		2		4		5		5		4	3	5	5	
34 Water sports - Diversity						1		1	1	1		1		1		
34 Water sports - Intensity						4		4	6	3		2		1		
34 Water sports - With Whom						4		5	2	2		2		2		
34 Water sports - Where						6		6	1	6		6		6		
34 Water sports - Enjoyment						5		5	5	5		5		3		
35 Snow sports - Diversity	1				1	1							1		1	
35 Snow sports - Intensity	5				5	3							4		3	
35 Snow sports - With Whom	2				2	2							2		1	
35 Snow sports - Where	3				3	6							5		5	
35 Snow sports - Enjoyment	5				5	3							5		5	

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
36 Playing on equipment - Diversity	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1
36 Playing on equipment - Intensity	6	6	4	2	4	5	4	6	6	5	4		4	7	5	6
36 Playing on equipment - With Whom	4	2	2	2	2	2	2	5	1	4	4		2	2	2	5
36 Playing on equipment - Where	5	3	5	3	3	3	3	3	3	4	5		3	3	5	5
36 Playing on equipment - Enjoyment	5	5	4	2	5	4	3	5	4	5	5		4	4	3	3
37 Playing games - Diversity		1	1			1		1		1	1		1		1	1
37 Playing games - Intensity		3	5			5		4		6	6		4		5	6
37 Playing games - With Whom		1	2			4		4		5	2		1		2	5
37 Playing games - Where		1	1			3		3		1	1		4		1	5
37 Playing games - Enjoyment		3	3			4		5		5	5		2		2	3
38 Gardening - Diversity		1	1			1									1	1
38 Gardening - Intensity		6	2			6									6	2
38 Gardening - With Whom		2	2			2									1	2
38 Gardening - Where		1	1			1									1	1
38 Gardening - Enjoyment		5	3			3									5	4
39 Fishing - Diversity						1								1		
39 Fishing - Intensity						3								2		
39 Fishing - With Whom						2								2		
39 Fishing - Where						6								6		
39 Fishing - Enjoyment						3								5		
40 Individual physical activities - Diversity			1			1										
40 Individual physical activities - Intensity			5			4										
40 Individual physical activities - With Whom			2			2										
40 Individual physical activities - Where			1			3										
40 Individual physical activities - Enjoyment			3			4										

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
41 Non-team sports - Diversity		1						1	1	1						
41 Non-team sports - Intensity		6						6	1	5						
41 Non-team sports - With Whom		1						5	5	2						
41 Non-team sports - Where		5						5	6	1						
41 Non-team sports - Enjoyment		5						5	5	3						
42 Going to the movies - Diversity	1	1			1	1	1			1	1	1	1		1	1
42 Going to the movies - Intensity	1	3			4	1	3			2	3	3	3		2	2
42 Going to the movies - With Whom	4	2			2	2	2			2	2	2	2		5	2
42 Going to the movies - Where	5	5			5	5	5			5	5	5	5		4	6
42 Going to the movies - Enjoyment	5	5			5	4	3			5	5	5	4		5	3
43 Public library - Diversity	1		1	1			1	1		1	1		1		1	
43 Public library - Intensity	2		5	5			5	5		6	3		5		5	
43 Public library - With Whom	2		2	2			2	2		4	2		2		5	
43 Public library - Where	5		5	5			5	5		2	5		5		3	
43 Public library - Enjoyment	5		5	4			5	5		5	2		4		5	
44 Watching TV or movie - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
44 Watching TV or movie - Intensity	7	7	7	5	7	7	5	7	7	6	7	7	6		7	7
44 Watching TV or movie - With Whom	2	2	2	2	1	1	1	2	2	1	2	2	2		2	2
44 Watching TV or movie - Where	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
44 Watching TV or movie - Enjoyment	5	5	5	2	5	3	5	4	4	4	5	5	3		5	5
45 Going to live event - Diversity	1	1					1				1			1	1	
45 Going to live event - Intensity	1	1					1				1			2	2	
45 Going to live event - With Whom	5	3					2				2			2	4	
45 Going to live event - Where	6	6					6				6			6	6	
45 Going to live event - Enjoyment	5	5					5				5			4	5	

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
46 Full day outing - Diversity	1				1	1	1	1			1	1	1		1	1
46 Full day outing - Intensity	2				4	4	1	6			1	5	3		3	4
46 Full day outing - With Whom	5				2	2	2	2			2	2	2		5	2
46 Full day outing - Where	6				6	6	6	6			6	5	6		6	6
46 Full day outing - Enjoyment	5				5	5	5	5			5	5	5		5	5
47 Reading - Diversity	1		1	1	1		1	1	1	1	1		1	1	1	1
47 Reading - Intensity	7		7	7	6		7	7	7	7	7		6	7	6	7
47 Reading - With Whom	2		1	1	2		1	5	1	2	1		1	1	1	1
47 Reading - Where	1		1	1	1		1	4	1	1	1		1	1	1	1
47 Reading - Enjoyment	5		5	5	3		4	2	5	5	1		4	5	3	5
48 Listening to music - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
48 Listening to music - Intensity	7	5	5	7	7	7	7	6	7	6	5	7	6	3	7	6
48 Listening to music - With Whom	4	1	1	1	2	1	1	2	2	2	1	2	1	2	1	1
48 Listening to music - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
48 Listening to music - Enjoyment	5	5	5	5	4	5	5	3	4	5	4	5	4	4	5	4
49 Volunteer work - Diversity		1					1						1			
49 Volunteer work - Intensity		1					5						5			
49 Volunteer work - With Whom		5					4						5			
49 Volunteer work - Where		4					5						5			
49 Volunteer work - Enjoyment		5					4						4			
50 Doing a chore - Diversity			1			1	1	1	1	1		1	1		1	
50 Doing a chore - Intensity			6			6	7	4	5	6		7	4		4	
50 Doing a chore - With Whom			2			2	1	5	1	2		2	1		1	
50 Doing a chore - Where			1			1	1	4	1	1		1	1		1	
50 Doing a chore - Enjoyment			5			3	5	3	2	2		5	1		1	

CAPE Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
51 Paid job - Diversity							1									
51 Paid job - Intensity							7									
51 Paid job - With Whom							1									
51 Paid job - Where							1									
51 Paid job - Enjoyment							5									
52 Making food - Diversity		1	1		1		1	1	1				1			
52 Making food - Intensity		6	3		6		7	5	3				6			
52 Making food - With Whom		2	2		2		1	2	1				2			
52 Making food - Where		1	1		1		1	1	1				1			
52 Making food - Enjoyment		5	5		5		2	3	5				3			
53 Homework - Diversity	1	1			1		1			1	1					1
53 Homework - Intensity	6	6			6		6			4	1					5
53 Homework - With Whom	2	2			1		2			2	1					1
53 Homework - Where	1	1			1		1			1	1					1
53 Homework - Enjoyment	1	1			5		1			1	1					1
54 Shopping - Diversity	1	1	1		1	1	1	1	1	1	1	1	1	1	1	
54 Shopping - Intensity	3	4	3		6	6	7	6	5	4	6	5	5	3	4	
54 Shopping - With Whom	2	2	2		2	2	2	2	2	2	2	2	2	2	1	
54 Shopping - Where	5	5	5		5	5	5	5	5	5	5	5	5	5	1	
54 Shopping - Enjoyment	1	5	2		3	4	1	5	4	4	1	1	3	2	1	
55 Taking care of a pet - Diversity	1		1		1	1			1	1		1		1		
55 Taking care of a pet - Intensity	5		6		7	4			5	5		7		5		
55 Taking care of a pet - With Whom	2		2		1	2			2	2		1		2		
55 Taking care of a pet - Where	1		1		1	1			1	1		1		3		
55 Taking care of a pet - Enjoyment	5		5		5	3			5	3		3		2		

CAPE Summary Score data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Total Diversity	35	31	26	14	28	27	32	27	26	35	28	17	39	14	33	20
Total Intensity	164	144	131	78	152	138	163	142	127	156	100	97	191	50	154	112
Total With Whom	103	90	48	27	58	57	63	86	63	78	62	31	93	25	127	45
Total Where	101	101	63	34	78	80	92	93	67	81	75	41	103	35	98	56
Total Enjoyment	165	137	127	58	114	108	126	110	112	131	80	72	152	56	148	86
Diversity score	35	31	26	14	28	27	32	27	26	35	28	17	39	14	33	20
Intensity score	3	2.6	2.4	1.4	2.8	2.5	3	2.6	2.3	2.8	1.8	1.8	3.5	0.9	2.8	2
With Whom score	2.9	2.9	1.8	1.9	2.1	2.1	2	3.2	2.4	2.2	2.2	1.8	2.4	1.8	3.8	2.3
Where score	2.9	3.3	2.4	2.4	2.8	2.9	2.9	3.4	2.6	2.3	2.7	2.4	2.6	2.5	3	2.8
Enjoyment score	4.7	4.4	4.9	4.1	4.1	4	3.9	4.1	4.3	3.7	2.9	4.2	3.9	4	4.5	4.3

CAPE Summary Score data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1 Doing Puzzles - Diversity	1	1				1		1				1	1	1		1
1 Doing Puzzles - Intensity	3	6				4		5				6	3	6		7
1 Doing Puzzles - With Whom	4	1				1		4				2	1	1		4
1 Doing Puzzles - Where	1	1				1		1				2	1	1		4
1 Doing Puzzles - Enjoyment	5	5				4		2				5	3	5		5
2 Board or Card Games - Diversity	1	1	1	1	1	1		1			1			1		1
2 Board or Card Games - Intensity	5	3	2	3	5	4		6			5			7		5
2 Board or Card Games - With Whom	4	2	2	2	2	2		4			2			2		2
2 Board or Card Games - Where	1	1	1	2	1	1		4			1			1		1
2 Board or Card Games - Enjoyment	5	3	3	3	4	5		5			4			5		3
3 Crafts, drawing, colouring - Diversity	1	1	1		1	1	1		1		1	1	1	1	1	1
3 Crafts, drawing, colouring - Intensity	3	6	4		5	2	6		6		7	5	1	7	5	5
3 Crafts, drawing, colouring - With Whom	4	3	1		2	1	1		5		1	2	5	4	1	2
3 Crafts, drawing, colouring - Where	1	2	1		1	1	1		4		4	1	4	3	4	1
3 Crafts, drawing, colouring - Enjoyment	5	5	4		4	3	4		5		5	4	5	5	5	2
4 Collecting things - Diversity	1	1				1			1	1	1			1	1	
4 Collecting things - Intensity	4	5				4			5	1	4			5	3	
4 Collecting things - With Whom	1	4				1			1	4	1			1	1	
4 Collecting things - Where	5	4				6			1	5	1			1	1	
4 Collecting things - Enjoyment	5	2				5			5	5	5			5	5	
5 Computer or video games - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5 Computer or video games - Intensity	7	7	3	7	7	2	6	6	7	7	7	7	7	7	6	
5 Computer or video games - With Whom	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	
5 Computer or video games - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5 Computer or video games - Enjoyment	5	5	2	5	5	2	3	5	5	5	5	5	5	5	5	

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
6 Talking on the phone - Diversity	1		1	1	1	1	1		1	1	1		1	1	1	
6 Talking on the phone - Intensity	6		5	5	2	5	4		4	7	6		6	7	6	
6 Talking on the phone - With Whom	1		4	1	2	1	2		4	1	2		3	4	3	
6 Talking on the phone - Where	1		1	1	1	1	1		1	1	1		1	1	1	
6 Talking on the phone - Enjoyment	5		3	2	2	3	3		3	5	5		2	5	5	
7 Going to a party - Diversity	1	1	1	1		1			1	1	1	1	1	1	1	
7 Going to a party - Intensity	1	2	2	4		2			3	3	3	2	2	7	3	
7 Going to a party - With Whom	1	4	4	2		4			4	2	2	2	4	2	4	
7 Going to a party - Where	3	5	3	1		5			5	1	2	2	5	3	5	
7 Going to a party - Enjoyment	5	5	4	4		4			4	5	5	4	3	5	5	
8 Hanging out - Diversity	1	1			1	1		1	1	1	1	1	1	1	1	1
8 Hanging out - Intensity	5	7			7	4		6	7	7	4	5	4	7	5	5
8 Hanging out - With Whom	4	2			2	4		4	4	1	4	4	4	4	1	2
8 Hanging out - Where	5	1			2	1		1	4	5	1	3	3	1	1	1
8 Hanging out - Enjoyment	5	3			4	4		5	5	5	5	4	4	5	4	1
9 Visiting - Diversity	1	1			1	1	1	1	1	1	1			1	1	1
9 Visiting - Intensity	5	4			5	2	3	5	4	5	4			7	3	5
9 Visiting - With Whom	2	3			3	2	2	2	4	3	2			1	2	3
9 Visiting - Where	5	2			2	2	1	2	5	2	2			3	2	2
9 Visiting - Enjoyment	5	5			4	3	4	5	4	4	5			5	4	2
10 Writing letters - Diversity	1			1			1						1	1	1	
10 Writing letters - Intensity	3			1			2						1	7	3	
10 Writing letters - With Whom	1			1			2						1	1	1	
10 Writing letters - Where	1			1			1						4	1	1	
10 Writing letters - Enjoyment	4			1			3						2	5	5	

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
11 Entertaining others - Diversity	1	1	1			1			1	1				1	1	1
11 Entertaining others - Intensity	3	5	3			4			7	7				7	3	5
11 Entertaining others - With Whom	2	2	4			1			4	1				1	1	2
11 Entertaining others - Where	1	1	1			1			4	5				4	1	1
11 Entertaining others - Enjoyment	5	4	4			3			5	5				5	3	5
12 Playing with pets - Diversity	1	1	1		1			1			1			1		1
12 Playing with pets -Intensity	7	7	7		4			5			6			7		6
12 Playing with pets - With Whom	1	1	4		2			2			1			1		2
12 Playing with pets - Where	1	1	5		3			1			1			1		1
12 Playing with pets - Enjoyment	5	5	5		3			2			5			5		4
13 Writing a story - Diversity	1					1					1			1	1	
13 Writing a story - Intensity	3					4					6			7	3	
13 Writing a story - With Whom	1					1					1			1	1	
13 Writing a story - Where	1					1					4			1	1	
13 Writing a story - Enjoyment	4					5					5			5	2	
14 Pretend or imaginary play - Diversity	1		1		1						1	1		1	1	
14 Pretend or imaginary play - Intensity	7		6		4						6	6		7	6	
14 Pretend or imaginary play - With Whom	1		1		2						1	2		1	1	
14 Pretend or imaginary play - Where	1		1		1						1	1		2	1	
14 Pretend or imaginary play - Enjoyment	5		5		3						5	4		5	3	
15Playing with things or toys - Diversity	1	1	1	1	1					1	1	1	1	1	1	1
15 Playing with things or toys - Intensity	7	7	7	4	7					4	7	7	7	7	6	5
15 Playing with things or toys - With Whom	1	1	1	1	2					1	1	1	1	1	1	1
15 Playing with things or toys - Where	1	1	1	1	1					1	1	1	1	1	1	1
15 Playing with things or toys - Enjoyment	5	5	4	1	4					4	5	5	5	5	2	2

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
16 Martial arts - Diversity			1			1	1									
16 Martial arts - Intensity			5			6	2									
16 Martial arts - With Whom			5			1	5									
16 Martial arts - Where			5			5	5									
16 Martial arts - Enjoyment			5			5	5									
17 Swimming - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17 Swimming - Intensity	5	5	5	1	5	6	2	5	6	6	5	5	1	7	3	6
17 Swimming - With Whom	1	5	5	1	5	2	2	5	5	2	2	2	5	5	2	2
17 Swimming - Where	5	5	5	5	4	1	6	5	5	5	2	6	6	5	5	5
17 Swimming - Enjoyment	5	4	5	1	5	4	3	5	5	5	5	5	5	5	4	4
18 Gymnastics - Diversity	1	1							1					1		
18 Gymnastics - Intensity	5	5							6					7		
18 Gymnastics - With Whom	1	5							4					4		
18 Gymnastics - Where	5	5							4					6		
18 Gymnastics - Enjoyment	5	5							5					5		
19 Horseback riding - Diversity			1					1						1		
19 Horseback riding - Intensity			4					6						7		
19 Horseback riding - With Whom			5					5						1		
19 Horseback riding - Where			5					6						4		
19 Horseback riding - Enjoyment			5					5						5		
20 Racing or track and field - Diversity						1		1			1			1		1
20 Racing or track and field - Intensity						2		6			6			7		5
20 Racing or track and field - With Whom						2		5			5			1		5
20 Racing or track and field - Where						5		4			4			4		4
20 Racing or track and field - Enjoyment						4		5			2			5		4

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
21 Team sports - Diversity	1		1			1		1		1					1	1
21 Team sports - Intensity	5		3			6		6		6					5	5
21 Team sports - With Whom	1		4			5		5		5					5	2
21 Team sports - Where	5		4			5		5		5					5	1
21 Team sports - Enjoyment	5		1			5		5		5					5	4
22 Learning to sing - Diversity	1												1		1	
22 Learning to sing - Intensity	7												5		5	
22 Learning to sing - With Whom	1												5		5	
22 Learning to sing - Where	1												4		5	
22 Learning to sing - Enjoyment	5												5		4	
23 Art lessons - Diversity				1												
23 Art lessons - Intensity				5												
23 Art lessons - With Whom				1												
23 Art lessons - Where				4												
23 Art lessons - Enjoyment				2												
24 Learning to dance - Diversity			1											1		
24 Learning to dance - Intensity			5											7		
24 Learning to dance - With Whom			5											5		
24 Learning to dance - Where			5											5		
24 Learning to dance - Enjoyment			4											5		
25 Tutor - Diversity										1					1	
25 Tutor - Intensity										6					5	
25 Tutor - With Whom										1					5	
25 Tutor - Where										5					5	
25 Tutor - Enjoyment										1					4	

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
26 Playing musical instrument - Diversity		1					1		1		1			1	1	1
26 Playing musical instrument - Intensity		6					5		6		6			7	5	6
26 Playing musical instrument - With Whom		1					2		4		5			5	5	5
26 Playing musical instrument - Where		1					1		4		4			3	6	5
26 Playing musical instrument - Enjoyment		3					4		5		5			3	4	1
27 Music lessons - Diversity							1							1	1	1
27 Music lessons - Intensity							4							7	5	5
27 Music lessons - With Whom							2							5	5	5
27 Music lessons - Where							1							3	5	5
27 Music lessons - Enjoyment							5							5	4	1
28 Community organizations - Diversity	1					1		1							1	
28 Community organizations - Intensity	5					5		5							5	
28 Community organizations - With Whom	1					1		5							5	
28 Community organizations - Where	5					5		5							5	
28 Community organizations - Enjoyment	5					4		5							5	
29 Religious activity - Diversity												1			1	
29 Religious activity - Intensity												5			5	
29 Religious activity - With Whom												2			5	
29 Religious activity - Where												5			5	
29 Religious activity - Enjoyment												4			4	
30 School clubs - Diversity	1			1					1				1		1	
30 School clubs - Intensity	5			5					5				5		6	
30 School clubs - With Whom	1			4					5				5		5	
30 School clubs - Where	4			4					4				4		4	
30 School clubs - Enjoyment	5			4					3				4		4	

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
31 Dancing - Diversity	1		1		1				1		1			1		1
31 Dancing - Intensity	7		6		7				7		7			7		7
31 Dancing - With Whom	1		5		3				4		2			1		2
31 Dancing - Where	1		5		2				4		1			1		1
31 Dancing - Enjoyment	5		5		5				5		3			5		2
32 Walk or hike - Diversity	1		1		1	1	1	1			1		1		1	1
32 Walk or hike - Intensity	5		6		7	4	7	5			5		2		5	6
32 Walk or hike - With Whom	2		2		2	2	2	2			2		2		2	2
32 Walk or hike - Where	5		5		3	5	3	3			3		3		5	3
32 Walk or hike - Enjoyment	5		4		5	4	2	2			4		1		4	2
33 Bicycling, etc - Diversity	1	1				1		1	1	1				1	1	
33 Bicycling, etc - Intensity	5	4				5		6	7	2				1	5	
33 Bicycling, etc - With Whom	2	2				2		4	1	1				1	2	
33 Bicycling, etc - Where	5	3				5		3	1	1				4	5	
33 Bicycling, etc - Enjoyment	5	3				4		5	5	5				2	3	
34 Water sports - Diversity	1	1	1							1						
34 Water sports - Intensity	5	1	2							4						
34 Water sports - With Whom	1	2	2							1						
34 Water sports - Where	5	6	6							6						
34 Water sports - Enjoyment	5	5	5							5						
35 Snow sports - Diversity						1		1	1	1	1				1	
35 Snow sports - Intensity						4		2	6	6	5				5	
35 Snow sports - With Whom						2		2	5	5	2				5	
35 Snow sports - Where						5		6	6	5	3				5	
35 Snow sports - Enjoyment						4		5	4	5	4				4	

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
36 Playing on equipment - Diversity	1	1	1		1	1		1	1	1	1			1	1	1
36 Playing on equipment - Intensity	5	6	4		5	7		5	6	6	6			7	3	5
36 Playing on equipment - With Whom	2	2	4		2	1		4	1	4	2			1	2	2
36 Playing on equipment - Where	5	3	3		3	4		3	1	5	3			3	5	3
36 Playing on equipment - Enjoyment	5	5	2		4	4		5	4	5	4			5	3	3
37 Playing games - Diversity	1	1			1	1	1	1	1	1				1	1	1
37 Playing games - Intensity	5	4			6	5	6	5	4	6				7	3	5
37 Playing games - With Whom	4	1			2	2	2	4	4	4				1	2	2
37 Playing games - Where	5	1			1	1	1	3	3	3				1	1	1
37 Playing games - Enjoyment	5	3			5	4	5	5	4	5				5	5	2
38 Gardening - Diversity		1	1	1		1										
38 Gardening - Intensity		2	3	1		3										
38 Gardening - With Whom		2	2	2		2										
38 Gardening - Where		1	1	1		1										
38 Gardening - Enjoyment		5	2	3		4										
39 Fishing - Diversity														1		
39 Fishing - Intensity														5		
39 Fishing - With Whom														2		
39 Fishing - Where														5		
39 Fishing - Enjoyment														5		
40 Individual physical activities - Diversity																1
40 Individual physical activities - Intensity																5
40 Individual physical activities - With Whom																2
40 Individual physical activities - Where																3
40 Individual physical activities - Enjoyment																2

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
41 Non-team sports - Diversity	1						1	1								
41 Non-team sports - Intensity	5						6	5								
41 Non-team sports - With Whom	4						4	2								
41 Non-team sports - Where	5						4	1								
41 Non-team sports - Enjoyment	5						2	2								
42 Going to the movies - Diversity	1	1			1	1	1		1	1	1	1	1		1	
42 Going to the movies - Intensity	1	1			1	3	3		1	3	3	3	3		3	
42 Going to the movies - With Whom	2	2			2	3	2		2	4	2	2	2		2	
42 Going to the movies - Where	5	5			5	6	6		5	5	6	5	5		5	
42 Going to the movies - Enjoyment	5	5			4	5	4		4	4	4	5	4		5	
43 Public library - Diversity	1		1	1		1	1	1	1	1	1		1			
43 Public library - Intensity	5		5	6		5	6	5	2	5	4		4			
43 Public library - With Whom	4		2	2		5	2	2	2	4	1		2			
43 Public library - Where	4		3	5		4	5	3	5	3	1		5			
43 Public library - Enjoyment	5		5	3		5	4	3	4	5	2		4			
44 Watching TV or movie - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44 Watching TV or movie - Intensity	6	7	5	7	7	7	5	7	7	6	5	7	5	7	7	7
44 Watching TV or movie - With Whom	1	1	2	2	1	1	1	2	2	2	2	2	1	2	1	2
44 Watching TV or movie - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44 Watching TV or movie - Enjoyment	5	5	5	4	5	4	2	5	2	5	5	5	3	5	5	5
45 Going to live event - Diversity	1	1					1						1		1	
45 Going to live event - Intensity	1	1					3						1		1	
45 Going to live event - With Whom	2	2					2						2		2	
45 Going to live event - Where	6	6					6						5		6	
45 Going to live event - Enjoyment	5	5					5						4		5	

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
46 Full day outing - Diversity		1	1			1		1		1	1	1	1		1	1
46 Full day outing - Intensity		1	4			3		3		3	1	5	3		4	4
46 Full day outing - With Whom		2	2			4		2		2	2	2	2		2	2
46 Full day outing - Where		6	5			6		6		6	6	5	5		6	6
46 Full day outing - Enjoyment		5	5			5		4		4	5	5	5		5	5
47 Reading - Diversity	1		1			1	1	1	1	1			1	1	1	1
47 Reading - Intensity	7		7			7	6	6	7	7			5	7	6	7
47 Reading - With Whom	2		2			4	1	1	1	1			1	1	1	1
47 Reading - Where	1		1			1	1	1	4	1			1	1	1	4
47 Reading - Enjoyment	5		4			5	5	4	3	1			4	5	2	5
48 Listening to music - Diversity	1	1	1	1	1	1	1			1	1	1	1	1		1
48 Listening to music - Intensity	7	7	7	7	4	7	6			6	2	7	5	5		7
48 Listening to music - With Whom	2	1	2	1	1	1	1			4	1	2	1	2		1
48 Listening to music - Where	1	1	1	1	5	1	1			1	1	1	1	1		1
48 Listening to music - Enjoyment	5	5	5	5	3	5	5			4	2	5	3	5		5
49 Volunteer work - Diversity		1	1				1			1						
49 Volunteer work - Intensity		5	6				5			6						
49 Volunteer work - With Whom		5	5				5			4						
49 Volunteer work - Where		4	4				5			4						
49 Volunteer work - Enjoyment		5	4				4			4						
50 Doing a chore - Diversity	1			1			1		1	1		1	1	1		
50 Doing a chore - Intensity	6			6			5		5	7		6	7	6		
50 Doing a chore - With Whom	2			2			1		1	2		2	1	2		
50 Doing a chore - Where	1			1			1		1	1		1	1	1		
50 Doing a chore - Enjoyment	5			2			5		3	4		4	3	2		

CAPE Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
51 Paid job - Diversity																
51 Paid job - Intensity																
51 Paid job - With Whom																
51 Paid job - Where																
51 Paid job - Enjoyment																
52 Making food - Diversity	1	1	1		1		1		1	1			1			
52 Making food - Intensity	5	7	5		7		5		1	4			5			
52 Making food - With Whom	2	2	2		1		1		1	2			1			
52 Making food - Where	1	1	1		1		1		1	1			1			
52 Making food - Enjoyment	5	5	3		4		5		5	3			5			
53 Homework - Diversity	1	1				1	1			1	1		1			1
53 Homework - Intensity	6	7				7	6			6	3		5			6
53 Homework - With Whom	2	2				1	1			4	1		1			1
53 Homework - Where	1	1				1	1			1	1		1			1
53 Homework - Enjoyment	2	5				5	5			1	1		3			1
54 Shopping - Diversity	1	1	1	1	1	1	1	1	1	1		1	1	1		1
54 Shopping - Intensity	3	4	3	4	3	5	3	4	5	3		5	4	4		6
54 Shopping - With Whom	2	2	2	2	2	2	2	2	2	3		3	2	2		2
54 Shopping - Where	5	5	5	5	5	5	5	5	5	6		5	5	3		5
54 Shopping - Enjoyment	5	5	1	4	2	5	5	2	5	5		2	3	2		4
55 Taking care of a pet - Diversity	1		1		1	1		1	1	1			1		1	
55 Taking care of a pet - Intensity	7		6		6	6		6	7	7			7		7	
55 Taking care of a pet - With Whom	2		2		1	1		2	1	2			1		4	
55 Taking care of a pet - Where	1		1		1	1		1	1	1			1		3	
55 Taking care of a pet - Enjoyment	5		5		1	5		3	5	5			4		5	

CAPE Summary Score data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Total Diversity	39	25	28	14	18	36	38	25	27	31	16	20	34	16	22	23
Total Intensity	192	83	153	78	72	235	176	134	127	140	54	109	144	83	113	133
Total With Whom	74	56	60	27	45	81	96	60	56	97	25	46	58	27	70	69
Total Where	112	86	59	35	55	95	67	61	68	91	37	44	95	29	75	75
Total Enjoyment	190	119	123	58	63	174	156	72	112	121	45	83	132	60	98	101
Diversity score	39	25	28	14	18	36	38	25	27	31	16	20	34	16	22	23
Intensity score	3.5	1.5	2.8	1.4	1.3	4.3	3.2	2.4	2.3	2.5	1	2	2.6	1.5	2.1	2.4
With Whom score	1.9	2.3	2.1	1.9	2.5	2.3	2.5	2.4	2.1	3.1	1.6	2.3	1.7	1.7	3.2	3
Where score	2.9	3.4	2.1	2.5	3.1	2.6	1.8	2.4	2.5	2.9	2.3	2.2	2.8	1.8	3.4	3.3
Enjoyment score	4.9	4.8	4.4	4.1	3.5	4.8	4.1	2.9	4.1	3.9	2.8	4.2	3.9	3.8	4.5	4.4

PAC Summary Score data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1- Doing puzzles	2	1	1	2	2	2	1	3	2	1	1	1	1	2	2	2
2 – Playing board games or card games	3	3	3	1	1	2	1	3	2	2	1	1	2	3	3	2
3 – Doing crafts drawing or colouring	3	2	3	2	3	2	3	3	3	3	1	3	1	3	2	3
4 – Collecting things	3	2	3	2	2	1	1	3	2	2	1	1	3	3	3	1
5 – Playing computer or video games	3	3	3	3	3	3	3	3	3	1	3	3	1	3	3	3
12 – Playing with pets	3	2	3	1	3	3	3	3	3	2	3	1	3	3	3	1
14 – Doing pretend or imaginary play	3	1	3	2	1	1	1	3	1	2	1	1	1	3	3	3
15 – Playing with things or toys	3	2	3	2	1	2	3	3	2	2	1	3	1	2	3	2
32 – Going for a walk or hike	2	1	1	1	2	2	3	3	3	2	1	3	1	2	3	2
36 – Playing on equipment	3	3	2	3	2	3	3	3	3	2	1	3	2	2	3	2
44 – Watching TV or a rented movie	3	3	3	1	3	3	1	3	3	1	3	3	1	2	3	3
55 – Taking care of a pet	3	3	3	1	2	2	3	3	3	2	3	1	3	3	2	1
Recreation Activities Sum	34	26	31	21	25	26	26	36	30	22	20	24	20	31	33	25
Recreation Activities Preference Score	2.8	2.2	2.6	1.8	2.1	2.2	2.2	3	2.5	1.8	1.7	2	1.7	2.6	2.8	2.1
16 – Doing martial arts	2	1	1	1	1	3	3	1	1	2	1	1	1	2	1	3
20 – Racing or track and field	2	1	1	2	1	1	3	3	1	2	1	1	3	2	2	2
21 – Doing team sports	3	3	1	2	1	2	3	3	1	1	1	1	3	1	2	2
30 – Participating in school clubs	3	3	3	1	2	2	1	3	1	1	1	1	1	2	2	2
33 – Bicycling, skateboarding, roller blading	3	3	3	3	2	3	3	1	2	1	1	1	3	1	2	2
34 – Water sports	3	3	1	2	3	3	1	1	1	2	1	1	3	2	2	3
35 – Snow sports	3	1	1	2	1	1	3	2	1	1	1	3	2	2	2	2
37 – Playing games	1	3	1	2	2	2	3	3	2	1	1	3	2	3	2	2
38 – Gardening	3	2	1	1	1	2	3	3	3	1	1	1	3	3	1	1
39 – Fishing	2	1	1	1	3	3	1	3	1	1	1	1	2	2	2	2
40 –Individual physical activities	1	1	1	1	1	2	1	1	1	1	1	2	2	2	1	2
41 – Non team sports	2	3	1	1	2	2	1	3	2	2	1	3	1	2	1	3
51 – Paid job	2	2	1	1	1	1	3	3	3	1	1	1	3	2	2	1
Physical Activity Sum	30	27	17	20	21	27	29	30	20	17	13	20	29	26	29	27
Physical Activity Preference Score	2.3	2.1	1.3	1.5	1.6	2.1	2.2	2.3	1.5	1.3	1	1.5	2.2	2	2.2	2.1

PAC Summary Score data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
6 – Talking on the phone	3	2	3	1	2	1	3	2	1	1	1	1	1	3	1	2
7 – Going to a party	3	3	3	3	3	3	3	3	2	2	3	1	1	3	3	2
8 – Hanging out	3	3	3	2	1	2	3	1	2	1	1	1	2	3	3	2
9 – Visiting	3	2	3	2	2	2	3	3	2	2	1	1	2	3	2	2
11 – Entertaining others	3	3	1	1	1	1	3	3	1	1	3	1	2	3	3	3
42 – Going to the movies	3	3	3	1	3	3	3	2	2	2	3	3	1	2	3	3
45 – Going to a live event	3	3	1	1	3	3	3	3	1	1	3	1	1	3	3	2
46 – Full day outing	3	2	3	1	2	3	3	3	2	2	3	3	3	1	3	3
48 – Listening to music	3	3	2	3	3	3	3	3	2	2	2	3	2	2	3	3
52 – Making food	3	3	1	1	3	2	3	3	3	1	1	2	3	2	2	2
Social Activities sum	30	27	23	16	23	23	30	26	18	15	21	17	18	25	26	24
Social Activities Preference Score	3	2.7	2.3	1.6	2.3	2.3	3	2.6	1.8	1.5	2.1	1.7	1.8	2.5	2.6	2.4
17 – Swimming	3	3	3	3	3	3	3	3	3	3	1	3	2	3	3	3
18 – Gymnastics	3	3	3	3	1	3	1	1	2	1	1	1	1	2	1	3
19 – Horseback riding	1	1	3	3	3	3	1	1	3	3	1	1	1	2	3	2
22 – Learning to sing	3	1	3	1	3	2	3	3	1	1	1	1	1	2	1	1
23 – Art lessons	3	2	3	1	3	3	3	3	1	2	2	1	1	3	2	1
24 – Learning to dance	3	3	1	1	3	3	3	3	1	2	1	1	1	2	1	1
26 – Playing a musical instrument	3	3	3	1	3	3	3	3	2	2	1	3	2	2	1	3
27 – Music lessons	3	1	2	1	3	2	3	3	1	1	1	1	1	3	1	1
28 – Community organizations	3	3	1	1	2	3	2	3	1	1	2	1	2	1	3	2
31 – Dancing	3	3	1	2	3	3	3	3	1	3	1	3	2	2	3	2
Skill Based Sum	28	23	23	17	27	28	25	26	16	19	12	16	14	22	19	19
Skill Based Preference Score	2.8	2.3	2.3	1.7	2.7	2.8	2.5	2.6	1.6	1.9	1.2	1.6	1.4	2.2	1.9	1.9

PAC Summary Score data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
10 – Writing letters	3	1	3	1	1	1	3	3	1	1	1	1	2	2	1	1
13 – Writing a story	3	1	3	1	2	1	3	3	1	1	1	1	3	3	1	1
25 – Getting help from a tutor	2	2	1	2	1	1	3	3	1	1	1	1	1	2	2	1
29 – Religious activity	3	1	2	2	1	1	1	3	3	1	1	1	1	3	1	1
43 – Going to the public library	3	1	3	1	2	2	3	3	2	1	1	1	3	2	2	3
47 – Reading	2	1	3	2	1	2	3	3	3	2	1	1	3	2	2	3
49 – Volunteering	2	2	1	1	2	2	3	3	1	3	1	1	2	2	2	2
50 – Doing a chore	3	1	1	1	1	1	3	2	2	1	1	3	1	2	1	1
53 – Doing homework	1	1	1	1	2	1	3	1	1	1	1	1	1	1	2	1
54 – Shopping	2	3	1	1	3	3	3	3	2	2	1	1	2	2	2	2
Self-Improvement Sum	24	14	19	13	16	15	28	27	17	14	10	12	19	21	16	16
Self-Improvement Preference Score	2.4	1.4	1.9	1.3	1.6	1.5	2.8	2.7	1.7	1.4	1	1.2	1.9	2.1	1.6	1.6
Overall Sum	146	117	113	87	112	119	138	145	101	87	76	89	100	125	123	111
PAC Overall Score	2.7	2.1	2.1	1.6	2	2.2	2.5	2.6	1.8	1.6	1.4	1.6	1.8	2.3	2.2	2

PAC Summary Score data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1- Doing puzzles	3	1	2	2	2	3	1	3	3	1	1	2	3	2	1	2
2 – Playing board games or card games	3	3	3	2	2	3	1	3	2	2	1	2	2	2	3	2
3 – Doing crafts drawing or colouring	3	2	3	3	3	3	3	1	3	2	1	2	1	3	1	2
4 – Collecting things	3	2	3	3	3	3	3	1	2	2	1	1	3	2	1	3
5 – Playing computer or video games	3	3	3	3	3	3	3	1	3	1	3	3	1	3	3	3
12 – Playing with pets	3	2	3	3	3	3	1	1	3	2	2	2	2	3	2	3
14 – Doing pretend or imaginary play	3	1	2	3	3	3	1	3	1	3	1	2	1	3	1	1
15 – Playing with things or toys	3	2	3	3	3	3	3	3	2	2	1	3	1	2	3	1
32 – Going for a walk or hike	3	1	2	2	2	3	1	1	2	1	1	3	2	2	3	1
36 – Playing on equipment	3	2	2	3	3	3	3	1	3	1	1	3	2	1	3	3
44 – Watching TV or a rented movie	3	2	3	3	3	3	3	3	2	2	3	3	2	3	1	3
55 – Taking care of a pet	3	2	3	3	3	3	1	3	3	2	1	2	3	2	3	1
Recreation Activities Sum	36	23	32	33	33	36	24	24	29	21	17	28	23	28	25	25
Recreation Activities Preference Score	3	1.9	2.7	2.8	2.8	3	2	2	2.4	1.8	1.4	2.3	1.9	2.3	2.1	2.1
16 – Doing martial arts	2	1	2	2	2	3	1	1	1	2	1	1	3	3	1	3
20 – Racing or track and field	3	2	1	1	1	3	1	3	1	1	1	1	2	3	3	1
21 – Doing team sports	3	3	2	2	2	3	3	1	1	1	1	1	3	2	3	3
30 – Participating in school clubs	3	2	2	3	3	3	3	1	1	1	2	1	2	1	3	3
33 – Bicycling, skateboarding, roller blading	3	1	2	3	3	3	1	1	2	1	1	2	3	1	3	3
34 – Water sports	3	3	1	2	2	3	1	1	3	2	1	3	2	1	1	3
35 – Snow sports	3	3	1	3	3	3	3	1	3	2	1	3	2	2	3	3
37 – Playing games	3	3	3	2	2	3	3	2	2	1	1	3	3	2	3	3
38 – Gardening	3	1	1	1	1	3	1	3	3	1	1	1	3	3	1	1
39 – Fishing	2	1	2	2	2	3	1	1	1	1	1	1	2	1	1	2
40 –Individual physical activities	1	1	1	1	1	3	1	3	1	1	1	1	2	2	1	1
41 – Non team sports	3	1	3	3	3	3	3	3	1	2	1	2	2	1	1	3
51 – Paid job	1	2	2	3	3	3	1	1	1	1	1	1	2	1	2	1
Physical Activity Sum	33	24	23	28	28	39	23	22	21	17	14	21	23	23	26	30
Physical Activity Preference Score	2.5	1.9	1.8	2.2	2.2	3	1.8	1.7	1.6	1.3	1.1	1.6	1.8	1.8	2	2.3

PAC Summary Score data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
6 – Talking on the phone	3	2	2	1	1	3	3	1	1	1	1	1	2	3	1	3
7 – Going to a party	3	3	3	3	3	3	3	1	3	1	2	2	2	3	3	3
8 – Hanging out	3	3	3	2	2	3	3	1	3	1	1	2	2	2	2	3
9 – Visiting	3	3	3	2	2	3	3	3	3	2	1	2	3	3	3	3
11 – Entertaining others	3	2	3	1	1	3	1	1	2	1	1	1	2	2	1	3
42 – Going to the movies	3	3	1	3	3	3	3	1	3	2	3	3	2	2	3	3
45 – Going to a live event	3	3	1	2	2	3	3	1	2	3	2	2	2	3	3	1
46 – Full day outing	3	3	2	2	2	3	1	3	2	2	3	3	3	2	3	3
48 – Listening to music	3	3	3	1	1	3	3	3	1	2	2	3	2	3	1	3
52 – Making food	3	3	3	3	3	3	3	3	3	1	1	2	2	2	2	2
Social Activities sum	30	28	24	20	20	30	26	18	23	16	17	21	22	25	22	27
Social Activities Preference Score	3	2.8	2.4	2	2	3	2.6	1.8	2.3	1.6	1.7	2.1	2.2	2.5	2.2	2.7
17 – Swimming	3	3	3	3	3	3	3	3	3	2	1	3	3	3	3	3
18 – Gymnastics	3	2	2	2	2	3	1	1	3	2	1	1	2	2	1	3
19 – Horseback riding	2	3	1	3	3	3	1	1	2	3	1	1	1	1	3	2
22 – Learning to sing	3	1	3	3	3	3	3	1	1	1	1	2	1	3	1	1
23 – Art lessons	3	1	3	3	3	3	1	1	2	1	2	1	1	2	1	1
24 – Learning to dance	3	1	3	3	3	3	1	1	1	1	1	2	1	2	1	1
26 – Playing a musical instrument	3	1	3	3	3	3	3	3	2	1	1	2	2	3	3	3
27 – Music lessons	3	1	3	3	3	3	3	3	1	1	1	2	2	3	1	1
28 – Community organizations	3	3	2	2	2	3	3	1	1	1	1	1	3	2	3	2
31 – Dancing	3	1	3	3	3	3	1	3	1	2	1	2	1	2	3	3
Skill Based Sum	29	17	26	28	28	30	20	18	17	15	11	17	17	23	20	20
Skill Based Preference Score	2.9	1.7	2.6	2.8	2.8	3	2	1.8	1.7	1.5	1.1	1.7	1.7	2.3	2	2

PAC Summary Score data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
10 – Writing letters	3	1	2	1	1	3	1	3	1	1	1	1	2	2	1	1
13 – Writing a story	3	1	2	2	2	3	1	1	1	2	1	1	3	3	1	1
25 – Getting help from a tutor	3	1	1	1	1	3	3	1	1	1	1	1	1	2	1	1
29 – Religious activity	2	1	2	1	1	3	3	1	1	1	1	1	2	3	1	1
43 – Going to the public library	3	1	3	3	3	3	3	3	3	2	2	1	2	2	1	3
47 – Reading	3	1	3	2	2	3	3	3	2	2	2	2	2	3	1	3
49 – Volunteering	2	3	2	1	1	3	3	1	1	2	1	2	3	2	1	1
50 – Doing a chore	3	1	2	2	2	3	3	1	2	1	1	2	1	2	1	1
53 – Doing homework	2	1	2	2	2	3	3	3	1	1	1	1	1	2	2	1
54 – Shopping	3	3	1	3	3	3	3	3	3	2	1	2	2	2	1	3
Self-Improvement Sum	27	14	20	18	18	30	26	20	16	15	12	14	19	23	11	16
Self-Improvement Preference Score	2.7	1.4	2	1.8	1.8	3	2.6	2	1.6	1.5	1.2	1.4	1.9	2.3	1.1	1.6
Overall Sum	155	106	125	127	127	165	119	102	96	84	69	101	104	122	104	118
PAC Overall Score	2.8	1.9	2.3	2.3	2.3	3	2.2	1.9	1.7	1.5	1.3	1.8	1.9	2.2	1.9	2.1

CAPE Recreational Activities Domain data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1 Doing Puzzles - Diversity		1		1	1	1		1				1		1		1
1 Doing Puzzles - Intensity		7		3	4	6		1				5		7		5
1 Doing Puzzles - With Whom		1		2	1	1		4				2		1		3
1 Doing Puzzles - Where		1		1	1	1		1				1		1		1
1 Doing Puzzles - Enjoyment		5		3	3	4		3				2		3		4
2 Board or Card Games - Diversity	1	1	1	1		1	1	1	1	1	1		1	1		1
2 Board or Card Games - Intensity	4	7	2	6		5	3	6	3	6	4		1	6		4
2 Board or Card Games - With Whom	2	2	2	2		2	2	5	4	5	2		2	3		2
2 Board or Card Games - Where	1	1	1	1		1	1	1	4	3	1		1	2		1
2 Board or Card Games - Enjoyment	5	5	3	3		4	5	5	4	5	5		4	4		5
3 Crafts, drawing, colouring - Diversity	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1
3 Crafts, drawing, colouring - Intensity	6	7	6	1	6		7	5	7	4	6	7	7	7	6	6
3 Crafts, drawing, colouring - With Whom	1	1	1	1	2		1	1	1	4	1	2	1	1	2	5
3 Crafts, drawing, colouring - Where	1	1	1	1	1		1	1	1	5	1	1	5	1	1	5
3 Crafts, drawing, colouring - Enjoyment	4	5	5	2	5		5	3	5	4	5	4	5	4	5	5
4 Collecting things - Diversity		1	1	1		1		1		1	1					
4 Collecting things - Intensity		6	5	5		2		3		1	3					
4 Collecting things - With Whom		1	1	1		2		5		3	1					
4 Collecting things - Where		5	1	1		6		6		6	3					
4 Collecting things - Enjoyment		3	4	3		5		5		5	5					
5 Computer or video games - Diversity	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
5 Computer or video games - Intensity	7	7	4	7	7	5		7	7	7	6	7	7	7	7	3
5 Computer or video games - With Whom	1	2	1	1	1	2		1	1	1	1	2	1	2	1	2
5 Computer or video games - Where	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
5 Computer or video games - Enjoyment	5	5	3	5	5	3		5	5	5	5	5	5	5	4	3

CAPE Recreational Activities Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
12 Playing with pets - Diversity	1	1	1			1		1			1		1	1		
12 Playing with pets -Intensity	7	7	7			7		7			7		7	7		
12 Playing with pets - With Whom	1	1	1			2		1			2		2	2		
12 Playing with pets - Where	1	1	1			1		1			1		1	1		
12 Playing with pets - Enjoyment	5	5	5			3		5			5		5	4		
14 Pretend or imaginary play - Diversity	1		1	1		1		1	1	1	1	1	1			1
14 Pretend or imaginary play - Intensity	6		6	1		4		7	7	6	6	7	6			6
14 Pretend or imaginary play - With Whom	4		1	2		2		1	4	3	1	2	1			1
14 Pretend or imaginary play - Where	3		1	1		1		1	4	3	1	1	1			1
14 Pretend or imaginary play - Enjoyment	5		5	2		3		5	5	3	5	4	4			4
15Playing with things or toys - Diversity	1	1	1	1	1			1	1	1	1	1	1	1	1	1
15 Playing with things or toys - Intensity	7	7	7	5	7			5	5	3	7	7	6	7	5	7
15 Playing with things or toys - With Whom	1	1	1	2	1			5	1	5	1	2	1	1	1	1
15 Playing with things or toys - Where	1	1	1	1	1			1	1	3	1	1	1	1	1	5
15 Playing with things or toys - Enjoyment	5	5	5	2	5			5	4	5	5	5	5	3	5	4
32 Walk or hike - Diversity	1	1	1		1	1	1	1			1		1	1	1	1
32 Walk or hike - Intensity	3	6	5		6	3	6	5			5		6	5	6	6
32 Walk or hike - With Whom	2	2	2		2	2	2	5			2		2	2	2	5
32 Walk or hike - Where	5	3	5		5	3	3	3			5		5	3	3	5
32 Walk or hike - Enjoyment	4	5	4		5	4	4	4			5		3	3	5	5
36 Playing on equipment - Diversity	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1
36 Playing on equipment - Intensity	6	6	4	2	4	5	4	6	6	5	4		4	7	5	6
36 Playing on equipment - With Whom	4	2	2	2	2	2	2	5	1	4	4		2	2	2	5
36 Playing on equipment - Where	5	3	5	3	3	3	3	3	3	4	5		3	3	5	5
36 Playing on equipment - Enjoyment	5	5	4	2	5	4	3	5	4	5	5		4	4	3	3

CAPE Recreational Activities Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
44 Watching TV or movie - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
44 Watching TV or movie - Intensity	7	7	7	5	7	7	5	7	7	6	7	7	6		7	7
44 Watching TV or movie - With Whom	2	2	2	2	1	1	1	2	2	1	2	2	2		2	2
44 Watching TV or movie - Where	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
44 Watching TV or movie - Enjoyment	5	5	5	2	5	3	5	4	4	4	5	5	3		5	5
55 Taking care of a pet - Diversity	1		1		1	1			1	1		1		1		
55 Taking care of a pet - Intensity	5		6		7	4			5	5		7		5		
55 Taking care of a pet - With Whom	2		2		1	2			2	2		1		2		
55 Taking care of a pet - Where	1		1		1	1			1	1		1		3		
55 Taking care of a pet - Enjoyment	5		5		5	3			5	3		3		2		
Diversity Sum	10	8	11	6	11	10	6	9	11	11	9	7	10	4	12	7
Intensity Sum	58	39	61	38	58	64	34	50	72	52	37	41	50	20	64	42
With Whom Sum	21	27	19	12	14	17	9	26	17	15	15	11	18	7	40	14
Where Sum	20	26	21	6	20	15	12	25	19	19	11	13	19	8	23	15
Enjoyment Sum	48	37	55	22	45	36	27	37	52	45	27	33	36	17	52	32
Diversity Score	10	8	11	6	11	10	6	9	11	11	9	7	10	4	12	7
Intensity Score	4.8	3.3	5.1	3.2	4.8	5.3	2.8	4.2	6	4.3	3.1	3.4	4.2	1.7	5.3	3.5
With Whom Score	2.1	3.4	1.7	2	1.3	1.7	1.5	2.9	1.5	1.4	1.7	1.6	1.8	1.8	3.3	2
Where Score	2	3.3	1.9	1	1.8	1.5	2	2.8	1.7	1.7	1.2	1.9	1.9	2	1.9	2.1
Enjoyment Score	4.8	4.6	5	3.7	4.1	3.6	4.5	4.1	4.7	4.1	3	4.7	3.6	4.3	4.3	4.6

CAPE Recreational Activities Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1 Doing Puzzles - Diversity	1	1				1		1				1	1	1		1
1 Doing Puzzles - Intensity	3	6				4		5				6	3	6		7
1 Doing Puzzles - With Whom	4	1				1		4				2	1	1		4
1 Doing Puzzles - Where	1	1				1		1				2	1	1		4
1 Doing Puzzles - Enjoyment	5	5				4		2				5	3	5		5
2 Board or Card Games - Diversity	1	1	1	1	1	1		1			1			1		1
2 Board or Card Games - Intensity	5	3	2	3	5	4		6			5			7		5
2 Board or Card Games - With Whom	4	2	2	2	2	2		4			2			2		2
2 Board or Card Games - Where	1	1	1	2	1	1		4			1			1		1
2 Board or Card Games - Enjoyment	5	3	3	3	4	5		5			4			5		3
3 Crafts, drawing, colouring - Diversity	1	1	1		1	1	1		1		1	1	1	1	1	1
3 Crafts, drawing, colouring - Intensity	3	6	4		5	2	6		6		7	5	1	7	5	5
3 Crafts, drawing, colouring - With Whom	4	3	1		2	1	1		5		1	2	5	4	1	2
3 Crafts, drawing, colouring - Where	1	2	1		1	1	1		4		4	1	4	3	4	1
3 Crafts, drawing, colouring - Enjoyment	5	5	4		4	3	4		5		5	4	5	5	5	2
4 Collecting things - Diversity	1	1				1			1	1	1			1	1	
4 Collecting things - Intensity	4	5				4			5	1	4			5	3	
4 Collecting things - With Whom	1	4				1			1	4	1			1	1	
4 Collecting things - Where	5	4				6			1	5	1			1	1	
4 Collecting things - Enjoyment	5	2				5			5	5	5			5	5	
5 Computer or video games - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5 Computer or video games - Intensity	7	7	3	7	7	2	6	6	7	7	7	7	7	7	6	
5 Computer or video games - With Whom	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	
5 Computer or video games - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5 Computer or video games - Enjoyment	5	5	2	5	5	2	3	5	5	5	5	5	5	5	5	

CAPE Recreational Activities Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
12 Playing with pets - Diversity	1	1	1		1			1			1			1		1
12 Playing with pets -Intensity	7	7	7		4			5			6			7		6
12 Playing with pets - With Whom	1	1	4		2			2			1			1		2
12 Playing with pets - Where	1	1	5		3			1			1			1		1
12 Playing with pets - Enjoyment	5	5	5		3			2			5			5		4
14 Pretend or imaginary play - Diversity	1		1		1						1	1		1	1	
14 Pretend or imaginary play - Intensity	7		6		4						6	6		7	6	
14 Pretend or imaginary play - With Whom	1		1		2						1	2		1	1	
14 Pretend or imaginary play - Where	1		1		1						1	1		2	1	
14 Pretend or imaginary play - Enjoyment	5		5		3						5	4		5	3	
15Playing with things or toys - Diversity	1	1	1	1	1					1	1	1	1	1	1	1
15 Playing with things or toys - Intensity	7	7	7	4	7					4	7	7	7	7	6	5
15 Playing with things or toys - With Whom	1	1	1	1	2					1	1	1	1	1	1	1
15 Playing with things or toys - Where	1	1	1	1	1					1	1	1	1	1	1	1
15 Playing with things or toys - Enjoyment	5	5	4	1	4					4	5	5	5	5	2	2
32 Walk or hike - Diversity	1		1		1	1	1	1			1		1		1	1
32 Walk or hike - Intensity	5		6		7	4	7	5			5		2		5	6
32 Walk or hike - With Whom	2		2		2	2	2	2			2		2		2	2
32 Walk or hike - Where	5		5		3	5	3	3			3		3		5	3
32 Walk or hike - Enjoyment	5		4		5	4	2	2			4		1		4	2
36 Playing on equipment - Diversity	1	1	1		1	1		1	1	1	1			1	1	1
36 Playing on equipment - Intensity	5	6	4		5	7		5	6	6	6			7	3	5
36 Playing on equipment - With Whom	2	2	4		2	1		4	1	4	2			1	2	2
36 Playing on equipment - Where	5	3	3		3	4		3	1	5	3			3	5	3
36 Playing on equipment - Enjoyment	5	5	2		4	4		5	4	5	4			5	3	3

CAPE Recreational Activities Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
44 Watching TV or movie - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44 Watching TV or movie - Intensity	6	7	5	7	7	7	5	7	7	6	5	7	5	7	7	7
44 Watching TV or movie - With Whom	1	1	2	2	1	1	1	2	2	2	2	2	1	2	1	2
44 Watching TV or movie - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44 Watching TV or movie - Enjoyment	5	5	5	4	5	4	2	5	2	5	5	5	3	5	5	5
55 Taking care of a pet - Diversity	1		1		1	1		1	1	1			1		1	
55 Taking care of a pet - Intensity	7		6		6	6		6	7	7			7		7	
55 Taking care of a pet - With Whom	2		2		1	1		2	1	2			1		4	
55 Taking care of a pet - Where	1		1		1	1		1	1	1			1		3	
55 Taking care of a pet - Enjoyment	5		5		1	5		3	5	5			4		5	
Diversity Sum	12	5	11	6	7	11	8	9	10	10	4	9	9	4	8	5
Intensity Sum	66	25	64	38	33	73	39	52	61	52	19	51	39	26	47	31
With Whom Sum	24	11	16	10	12	16	10	19	18	20	6	18	11	6	22	10
Where Sum	24	13	18	7	12	16	19	16	16	20	5	15	21	6	17	8
Enjoyment Sum	60	24	52	27	25	54	29	24	42	39	14	37	34	14	31	24
Diversity Score	12	5	11	6	7	11	8	9	10	10	4	9	9	4	8	5
Intensity Score	5.5	2.1	5.3	3.2	2.8	6.1	3.3	4.3	5.1	4.3	1.6	4.3	3.3	2.2	3.9	2.6
With Whom Score	2	2.2	1.5	1.7	1.7	1.5	1.3	2.1	1.8	2	1.5	2	1.2	1.5	2.8	2
Where Score	2	2.6	1.6	1.2	1.7	1.5	2.4	1.8	1.6	2	1.3	1.7	2.3	1.5	2.1	1.6
Enjoyment Score	5	4.8	4.7	4.5	3.6	4.9	3.6	2.7	4.2	3.9	3.5	4.1	3.8	3.5	3.9	4.8

CAPE Physical Activities Domain data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
16 Martial arts - Diversity			1	1												
16 Martial arts - Intensity			5	5												
16 Martial arts - With Whom			5	5												
16 Martial arts - Where			5	5												
16 Martial arts - Enjoyment			4	1												
20 Racing or track and field - Diversity			1			1		1					1	1		
20 Racing or track and field - Intensity			4			2		1					7	1		
20 Racing or track and field - With Whom			5			2		5					5	5		
20 Racing or track and field - Where			4			6		6					4	4		
20 Racing or track and field - Enjoyment			3			4		5					2	3		
21 Team sports - Diversity	1					1		1		1						
21 Team sports - Intensity	5					6		6		6						
21 Team sports - With Whom	5					5		5		5						
21 Team sports - Where	5					5		5		5						
21 Team sports - Enjoyment	5					4		5		5						
30 School clubs - Diversity	1		1	1				1		1						
30 School clubs - Intensity	5		6	5				5		6						
30 School clubs - With Whom	4		4	4				5		4						
30 School clubs - Where	4		4	5				4		4						
30 School clubs - Enjoyment	5		4	3				5		5						
33 Bicycling, etc - Diversity	1	1		1		1		1		1		1	1	1	1	
33 Bicycling, etc - Intensity	4	3		2		6		6		2		5	4	7	6	
33 Bicycling, etc - With Whom	2	2		2		2		5		1		2	2	2	2	
33 Bicycling, etc - Where	3	3		3		3		3		1		3	5	3	3	
33 Bicycling, etc - Enjoyment	5	3		2		4		5		5		4	3	5	5	

CAPE Physical Activities Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
34 Water sports - Diversity						1		1	1	1		1		1		
34 Water sports - Intensity						4		4	6	3		2		1		
34 Water sports - With Whom						4		5	2	2		2		2		
34 Water sports - Where						6		6	1	6		6		6		
34 Water sports - Enjoyment						5		5	5	5		5		3		
35 Snow sports - Diversity	1				1	1							1		1	
35 Snow sports - Intensity	5				5	3							4		3	
35 Snow sports - With Whom	2				2	2							2		1	
35 Snow sports - Where	3				3	6							5		5	
35 Snow sports - Enjoyment	5				5	3							5		5	
37 Playing games - Diversity		1	1			1		1		1	1		1		1	1
37 Playing games - Intensity		3	5			5		4		6	6		4		5	6
37 Playing games - With Whom		1	2			4		4		5	2		1		2	5
37 Playing games - Where		1	1			3		3		1	1		4		1	5
37 Playing games - Enjoyment		3	3			4		5		5	5		2		2	3
38 Gardening - Diversity		1	1			1									1	1
38 Gardening - Intensity		6	2			6									6	2
38 Gardening - With Whom		2	2			2									1	2
38 Gardening - Where		1	1			1									1	1
38 Gardening - Enjoyment		5	3			3									5	4
39 Fishing - Diversity						1								1		
39 Fishing - Intensity						3								2		
39 Fishing - With Whom						2								2		
39 Fishing - Where						6								6		
39 Fishing - Enjoyment						3								5		

CAPE Physical Activities Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
40 Individual physical activities - Diversity			1			1										
40 Individual physical activities - Intensity			5			4										
40 Individual physical activities - With Whom			2			2										
40 Individual physical activities - Where			1			3										
40 Individual physical activities - Enjoyment			3			4										
41 Non-team sports - Diversity		1						1	1	1						
41 Non-team sports - Intensity		6						6	1	5						
41 Non-team sports - With Whom		1						5	5	2						
41 Non-team sports - Where		5						5	6	1						
41 Non-team sports - Enjoyment		5						5	5	3						
51 Paid job - Diversity							1									
51 Paid job - Intensity							7									
51 Paid job - With Whom							1									
51 Paid job - Where							1									
51 Paid job - Enjoyment							5									
Diversity Sum	4	6	2	2	1	4	5	3	4	7	3	1	9		6	1
Intensity Sum	19	29	11	7	5	11	27	14	13	27	12	5	39		26	6
With Whom Sum	13	18	7	4	5	11	7	12	10	22	11	2	25		29	2
Where Sum	15	22	7	9	4	19	11	11	11	17	13	3	39		27	1
Enjoyment Sum	20	30	6	9	4	16	22	12	16	23	6	5	34		30	5
Diversity Score	4	6	2	2	1	4	5	3	4	7	3	1	9		6	1
Intensity Score	1.5	2.2	0.8	0.5	0.4	0.8	2.1	1.1	1	2.1	0.9	0.4	3		2	0.5
With Whom Score	3.3	3	3.5	2	5	2.8	1.4	4	2.5	3.1	3.7	2	2.8		4.8	2
Where Score	3.8	3.7	3.5	4.5	4	4.8	2.2	3.7	2.8	2.4	4.3	3	4.3		4.5	1
Enjoyment Score	5	5	3	4.5	4	4	4.4	4	4	3.3	2	5	3.8		5	5

CAPE Physical Activities Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
16 Martial arts - Diversity			1			1	1									
16 Martial arts - Intensity			5			6	2									
16 Martial arts - With Whom			5			1	5									
16 Martial arts - Where			5			5	5									
16 Martial arts - Enjoyment			5			5	5									
20 Racing or track and field - Diversity						1		1			1			1		1
20 Racing or track and field - Intensity						2		6			6			7		5
20 Racing or track and field - With Whom						2		5			5			1		5
20 Racing or track and field - Where						5		4			4			4		4
20 Racing or track and field - Enjoyment						4		5			2			5		4
21 Team sports - Diversity	1		1			1		1		1					1	1
21 Team sports - Intensity	5		3			6		6		6					5	5
21 Team sports - With Whom	1		4			5		5		5					5	2
21 Team sports - Where	5		4			5		5		5					5	1
21 Team sports - Enjoyment	5		1			5		5		5					5	4
30 School clubs - Diversity	1			1					1				1		1	
30 School clubs - Intensity	5			5					5				5		6	
30 School clubs - With Whom	1			4					5				5		5	
30 School clubs - Where	4			4					4				4		4	
30 School clubs - Enjoyment	5			4					3				4		4	
33 Bicycling, etc - Diversity	1	1				1		1	1	1				1	1	
33 Bicycling, etc - Intensity	5	4				5		6	7	2				1	5	
33 Bicycling, etc - With Whom	2	2				2		4	1	1				1	2	
33 Bicycling, etc - Where	5	3				5		3	1	1				4	5	
33 Bicycling, etc - Enjoyment	5	3				4		5	5	5				2	3	

CAPE Physical Activities Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
34 Water sports - Diversity	1	1	1							1						
34 Water sports - Intensity	5	1	2							4						
34 Water sports - With Whom	1	2	2							1						
34 Water sports - Where	5	6	6							6						
34 Water sports - Enjoyment	5	5	5							5						
35 Snow sports - Diversity						1		1	1	1	1				1	
35 Snow sports - Intensity						4		2	6	6	5				5	
35 Snow sports - With Whom						2		2	5	5	2				5	
35 Snow sports - Where						5		6	6	5	3				5	
35 Snow sports - Enjoyment						4		5	4	5	4				4	
37 Playing games - Diversity	1	1			1	1	1	1	1	1				1	1	1
37 Playing games - Intensity	5	4			6	5	6	5	4	6				7	3	5
37 Playing games - With Whom	4	1			2	2	2	4	4	4				1	2	2
37 Playing games - Where	5	1			1	1	1	3	3	3				1	1	1
37 Playing games - Enjoyment	5	3			5	4	5	5	4	5				5	5	2
38 Gardening - Diversity		1	1	1		1										
38 Gardening - Intensity		2	3	1		3										
38 Gardening - With Whom		2	2	2		2										
38 Gardening - Where		1	1	1		1										
38 Gardening - Enjoyment		5	2	3		4										
39 Fishing - Diversity														1		
39 Fishing - Intensity														5		
39 Fishing - With Whom														2		
39 Fishing - Where														5		
39 Fishing - Enjoyment														5		

CAPE Physical Activities Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
40 Individual physical activities - Diversity																1
40 Individual physical activities - Intensity																5
40 Individual physical activities - With Whom																2
40 Individual physical activities - Where																3
40 Individual physical activities - Enjoyment																2
41 Non-team sports - Diversity	1						1	1								
41 Non-team sports - Intensity	5						6	5								
41 Non-team sports - With Whom	4						4	2								
41 Non-team sports - Where	5						4	1								
41 Non-team sports - Enjoyment	5						2	2								
51 Paid job - Diversity																
51 Paid job - Intensity																
51 Paid job - With Whom																
51 Paid job - Where																
51 Paid job - Enjoyment																
Diversity Sum	6	5	1		4	4	6	5	4	4	2	1	7	2	5	4
Intensity Sum	30	24	6		19	20	30	25	11	13	6	6	31	8	25	22
With Whom Sum	13	16	2		10	5	23	13	7	14	6	2	16	7	20	15
Where Sum	29	20	1		18	14	24	10	11	17	5	1	27	6	21	14
Enjoyment Sum	30	25	5		12	17	23	14	16	13	7	5	30	10	25	16
Diversity Score	6	5	1		4	4	6	5	4	4	2	1	7	2	5	4
Intensity Score	2.3	1.8	0.5		1.5	1.5	2.3	1.9	0.8	1	0.5	0.5	2.4	0.6	1.9	1.7
With Whom Score	2.2	3.2	2		2.5	1.3	3.8	2.6	1.8	3.5	3	2	2.3	3.5	4	3.8
Where Score	4.8	4	1		4.5	3.5	4	2	2.8	4.3	2.5	1	3.9	3	4.2	3.5
Enjoyment Score	5	5	5		3	4.3	3.8	2.8	4	3.3	3.5	5	4.3	5	5	4

CAPE Social Activities Domain data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
6 Talking on the phone - Diversity	1		1	1		1				1	1		1		1	1
6 Talking on the phone - Intensity	5		6	3		5				6	5		6		7	4
6 Talking on the phone - With Whom	3		4	3		4				3	2		3		1	2
6 Talking on the phone - Where	1		1	1		1				1	2		1		1	1
6 Talking on the phone - Enjoyment	5		2	1		4				4	5		2		5	2
7 Going to a party - Diversity	1	1	1	1		1		1	1	1	1	1	1	1		1
7 Going to a party - Intensity	3	3	2	1		2		3	3	2	2	3	1	1		3
7 Going to a party - With Whom	4	4	4	3		2		5	4	2	4	3	4	4		3
7 Going to a party - Where	5	4	5	2		1		6	6	6	5	2	3	5		2
7 Going to a party - Enjoyment	5	5	5	5		5		5	4	5	5	4	5	5		5
8 Hanging out - Diversity	1		1			1		1	1	1	1		1	1		1
8 Hanging out - Intensity	6		6			5		5	7	7	6		6	7		5
8 Hanging out - With Whom	4		2			4		4	4	5	2		4	3		3
8 Hanging out - Where	3		1			1		1	4	3	5		5	3		2
8 Hanging out - Enjoyment	5		4			4		5	4	5	5		4	4		4
9 Visiting - Diversity	1		1	1	1	1	1	1		1	1		1	1	1	1
9 Visiting - Intensity	4		1	5	5	5	2	6		4	3		5	4	4	6
9 Visiting - With Whom	4		2	3	3	4	2	5		3	2		3	3	3	5
9 Visiting - Where	3		2	2	1	1	5	1		2	6		2	2	2	5
9 Visiting - Enjoyment	5		4	2	1	5	4	5		5	5		5	4	3	5
11 Entertaining others - Diversity	1		1	1		1	1	1	1	1	1				1	
11 Entertaining others - Intensity	5		3	7		5	2	6	7	4	5				5	
11 Entertaining others - With Whom	2		2	2		4	2	5	2	3	2				1	
11 Entertaining others - Where	1		1	1		1	1	1	1	2	1				1	
11 Entertaining others - Enjoyment	5		3	5		4	5	5	5	5	5				3	

CAPE Social Activities Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
42 Going to the movies - Diversity	1	1			1	1	1			1	1	1	1		1	1
42 Going to the movies - Intensity	1	3			4	1	3			2	3	3	3		2	2
42 Going to the movies - With Whom	4	2			2	2	2			2	2	2	2		5	2
42 Going to the movies - Where	5	5			5	5	5			5	5	5	5		4	6
42 Going to the movies - Enjoyment	5	5			5	4	3			5	5	5	4		5	3
45 Going to live event - Diversity	1	1					1				1			1	1	
45 Going to live event - Intensity	1	1					1				1			2	2	
45 Going to live event - With Whom	5	3					2				2			2	4	
45 Going to live event - Where	6	6					6				6			6	6	
45 Going to live event - Enjoyment	5	5					5				5			4	5	
46 Full day outing - Diversity	1				1	1	1	1			1	1	1		1	1
46 Full day outing - Intensity	2				4	4	1	6			1	5	3		3	4
46 Full day outing - With Whom	5				2	2	2	2			2	2	2		5	2
46 Full day outing - Where	6				6	6	6	6			6	5	6		6	6
46 Full day outing - Enjoyment	5				5	5	5	5			5	5	5		5	5
48 Listening to music - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
48 Listening to music - Intensity	7	5	5	7	7	7	7	6	7	6	5	7	6	3	7	6
48 Listening to music - With Whom	4	1	1	1	2	1	1	2	2	2	1	2	1	2	1	1
48 Listening to music - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
48 Listening to music - Enjoyment	5	5	5	5	4	5	5	3	4	5	4	5	4	4	5	4
52 Making food - Diversity		1	1		1		1	1	1				1			
52 Making food - Intensity		6	3		6		7	5	3				6			
52 Making food - With Whom		2	2		2		1	2	1				2			
52 Making food - Where		1	1		1		1	1	1				1			
52 Making food - Enjoyment		5	5		5		2	3	5				3			

CAPE Social Activities Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	9	9	7	2	8	6	8	7	3	7	8	4	9	4	8	6
Intensity Sum	34	38	33	10	39	24	35	35	13	26	26	20	40	9	34	29
With Whom Sum	35	24	16	4	22	15	13	19	7	18	18	9	25	8	34	15
Where Sum	31	27	13	3	24	22	23	18	6	16	24	12	18	13	28	26
Enjoyment Sum	35	44	33	9	35	27	31	27	14	28	32	16	38	17	40	25
Diversity Score	9	9	7	2	8	6	8	7	3	7	8	4	9	4	8	6
Intensity Score	3.4	3.8	3.3	1	3.9	2.4	3.5	3.5	1.3	2.6	2.6	2	4	0.9	3.4	2.9
With Whom Score	3.9	2.7	2.3	2	2.8	2.5	1.6	2.7	2.3	2.6	2.3	2.3	2.8	2	4.3	2.5
Where Score	3.4	3	1.9	1.5	3	3.7	2.9	2.6	2	2.3	3	3	2	3.3	3.5	4.3
Enjoyment Score	3.9	4.9	4.7	4.5	4.4	4.5	3.9	3.9	4.7	4	4	4	4.2	4.3	5	4.2

CAPE Social Activities Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
6 Talking on the phone - Diversity	1		1	1	1	1	1		1	1	1		1	1	1	
6 Talking on the phone - Intensity	6		5	5	2	5	4		4	7	6		6	7	6	
6 Talking on the phone - With Whom	1		4	1	2	1	2		4	1	2		3	4	3	
6 Talking on the phone - Where	1		1	1	1	1	1		1	1	1		1	1	1	
6 Talking on the phone - Enjoyment	5		3	2	2	3	3		3	5	5		2	5	5	
7 Going to a party - Diversity	1	1	1	1		1			1	1	1	1	1	1	1	
7 Going to a party - Intensity	1	2	2	4		2			3	3	3	2	2	7	3	
7 Going to a party - With Whom	1	4	4	2		4			4	2	2	2	4	2	4	
7 Going to a party - Where	3	5	3	1		5			5	1	2	2	5	3	5	
7 Going to a party - Enjoyment	5	5	4	4		4			4	5	5	4	3	5	5	
8 Hanging out - Diversity	1	1			1	1		1	1	1	1	1	1	1	1	1
8 Hanging out - Intensity	5	7			7	4		6	7	7	4	5	4	7	5	5
8 Hanging out - With Whom	4	2			2	4		4	4	1	4	4	4	4	1	2
8 Hanging out - Where	5	1			2	1		1	4	5	1	3	3	1	1	1
8 Hanging out - Enjoyment	5	3			4	4		5	5	5	5	4	4	5	4	1
9 Visiting - Diversity	1	1			1	1	1	1	1	1	1			1	1	1
9 Visiting - Intensity	5	4			5	2	3	5	4	5	4			7	3	5
9 Visiting - With Whom	2	3			3	2	2	2	4	3	2			1	2	3
9 Visiting - Where	5	2			2	2	1	2	5	2	2			3	2	2
9 Visiting - Enjoyment	5	5			4	3	4	5	4	4	5			5	4	2
11 Entertaining others - Diversity	1	1	1			1			1	1				1	1	1
11 Entertaining others - Intensity	3	5	3			4			7	7				7	3	5
11 Entertaining others - With Whom	2	2	4			1			4	1				1	1	2
11 Entertaining others - Where	1	1	1			1			4	5				4	1	1
11 Entertaining others - Enjoyment	5	4	4			3			5	5				5	3	5

CAPE Social Activities Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
42 Going to the movies - Diversity	1	1			1	1	1		1	1	1	1	1		1	
42 Going to the movies - Intensity	1	1			1	3	3		1	3	3	3	3		3	
42 Going to the movies - With Whom	2	2			2	3	2		2	4	2	2	2		2	
42 Going to the movies - Where	5	5			5	6	6		5	5	6	5	5		5	
42 Going to the movies - Enjoyment	5	5			4	5	4		4	4	4	5	4		5	
45 Going to live event - Diversity	1	1					1						1		1	
45 Going to live event - Intensity	1	1					3						1		1	
45 Going to live event - With Whom	2	2					2						2		2	
45 Going to live event - Where	6	6					6						5		6	
45 Going to live event - Enjoyment	5	5					5						4		5	
46 Full day outing - Diversity		1	1			1		1		1	1	1	1		1	1
46 Full day outing - Intensity		1	4			3		3		3	1	5	3		4	4
46 Full day outing - With Whom		2	2			4		2		2	2	2	2		2	2
46 Full day outing - Where		6	5			6		6		6	6	5	5		6	6
46 Full day outing - Enjoyment		5	5			5		4		4	5	5	5		5	5
48 Listening to music - Diversity	1	1	1	1	1	1	1			1	1	1	1	1		1
48 Listening to music - Intensity	7	7	7	7	4	7	6			6	2	7	5	5		7
48 Listening to music - With Whom	2	1	2	1	1	1	1			4	1	2	1	2		1
48 Listening to music - Where	1	1	1	1	5	1	1			1	1	1	1	1		1
48 Listening to music - Enjoyment	5	5	5	5	3	5	5			4	2	5	3	5		5
52 Making food - Diversity	1	1	1		1		1		1	1			1			
52 Making food - Intensity	5	7	5		7		5		1	4			5			
52 Making food - With Whom	2	2	2		1		1		1	2			1			
52 Making food - Where	1	1	1		1		1		1	1			1			
52 Making food - Enjoyment	5	5	3		4		5		5	3			5			

CAPE Social Activities Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	9	10	7	3	6	8	9	4	6	7	5	6	10	3	5	7
Intensity Sum	34	46	29	14	24	48	36	18	19	26	15	29	34	12	10	36
With Whom Sum	18	16	15	7	15	20	21	9	14	24	8	13	20	6	12	23
Where Sum	28	32	21	6	20	25	28	10	15	18	15	16	27	3	20	26
Enjoyment Sum	45	49	35	13	20	40	39	12	29	26	17	25	39	12	25	31
Diversity Score	9	10	7	3	6	8	9	4	6	7	5	6	10	3	5	7
Intensity Score	3.4	4.6	2.9	1.4	2.4	4.8	3.6	1.8	1.9	2.6	1.5	2.9	3.4	1.2	1.9	3.6
With Whom Score	2	1.6	2.1	2.3	2.5	2.5	2.3	2.3	2.3	3.4	1.6	2.2	2	2	2.4	3.3
Where Score	3.1	3.2	3	2	3.3	3.1	3.1	2.5	2.5	2.6	3	2.7	2.7	1	4	3.7
Enjoyment Score	5	4.9	5	4.3	3.3	5	4.3	3	4.8	3.7	3.4	4.2	3.9	4	5	4.4

CAPE Skill-Based Domain data by participant at pre test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
17 Swimming - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17 Swimming - Intensity	5	3	5	5	5	7	2	5	6	5	4	6	7	5	5	7
17 Swimming - With Whom	5	5	2	5	2	2	2	5	2	5	2	2	2	5	2	5
17 Swimming - Where	5	5	5	5	5	1	6	3	1	5	6	5	3	5	2	5
17 Swimming - Enjoyment	5	5	5	1	5	4	5	5	5	2	5	5	5	3	4	4
18 Gymnastics - Diversity	1	1							1							
18 Gymnastics - Intensity	5	4							6							
18 Gymnastics - With Whom	5	5							1							
18 Gymnastics - Where	5	5							1							
18 Gymnastics - Enjoyment	5	5							5							
19 Horseback riding - Diversity		1	1					1								
19 Horseback riding - Intensity		3	4					1								
19 Horseback riding - With Whom		5	5					5								
19 Horseback riding - Where		5	5					6								
19 Horseback riding - Enjoyment		5	5					5								
22 Learning to sing - Diversity	1	1								1					1	
22 Learning to sing - Intensity	5	5								5					5	
22 Learning to sing - With Whom	4	5								5					5	
22 Learning to sing - Where	4	4								5					6	
22 Learning to sing - Enjoyment	5	1								2					3	
23 Art lessons - Diversity				1												
23 Art lessons - Intensity				1												
23 Art lessons - With Whom				2												
23 Art lessons - Where				5												
23 Art lessons - Enjoyment				3												

CAPE Skill-Based Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
24 Learning to dance - Diversity														1		
24 Learning to dance - Intensity														5		
24 Learning to dance - With Whom														5		
24 Learning to dance - Where														5		
24 Learning to dance - Enjoyment														5		
26 Playing musical instrument - Diversity	1			1	1	1	1		1		1			1		1
26 Playing musical instrument - Intensity	5			1	7	5	5		6		5			7		5
26 Playing musical instrument - With Whom	1			1	1	2	2		5		1			1		5
26 Playing musical instrument - Where	1			4	1	1	1		4		1			1		6
26 Playing musical instrument - Enjoyment	5			2	5	4	3		5		5			5		5
27 Music lessons - Diversity																
27 Music lessons - Intensity																
27 Music lessons - With Whom																
27 Music lessons - Where																
27 Music lessons - Enjoyment																
28 Community organizations - Diversity	1		1			1		1	1	1			1	1	1	1
28 Community organizations - Intensity	5		4			5		5	5	5			5	5	5	3
28 Community organizations - With Whom	5		5			5		5	4	5			4	2	4	5
28 Community organizations - Where	5		5			5		3	6	5			5	5	4	5
28 Community organizations - Enjoyment	5		3			4		5	3	5			5	4	4	5
31 Dancing - Diversity	1		1		1	1				1	1		1	1		1
31 Dancing - Intensity	7		6		7	7				6	6		6	6		6
31 Dancing - With Whom	4		1		2	1				2	2		2	3		5
31 Dancing - Where	1		1		1	1				1	1		1	2		5
31 Dancing - Enjoyment	5		5		5	3				5	5		4	5		3

CAPE Skill-Based Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	6	4	3	1	3	5	3	4	4	4	3	3	4	2	3	4
Intensity Sum	32	21	15	6	18	28	15	21	15	19	7	19	24	7	11	23
With Whom Sum	24	17	5	2	8	16	11	20	20	13	8	5	10	4	15	12
Where Sum	21	16	8	5	9	18	12	21	19	16	14	7	8	7	12	12
Enjoyment Sum	30	17	15	5	14	22	11	19	16	18	6	15	15	8	15	18
Diversity Score	6	4	3	1	3	5	3	4	4	4	3	3	4	2	3	4
Intensity Score	3.2	2.1	1.5	0.6	1.8	2.8	1.5	2.1	1.5	1.9	0.7	1.9	2.4	0.7	1.1	2.3
With Whom Score	4	4.3	1.7	2	2.7	3.2	3.7	5	5	3.3	2.7	1.7	2.5	2	5	3
Where Score	3.5	4	2.7	5	3	3.6	4	5.3	4.8	4	4.7	2.3	2	3.5	4	3
Enjoyment Score	5	4.3	5	5	4.7	4.4	3.7	4.8	4	4.5	2	5	3.8	4	5	4.5

CAPE Skill-Based Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
17 Swimming - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17 Swimming - Intensity	5	5	5	1	5	6	2	5	6	6	5	5	1	7	3	6
17 Swimming - With Whom	1	5	5	1	5	2	2	5	5	2	2	2	5	5	2	2
17 Swimming - Where	5	5	5	5	4	1	6	5	5	5	2	6	6	5	5	5
17 Swimming - Enjoyment	5	4	5	1	5	4	3	5	5	5	5	5	5	5	4	4
18 Gymnastics - Diversity	1	1							1					1		
18 Gymnastics - Intensity	5	5							6					7		
18 Gymnastics - With Whom	1	5							4					4		
18 Gymnastics - Where	5	5							4					6		
18 Gymnastics - Enjoyment	5	5							5					5		
19 Horseback riding - Diversity			1					1						1		
19 Horseback riding - Intensity			4					6						7		
19 Horseback riding - With Whom			5					5						1		
19 Horseback riding - Where			5					6						4		
19 Horseback riding - Enjoyment			5					5						5		
22 Learning to sing - Diversity	1												1		1	
22 Learning to sing - Intensity	7												5		5	
22 Learning to sing - With Whom	1												5		5	
22 Learning to sing - Where	1												4		5	
22 Learning to sing - Enjoyment	5												5		4	
23 Art lessons - Diversity				1												
23 Art lessons - Intensity				5												
23 Art lessons - With Whom				1												
23 Art lessons - Where				4												
23 Art lessons - Enjoyment				2												

CAPE Skill-Based Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
24 Learning to dance - Diversity			1											1		
24 Learning to dance - Intensity			5											7		
24 Learning to dance - With Whom			5											5		
24 Learning to dance - Where			5											5		
24 Learning to dance - Enjoyment			4											5		
26 Playing musical instrument - Diversity		1					1		1		1			1	1	1
26 Playing musical instrument - Intensity		6					5		6		6			7	5	6
26 Playing musical instrument - With Whom		1					2		4		5			5	5	5
26 Playing musical instrument - Where		1					1		4		4			3	6	5
26 Playing musical instrument - Enjoyment		3					4		5		5			3	4	1
27 Music lessons - Diversity							1							1	1	1
27 Music lessons - Intensity							4							7	5	5
27 Music lessons - With Whom							2							5	5	5
27 Music lessons - Where							1							3	5	5
27 Music lessons - Enjoyment							5							5	4	1
28 Community organizations - Diversity	1					1		1							1	
28 Community organizations - Intensity	5					5		5							5	
28 Community organizations - With Whom	1					1		5							5	
28 Community organizations - Where	5					5		5							5	
28 Community organizations - Enjoyment	5					4		5							5	
31 Dancing - Diversity	1		1		1				1		1			1		1
31 Dancing - Intensity	7		6		7				7		7			7		7
31 Dancing - With Whom	1		5		3				4		2			1		2
31 Dancing - Where	1		5		2				4		1			1		1
31 Dancing - Enjoyment	5		5		5				5		3			5		2

CAPE Skill-Based Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	5	1	3	1	2	7	5	4	3	4	2	2	2	3	3	4
Intensity Sum	29	6	18	5	6	49	23	24	16	20	6	12	11	11	16	25
With Whom Sum	5	2	9	2	10	26	22	14	11	20	2	8	3	6	15	17
Where Sum	17	5	7	6	10	27	26	16	11	20	9	6	6	8	16	17
Enjoyment Sum	25	5	13	5	10	33	21	8	12	19	3	10	8	12	15	20
Diversity Score	5	1	3	1	2	7	5	4	3	4	2	2	2	3	3	4
Intensity Score	2.9	0.6	1.8	0.5	0.6	4.9	2.3	2.4	1.6	2	0.6	1.2	1.1	1.1	1.6	2.5
With Whom Score	1	2	3	2	5	3.7	4.4	3.5	3.7	5	1	4	1.5	2	5	4.3
Where Score	3.4	5	2.3	6	5	3.9	5.2	4	3.7	5	4.5	3	3	2.7	5.3	4.3
Enjoyment Score	5	5	4.3	5	5	4.7	4.2	2	4	4.8	1.5	5	4	4	5	5

CAPE Self-Improvement Domain data by participant at pre test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
10 Writing letters - Diversity	1			1		1	1								1	
10 Writing letters - Intensity	2			1		6	1								4	
10 Writing letters - With Whom	2			4		3	2								1	
10 Writing letters - Where	1			1		1	1								1	
10 Writing letters - Enjoyment	5			4		5	3								2	
13 Writing a story - Diversity	1					1	1								1	
13 Writing a story - Intensity	1					4	3								1	
13 Writing a story - With Whom	1					1	1								1	
13 Writing a story - Where	1					1	1								5	
13 Writing a story - Enjoyment	5					4	4								4	
25 Tutor - Diversity										1					1	
25 Tutor - Intensity										6					5	
25 Tutor - With Whom										5					5	
25 Tutor - Where										5					5	
25 Tutor - Enjoyment										1					4	
29 Religious activity - Diversity		1										1			1	
29 Religious activity - Intensity		3										5			5	
29 Religious activity - With Whom		5										2			4	
29 Religious activity - Where		5										5			5	
29 Religious activity - Enjoyment		3										4			5	
43 Public library - Diversity	1		1	1			1	1		1	1		1		1	
43 Public library - Intensity	2		5	5			5	5		6	3		5		5	
43 Public library - With Whom	2		2	2			2	2		4	2		2		5	
43 Public library - Where	5		5	5			5	5		2	5		5		3	
43 Public library - Enjoyment	5		5	4			5	5		5	2		4		5	

CAPE Self-Improvement Domain Data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
47 Reading - Diversity	1		1	1	1		1	1	1	1	1		1	1	1	1
47 Reading - Intensity	7		7	7	6		7	7	7	7	7		6	7	6	7
47 Reading - With Whom	2		1	1	2		1	5	1	2	1		1	1	1	1
47 Reading - Where	1		1	1	1		1	4	1	1	1		1	1	1	1
47 Reading - Enjoyment	5		5	5	3		4	2	5	5	1		4	5	3	5
49 Volunteer work - Diversity		1					1						1			
49 Volunteer work - Intensity		1					5						5			
49 Volunteer work - With Whom		5					4						5			
49 Volunteer work - Where		4					5						5			
49 Volunteer work - Enjoyment		5					4						4			
50 Doing a chore - Diversity			1			1	1	1	1	1		1	1		1	
50 Doing a chore - Intensity			6			6	7	4	5	6		7	4		4	
50 Doing a chore - With Whom			2			2	1	5	1	2		2	1		1	
50 Doing a chore - Where			1			1	1	4	1	1		1	1		1	
50 Doing a chore - Enjoyment			5			3	5	3	2	2		5	1		1	
53 Homework - Diversity	1	1			1		1			1	1					1
53 Homework - Intensity	6	6			6		6			4	1					5
53 Homework - With Whom	2	2			1		2			2	1					1
53 Homework - Where	1	1			1		1			1	1					1
53 Homework - Enjoyment	1	1			5		1			1	1					1
54 Shopping - Diversity	1	1	1		1	1	1	1	1	1	1	1	1	1	1	
54 Shopping - Intensity	3	4	3		6	6	7	6	5	4	6	5	5	3	4	
54 Shopping - With Whom	2	2	2		2	2	2	2	2	2	2	2	2	2	1	
54 Shopping - Where	5	5	5		5	5	5	5	5	5	5	5	5	5	1	
54 Shopping - Enjoyment	1	5	2		3	4	1	5	4	4	1	1	3	2	1	

CAPE Self-Improvement Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	6	4	4	3	3	2	10	4	4	4	5	2	7	4	4	2
Intensity Sum	21	17	21	17	18	12	52	22	20	21	18	12	35	14	19	12
With Whom Sum	11	14	7	5	5	4	23	14	9	8	10	4	15	6	9	2
Where Sum	14	15	12	11	7	6	34	18	12	12	13	6	19	8	8	2
Enjoyment Sum	22	12	17	13	8	7	35	15	14	15	9	3	28	14	11	6
Diversity Score	6	4	4	3	3	2	10	4	4	4	5	2	7	4	4	2
Intensity Score	2.1	1.7	2.1	1.7	1.8	1.2	5.2	2.2	2	2.1	1.8	1.2	3.5	1.4	1.9	1.2
With Whom Score	1.8	3.5	1.8	1.7	1.7	2	2.3	3.5	2.3	2	2	2	2.1	1.5	2.3	1
Where Score	2.3	3.8	3	3.7	2.3	3	3.4	4.5	3	3	2.6	3	2.7	2	2	1
Enjoyment Score	3.7	3	4.3	4.3	2.7	3.5	3.5	3.8	3.5	3.8	1.8	1.5	4	3.5	2.8	3

CAPE Self-Improvement Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
10 Writing letters - Diversity	1			1			1						1	1	1	
10 Writing letters - Intensity	3			1			2						1	7	3	
10 Writing letters - With Whom	1			1			2						1	1	1	
10 Writing letters - Where	1			1			1						4	1	1	
10 Writing letters - Enjoyment	4			1			3						2	5	5	
13 Writing a story - Diversity	1					1					1			1	1	
13 Writing a story - Intensity	3					4					6			7	3	
13 Writing a story - With Whom	1					1					1			1	1	
13 Writing a story - Where	1					1					4			1	1	
13 Writing a story - Enjoyment	4					5					5			5	2	
25 Tutor - Diversity										1					1	
25 Tutor - Intensity										6					5	
25 Tutor - With Whom										1					5	
25 Tutor - Where										5					5	
25 Tutor - Enjoyment										1					4	
29 Religious activity - Diversity												1			1	
29 Religious activity - Intensity												5			5	
29 Religious activity - With Whom												2			5	
29 Religious activity - Where												5			5	
29 Religious activity - Enjoyment												4			4	
43 Public library - Diversity	1		1	1		1	1	1	1	1	1		1			
43 Public library - Intensity	5		5	6		5	6	5	2	5	4		4			
43 Public library - With Whom	4		2	2		5	2	2	2	4	1		2			
43 Public library - Where	4		3	5		4	5	3	5	3	1		5			
43 Public library - Enjoyment	5		5	3		5	4	3	4	5	2		4			

CAPE Self-Improvement Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
47 Reading - Diversity	1		1			1	1	1	1	1			1	1	1	1
47 Reading - Intensity	7		7			7	6	6	7	7			5	7	6	7
47 Reading - With Whom	2		2			4	1	1	1	1			1	1	1	1
47 Reading - Where	1		1			1	1	1	4	1			1	1	1	4
47 Reading - Enjoyment	5		4			5	5	4	3	1			4	5	2	5
49 Volunteer work - Diversity		1	1				1			1						
49 Volunteer work - Intensity		5	6				5			6						
49 Volunteer work - With Whom		5	5				5			4						
49 Volunteer work - Where		4	4				5			4						
49 Volunteer work - Enjoyment		5	4				4			4						
50 Doing a chore - Diversity	1			1			1		1	1		1	1	1		
50 Doing a chore - Intensity	6			6			5		5	7		6	7	6		
50 Doing a chore - With Whom	2			2			1		1	2		2	1	2		
50 Doing a chore - Where	1			1			1		1	1		1	1	1		
50 Doing a chore - Enjoyment	5			2			5		3	4		4	3	2		
53 Homework - Diversity	1	1				1	1			1	1		1			1
53 Homework - Intensity	6	7				7	6			6	3		5			6
53 Homework - With Whom	2	2				1	1			4	1		1			1
53 Homework - Where	1	1				1	1			1	1		1			1
53 Homework - Enjoyment	2	5				5	5			1	1		3			1
54 Shopping - Diversity	1	1	1	1	1	1	1	1	1	1		1	1	1		1
54 Shopping - Intensity	3	4	3	4	3	5	3	4	5	3		5	4	4		6
54 Shopping - With Whom	2	2	2	2	2	2	2	2	2	3		3	2	2		2
54 Shopping - Where	5	5	5	5	5	5	5	5	5	6		5	5	3		5
54 Shopping - Enjoyment	5	5	1	4	2	5	5	2	5	5		2	3	2		4

CAPE Self-Improvement Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	7	4	5	4	2	6	10	3	4	6	3	2	6	3	1	3
Intensity Sum	33	22	27	21	4	38	47	15	19	34	8	11	29	13	6	19
With Whom Sum	14	10	12	8	3	14	24	5	6	19	3	5	8	5	1	4
Where Sum	14	15	17	16	9	13	30	8	15	16	3	6	13	5	1	10
Enjoyment Sum	30	16	19	13	4	30	43	9	15	24	4	6	22	10	2	10
Diversity Score	7	4	5	4	2	6	10	3	4	6	3	2	6	3	1	3
Intensity Score	3.3	2.2	2.7	2.1	0.4	3.8	4.7	1.5	1.9	3.4	0.8	1.1	2.9	1.3	0.6	1.9
With Whom Score	2	2.5	2.4	2	1.5	2.3	2.4	1.7	1.5	3.2	1	2.5	1.3	1.7	1	1.3
Where Score	2	3.8	3.4	4	4.5	2.2	3	2.7	3.8	2.7	1	3	2.2	1.7	1	3.3
Enjoyment Score	4.3	4	3.8	3.3	2	5	4.3	3	3.8	4	1.3	3	3.7	3.3	2	3.3

CAPE Informal Domain data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1 Doing Puzzles - Diversity		1		1	1	1		1				1		1		1
1 Doing Puzzles - Intensity		7		3	4	6		1				5		7		5
1 Doing Puzzles - With Whom		1		2	1	1		4				2		1		3
1 Doing Puzzles - Where		1		1	1	1		1				1		1		1
1 Doing Puzzles - Enjoyment		5		3	3	4		3				2		3		4
2 Board or Card Games - Diversity	1	1	1	1		1	1	1	1	1	1		1	1		1
2 Board or Card Games - Intensity	4	7	2	6		5	3	6	3	6	4		1	6		4
2 Board or Card Games - With Whom	2	2	2	2		2	2	5	4	5	2		2	3		2
2 Board or Card Games - Where	1	1	1	1		1	1	1	4	3	1		1	2		1
2 Board or Card Games - Enjoyment	5	5	3	3		4	5	5	4	5	5		4	4		5
3 Crafts, drawing, colouring - Diversity	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1
3 Crafts, drawing, colouring - Intensity	6	7	6	1	6		7	5	7	4	6	7	7	7	6	6
3 Crafts, drawing, colouring - With Whom	1	1	1	1	2		1	1	1	4	1	2	1	1	2	5
3 Crafts, drawing, colouring - Where	1	1	1	1	1		1	1	1	5	1	1	5	1	1	5
3 Crafts, drawing, colouring - Enjoyment	4	5	5	2	5		5	3	5	4	5	4	5	4	5	5
4 Collecting things - Diversity		1	1	1		1		1		1	1					
4 Collecting things - Intensity		6	5	5		2		3		1	3					
4 Collecting things - With Whom		1	1	1		2		5		3	1					
4 Collecting things - Where		5	1	1		6		6		6	3					
4 Collecting things - Enjoyment		3	4	3		5		5		5	5					
5 Computer or video games - Diversity	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
5 Computer or video games - Intensity	7	7	4	7	7	5		7	7	7	6	7	7	7	7	3
5 Computer or video games - With Whom	1	2	1	1	1	2		1	1	1	1	2	1	2	1	2
5 Computer or video games - Where	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
5 Computer or video games - Enjoyment	5	5	3	5	5	3		5	5	5	5	5	5	5	4	3

CAPE Informal Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
6 Talking on the phone - Diversity	1		1	1		1				1	1		1		1	1
6 Talking on the phone - Intensity	5		6	3		5				6	5		6		7	4
6 Talking on the phone - With Whom	3		4	3		4				3	2		3		1	2
6 Talking on the phone - Where	1		1	1		1				1	2		1		1	1
6 Talking on the phone - Enjoyment	5		2	1		4				4	5		2		5	2
7 Going to a party - Diversity	1	1	1	1		1		1	1	1	1	1	1	1		1
7 Going to a party - Intensity	3	3	2	1		2		3	3	2	2	3	1	1		3
7 Going to a party - With Whom	4	4	4	3		2		5	4	2	4	3	4	4		3
7 Going to a party - Where	5	4	5	2		1		6	6	6	5	2	3	5		2
7 Going to a party - Enjoyment	5	5	5	5		5		5	4	5	5	4	5	5		5
8 Hanging out - Diversity	1		1			1		1	1	1	1		1	1		1
8 Hanging out - Intensity	6		6			5		5	7	7	6		6	7		5
8 Hanging out - With Whom	4		2			4		4	4	5	2		4	3		3
8 Hanging out - Where	3		1			1		1	4	3	5		5	3		2
8 Hanging out - Enjoyment	5		4			4		5	4	5	5		4	4		4
9 Visiting - Diversity	1		1	1	1	1	1	1		1	1		1	1	1	1
9 Visiting - Intensity	4		1	5	5	5	2	6		4	3		5	4	4	6
9 Visiting - With Whom	4		2	3	3	4	2	5		3	2		3	3	3	5
9 Visiting - Where	3		2	2	1	1	5	1		2	6		2	2	2	5
9 Visiting - Enjoyment	5		4	2	1	5	4	5		5	5		5	4	3	5
10 Writing letters - Diversity	1			1		1	1								1	
10 Writing letters - Intensity	2			1		6	1								4	
10 Writing letters - With Whom	2			4		3	2								1	
10 Writing letters - Where	1			1		1	1								1	
10 Writing letters - Enjoyment	5			4		5	3								2	

CAPE Informal Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
11 Entertaining others - Diversity	1		1	1		1	1	1	1	1	1				1	
11 Entertaining others - Intensity	5		3	7		5	2	6	7	4	5				5	
11 Entertaining others - With Whom	2		2	2		4	2	5	2	3	2				1	
11 Entertaining others - Where	1		1	1		1	1	1	1	2	1				1	
11 Entertaining others - Enjoyment	5		3	5		4	5	5	5	5	5				3	
12 Playing with pets - Diversity	1	1	1			1		1			1		1	1		
12 Playing with pets -Intensity	7	7	7			7		7			7		7	7		
12 Playing with pets - With Whom	1	1	1			2		1			2		2	2		
12 Playing with pets - Where	1	1	1			1		1			1		1	1		
12 Playing with pets - Enjoyment	5	5	5			3		5			5		5	4		
13 Writing a story - Diversity	1					1	1								1	
13 Writing a story - Intensity	1					4	3								1	
13 Writing a story - With Whom	1					1	1								1	
13 Writing a story - Where	1					1	1								5	
13 Writing a story - Enjoyment	5					4	4								4	
14 Pretend or imaginary play - Diversity	1		1	1		1		1	1	1	1	1	1			1
14 Pretend or imaginary play - Intensity	6		6	1		4		7	7	6	6	7	6			6
14 Pretend or imaginary play - With Whom	4		1	2		2		1	4	3	1	2	1			1
14 Pretend or imaginary play - Where	3		1	1		1		1	4	3	1	1	1			1
14 Pretend or imaginary play - Enjoyment	5		5	2		3		5	5	3	5	4	4			4
15Playing with things or toys - Diversity	1	1	1	1	1			1	1	1	1	1	1	1	1	1
15 Playing with things or toys - Intensity	7	7	7	5	7			5	5	3	7	7	6	7	5	7
15 Playing with things or toys - With Whom	1	1	1	2	1			5	1	5	1	2	1	1	1	1
15 Playing with things or toys - Where	1	1	1	1	1			1	1	3	1	1	1	1	1	5
15 Playing with things or toys - Enjoyment	5	5	5	2	5			5	4	5	5	5	5	3	5	4

CAPE Informal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
31 Dancing - Diversity	1		1		1	1				1	1		1	1		1
31 Dancing - Intensity	7		6		7	7				6	6		6	6		6
31 Dancing - With Whom	4		1		2	1				2	2		2	3		5
31 Dancing - Where	1		1		1	1				1	1		1	2		5
31 Dancing - Enjoyment	5		5		5	3				5	5		4	5		3
32 Walk or hike - Diversity	1	1	1		1	1	1	1			1		1	1	1	1
32 Walk or hike - Intensity	3	6	5		6	3	6	5			5		6	5	6	6
32 Walk or hike - With Whom	2	2	2		2	2	2	5			2		2	2	2	5
32 Walk or hike - Where	5	3	5		5	3	3	3			5		5	3	3	5
32 Walk or hike - Enjoyment	4	5	4		5	4	4	4			5		3	3	5	5
33 Bicycling, etc - Diversity	1	1		1		1		1		1		1	1	1	1	
33 Bicycling, etc - Intensity	4	3		2		6		6		2		5	4	7	6	
33 Bicycling, etc - With Whom	2	2		2		2		5		1		2	2	2	2	
33 Bicycling, etc - Where	3	3		3		3		3		1		3	5	3	3	
33 Bicycling, etc - Enjoyment	5	3		2		4		5		5		4	3	5	5	
34 Water sports - Diversity						1		1	1	1		1		1		
34 Water sports - Intensity						4		4	6	3		2		1		
34 Water sports - With Whom						4		5	2	2		2		2		
34 Water sports - Where						6		6	1	6		6		6		
34 Water sports - Enjoyment						5		5	5	5		5		3		
35 Snow sports - Diversity	1				1	1							1		1	
35 Snow sports - Intensity	5				5	3							4		3	
35 Snow sports - With Whom	2				2	2							2		1	
35 Snow sports - Where	3				3	6							5		5	
35 Snow sports - Enjoyment	5				5	3							5		5	

CAPE Informal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
36 Playing on equipment - Diversity	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1
36 Playing on equipment - Intensity	6	6	4	2	4	5	4	6	6	5	4		4	7	5	6
36 Playing on equipment - With Whom	4	2	2	2	2	2	2	5	1	4	4		2	2	2	5
36 Playing on equipment - Where	5	3	5	3	3	3	3	3	3	4	5		3	3	5	5
36 Playing on equipment - Enjoyment	5	5	4	2	5	4	3	5	4	5	5		4	4	3	3
37 Playing games - Diversity		1	1			1		1		1	1		1		1	1
37 Playing games - Intensity		3	5			5		4		6	6		4		5	6
37 Playing games - With Whom		1	2			4		4		5	2		1		2	5
37 Playing games - Where		1	1			3		3		1	1		4		1	5
37 Playing games - Enjoyment		3	3			4		5		5	5		2		2	3
38 Gardening - Diversity		1	1			1									1	1
38 Gardening - Intensity		6	2			6									6	2
38 Gardening - With Whom		2	2			2									1	2
38 Gardening - Where		1	1			1									1	1
38 Gardening - Enjoyment		5	3			3									5	4
39 Fishing - Diversity						1								1		
39 Fishing - Intensity						3								2		
39 Fishing - With Whom						2								2		
39 Fishing - Where						6								6		
39 Fishing - Enjoyment						3								5		
40 Individual physical activities - Diversity			1			1										
40 Individual physical activities - Intensity			5			4										
40 Individual physical activities - With Whom			2			2										
40 Individual physical activities - Where			1			3										
40 Individual physical activities - Enjoyment			3			4										

CAPE Informal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
41 Non-team sports - Diversity		1						1	1	1						
41 Non-team sports - Intensity		6						6	1	5						
41 Non-team sports - With Whom		1						5	5	2						
41 Non-team sports - Where		5						5	6	1						
41 Non-team sports - Enjoyment		5						5	5	3						
42 Going to the movies - Diversity	1	1			1	1	1			1	1	1	1		1	1
42 Going to the movies - Intensity	1	3			4	1	3			2	3	3	3		2	2
42 Going to the movies - With Whom	4	2			2	2	2			2	2	2	2		5	2
42 Going to the movies - Where	5	5			5	5	5			5	5	5	5		4	6
42 Going to the movies - Enjoyment	5	5			5	4	3			5	5	5	4		5	3
43 Public library - Diversity	1		1	1			1	1		1	1		1		1	
43 Public library - Intensity	2		5	5			5	5		6	3		5		5	
43 Public library - With Whom	2		2	2			2	2		4	2		2		5	
43 Public library - Where	5		5	5			5	5		2	5		5		3	
43 Public library - Enjoyment	5		5	4			5	5		5	2		4		5	
44 Watching TV or movie - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
44 Watching TV or movie - Intensity	7	7	7	5	7	7	5	7	7	6	7	7	6		7	7
44 Watching TV or movie - With Whom	2	2	2	2	1	1	1	2	2	1	2	2	2		2	2
44 Watching TV or movie - Where	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1
44 Watching TV or movie - Enjoyment	5	5	5	2	5	3	5	4	4	4	5	5	3		5	5
45 Going to live event - Diversity	1	1					1				1			1	1	
45 Going to live event - Intensity	1	1					1				1			2	2	
45 Going to live event - With Whom	5	3					2				2			2	4	
45 Going to live event - Where	6	6					6				6			6	6	
45 Going to live event - Enjoyment	5	5					5				5			4	5	

CAPE Informal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
46 Full day outing - Diversity	1				1	1	1	1			1	1	1		1	1
46 Full day outing - Intensity	2				4	4	1	6			1	5	3		3	4
46 Full day outing - With Whom	5				2	2	2	2			2	2	2		5	2
46 Full day outing - Where	6				6	6	6	6			6	5	6		6	6
46 Full day outing - Enjoyment	5				5	5	5	5			5	5	5		5	5
47 Reading - Diversity	1		1	1	1		1	1	1	1	1		1	1	1	1
47 Reading - Intensity	7		7	7	6		7	7	7	7	7		6	7	6	7
47 Reading - With Whom	2		1	1	2		1	5	1	2	1		1	1	1	1
47 Reading - Where	1		1	1	1		1	4	1	1	1		1	1	1	1
47 Reading - Enjoyment	5		5	5	3		4	2	5	5	1		4	5	3	5
48 Listening to music - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
48 Listening to music - Intensity	7	5	5	7	7	7	7	6	7	6	5	7	6	3	7	6
48 Listening to music - With Whom	4	1	1	1	2	1	1	2	2	2	1	2	1	2	1	1
48 Listening to music - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
48 Listening to music - Enjoyment	5	5	5	5	4	5	5	3	4	5	4	5	4	4	5	4
49 Volunteer work - Diversity		1					1						1			
49 Volunteer work - Intensity		1					5						5			
49 Volunteer work - With Whom		5					4						5			
49 Volunteer work - Where		4					5						5			
49 Volunteer work - Enjoyment		5					4						4			
50 Doing a chore - Diversity			1			1	1	1	1	1		1	1		1	
50 Doing a chore - Intensity			6			6	7	4	5	6		7	4		4	
50 Doing a chore - With Whom			2			2	1	5	1	2		2	1		1	
50 Doing a chore - Where			1			1	1	4	1	1		1	1		1	
50 Doing a chore - Enjoyment			5			3	5	3	2	2		5	1		1	

CAPE Informal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
51 Paid job - Diversity							1									
51 Paid job - Intensity							7									
51 Paid job - With Whom							1									
51 Paid job - Where							1									
51 Paid job - Enjoyment							5									
52 Making food - Diversity		1	1		1		1	1	1				1			
52 Making food - Intensity		6	3		6		7	5	3				6			
52 Making food - With Whom		2	2		2		1	2	1				2			
52 Making food - Where		1	1		1		1	1	1				1			
52 Making food - Enjoyment		5	5		5		2	3	5				3			
53 Homework - Diversity	1	1			1		1			1	1					1
53 Homework - Intensity	6	6			6		6			4	1					5
53 Homework - With Whom	2	2			1		2			2	1					1
53 Homework - Where	1	1			1		1			1	1					1
53 Homework - Enjoyment	1	1			5		1			1	1					1
54 Shopping - Diversity	1	1	1		1	1	1	1	1	1	1	1	1	1	1	
54 Shopping - Intensity	3	4	3		6	6	7	6	5	4	6	5	5	3	4	
54 Shopping - With Whom	2	2	2		2	2	2	2	2	2	2	2	2	2	1	
54 Shopping - Where	5	5	5		5	5	5	5	5	5	5	5	5	5	1	
54 Shopping - Enjoyment	1	5	2		3	4	1	5	4	4	1	1	3	2	1	
55 Taking care of a pet - Diversity	1		1		1	1			1	1		1		1		
55 Taking care of a pet - Intensity	5		6		7	4			5	5		7		5		
55 Taking care of a pet - With Whom	2		2		1	2			2	2		1		2		
55 Taking care of a pet - Where	1		1		1	1			1	1		1		3		
55 Taking care of a pet - Enjoyment	5		5		5	3			5	3		3		2		

CAPE Informal Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	28	25	24	12	25	22	29	24	21	28	23	19	34	12	27	16
Intensity Sum	129	111	123	67	133	116	132	127	108	127	83	104	163	43	131	89
With Whom Sum	74	71	45	23	48	45	54	76	38	52	45	41	75	21	97	33
Where Sum	72	77	56	24	66	60	78	77	43	53	51	40	75	29	69	44
Enjoyment Sum	130	121	117	49	99	88	118	96	93	107	70	78	128	48	118	68
Diversity Score	28	25	24	12	25	22	29	24	21	28	23	19	34	12	27	16
Intensity Score	3.2	2.8	3.1	1.7	3.3	2.9	3.3	3.2	2.7	3.2	2.1	2.6	4.1	1.1	3.3	2.2
With Whom Score	2.6	2.8	1.9	1.9	1.9	2	1.9	3.2	1.8	1.9	2	2.2	2.2	1.8	3.6	2.1
Where Score	2.6	3.1	2.3	2	2.6	2.7	2.7	3.2	2	1.9	2.2	2.1	2.2	2.4	2.6	2.8
Enjoyment Score	4.6	4.8	4.9	4.1	4	4	4.1	4	4.4	3.8	3	4.1	3.8	4	4.4	4.3

CAPE Informal Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1 Doing Puzzles - Diversity	1	1				1		1				1	1	1		1
1 Doing Puzzles - Intensity	3	6				4		5				6	3	6		7
1 Doing Puzzles - With Whom	4	1				1		4				2	1	1		4
1 Doing Puzzles - Where	1	1				1		1				2	1	1		4
1 Doing Puzzles - Enjoyment	5	5				4		2				5	3	5		5
2 Board or Card Games - Diversity	1	1	1	1	1	1		1			1			1		1
2 Board or Card Games - Intensity	5	3	2	3	5	4		6			5			7		5
2 Board or Card Games - With Whom	4	2	2	2	2	2		4			2			2		2
2 Board or Card Games - Where	1	1	1	2	1	1		4			1			1		1
2 Board or Card Games - Enjoyment	5	3	3	3	4	5		5			4			5		3
3 Crafts, drawing, colouring - Diversity	1	1	1		1	1	1		1		1	1	1	1	1	1
3 Crafts, drawing, colouring - Intensity	3	6	4		5	2	6		6		7	5	1	7	5	5
3 Crafts, drawing, colouring - With Whom	4	3	1		2	1	1		5		1	2	5	4	1	2
3 Crafts, drawing, colouring - Where	1	2	1		1	1	1		4		4	1	4	3	4	1
3 Crafts, drawing, colouring - Enjoyment	5	5	4		4	3	4		5		5	4	5	5	5	2
4 Collecting things - Diversity	1	1				1			1	1	1			1	1	
4 Collecting things - Intensity	4	5				4			5	1	4			5	3	
4 Collecting things - With Whom	1	4				1			1	4	1			1	1	
4 Collecting things - Where	5	4				6			1	5	1			1	1	
4 Collecting things - Enjoyment	5	2				5			5	5	5			5	5	
5 Computer or video games - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5 Computer or video games - Intensity	7	7	3	7	7	2	6	6	7	7	7	7	7	7	6	
5 Computer or video games - With Whom	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	
5 Computer or video games - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5 Computer or video games - Enjoyment	5	5	2	5	5	2	3	5	5	5	5	5	5	5	5	

CAPE Informal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
6 Talking on the phone - Diversity	1		1	1	1	1	1		1	1	1		1	1	1	
6 Talking on the phone - Intensity	6		5	5	2	5	4		4	7	6		6	7	6	
6 Talking on the phone - With Whom	1		4	1	2	1	2		4	1	2		3	4	3	
6 Talking on the phone - Where	1		1	1	1	1	1		1	1	1		1	1	1	
6 Talking on the phone - Enjoyment	5		3	2	2	3	3		3	5	5		2	5	5	
7 Going to a party - Diversity	1	1	1	1		1			1	1	1	1	1	1	1	
7 Going to a party - Intensity	1	2	2	4		2			3	3	3	2	2	7	3	
7 Going to a party - With Whom	1	4	4	2		4			4	2	2	2	4	2	4	
7 Going to a party - Where	3	5	3	1		5			5	1	2	2	5	3	5	
7 Going to a party - Enjoyment	5	5	4	4		4			4	5	5	4	3	5	5	
8 Hanging out - Diversity	1	1			1	1		1	1	1	1	1	1	1	1	1
8 Hanging out - Intensity	5	7			7	4		6	7	7	4	5	4	7	5	5
8 Hanging out - With Whom	4	2			2	4		4	4	1	4	4	4	4	1	2
8 Hanging out - Where	5	1			2	1		1	4	5	1	3	3	1	1	1
8 Hanging out - Enjoyment	5	3			4	4		5	5	5	5	4	4	5	4	1
9 Visiting - Diversity	1	1			1	1	1	1	1	1	1			1	1	1
9 Visiting - Intensity	5	4			5	2	3	5	4	5	4			7	3	5
9 Visiting - With Whom	2	3			3	2	2	2	4	3	2			1	2	3
9 Visiting - Where	5	2			2	2	1	2	5	2	2			3	2	2
9 Visiting - Enjoyment	5	5			4	3	4	5	4	4	5			5	4	2
10 Writing letters - Diversity	1			1			1						1	1	1	
10 Writing letters - Intensity	3			1			2						1	7	3	
10 Writing letters - With Whom	1			1			2						1	1	1	
10 Writing letters - Where	1			1			1						4	1	1	
10 Writing letters - Enjoyment	4			1			3						2	5	5	

CAPE Informal Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
11 Entertaining others - Diversity	1	1	1			1			1	1				1	1	1
11 Entertaining others - Intensity	3	5	3			4			7	7				7	3	5
11 Entertaining others - With Whom	2	2	4			1			4	1				1	1	2
11 Entertaining others - Where	1	1	1			1			4	5				4	1	1
11 Entertaining others - Enjoyment	5	4	4			3			5	5				5	3	5
12 Playing with pets - Diversity	1	1	1		1			1			1			1		1
12 Playing with pets -Intensity	7	7	7		4			5			6			7		6
12 Playing with pets - With Whom	1	1	4		2			2			1			1		2
12 Playing with pets - Where	1	1	5		3			1			1			1		1
12 Playing with pets - Enjoyment	5	5	5		3			2			5			5		4
13 Writing a story - Diversity	1					1					1			1	1	
13 Writing a story - Intensity	3					4					6			7	3	
13 Writing a story - With Whom	1					1					1			1	1	
13 Writing a story - Where	1					1					4			1	1	
13 Writing a story - Enjoyment	4					5					5			5	2	
14 Pretend or imaginary play - Diversity	1		1		1						1	1		1	1	
14 Pretend or imaginary play - Intensity	7		6		4						6	6		7	6	
14 Pretend or imaginary play - With Whom	1		1		2						1	2		1	1	
14 Pretend or imaginary play - Where	1		1		1						1	1		2	1	
14 Pretend or imaginary play - Enjoyment	5		5		3						5	4		5	3	
15Playing with things or toys - Diversity	1	1	1	1	1					1	1	1	1	1	1	1
15 Playing with things or toys - Intensity	7	7	7	4	7					4	7	7	7	7	6	5
15 Playing with things or toys - With Whom	1	1	1	1	2					1	1	1	1	1	1	1
15 Playing with things or toys - Where	1	1	1	1	1					1	1	1	1	1	1	1
15 Playing with things or toys - Enjoyment	5	5	4	1	4					4	5	5	5	5	2	2

CAPE Informal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
31 Dancing - Diversity	1		1		1				1		1			1		1
31 Dancing - Intensity	7		6		7				7		7			7		7
31 Dancing - With Whom	1		5		3				4		2			1		2
31 Dancing - Where	1		5		2				4		1			1		1
31 Dancing - Enjoyment	5		5		5				5		3			5		2
32 Walk or hike - Diversity	1		1		1	1	1	1			1		1		1	1
32 Walk or hike - Intensity	5		6		7	4	7	5			5		2		5	6
32 Walk or hike - With Whom	2		2		2	2	2	2			2		2		2	2
32 Walk or hike - Where	5		5		3	5	3	3			3		3		5	3
32 Walk or hike - Enjoyment	5		4		5	4	2	2			4		1		4	2
33 Bicycling, etc - Diversity	1	1				1		1	1	1				1	1	
33 Bicycling, etc - Intensity	5	4				5		6	7	2				1	5	
33 Bicycling, etc - With Whom	2	2				2		4	1	1				1	2	
33 Bicycling, etc - Where	5	3				5		3	1	1				4	5	
33 Bicycling, etc - Enjoyment	5	3				4		5	5	5				2	3	
34 Water sports - Diversity	1	1	1							1						
34 Water sports - Intensity	5	1	2							4						
34 Water sports - With Whom	1	2	2							1						
34 Water sports - Where	5	6	6							6						
34 Water sports - Enjoyment	5	5	5							5						
35 Snow sports - Diversity						1		1	1	1	1				1	
35 Snow sports - Intensity						4		2	6	6	5				5	
35 Snow sports - With Whom						2		2	5	5	2				5	
35 Snow sports - Where						5		6	6	5	3				5	
35 Snow sports - Enjoyment						4		5	4	5	4				4	

CAPE Informal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
36 Playing on equipment - Diversity	1	1	1		1	1		1	1	1	1			1	1	1
36 Playing on equipment - Intensity	5	6	4		5	7		5	6	6	6			7	3	5
36 Playing on equipment - With Whom	2	2	4		2	1		4	1	4	2			1	2	2
36 Playing on equipment - Where	5	3	3		3	4		3	1	5	3			3	5	3
36 Playing on equipment - Enjoyment	5	5	2		4	4		5	4	5	4			5	3	3
37 Playing games - Diversity	1	1			1	1	1	1	1	1				1	1	1
37 Playing games - Intensity	5	4			6	5	6	5	4	6				7	3	5
37 Playing games - With Whom	4	1			2	2	2	4	4	4				1	2	2
37 Playing games - Where	5	1			1	1	1	3	3	3				1	1	1
37 Playing games - Enjoyment	5	3			5	4	5	5	4	5				5	5	2
38 Gardening - Diversity		1	1	1		1										
38 Gardening - Intensity		2	3	1		3										
38 Gardening - With Whom		2	2	2		2										
38 Gardening - Where		1	1	1		1										
38 Gardening - Enjoyment		5	2	3		4										
39 Fishing - Diversity														1		
39 Fishing - Intensity														5		
39 Fishing - With Whom														2		
39 Fishing - Where														5		
39 Fishing - Enjoyment														5		
40 Individual physical activities - Diversity																1
40 Individual physical activities - Intensity																5
40 Individual physical activities - With Whom																2
40 Individual physical activities - Where																3
40 Individual physical activities - Enjoyment																2

CAPE Informal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
41 Non-team sports - Diversity	1						1	1								
41 Non-team sports - Intensity	5						6	5								
41 Non-team sports - With Whom	4						4	2								
41 Non-team sports - Where	5						4	1								
41 Non-team sports - Enjoyment	5						2	2								
42 Going to the movies - Diversity	1	1			1	1	1		1	1	1	1	1		1	
42 Going to the movies - Intensity	1	1			1	3	3		1	3	3	3	3		3	
42 Going to the movies - With Whom	2	2			2	3	2		2	4	2	2	2		2	
42 Going to the movies - Where	5	5			5	6	6		5	5	6	5	5		5	
42 Going to the movies - Enjoyment	5	5			4	5	4		4	4	4	5	4		5	
43 Public library - Diversity	1		1	1		1	1	1	1	1	1		1			
43 Public library - Intensity	5		5	6		5	6	5	2	5	4		4			
43 Public library - With Whom	4		2	2		5	2	2	2	4	1		2			
43 Public library - Where	4		3	5		4	5	3	5	3	1		5			
43 Public library - Enjoyment	5		5	3		5	4	3	4	5	2		4			
44 Watching TV or movie - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44 Watching TV or movie - Intensity	6	7	5	7	7	7	5	7	7	6	5	7	5	7	7	7
44 Watching TV or movie - With Whom	1	1	2	2	1	1	1	2	2	2	2	2	1	2	1	2
44 Watching TV or movie - Where	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44 Watching TV or movie - Enjoyment	5	5	5	4	5	4	2	5	2	5	5	5	3	5	5	5
45 Going to live event - Diversity	1	1					1						1		1	
45 Going to live event - Intensity	1	1					3						1		1	
45 Going to live event - With Whom	2	2					2						2		2	
45 Going to live event - Where	6	6					6						5		6	
45 Going to live event - Enjoyment	5	5					5						4		5	

CAPE Informal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
46 Full day outing - Diversity		1	1			1		1		1	1	1	1		1	1
46 Full day outing - Intensity		1	4			3		3		3	1	5	3		4	4
46 Full day outing - With Whom		2	2			4		2		2	2	2	2		2	2
46 Full day outing - Where		6	5			6		6		6	6	5	5		6	6
46 Full day outing - Enjoyment		5	5			5		4		4	5	5	5		5	5
47 Reading - Diversity	1		1			1	1	1	1	1			1	1	1	1
47 Reading - Intensity	7		7			7	6	6	7	7			5	7	6	7
47 Reading - With Whom	2		2			4	1	1	1	1			1	1	1	1
47 Reading - Where	1		1			1	1	1	4	1			1	1	1	4
47 Reading - Enjoyment	5		4			5	5	4	3	1			4	5	2	5
48 Listening to music - Diversity	1	1	1	1	1	1	1			1	1	1	1	1		1
48 Listening to music - Intensity	7	7	7	7	4	7	6			6	2	7	5	5		7
48 Listening to music - With Whom	2	1	2	1	1	1	1			4	1	2	1	2		1
48 Listening to music - Where	1	1	1	1	5	1	1			1	1	1	1	1		1
48 Listening to music - Enjoyment	5	5	5	5	3	5	5			4	2	5	3	5		5
49 Volunteer work - Diversity		1	1				1			1						
49 Volunteer work - Intensity		5	6				5			6						
49 Volunteer work - With Whom		5	5				5			4						
49 Volunteer work - Where		4	4				5			4						
49 Volunteer work - Enjoyment		5	4				4			4						
50 Doing a chore - Diversity	1			1			1		1	1		1	1	1		
50 Doing a chore - Intensity	6			6			5		5	7		6	7	6		
50 Doing a chore - With Whom	2			2			1		1	2		2	1	2		
50 Doing a chore - Where	1			1			1		1	1		1	1	1		
50 Doing a chore - Enjoyment	5			2			5		3	4		4	3	2		

CAPE Informal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
51 Paid job - Diversity																
51 Paid job - Intensity																
51 Paid job - With Whom																
51 Paid job - Where																
51 Paid job - Enjoyment																
52 Making food - Diversity	1	1	1		1		1		1	1			1			
52 Making food - Intensity	5	7	5		7		5		1	4			5			
52 Making food - With Whom	2	2	2		1		1		1	2			1			
52 Making food - Where	1	1	1		1		1		1	1			1			
52 Making food - Enjoyment	5	5	3		4		5		5	3			5			
53 Homework - Diversity	1	1				1	1			1	1		1			1
53 Homework - Intensity	6	7				7	6			6	3		5			6
53 Homework - With Whom	2	2				1	1			4	1		1			1
53 Homework - Where	1	1				1	1			1	1		1			1
53 Homework - Enjoyment	2	5				5	5			1	1		3			1
54 Shopping - Diversity	1	1	1	1	1	1	1	1	1	1		1	1	1		1
54 Shopping - Intensity	3	4	3	4	3	5	3	4	5	3		5	4	4		6
54 Shopping - With Whom	2	2	2	2	2	2	2	2	2	3		3	2	2		2
54 Shopping - Where	5	5	5	5	5	5	5	5	5	6		5	5	3		5
54 Shopping - Enjoyment	5	5	1	4	2	5	5	2	5	5		2	3	2		4
55 Taking care of a pet - Diversity	1		1		1	1		1	1	1			1		1	
55 Taking care of a pet - Intensity	7		6		6	6		6	7	7			7		7	
55 Taking care of a pet - With Whom	2		2		1	1		2	1	2			1		4	
55 Taking care of a pet - Where	1		1		1	1		1	1	1			1		3	
55 Taking care of a pet - Enjoyment	5		5		1	5		3	5	5			4		5	

CAPE Informal Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	33	22	25	12	15	29	27	20	24	26	13	15	29	12	17	19
Intensity Sum	160	105	136	68	61	179	138	107	111	123	43	85	119	63	85	110
With Whom Sum	68	48	48	23	30	55	43	41	45	72	19	28	47	21	45	51
Where Sum	82	71	52	24	41	65	70	41	57	66	24	30	74	16	50	57
Enjoyment Sum	160	108	111	49	49	141	106	58	100	101	38	62	112	43	73	83
Diversity Score	33	22	25	12	15	29	27	20	24	26	13	15	29	12	17	19
Intensity Score	4	2.6	3.4	1.7	1.5	4.5	3.5	2.7	2.8	3.1	1.1	2.1	3	1.6	2.1	2.8
With Whom Score	2.1	2.2	1.9	1.9	2	1.9	1.6	2.1	1.9	2.8	1.5	1.9	1.6	1.8	2.6	2.7
Where Score	2.5	3.2	2.1	2	2.7	2.2	2.6	2.1	2.4	2.5	1.8	2	2.6	1.3	2.9	3
Enjoyment Score	4.8	4.9	4.4	4.1	3.3	4.9	3.9	2.9	4.2	3.8	2.9	4.1	3.9	3.6	4.3	4.4

CAPE Formal Domain data by participants at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
16 Martial arts - Diversity			1	1												
16 Martial arts - Intensity			5	5												
16 Martial arts - With Whom			5	5												
16 Martial arts - Where			5	5												
16 Martial arts - Enjoyment			4	1												
17 Swimming - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17 Swimming - Intensity	5	3	5	5	5	7	2	5	6	5	4	6	7	5	5	7
17 Swimming - With Whom	5	5	2	5	2	2	2	5	2	5	2	2	2	5	2	5
17 Swimming - Where	5	5	5	5	5	1	6	3	1	5	6	5	3	5	2	5
17 Swimming - Enjoyment	5	5	5	1	5	4	5	5	5	2	5	5	5	3	4	4
18 Gymnastics - Diversity	1	1							1							
18 Gymnastics - Intensity	5	4							6							
18 Gymnastics - With Whom	5	5							1							
18 Gymnastics - Where	5	5							1							
18 Gymnastics - Enjoyment	5	5							5							
19 Horseback riding - Diversity		1	1					1								
19 Horseback riding - Intensity		3	4					1								
19 Horseback riding - With Whom		5	5					5								
19 Horseback riding - Where		5	5					6								
19 Horseback riding - Enjoyment		5	5					5								
20 Racing or track and field - Diversity			1			1		1					1	1		
20 Racing or track and field - Intensity			4			2		1					7	1		
20 Racing or track and field - With Whom			5			2		5					5	5		
20 Racing or track and field - Where			4			6		6					4	4		
20 Racing or track and field - Enjoyment			3			4		5					2	3		

CAPE Formal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
21 Team sports - Diversity	1					1		1		1						
21 Team sports - Intensity	5					6		6		6						
21 Team sports - With Whom	5					5		5		5						
21 Team sports - Where	5					5		5		5						
21 Team sports - Enjoyment	5					4		5		5						
22 Learning to sing - Diversity	1	1								1					1	
22 Learning to sing - Intensity	5	5								5					5	
22 Learning to sing - With Whom	4	5								5					5	
22 Learning to sing - Where	4	4								5					6	
22 Learning to sing - Enjoyment	5	1								2					3	
23 Art lessons - Diversity				1												
23 Art lessons - Intensity				1												
23 Art lessons - With Whom				2												
23 Art lessons - Where				5												
23 Art lessons - Enjoyment				3												
24 Learning to dance - Diversity														1		
24 Learning to dance - Intensity														5		
24 Learning to dance - With Whom														5		
24 Learning to dance - Where														5		
24 Learning to dance - Enjoyment														5		
25 Tutor - Diversity										1					1	
25 Tutor - Intensity										6					5	
25 Tutor - With Whom										5					5	
25 Tutor - Where										5					5	
25 Tutor - Enjoyment										1					4	

CAPE Formal Domain data by participant at pre test continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
26 Playing musical instrument - Diversity	1			1	1	1	1		1		1			1		1
26 Playing musical instrument - Intensity	5			1	7	5	5		6		5			7		5
26 Playing musical instrument - With Whom	1			1	1	2	2		5		1			1		5
26 Playing musical instrument - Where	1			4	1	1	1		4		1			1		6
26 Playing musical instrument - Enjoyment	5			2	5	4	3		5		5			5		5
27 Music lessons - Diversity																
27 Music lessons - Intensity																
27 Music lessons - With Whom																
27 Music lessons - Where																
27 Music lessons - Enjoyment																
28 Community organizations - Diversity	1		1			1		1	1	1			1	1	1	1
28 Community organizations - Intensity	5		4			5		5	5	5			5	5	5	3
28 Community organizations - With Whom	5		5			5		5	4	5			4	2	4	5
28 Community organizations - Where	5		5			5		3	6	5			5	5	4	5
28 Community organizations - Enjoyment	5		3			4		5	3	5			5	4	4	5
29 Religious activity - Diversity		1										1			1	
29 Religious activity - Intensity		3										5			5	
29 Religious activity - With Whom		5										2			4	
29 Religious activity - Where		5										5			5	
29 Religious activity - Enjoyment		3										4			5	
30 School clubs - Diversity	1		1	1				1		1						
30 School clubs - Intensity	5		6	5				5		6						
30 School clubs - With Whom	4		4	4				5		4						
30 School clubs - Where	4		4	5				4		4						
30 School clubs - Enjoyment	5		4	3				5		5						

CAPE Formal Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	7	6	2	2	3	7	5	3	5	6	5	2	5	2	6	4
Intensity Sum	35	33	9	11	19	49	25	15	18	28	17	12	25	7	23	23
With Whom Sum	29	29	3	4	11	26	20	15	25	26	17	3	16	4	30	12
Where Sum	29	29	7	10	12	30	22	16	24	28	24	6	18	7	27	12
Enjoyment Sum	35	20	10	9	12	33	20	14	19	24	10	10	20	8	30	18
Diversity Score	7	6	2	2	3	7	5	3	5	6	5	2	5	2	6	4
Intensity Score	2.3	2.2	0.6	0.7	1.3	3.3	1.7	1	1.2	1.9	1.1	0.8	1.7	0.5	1.5	1.5
With Whom Score	4.1	4.8	1.5	2	3.7	3.7	4	5	5	4.3	3.4	1.5	3.2	2	5	3
Where Score	4.1	4.8	3.5	5	4	4.3	4.4	5.3	4.8	4.7	4.8	3	3.6	3.5	4.5	3
Enjoyment Score	5	3.3	5	4.5	4	4.7	4	4.7	3.8	4	2	5	4	4	5	4.5

CAPE Formal Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
16 Martial arts - Diversity			1			1	1									
16 Martial arts - Intensity			5			6	2									
16 Martial arts - With Whom			5			1	5									
16 Martial arts - Where			5			5	5									
16 Martial arts - Enjoyment			5			5	5									
17 Swimming - Diversity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17 Swimming - Intensity	5	5	5	1	5	6	2	5	6	6	5	5	1	7	3	6
17 Swimming - With Whom	1	5	5	1	5	2	2	5	5	2	2	2	5	5	2	2
17 Swimming - Where	5	5	5	5	4	1	6	5	5	5	2	6	6	5	5	5
17 Swimming - Enjoyment	5	4	5	1	5	4	3	5	5	5	5	5	5	5	4	4
18 Gymnastics - Diversity	1	1							1					1		
18 Gymnastics - Intensity	5	5							6					7		
18 Gymnastics - With Whom	1	5							4					4		
18 Gymnastics - Where	5	5							4					6		
18 Gymnastics - Enjoyment	5	5							5					5		
19 Horseback riding - Diversity			1					1						1		
19 Horseback riding - Intensity			4					6						7		
19 Horseback riding - With Whom			5					5						1		
19 Horseback riding - Where			5					6						4		
19 Horseback riding - Enjoyment			5					5						5		
20 Racing or track and field - Diversity						1		1			1			1		1
20 Racing or track and field - Intensity						2		6			6			7		5
20 Racing or track and field - With Whom						2		5			5			1		5
20 Racing or track and field - Where						5		4			4			4		4
20 Racing or track and field - Enjoyment						4		5			2			5		4

CAPE Formal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
21 Team sports - Diversity	1		1			1		1		1					1	1
21 Team sports - Intensity	5		3			6		6		6					5	5
21 Team sports - With Whom	1		4			5		5		5					5	2
21 Team sports - Where	5		4			5		5		5					5	1
21 Team sports - Enjoyment	5		1			5		5		5					5	4
22 Learning to sing - Diversity	1												1		1	
22 Learning to sing - Intensity	7												5		5	
22 Learning to sing - With Whom	1												5		5	
22 Learning to sing - Where	1												4		5	
22 Learning to sing - Enjoyment	5												5		4	
23 Art lessons - Diversity				1												
23 Art lessons - Intensity				5												
23 Art lessons - With Whom				1												
23 Art lessons - Where				4												
23 Art lessons - Enjoyment				2												
24 Learning to dance - Diversity			1											1		
24 Learning to dance - Intensity			5											7		
24 Learning to dance - With Whom			5											5		
24 Learning to dance - Where			5											5		
24 Learning to dance - Enjoyment			4											5		
25 Tutor - Diversity										1					1	
25 Tutor - Intensity										6					5	
25 Tutor - With Whom										1					5	
25 Tutor - Where										5					5	
25 Tutor - Enjoyment										1					4	

CAPE Formal Domain data by participant at follow up continued

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
26 Playing musical instrument - Diversity		1					1		1		1			1	1	1
26 Playing musical instrument - Intensity		6					5		6		6			7	5	6
26 Playing musical instrument - With Whom		1					2		4		5			5	5	5
26 Playing musical instrument - Where		1					1		4		4			3	6	5
26 Playing musical instrument - Enjoyment		3					4		5		5			3	4	1
27 Music lessons - Diversity							1							1	1	1
27 Music lessons - Intensity							4							7	5	5
27 Music lessons - With Whom							2							5	5	5
27 Music lessons - Where							1							3	5	5
27 Music lessons - Enjoyment							5							5	4	1
28 Community organizations - Diversity	1					1		1							1	
28 Community organizations - Intensity	5					5		5							5	
28 Community organizations - With Whom	1					1		5							5	
28 Community organizations - Where	5					5		5							5	
28 Community organizations - Enjoyment	5					4		5							5	
29 Religious activity - Diversity												1			1	
29 Religious activity - Intensity												5			5	
29 Religious activity - With Whom												2			5	
29 Religious activity - Where												5			5	
29 Religious activity - Enjoyment												4			4	
30 School clubs - Diversity	1			1					1				1		1	
30 School clubs - Intensity	5			5					5				5		6	
30 School clubs - With Whom	1			4					5				5		5	
30 School clubs - Where	4			4					4				4		4	
30 School clubs - Enjoyment	5			4					3				4		4	

CAPE Formal Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Diversity Sum	6	3	3	2	3	5	9	5	3	5	3	1	5	4	5	4
Intensity Sum	32	18	17	10	11	23	44	27	16	22	11	5	25	13	28	23
With Whom Sum	6	8	12	4	15	18	42	19	11	25	6	5	11	11	25	18
Where Sum	25	15	10	11	14	20	45	20	11	25	13	4	21	13	25	17
Enjoyment Sum	30	11	12	9	14	20	38	14	12	20	7	5	22	17	25	18
Diversity Score	6	3	3	2	3	5	9	5	3	5	3	1	5	4	5	4
Intensity Score	2.1	1.2	1.1	0.7	0.7	1.5	2.9	1.8	1.1	1.5	0.7	0.3	1.7	0.9	1.9	1.5
With Whom Score	1	2.7	4	2	5	3.6	4.7	3.8	3.7	5	2	5	2.2	2.8	5	4.5
Where Score	4.2	5	3.3	5.5	4.7	4	5	4	3.7	5	4.3	4	4.2	3.3	5	4.3
Enjoyment Score	5	3.7	4	4.5	4.7	4	4.2	2.8	4	4	2.3	5	4.4	4.3	5	4.5

PAC Informal Domain data by participant at pre test

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1- Doing puzzles	2	1	1	2	2	2	1	3	2	1	1	1	1	2	2	2
2 – Playing board games or card games	3	3	3	1	1	2	1	3	2	2	1	1	2	3	3	2
3 – Doing crafts drawing or colouring	3	2	3	2	3	2	3	3	3	3	1	3	1	3	2	3
4 – Collecting things	3	2	3	2	2	1	1	3	2	2	1	1	3	3	3	1
5 – Playing computer or video games	3	3	3	3	3	3	3	3	3	1	3	3	1	3	3	3
6 – Talking on the phone	3	2	3	1	2	1	3	2	1	1	1	1	1	3	1	2
7 – Going to a party	3	3	3	3	3	3	3	3	2	2	3	1	1	3	3	2
8 – Hanging out	3	3	3	2	1	2	3	1	2	1	1	1	2	3	3	2
9 – Visiting	3	2	3	2	2	2	3	3	2	2	1	1	2	3	2	2
10 – Writing letters	3	1	3	1	1	1	3	3	1	1	1	1	2	2	1	1
11 – Entertaining others	3	3	1	1	1	1	3	3	1	1	3	1	2	3	3	3
12 – Playing with pets	3	2	3	1	3	3	3	3	3	2	3	1	3	3	3	1
13 – Writing a story	3	1	3	1	2	1	3	3	1	1	1	1	3	3	1	1
14 – Doing pretend or imaginary play	3	1	3	2	1	1	1	3	1	2	1	1	1	3	3	3
15 – Playing with things or toys	3	2	3	2	1	2	3	3	2	2	1	3	1	2	3	2
31 – Dancing	3	3	1	2	3	3	3	3	1	3	1	3	2	2	3	2
32 – Going for a walk or hike	2	1	1	1	2	2	3	3	3	2	1	3	1	2	3	2
33 – Bicycling, skateboarding, roller blading	3	3	3	3	2	3	3	1	2	1	1	1	3	1	2	2
34 – Water sports	3	3	1	2	3	3	1	1	1	2	1	1	3	2	2	3
35 – Snow sports	3	1	1	2	1	1	3	2	1	1	1	3	2	2	2	2
36 – Playing on equipment	3	3	2	3	2	3	3	3	3	2	1	3	2	2	3	2
37 – Playing games	1	3	1	2	2	2	3	3	2	1	1	3	2	3	2	2
38 – Gardening	3	2	1	1	1	2	3	3	3	1	1	1	3	3	1	1
39 – Fishing	2	1	1	1	3	3	1	3	1	1	1	1	2	2	2	2
40 –Individual physical activities	1	1	1	1	1	2	1	1	1	1	1	2	2	2	1	2
41 – Non team sports	2	3	1	1	2	2	1	3	2	2	1	3	1	2	1	3
42 – Going to the movies	3	3	3	1	3	3	3	2	2	2	3	3	1	2	3	3
43 – Going to the public library	3	1	3	1	2	2	3	3	2	1	1	1	3	2	2	3
44 – Watching TV or a rented movie	3	3	3	1	3	3	1	3	3	1	3	3	1	2	3	3

PAC Informal Domain data by participant at pre test continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
45 – Going to a live event	3	3	1	1	3	3	3	3	1	1	3	1	1	3	3	2
46 – Full day outing	3	2	3	1	2	3	3	3	2	2	3	3	3	1	3	3
47 – Reading	2	1	3	2	1	2	3	3	3	2	1	1	3	2	2	3
48 – Listening to music	3	3	2	3	3	3	3	3	2	2	2	3	2	2	3	3
49 – Volunteering	2	2	1	1	2	2	3	3	1	3	1	1	2	2	2	2
50 – Doing a chore	3	1	1	1	1	1	3	2	2	1	1	3	1	2	1	1
51 – Paid job	2	2	1	1	1	1	3	3	3	1	1	1	3	2	2	1
52 – Making food	3	3	1	1	3	2	3	3	3	1	1	2	3	2	2	2
53 – Doing homework	1	1	1	1	2	1	3	1	1	1	1	1	1	1	2	1
54 – Shopping	2	3	1	1	3	3	3	3	2	2	1	1	2	2	2	2
55 – Taking care of a pet	3	3	3	1	2	2	3	3	3	2	3	1	3	3	2	1
Informal Domain Sum	106	86	92	62	92	84	102	106	78	63	59	68	76	93	94	83
PAC Preference Score	2.7	2.2	2.3	1.6	2.3	2.1	2.6	2.7	2	1.6	1.5	1.7	1.9	2.3	2.4	2.1

PAC Formal Domain data by participant at pre test

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
16 – Doing martial arts	2	1	1	1	1	3	3	1	1	2	1	1	1	2	1	3
17 – Swimming	3	3	3	3	3	3	3	3	3	3	1	3	2	3	3	3
18 – Gymnastics	3	3	3	3	1	3	1	1	2	1	1	1	1	2	1	3
19 – Horseback riding	1	1	3	3	3	3	1	1	3	3	1	1	1	2	3	2
20 – Racing or track and field	2	1	1	2	1	1	3	3	1	2	1	1	3	2	2	2
21 – Doing team sports	3	3	1	2	1	2	3	3	1	1	1	1	3	1	2	2
22 – Learning to sing	3	1	3	1	3	2	3	3	1	1	1	1	1	2	1	1
23 – Art lessons	3	2	3	1	3	3	3	3	1	2	2	1	1	3	2	1
24 – Learning to dance	3	3	1	1	3	3	3	3	1	2	1	1	1	2	1	1
25 – Getting help from a tutor	2	2	1	2	1	1	3	3	1	1	1	1	1	2	2	1
26 – Playing a musical instrument	3	3	3	1	3	3	3	3	2	2	1	3	2	2	1	3
27 – Music lessons	3	1	2	1	3	2	3	3	1	1	1	1	1	3	1	1
28 – Community organizations	3	3	1	1	2	3	2	3	1	1	2	1	2	1	3	2
29 – Religious activity	3	1	2	2	1	1	1	3	3	1	1	1	1	3	1	1
30 – Participating in school clubs	3	3	3	1	2	2	1	3	1	1	1	1	1	2	2	2
Formal Domain Sum	40	31	33	25	35	35	35	39	23	24	17	19	22	32	29	28
PAC Preference Score	2.7	2.1	2.2	1.7	2.3	2.3	2.3	2.6	1.5	1.6	1.1	1.3	1.5	2.1	1.9	1.9

PAC Informal Domain data by participant at follow up

Variable	Participants															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
1- Doing puzzles	3	1	2	2	2	3	1	3	3	1	1	2	3	2	1	2
2 – Playing board games or card games	3	3	3	2	2	3	1	3	2	2	1	2	2	2	3	2
3 – Doing crafts drawing or colouring	3	2	3	3	3	3	3	1	3	2	1	2	1	3	1	2
4 – Collecting things	3	2	3	3	3	3	3	1	2	2	1	1	3	2	1	3
5 – Playing computer or video games	3	3	3	3	3	3	3	1	3	1	3	3	1	3	3	3
6 – Talking on the phone	3	2	2	1	1	3	3	1	1	1	1	1	2	3	1	3
7 – Going to a party	3	3	3	3	3	3	3	1	3	1	2	2	2	3	3	3
8 – Hanging out	3	3	3	2	2	3	3	1	3	1	1	2	2	2	2	3
9 – Visiting	3	3	3	2	2	3	3	3	3	2	1	2	3	3	3	3
10 – Writing letters	3	1	2	1	1	3	1	3	1	1	1	1	2	2	1	1
11 – Entertaining others	3	2	3	1	1	3	1	1	2	1	1	1	2	2	1	3
12 – Playing with pets	3	2	3	3	3	3	1	1	3	2	2	2	2	3	2	3
13 – Writing a story	3	1	2	2	2	3	1	1	1	2	1	1	3	3	1	1
14 – Doing pretend or imaginary play	3	1	2	3	3	3	1	3	1	3	1	2	1	3	1	1
15 – Playing with things or toys	3	2	3	3	3	3	3	3	2	2	1	3	1	2	3	1
31 – Dancing	3	1	3	3	3	3	1	3	1	2	1	2	1	2	3	3
32 – Going for a walk or hike	3	1	2	2	2	3	1	1	2	1	1	3	2	2	3	1
33 – Bicycling, skateboarding, roller blading	3	1	2	3	3	3	1	1	2	1	1	2	3	1	3	3
34 – Water sports	3	3	1	2	2	3	1	1	3	2	1	3	2	1	1	3
35 – Snow sports	3	3	1	3	3	3	3	1	3	2	1	3	2	2	3	3
36 – Playing on equipment	3	2	2	3	3	3	3	1	3	1	1	3	2	1	3	3
37 – Playing games	3	3	3	2	2	3	3	2	2	1	1	3	3	2	3	3
38 – Gardening	3	1	1	1	1	3	1	3	3	1	1	1	3	3	1	1
39 – Fishing	2	1	2	2	2	3	1	1	1	1	1	1	2	1	1	2
40 –Individual physical activities	1	1	1	1	1	3	1	3	1	1	1	1	2	2	1	1
41 – Non team sports	3	1	3	3	3	3	3	3	1	2	1	2	2	1	1	3
42 – Going to the movies	3	3	1	3	3	3	3	1	3	2	3	3	2	2	3	3
43 – Going to the public library	3	1	3	3	3	3	3	3	3	2	2	1	2	2	1	3
44 – Watching TV or a rented movie	3	2	3	3	3	3	3	3	2	2	3	3	2	3	1	3

PAC Informal Domain data by participant at follow up continued

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
45 – Going to a live event	3	3	1	2	2	3	3	1	2	3	2	2	2	3	3	1
46 – Full day outing	3	3	2	2	2	3	1	3	2	2	3	3	3	2	3	3
47 – Reading	3	1	3	2	2	3	3	3	2	2	2	2	2	3	1	3
48 – Listening to music	3	3	3	1	1	3	3	3	1	2	2	3	2	3	1	3
49 – Volunteering	2	3	2	1	1	3	3	1	1	2	1	2	3	2	1	1
50 – Doing a chore	3	1	2	2	2	3	3	1	2	1	1	2	1	2	1	1
51 – Paid job	1	2	2	3	3	3	1	1	1	1	1	1	2	1	2	1
52 – Making food	3	3	3	3	3	3	3	3	3	1	1	2	2	2	2	2
53 – Doing homework	2	1	2	2	2	3	3	3	1	1	1	1	1	2	2	1
54 – Shopping	3	3	1	3	3	3	3	3	3	2	1	2	2	2	1	3
55 – Taking care of a pet	3	2	3	3	3	3	1	3	3	2	1	2	3	2	3	1
Informal Domain Sum	113	80	82	73	81	120	86	79	84	64	54	81	85	87	78	89
PAC Preference Score	2.8	2	2.1	1.8	2	3	2.2	2	2.1	1.6	1.4	2	2.1	2.2	2	2.2

PAC Formal Domain data by participant at follow up

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
16 – Doing martial arts	2	1	2	2	2	3	1	1	1	2	1	1	3	3	1	3
17 – Swimming	3	3	3	3	3	3	3	3	3	2	1	3	3	3	3	3
18 – Gymnastics	3	2	2	2	2	3	1	1	3	2	1	1	2	2	1	3
19 – Horseback riding	2	3	1	3	3	3	1	1	2	3	1	1	1	1	3	2
20 – Racing or track and field	3	2	1	1	1	3	1	3	1	1	1	1	2	3	3	1
21 – Doing team sports	3	3	2	2	2	3	3	1	1	1	1	1	3	2	3	3
22 – Learning to sing	3	1	3	3	3	3	3	1	1	1	1	2	1	3	1	1
23 – Art lessons	3	1	3	3	3	3	1	1	2	1	2	1	1	2	1	1
24 – Learning to dance	3	1	3	3	3	3	1	1	1	1	1	2	1	2	1	1
25 – Getting help from a tutor	3	1	1	1	1	3	3	1	1	1	1	1	1	2	1	1
26 – Playing a musical instrument	3	1	3	3	3	3	3	3	2	1	1	2	2	3	3	3
27 – Music lessons	3	1	3	3	3	3	3	3	1	1	1	2	2	3	1	1
28 – Community organizations	3	3	2	2	2	3	3	1	1	1	1	1	3	2	3	2
29 – Religious activity	2	1	2	1	1	3	3	1	1	1	1	1	2	3	1	1
30 – Participating in school clubs	3	2	2	3	3	3	3	1	1	1	2	1	2	1	3	3
Formal Domain Sum	42	26	31	30	31	45	33	23	22	20	17	20	27	36	29	29
PAC Preference Score	2.8	1.7	2.1	2	2.1	3	2.2	1.5	1.5	1.3	1.1	1.3	1.8	2.4	1.9	1.9

Pedometer data by participant at pre test

Variable	Participants															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Average total steps	-	-	8436.6	6440.3	-	7139.4	8675.3	9593.5	3859.4	8640.6	-	-	4479.6	2758.3	3832	3824
Average weekday steps	-	-	7062.6	5921.8	-	7902.6	9108	12386.7	3999.2	10885	-	-	5373.8	3836	3844.5	3824
Average weekend steps	-	-	11871.5	7736.5	-	5231.5	7593.5	1214	3510	3029.5	-	-	2244	-	3807	-

Pedometer data by participant at post test

Variable	Participants															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Average total steps	-	3396.3	5558.7	4144.7	1154.4	3310.6	11032.2	-	2519.6	4507.7	-	-	-	3684.3	7354.1	1786
Average weekday steps	-	4009.6	6421.4	4590.5	1181.8	2580	11675	-	2761.5	3328	-	-	-	1691.5	5885.6	905.3
Average weekend steps	-	1863	3402	1470	1045	5137	10068	-	2716.5	6867	-	-	-	5677	11025.5	3107

Pedometer data by participant at follow up

Variable	**Participants**															
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Average total steps	2035.3	-	3843.3	7694.9	-	5577.1	8073.4	7179.2	6199	4853.9	-	-	3085	-	7882	-
Average weekday steps	2035.3	-	3843.4	8294.2	-	6053.2	8729.6	7997	8540.3	5452.8	-	-	2655.4	-	6920	-
Average weekend steps	-	-	-	4099	-	4387	6433	3908	2687	1260	-	-	4159	-	10287	-