FIT FOR ACTION

A Comparative Case-Study of the Implementation of an Adaptive Fitness and Conditioning Program for Teen and Transition Age Youth with Moderate Functioning ASD

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Abstract

The purpose of my research was to develop and refine pedagogic approaches, and establish fitness baselines to adapt fitness and conditioning programs for Moderate-functioning ASD individuals. I conducted a seven-week study with two teens and two trainers. The trainers implemented individualized fitness and conditioning programs that I developed. I conducted pre and post fitness baselines for each teen, a pre and post study interview with the trainers, and recorded semi-structured observations during each session. I used multi-level, within-case and across case analyses, working inductively and deductively. My findings indicated that fundamental movement concepts can be used to establish fitness baselines and develop individualized fitness programs. I tracked and evaluated progressions and improvements using conventional measurements applied to unconventional movements. This process contributed to understanding and making relevant modifications to activities as effective pedagogic strategies for my trainers. Further research should investigate fitness and conditioning programs with lower functioning ASD individuals.
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Chapter I – INTRODUCTION

Researcher’s Perspective

As a healthy and active individual, I could not imagine my life without physical activity or movement; as a child and teen, I was socially defined as an athlete and a dancer. I was constantly running from one activity to another, one game to the next, and when this came to an abrupt end in my University years, I turned to physical fitness, and intramurals as my new physical activity outlet. As a kinesiology undergraduate, I had limited freedom within my electives. When scheduling allowed, I chose a majority of physical education based courses, including Foundations of Adapted Physical Activity and Disability Studies in my second year, as well as the International Experiences in Sport and Education course during the summer of my fourth year at Brock University.

The International Experiences in Sport and Physical Education course allowed me to travel to El Salvador with 20 other Physical Education/Kinesiology students for two weeks to bring physical activity alternatives to a country plagued with violence and gang activity. It was during these two weeks that I developed my love not just for facilitating physical fitness and activity, but providing the opportunity for all to participate. My portfolio group for the trip was inclusion, the life skill the games we created was based upon. Modifications were the name of the game for those two weeks, and I finally felt that I found my niche. My creativity and ideas were being encouraged and finally useful. I was now being driven to think outside the box, providing meaningful movement opportunities to those who need them most. I have always wanted others to participate and was constantly looking for ways to ensure all were involved. This trip opened my eyes to the world of adaptations and modifications, but most of all to adapted physical activity.
It was also on this trip that I was encouraged by an upper year student to become more involved with S.N.A.P. (Special Needs Activity Program) at Brock. At the end of the trip, we wrote each member of the team a “Warm and Fuzzy” in which we could express our praises for one another privately. In my “Warm and Fuzzy” from her, she provided me with contact and background information about the program that I would need, to make the decision to join the S.N.A.P. team as a coordinator. I had been a volunteer for the previous two years and had enjoyed working with the children on a one to one basis, but knew little about the program and its inner workings. She encouraged my involvement with the program, and why I would be a great addition to the team. Little does she know that she was a major reason why I am here today, and I will be forever grateful for her encouragement and her mentoring. I coordinated S.N.A.P. the following year for my undergraduate thesis, and saw the importance of developmentally appropriate physical activity programming for the Special Needs population in Niagara Region.

Applying for my Masters, I knew that I wanted to continue working with children and teens with special needs and disabilities, and bring more program options to these individuals. I have always enjoyed and found solace in the gym and working out, but individuals with Autism Spectrum Disorder (ASD) have yet to be accommodated into these spaces. Working with this population as a personal trainer is rare, and they are typically deprived of the opportunity to explore all venues of physical education and activity, especially to receive fitness training. Current trainers have grown accustomed to working with able-bodied individuals, the “ideal trainee”. As the gym has now become my physical activity outlet, my curiosity about accessibility grew in the realm of fitness. Not once have I seen an individual with special needs enter the gym at Brock. I wondered
if the gym itself was inaccessible or the trainers and their knowledge of modifications and adaptations for exercises was a limiting factor to access for individuals. Current trainers may simply not have the knowledge to work with this population, or they may be unsure of the correct pedagogical approaches to use to be effective trainers. The disconnect between individuals with special needs, predominantly individuals with ASD, and personal trainers resonated with me, and became a pressing issue for me. I feel that everyone deserves access to equipment and to exercise, and all deserve access to proper instruction and knowledgeable trainers. This lead me to my research and my focus of not only providing proper fitness programming for the ASD population, but also proper training and pedagogical approaches for personal trainers.

**Background**

Physical activity has consistently been an important factor in human existence and the use of physical activity to prevent and alleviate disorders and illnesses, to promote wellness, and also to construct beautiful and well-proportioned bodies dates back to 2700 BC (DePauw, 2009). In a society in which physical activity, health and wellness and well being have been such an important factor, the need for physical activity has now stretched out to include those who live with a disability. It has been assessed that in general, individuals living with a disability have low physical fitness profiles, which can be attributed to the lack of access to proper physical activity (Kodish, et.al, 2006). Previous inquiries into physical activity programming for individuals with ASD expose growing concern to provide this population with meaningful movement experiences (Morin & Reid, 1985). ASD is a behavioural, social, motor and cognitive disorder than can be diagnosed as early as the age of three (Liu, 2012). Individuals with ASD prefer to
be alone, and have great difficulty interacting in social settings (Davis, 2010). Social cues and social interaction are atypical with this population and interest in repetitive behaviours and predictable situations is typical for individuals with ASD (Matson et al., 2010).

This leaves the ASD population at risk for being physically inactive; the characteristics and the ‘symptoms’ of their disability interfere with traditional and successful forms of physical activity (Sandt & Frey, 2005). If the population’s social and behavioural challenges, such as difficulties understanding social cues, making eye contact, and participating in social games, are not understood, possible opportunities to participate in physical activities become limited (Pan & Frey, 2006). These social and behavioural differences are not accommodated within traditional programs or activities, thus disallowing the provision of an inclusive environment within which this population might participate. Hence, individuals with ASD are unable to experience the vast number of benefits of physical activity that include: reducing cardiovascular disease risk factors, improving muscular strength and endurance, building and maintaining health bones and joints, as well as mitigating weight gain (Kodish et al., 2006). These benefits have been explored in same age peers, however the benefits of physical activity for youth with ASD have focused solely on exercise to reduce maladaptive behaviours (Sandt & Frey, 2006). “It is clear that people with ASD have been excluded from the physical activity literature,” (Pan & Frey 2006, p.597); however, one can only assume that the benefits of physical activity extend to youth with ASD (Pan & Frey, 2006).

The accessibility of programs for individuals with ASD is preventing physical activity from occurring. The Accessibility for Ontarians with Disabilities Act (AODA)
was introduced in 2005 to recognize the discrimination against and exclusion of individuals with disabilities in Ontario, with:

“The purpose of this Act is to benefit all Ontarians by, (a) developing, implementing and enforcing accessibility standards in order to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures and premises on or before January 1, 2025; and (b) providing for the involvement of persons with disabilities, of the Government of Ontario and of representatives of industries and of various sectors of the economy in the development of the accessibility standards.”

This act acknowledges all individuals with disabilities have the right to an inclusive lifestyle, with equal opportunity and access to education, recreation, goods, and services. It recognizes that most of Ontario is significantly inaccessible, and needs to be changed in order to accommodate the hundreds of thousands of individuals in Ontario who are living with a disability, and ensure that accessibility acknowledges the varying disabilities. 2025 may seem far away, but much needs to be done in the way of adaptation to ensure that physical activity programs and fitness areas such as gyms and fitness equipment are modified to allow for inclusion and accessibility. Equipment must be altered, the landscape of gyms must change, but also personal trainers and their state of mind and pedagogical approaches must adjust in order to accommodate those with disabilities.

Youth with ASD do not often have access to physical activity opportunities because of their disability; their choices to be active have become very limited (Pan & Frey, 2006). Individuals with ASD are not welcome into programs due to behavioural issues. It is not based on their ability or need. Physical activity levels of youth with ASD are affected primarily by the social constraints, rather than the actual impairment (Pan & Frey, 2006). Physical activity is also being impaired for individuals with ASD because of
equipment accessibility, and also lack of knowledge during training of trainers. Neither CanFitPro nor the Certified Professional Trainers Network-Certified Personal Trainer (CPTN-CPT) provides distinct/adequate training on working with an individual with a disability. The primary focus of their training seems to be based upon the able body. However, if trainers are not being trained on how to work with different populations, how can we expect gym environments to be accessible? Those that run and organize these spaces are not informed on the multiple considerations when configuring a gym, and also when working with a client with a disability. Individuals with ASD may require alternate preparatory and pedagogical methods during training sessions. By exploring the pedagogical approaches used during training of individuals with ASD, alternative training methods can be developed to assist in making gyms and personal training more accessible for individuals with ASD.

**Purpose**

In my study, I chose to direct my focus towards individuals with ‘moderate functioning’ ASD between the ages of twelve and eighteen. ‘Moderate functioning’ individuals with ASD is an umbrella term to encompass those features that indicate that that individual is able to understand visual, verbal, and/or physical cues, is able to follow a visual or verbal schedule/program, and has some fundamental movement skills and basic motor development. ‘Moderate functioning’ ASD may include some individuals who are non-verbal, but these individuals are still able to understand spoken language, communicative aids, or visual prompts. The increased need for adaptive physical activity (APA) for this population, especially this teen and transition age (twelve to twenty-one years old), continues to increase, but this age group remains under served.
The purpose of this qualitative research study is two-fold: it is to better understand the importance of physical fitness and conditioning for teens and transition age youth who are identified as Moderate-functioning ASD, and to develop and refine approaches to establishing fitness baselines and effective pedagogies that need to be adjusted from traditional personal training methods to better accommodate individuals with ‘Moderate functioning’ ASD. The topic of this thesis was chosen with the intention to contribute to qualitative research literature regarding fitness and conditioning programs for individuals with ASD. The general aim of this research project is to understand the benefits of a physical fitness and conditioning program delivered to youth and teens with ASD aged 12 to 18, and the pedagogical approaches that are necessary to administer a successful fitness and conditioning program. The following four (4) guiding research questions provide an overall framework for the research study.

**Research Questions**

1. How can fitness baselines be established for teens and transition age youth with ASD using fundamental movement concepts?
2. How can relevant individual fitness programs be created for teens and transition age youth with ASD?
3. How can progressions and improvements be tracked and evaluated?
4. What pedagogic approaches are effective when employing fitness programs with this population?
Basic Terminology

Accessibility for Ontarians with Disabilities Act (AODA) – This Act is to benefit all Ontarians by developing, implementing and enforcing accessibility standards in order to achieve accessibility for Ontarians with disabilities and provide the involvement of persons with disabilities in the development of the accessibility standards by 2025.

Autism Spectrum Disorder (ASD) – Cognitive, motor, social and behavioural disability diagnosed by age three in which the diagnosis is located along a spectrum from “low functioning” to “high functioning”.

Certified Professional Trainers Network-Certified Personal Trainer (CPTN-CPT) – Established in Canada in 1993, CPTN integrates current research and practical applications for education, communication, professional development and marketing opportunities for Personal Trainers to maintain a leading edge in professional training developments.

Functional Fitness – Alternative approaches to training in which the focus is the basics of training where the individual is able to handle their own body weight in all planes of movement. The focus of Functional Fitness is to improve function in everyday life.

Meaningful Movement – The movement pattern being learned or refined is relevant and contextually situated in order to be meaningful to the individual’s life.

Moderate-Functioning ASD – The individual is able to understand visual, verbal, and/or physical cues, is able to follow a visual or verbal schedule/program, and has some fundamental movement skills and basic motor development; the individual is able to understand language, communicative aids, or visual prompts, but may be non-verbal.
Self-Injurious Behaviours – Behaviours in individuals with ASD in which the individuals cause injury to themselves.

Transition Age Youth – Individuals 18 to 25 years of age that are being shifted out of childhood/adolescence to adult roles and lifestyles.
Chapter II – REVIEW OF LITERATURE

Overview

In my review of literature, it was evident that two distinct viewpoints emerged in the texts. Traditional literature about ASD is situated in the realm of the study of disabilities. Able-bodied individuals are studying ASD as a pathology; there are diagnostic criteria, prevalence rates, suggested treatments, and the search for a cure. Those in the realm of the study of disabilities believe that individuals with a diagnosis, who ‘fall victim’ to a disability wish to seek a cure, to once again be “normal.” Their hope is to allow all individuals living with a disability to return to an able body (or to the closest approximation possible), and be able to once again live a “normal” and healthy lifestyle. As I continued to read more deeply into the literature, I discovered the world of Disabilities Studies. The placement of those two letters changes the viewpoints of many articles, as individuals situated in this realm of Disability Studies believe that disability is not a pathology, but rather a fluid state of being not restricted to the ideals of hegemonic normalcy and committed to interrogating the unacknowledged influences and power of normalcy in culture. Disability is a way of being in the world, and is a way for those identifying as disabled to understand who they are (Titchkosky & Michalko, 2009). They are valued differences, which make up the mosaic that is our society and our world. Joseph Straus (2002), is an author in the world of Disabilities Studies, and identifies as a Critical Disability Studies scholar. His work helped to shape my view of Disability Studies, and helped me to understand and analyze my data sets with an open mind and a critical orientation.
This small difference, the placement of a two-letter word, would change the entire message of an article or book. Understanding the difference between the two helped me to contextualize the texts in my literature review. I have divided my literature review into two sections: The Study of Disabilities and Disabilities Studies. This allows me to be authentic to a Critical Disability Studies orientation and also allows me to re-present the work of able bodied scholars who are committed to research that improves the lives of people with disabilities.

**The Study of Disabilities**

*Autism Spectrum Disorder*

A “shared inability to relate themselves in an ordinary way to people and situations,” coupled with an “excessive desire for the maintenance of sameness” is one of the first definitions of ASD in the early 1940s by Leo Kanner (cited in Straus, 2010, p. 535). Kanner, a child psychiatrist at Johns Hopkins University published an article in which he identified a group of children who shared these unique traits (cited in Straus, 2010). He was the first to describe autistic children as a group (Sherrill, 1986). Meanwhile, a world away Hans Asperger (1944) published a study involving a group of children with frighteningly similar characteristics of “fundamental disturbance[s] [that] results in severe and characteristic difficulties of social integration,” (cited in Straus, 2010, p.535). These early definitions contributed to our early understanding and diagnosis of this now widespread neurological and developmental disorder, with prevalence rates increasing from 2 to 4 in 10,000 to now as high as 1 in 110 children in the United States being diagnosed with ASD (Sherrill, 1986; Liu, 2012). Autism originates “from the Greek word *autos*, meaning “self”, and refers specifically to self-
Absorption and withdrawal” (Sherrill, 2004, p.86). Individuals with autism find comfort in situations where they are alone, and have great difficulty in social settings with other people. They are seen to have a very basic disturbance of contact not only with others, and also very limited interaction with their environment (cited in Straus, 2010).

ASD is a “wildly heterogeneous lived experience of stressed embodiment” (cited in Connolly, 2008) found along a spectrum from low functioning to high functioning (Straus, 2010). The use of the term spectrum indicates that there is significant individual variation in the severity, and manifestation of ASD, and this can change at any moment during the individual’s life (Beresford et al., 2004). No individual diagnosed with ASD will be the same, as ASD is an extremely heterogeneous condition, which may occur by itself or in conjunction with other disorders (Sherrill, 1986). With such a great increase in recent diagnosis and diversity of the individuals, one can think of ASD as a new phenomenon, however ASD has now been present for over 75 years. There is not a specific checklist of characteristics of ASD; rather there are great variations and differences of manifestation in each individual. There are basic characteristics that can be used to assess and diagnose this disability, but these are only guidelines, and can vary from individual to individual.

The most prevalent characteristics of ASD include language deficits, social and relationship impairments, cognitive delays, as well as motor differences (Liu, 2012). Individuals living with ASD may also have a deficit in speech or language, and can be non-verbal (Steadward, Wheeler, & Watkinson, 2003). ASD individuals can also possess repetitive interests and behaviours, and exaggerated or unusual responses to sensory stimuli (Matson et al., 2010; Connolly, 2008).
Diagnosis can occur as early as age three, through primary diagnostic criteria of social interaction and language, however even earlier major motor milestones can be used as indicators of ASD (Liu, 2012). Motor impairments are now recognized as a core component of ASD, with delays in motor initiation, balance, coordination, and finger-to-thumb opposition, the presence of hypotonia, as well as difficulties with action imitation and recognition of motor intentions (Liu, 2012; Cossu, Boria, Copoli, Bracceshi, Giuberti, Santelli & Gallese 2012). These impairments have lead to observed absences in ASD individuals’ movement repertoire such as midline crossing, extension of spine and hip, contralateral arm and leg movement, and issues with running and decelerating, as well as weight transfer (Connolly, 2008). With the recognition of movement issues and dominances, ASD can be more easily identified in children.

Traditionally, treatment programs and interventions have focused on behavioural models, because behavior is the “most visible and unnerving manifestation of ASD” (Connolly, 2008, p.238). The focus is to eliminate undesired behaviours, reinforce positive activities, and eliminate non-functioning behaviours. Recent approaches have now turned towards physical activity as a way to address behaviours and help to improve quality of life. Physical activity for individuals with ASD in previous literature focused on “intensity and vigorousness” (Connolly, 2008, p.238). Meaningful movement experiences need to be provided to this population to focus on the lack of significant development of movement and motor issues (Morin & Reid, 1985). However, ASD individuals are at a greater risk for being physically inactive due to of lack of success in traditional forms of physical activity. There is an inherent need for programs that provide ASD individuals with appropriate programming and structure, to allow for continued
participation with extra opportunities for skill development (Sandt & Frey 2005, Obrusnikova & Miccinello, 2012). Focus needs to be directed to the absences of movement and motor functioning, but also the environment, structure, and instructional strategies used (Connolly, 2008). Providing an environment that is least restrictive, proper instructional strategies for this population, as well as repetitive structure in the program will elicit these meaningful movement opportunities to improve motor functioning.

**ASD and Motor Development**

“Motor development is the process through which a child acquires movement patterns and skills,” (Malina, Bouchard & Bar-Or, 2004, p.195). In the early years, it was believed that children with ASD have typical motor development compared to same aged peers (Sherrill, 1986). However, taking a closer look at motor development and patterns of this population indicate that their motor development is delayed, with skill acquisition and motor control not at comparable levels to same aged peers (Sherrill, 1986). Physical educators began to be concerned about providing meaningful movement experiences for individuals with ASD (Morin & Reid, 1985). This concern was not supported by the academic world, as little research was focused on the motor domain of individuals with ASD (Morin & Reid, 1985). Motor disorders in individuals with ASD were downplayed for years, and were overshadowed by their social and cognitive issues (Cossu et al., 2012). However, it started to become increasingly apparent that motor disorders were a major component to ASD (Cossu et al., 2012). Children with ASD exhibit delays and impairments in motor functioning, which can be recognized in the early stages of development (Cossu et al., 2012; Liu, 2012). During pre-school and school years,
children with ASD are reported as being clumsy and having motor delays by their parents. This clumsiness and motor delay is caused by the delay in motor milestone acquisition experienced during early development (Liu, 2012). “Specific motor deficits reported include motor imitation, balance, coordination, finger to thumb opposition, and the presence of hypotonia,” (Liu 2012, p.316). These deficits in motor development affect individuals with ASD especially during physical activity. These delays in development later impair motor functioning (Liu, 2012). In same aged peers these developmental milestones that have been achieved in the early stages of development are the building blocks for more complicated motor tasks. These building blocks are essential in order to learn more complicated motor tasks and concepts, affecting ASD individual’s ability to perform more complicated motor skills associated with physical activity and fitness.

Fundamental movement skills are the essential building blocks in motor development and skill acquisition. They allow for movement success not only in everyday tasks, but also physical activities. There are three categories to fundamental movement skills: object manipulation, locomotion and stability (nonlocomotor skills). Object manipulation skills are ones in which the object is moved, (i.e. catching, throwing, striking, kicking; all activities related in the projection and reception of an object) (Malina et al., 2004). Locomotor skills are skills that move the body through space (i.e. walking, running, jumping, galloping, hopping and skipping) (Malina et al., 2004). Stability, or nonlocomotor skills involve moving specific parts of the body are moved, through pushing, pulling, bending, curling and twisting (Malina et al., 2004). All children have the potential to learn and develop a diversity of fundamental movement patterns and skills, leading to more specialized skills (Malina et al., 2004). These skills, once acquired
can be refined and developed into more specialized skills. Malina et al. (2004, p.196) states that these learned motor activities are “an integral part of children’s behavioural repertoires and provide the medium through which children experience many dimensions of their environments.”

Fundamental movement and motor skills can be accessed in two ways: through the process and the product (Malina et al., 2004). The process is the technique of the movement and its many components (Malina et al., 2004). Flexion at joints, hip rotation, arm action and leg action are assessed during movement. The product of the motor skill speaks to the result or the outcome of an action (Malina et al., 2004). If the process of the movement or motor skill is positive, the product of this skill will also be positive, and vice versa. However, the acquisition of these fundamental movement and motor skills greatly affect motor competencies in later years. “The acquisition of competences in fundamental movement patterns is one of the more important developmental tasks of early childhood,” (Malina et al., 2004, p.196). These basic patterns are the building blocks upon which more complicated movement patterns will develop. Fundamental movement and motor skills must be achieved to perform more complicated tasks. An initial step in the creation of physical activity programs for individuals with ASD should be a description of their motor skills, to help develop an appropriate motor plan and curriculum for activity programs (Reid, Collier & Morin, 1983). During my research study, these fundamental movement and motor skills were observed and assessed for the participants, and allowed me to develop a more individualized motor plan. Their processes and products were also observed to assist in the formulation of individualized fitness plans.
Adapted Physical Activity and Physical Education

Although adapted physical activity and adapted physical education are two terms that are used interchangeably, they have very distinct and different meanings. Adapted physical activity (APA) is a “service delivery, pedagogy, coaching, training, or empowerment conducted by qualified professionals to enhance physical activity goal achievement of individuals of all ages with movement limitations and/or societal restrictions,” (Sherrill, 2004). In comparison, adapted physical education is delivered in the school setting and is, “used to describe services delivered to school aged individuals from birth through age 21,” (Sherrill, 2004). APA is a service that is specific and conducted by a trained individual who has experience and knowledge in adaptations of physical activity, while adapted physical education is done mostly in an inclusive environment, where the classroom teachers are adapting their physical education lessons to ‘successfully’ include individuals with disabilities in traditional games and physical education activities. With over 846 million individuals worldwide who have been identified with severe activity limitations, we must now professionally adapt physical activity to be inclusive, and to embrace these individual differences to provide these individuals with the best experience possible when participating in physical activity (Sherrill, 2004). Adapted physical activity is “first and foremost the beliefs and appropriate sensibility that enable service providers to embrace individual differences and enjoy the challenge of helping others achieve personal goals in relation to self-actualization through physical activity,” (Sherrill 2004, p.5). Having the appropriate sensibility to facilitate movement and help to create change is the most important part
when attempting to effect and change the entrenched habits of those around them, and this often includes the individual in need of the adapted physical activity.

APA can extend into other realms of physical activity. With the recent rise in awareness about leading healthy and active lifestyles, more and more individuals are turning towards fitness and conditioning as a form of physical activity. Personal trainers are being sought out to help individuals reach personal activity and fitness goals. However, personal training certifications do not teach adapted physical activity to their instructors. CPTN-CPT trainers are briefed on different disabilities, the diagnosis, and the manifestations, however very little is taught about adapting movement and exercises to include these individuals in personal training. Typically, individuals who need adapted physical activity would seek physical activity from an occupational therapist or physiotherapist, seldom from a personal trainer. Personal Trainers’ expertise is in designing fitness and conditioning programs; however, a lack of preparation and knowledge about these disabilities exclude these individuals from designing and implementing adapted fitness and conditioning programs. In turn, individuals seeking APA are not receiving properly adapted physical activity through personal training and fitness and conditioning.

*Adapted Physical Activity and ASD*

When designing adapted physical activity programs for individuals with ASD, the characteristics of the disability must be acknowledged during program development. Difficulty understanding social cues, making eye contact, playing imaginative and social games, and engaging in turn-taking or sharing are significant social and behavioural deficits associated with ASD (Pan & Frey, 2006). These ‘deficits’ limit individuals with
ASD’s opportunity to participate in traditional forms of physical activity (Pan & Frey, 2006). It has been recognized that physical activity is an essential for students with disability but few programs focusing directly on individuals with ASD have been developed (Schultheis, Boswell & Decker, 2000). The unique social and behavioural aspects of ASD have presented significant challenges to traditional physical activity programs and education (Schultheis, Boswell & Decker, 2000). These social and behavioural ‘deficits’ must be considered when developing adapted physical activity programs for this population.

There are few programs available for individuals with ASD in North America. A recently developed program in North Carolina, TEACCH (Treatment and Education of Autistic and Related Communications-Handicapped Children), takes into account the features of the disorder and attempts to minimize difficulties during activities (Panerai, Ferrante & Zingale, 2002). The program can take into account each individual’s needs and specific characteristics, and design the most appropriate education plan. The TEACCH model has recently been evaluated from a physical activity viewpoint, where physical structure, schedules, and task orientation were used as components of the model (Schultheis, Boswell & Decker, 2000). Providing individuals with the physical structure of the program ahead of time, schedules and prompting for each task as well as task orientation can be provided through visual aids (Panerai, Ferrante & Zingale, 2002). These visual aids allow the individual a more independent experience, as they can now monitor themselves and their time in the space (Panerai, Ferrante & Zingale, 2002). Individuals with ASD are more able to identify and perform assigned tasks when the
activity is clearly and visually bound in environment, task requirements, and time (Schultheis, Boswell & Decker, 2000).

The Miller Method is another alternative for individuals with ASD to receive APA. The Miller Method is an integrated approach that addresses the problems of body organization, social interaction, and communication in school, clinic, and home settings (Miller, 2007). Each person working with the child is focusing on one aspect of the child’s functioning, while addressing other areas that may be of concern. It is an action-oriented method, in which the children learn best through action and movement (Miller, 2007). It is a method of predetermined and organized systems, which are developed by the individuals working in a specific setting to address the problems identified. The Miller method believes that all children have the possibility for developmental gain, and that the actions are developmentally appropriate for each child.

In the past two years, I have been part of developing an APA program for individuals with ASD. The Station Based Pedagogy Project (SBPP) is a project that myself, 3 other graduate students, and Dr. Maureen Connolly have created to provide individuals with ASD a developmentally appropriate form of APA. SBP is station based, and has progressions, adaptations and modifications embedded within each station and activity. It focuses on six areas of movement, which were identified by Connolly (2008) as addressing gaps in the movement repertoire in individuals with ASD: gross motor, fine motor, sensorimotor, body management, games skills and fitness and conditioning. The SBP can be adapted for multiple environments, with minimal or maximal equipment.

There is limited research on movement and individuals with ASD, and what research is available, focuses on reducing maladaptive behaviours (Sandt & Frey, 2005).
In a study examining physical activity levels in individuals with a disability, ASD included, it was clear that youth with disabilities are inactive (Pan & Frey, 2006). Youth without disabilities are provided numerous programs and activities that are accessible; individuals with ASD often do not have basic access to physical activity opportunities, and are not afforded the same choices to be active (Pan & Frey, 2006). This group is not successfully integrated in physical activities available for same aged peers. The need for adapted physical activity for individuals with ASD is immense; children are not receiving the minimum required physical activity time in comparison to same aged peers (Pan & Frey, 2006). Physical activity is especially important for individuals with ASD, as they have low fitness profiles due to lack of opportunity to participate in organized physical activity (Kodish, Kulina, Martin, Pangrazi & Darst, 2006). Adequate physical activity levels can positively influence cardiovascular disease risk factors, improve muscular strength and endurance, help to form and maintain healthy bones and joints, as well as decrease possible feelings of depression and anxiety (Kodish et al., 2006).

When including individuals in physical activity, it is important that it is done by someone who is trained, and understands all aspects of inclusion. Many schools and programs do not have access to specialized teachers and instructors, making properly adapted physical activity an issue (Kodish et al., 2006). If distinct differences of individuals with ASD are embraced in physical activity, the issue of properly adapting this activity is no longer relevant (Sherrill, 2004). Having the correct beliefs and appropriate sensibilities towards this population and their unique characteristics can aid in the proper programming and implementation in adapted physical activity programs. This population would no longer sit on the sidelines of physical activity, but be integrated
and assisted to meet their own personal goals of self-actualization through physical activity (Sherrill, 2004). Adapted physical activity professionals should focus on providing equal opportunities for individuals with ASD to develop sport aptitudes, fitness, physical education, and recreation skills (Shephard & Bhambhani, 1998). The aim is to adapt existing tests, activities and exercises to meet the needs of that specific individual, while keeping the object of the activity and exercise intact.

Transition Age Youth

Transition from youth to adulthood has become a vulnerable time for youth with ASD (Friedman, Warfield & Parish, 2013). Preparing youth and adolescents for adult roles has gained increasing levels of attention from the 1980s to now (Sorrells, Rieth & Sindelar, 2004). With the increase in diagnosis and attention in both academic publications and media, transition of individuals with ASD into adulthood needs to be improved as entitlements of the children’s service system ends (Friedman, Warfield & Parish, 2013). As children begin to leave the school system, programs and post school activities are lacking for this age group. There is a need to assist students with ASD in moving more smoothly from school to adult life, through an outcome oriented process to help assist into post school activities (Sorrells, Rieth & Sindelar, 2004). This transition must consider all areas of functioning including personal health, continuing education, and career possibilities (Sorrells, Rieth & Sindelar, 2004). This transition process and planning is more difficult than one might expect. The planning needs to begin earlier in a student’s career to ensure that all areas of functioning are included and represented in this transition to adulthood (Sorrells, Rieth & Sindelar, 2004).
However, there is a lack of evidence-based research specifically focused on transition-age youth with ASD (Friedman, Warfield & Parish, 2013). This is due to the lack of services provided for individuals in this transition stage. The field of services remains “soft” for transition age youth with ASD (Sorrells, Rieth & Sindelar, 2004). To improve transition outcomes for this population the research must shift to developing, implementing and evaluating informed interventions and programming (Friedman, Warfield & Parish, 2013). Because of the absence of studies that specifically focus on transition age youth with ASD, this age group is being underserved and ignored (Friedman, Warfield & Parish, 2013). Programming needs to increase for this age group, to allow for better transition from youth to adulthood as they move out of school-age, where less support and less options are provided.

**Physical Fitness and ASD**

Physical fitness and personal health have become prominent features in everyday lives as well as schools. “Physical fitness is a state or a condition that permits the individual to carry out daily activities without undue fatigue and with sufficient reserve to enjoy active leisure,” (Malina et al., 2004, p.216). Fitness has been traditionally viewed as being comprised of three core components: muscular strength and endurance (MSE), cardiorespiratory endurance (CE) and motor ability or flexibility (F) (Malina et al, 2004). As physical activity and education have evolved, so has physical fitness, with the emphasis now on personal health and well being (Malina et al., 2004). Fitness continues to change and evolve and now with the Ontario curriculum for physical education mandating physical fitness and the promotion of “fit for life” there is more and more inclination to incorporate physical fitness and conditioning into physical education.
However, there is a distinction between physical activity and physical fitness. Physical fitness is MSE, F, and CE based with exercises and training to improve their three components, while physical activity is a broader category, including games, team based activities, and motor skills (Malina et al., 2004). Gyms and fitness centers are opening up across the country, offering new and innovative ways to receive the training and experience that one would need to continue to lead healthy and active lifestyles. Childhood obesity and inactivity rates have risen in recent years, and are finally receiving attention (Tremblay, Shields, Laviolette, Craig, Jassen & Gorber, 2010).

Inactivity levels are high in able-bodied youth, and this number translates directly to individuals with disabilities. Improved cardiorespiratory function, lower body mass index, and increased muscular strength and endurance as well as flexibility are a small portion of the benefits associated with improved physical fitness (Tremblay et al., 2010). National data have not been collected on youth and teens in Canada for almost two decades. Statistics Canada launched the Canadian Health Measures Survey (CHMS) in 2007 to assess the gap in the data (Tremblay et al., 2010). The results of the survey suggest that physical fitness levels have declined significantly since the 1980s (Tremblay et al, 2010). With a rise in obesity levels in youth due to inactivity, these conclusions were expected, however individuals with disabilities were not included in the survey. The survey was for able-bodied Canadian youth, ages ranging from 7 to 19 years old. Individuals with ASD are not immune to obesity; with limited access to proper programming and inclusion in physical education and recess, individuals with ASD are physically inactive due to their environments.
With little research examining the issue of obesity in children with ASD, the reported prevalence of obesity in individuals with ASD was varied (Curtin, Anderson, Must & Bandini, 2010). Curtin, Anderson, Must and Bandini (2010) used the National Survey of Children’s Health (NSCH) to collect data through telephone interviews to collect data in regards to obesity in youth diagnosed with ASD. The level of obesity in children diagnosed with ASD was seven percent greater compared to children not diagnosed with ASD (30.4% compared to 23.6%). The study suggests that children diagnosed with ASD are at least as likely if not more to be obese than children without ASD.

Knowing that individuals with ASD are as likely if not more likely than same aged undiagnosed peers to become obese, physical fitness is now more important than ever. This new interest in expanding opportunities for individuals with disabilities to participate in physical fitness activities has increased interest in exercise research as well as programming alternatives, but the interest has yet to meet the needs of the growing population of individuals with ASD (Miller, 1994). With 1 in 110 in the United States being diagnosed with ASD, an increase in services in programs needs to meet this growing population (Liu, 2012). Where programs are in place, individuals with ASD may still be unaware of methods or opportunities to develop and improve physical fitness as behavioural interventions have been the focus of numerous programs (Shephard & Bhambhani, 1998, Connolly, 2008). All people have the right to access physical fitness programs and activities that they wish to do, as well as where and with whom they wish to do it, regardless of diagnosis or ability (Bullock & Mahon, 1994). Individuals with ASD do not have access to physical fitness programs that are developmentally
appropriate. With limited training for working with clients with disabilities in CPTN personal training certification, and no training in CanFitPro personal training certification, it is the lack of knowledge that is the limiting factor for fitness and conditioning programs for individuals with ASD. Baseline measurement tools, progressions through traditional muscular strength and endurance, cardiovascular and flexibility exercises, as well as developmentally appropriate adaptations do not exist as a resource if working with individuals with ASD.

This gap in the literature in regards to development of appropriate physical fitness and conditioning programs is a driving force in my pursuit of this research study. With the AODA mandate that dictates that all aspects of our society, including goods, services, facilities, accommodation, employment, buildings, structures and premises must be accessible to all Ontarians on or before January 1, 2025, the realm of physical fitness and personal training has a long way to go to be accessible. Equipment adjustments must be made, but certified personal trainers must also be properly educated and informed about working with youth with ASD, as they, too, are a part of the obesity pandemic affecting North American youth.

*Functional Fitness*

“Training is simple…Push something, pull something, and do something for your legs. Add a few rollouts and you have a total body workout. It’s not the *what* as much as the *how*. How often, how many? In many cases just plain how. One leg or two, bars or dumbbells? The truth is, if we keep it simple and hard we will probably be okay.” (Boyle, 2010, p. 17).

Training can be and should be simple, but it continues to grow to be a complicated world of alternative training modalities, nutritional supplements, and what is the latest fitness trend. Turning towards functional fitness as a method of training allows for the basics of
training to be the focus for the programs. Functional training allows for individuals to safely handle their own body weight in all planes of movement (Boyle, 2010). Being able to handle our own body weight helps to improve function in everyday life, which is essential for quality of life and leading a healthy and active lifestyle. This would indicate that functional training should be looked at as purposeful training (Boyle, 2010). So many trainers and training governing bodies are quick to jump on (and abruptly off) the latest bandwagons of training innovations, constantly seeking the next best thing, to set themselves apart as trainers from the rest.

Trainers have been fed the idea that more is more, in terms of equipment, exercises and techniques, and that the more they do for, and with, their clients, the better results that they will see. “Think about practicing the art of common sense. Often good ideas seem so basic we discount them based only on their simplicity…try and stay with ideas that work, and be wary of anything that seems too good to be true.” (Boyle, 2010, p. 22). The simplest ideas can be the most effective, and the most basic exercises can be the most beneficial. Over-thinking training, and attempting to create elaborate training programs has taken away from the effectiveness of functional fitness and functional training. Trainers need to shift their focus to producing results using exercises and techniques that work, not what is the latest and greatest training modality; if it works that is all that should matter. Functional fitness is an important part of fitness and training, and an equal to its more modern and elaborate training modality opponents, but needs to be reexamined as an effective form of training. It offers those not defined as “athletes” the opportunity to participate in fitness, and reap the benefits and results that others are able to achieve through alternative training techniques.
Disabilities Studies

*Autism as Culture*

Kanner and Asperger identified autism in the 1940s, and it still was a very marginal phenomenon and was very much invisible to the world (Straus, 2010). Individuals diagnosed with autism were lumped in with those diagnosed with schizophrenia, until autism was included on its own in the Diagnostic and Statistical Manual: The official diagnostic guidelines for the American Psychiatric Association (DSM) (Straus, 2010). In 1943, autism was considered a ‘rare’ disorder, while today, diagnosis of ASD is as prevalent as 1 in 110 children in the United States and is continuing to rise. (Bogdashina, 2005; Liu, 2012). This large increase in the diagnosis rate has helped to spread public awareness about ASD, with articles and special series printed in newspapers around the world, including the New York Times and The Toronto Star. It has become a significant piece of the puzzle of Western culture and a prevalent part of the world of Disability Studies.

Joseph N. Straus (2010), an individual who is a member of the Disabilities Studies world recognized that individuals who *study* disability believe ASD to be found along a spectrum that provides a neat and linear progression from “low functioning” to “high functioning” (Davis, 2010). These individuals can be diagnosed and fit along a progressive criterion in terms of function, but the manifestations of ASD vary greatly. No two diagnosed are the same, and no cure has been found. This concept can be divided further into two distinct parts. Autism is seen as belonging to the medical culture, in which the ultimate goal is cure, or the social model of disability, in which ASD is socially constructed (Straus, 2010). The medical model that has been critiqued extensively in the
realm of Disability Studies has certain “defining attributes” (Straus, 2010). The medical model defines disability as pathology and this pathology is found within the body in a specific location, and the ultimate goal is to cure this pathology (Straus, 2010). However, if this disability cannot be cured, then the ‘defective body’ should be normalized or separated from the community to prevent contamination (Straus, 2010). The second part to this piece is the ever-evolving concept of the social construction of autism. Social construction of autism acknowledges that disability is a construct of society rather than being biologically derived (Straus, 2010). The disability varies within time and context, and is dependent on the conditions that are considered to be disabling (Straus, 2010). The growth of the autistic community has been fast and strong, enabling a shared culture to form as a support for the distinct social construction of autism, and autism as a cultural group.

The medical model understands autism as an illness or disease, which can be located in one discrete, or many ‘defective’, places in the body (Straus, 2010). Cures are continuously being proposed to help combat this illness, but until the cause is understood, these ‘cures’ continue to fail (Straus, 2010). Within the medical model, Autism is best understood as an issue in the mind or the brain, in which a triad of impairments emerges to explain the abnormalities that exist. The triad of impairments is comprised of “qualitative impairments in social interaction, qualitative impairments in social interaction, and restricted, repetitive, and stereotyped patterns of behavior, interests, and activities,” (Straus, 2010, p.549). Placing the diagnosis of autism in the mind presents a challenge for the medical model because it is impossible to directly observe the psyche and the mind, instead one must observe behaviours (Straus, 2010). The turn to therapies
and the number of drugs to help alleviate some of the symptoms has been exponential, however the medical model places equal emphasis on both the diagnosis and the cure (Straus, 2010). Nothing is able to address the diagnosis of autism directly.

Shifting our attention from medicine to culture, these behaviours of individuals with autism can be better understood, but also acknowledged as a construct of meanings that are present in social relationships that are valued through the legitimization of possessing desired physical characteristics (Straus, 2010). Our society constructs meanings around minority groups, like individuals with autism, who have created their own ‘autistic’ minority culture. Autism should be seen as “a fundamentally different way of being – perceiving, interpreting, and thinking,” (Bogdashina 2005, p.81). Professionals constructed the medical model’s triad of impairments, but these impairments have brought along many misconceptions about autism (Bogdashina, 2005). Shifting the focus to autistic culture, these ‘impairments’ can be reclaimed as a “term of cultural identification and pride,” (Straus, 2010, p.551). Looking at these ‘impairments’ as strictly “fundamentally different ways of being,” (Bogdashina 2005, p.81), individuals with ASD now have valued ways of thinking, and an interesting way of existing in the world. Shifting the focus of the triad of impairments to local coherence, fixity of focus, and private meanings allows for these characteristics to be valued and allows for different interpretations of same behaviours (Straus, 2010; Bogdashina, 2005).

Locale coherence best explains how individuals with autism are often extremely attentive to small details, on their own terms (Straus, 2010). This makes it difficult for individuals with autism to view the ‘bigger picture’ and instead they view the world in small parts. Fixity of focus describes the preference of individuals with ASD for
repetition, orderliness, system and ritual (Straus, 2010). Private meanings explains that there are certain idiosyncrasies and actions that have meaning to that specific individual with autism, but their meaning and need for this to occur is private (Straus, 2010). The autistic mind functions inwards, and expression is more likely to occur in an introverted way (Straus, 2010). Their actions seem inexplicable to the general public, but hold great meaning for that individual due to their inwards processing. Although these three elements of autistic culture are similar to that of the triad of impairments, they explain more of the characteristics and culture that is autism. They allow for greater understanding of the culture, and also for individuals with autism. The medical model allows for little understanding of the individuals, with the focus mainly on the diagnosis and the cure of this ‘illness’ or ‘disease’. By allowing for the social model of disability to occur, and the culture of autism to be constructed, a greater understanding of this minority group can occur.

The most important concept embedded in the social construction of disability is that none of the physical or mental conditions are the disabling factor, it is the lack of support in the environments and society that are disabling (Wendell, 1996). Our pace of life as a society has increased greatly in the last decade. Able bodied individuals take for granted the fast pace of life which they lead; this fast pace can marginalize individuals who cannot keep up with this increase in pace, therefore disabling them in a more ablest, productivist socially constructed views of society (Wendell, 1996).

**Inclusion as Pedagogy**

As we continue to uncover information in regards to disabilities and the need for equality, the push in education, school programming, community services, and the
workplace has become inclusion (Sherrill, 2004). This trend towards inclusion has also extended into physical education and physical activity. However much work still needs to be done to manifest this dream of social justice, inclusion and equal opportunities for all (Sherrill, 2004). It is one thing to include an individual in an activity or a task, but it is another to provide this individual with meaningful movement opportunities. Looking at a gym full of children, there will be varying skill levels, however the curriculum and lessons planned have been based upon a societal derived norm that has become accepted and recognized as a standard. We live in a world in which we have learned to compare our weight, height, blood sugar, even test scores; our society seeks to claim a title of normal. And now physical education and activity has fallen victim to these norms.

Physical educators plan for what the curriculum has dictated the “norm” to be, a lesson plan based on skills and motor competencies that should be achieved by this point. However, children with ASD have yet to acquire these fundamental movement skills, contradicting the norm. They will not be able to follow these curriculum derived lesson plans, no matter the number of modifications that have been made to allow for inclusion. By providing a lesson that is intended for the “norm”, physical education is now falling victim to hegemonic normalcy and deploying it through poorly modified exclusive lesson plans. The dominance of the physical norms in the class dictates the education that all will receive. Children with ASD may never have socially accepted normal motor patterns. Inclusion in traditional physical education may not ever be achieved, however with the implementation of adapted physical activity, children with ASD may be able to experience appropriate physical education. This adapted physical education would be
delivered by individuals who are trained in disabilities and know the appropriate way to modify and to delivery physical activity lessons to individuals with specific disabilities.

The philosophy of inclusion encompasses the basic belief that all individuals are entitled to equal opportunity (Flintoff & Fitzgerald, 2009). This philosophy must be looked at as a process, not just a desired place, which involves teamwork and direct interaction with the individual, activity and the environment (Flintoff & Fitzgerald, 2009). Inclusion needs to be looked at as a form of pedagogy and not an unachievable ideal. The challenge now becomes how can we meet the individual needs of individuals with disabilities, while meeting program requirements (Flintoff & Fitzgerald, 2009)? Changes and adaptations that have been made in the past are quick fixes to a prominent issue in physical activity and education. Those with disabilities are incorporated with minor changes and add-ons to the activity, rarely being fully included (Flintoff & Fitzgerald, 2009). Inclusion allows equity and equal opportunity for all; it is a process, not just a place to be reached. Inclusion in physical activity is slowly being addressed, but the issue with accessibility and inclusion in fitness settings is being over looked. The AODA states that “…accessibility standards in order to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures and premises on or before January 1, 2025…” must be achieved. This includes fitness and personal training.
Chapter III – DESIGN AND PROCESS OF RESEARCH METHODS

Overview

The following chapter will discuss the methodology and methods used to conduct my research study. A qualitative research approach was chosen to gain insight and understanding into the world of physical fitness with individuals with ASD. Qualitative research was chosen because little research exists in this area and it will help to understand the importance of physical fitness and conditioning for individuals with ‘moderate functioning’ ASD, as well as to develop appropriate pedagogic approaches and fitness baselines for practitioners who will work with an ASD population. Qualitative research allows for the reader to understand the ways in which others view their world around them (Patton, 2002). As a qualitative researcher, I want to understand the physical fitness experiences of individuals’ with ASD, and how they are individual to each participant. Qualitative research data are usually collected in three main ways: in-depth interviews with open ended questions, direct observations, and written documents (Patton, 2002). I utilized interviews, pre and post testing, field notes, and observations in my research to collect data and to inform the analysis of the various data sets. I wanted to qualitatively explore the world of physical fitness and individuals with ASD.

Paradigm

Paradigms are defined as the “very basic meta-theoretical assumptions which underwrite the frame of reference [and] mode of theorizing” by social scientists who operate within the paradigms (Burrell & Morgan, 1979, p. 23). It is a way to link the work of a group to a theory that holds true to their assumptions (Burrell & Morgan, 1979). A paradigm also represents a basic worldview that defines the very nature of the
“world,” what your place is in that world, and a range of imaginable relationships to this world and its components (Guba & Lincoln, 1994). The beliefs of a paradigm are basic, but must be accepted based on faith alone (Guba & Lincoln, 1994). Although a paradigm allows unity of these basic thoughts and beliefs, it does not mean that there will not be variance in standpoints and views within paradigms; it is simply an underlying unity in terms and assumptions (Burrell & Morgan, 1979). Each paradigm has a very different social and scientific reality, and looks to the world in alternative ways. Crotty (1998) suggests that a paradigm forms a direct link between the theory and practical components of research, and directly affects every decision made during the research process.

The paradigm that I selected to situate myself under for the purpose of this research is the interpretivist paradigm. Interpretivism both supports the methodology as well as the methods that I used in my research study. I wanted to “understand the world as it is, [and] understand the fundamental nature of the social world at the level of subjective experience” (Burrell & Morgan, 1979, p. 28). I wanted to seek to understand the subjective experience of personal trainers working with individuals with ASD and how these experiences can be used to elicit change not only in the world of personal trainers, but also in the opportunities for fitness and conditioning programs for youth and teens with ASD. Interpretivism looks to the world as an emerging social process, which is created by those concerned (Burrell & Morgan, 1979). I wish to understand the basis and source of this socially constructed reality in my research, and understand the individual experience of both the participants of Saturday S.N.A.P. and the CPTN trainers. I wanted to construct this knowledge through various analyses of the interaction of the trainers with the children. I wanted to accurately observe the fitness and conditioning programs
being employed, and describe and understand the trainers’ experience working with such a different population from what they are traditionally used to working with. As an interpretivist researcher, I believe that the reality that we choose to live in has been socially constructed, and that youth and teens with ASD have experiences with fitness and conditioning that I would like to understand (Wahyuni, 2012). I chose to refute that there is a single truth when working with individuals with ASD; each individual has an experience with fitness and conditioning that can provide the trainers and myself more information about how to provide this population with the best training program possible. I also wanted to know the experiences of the trainers as they work with an unfamiliar population as a client, and understand the social reality of providing youth and teens with ASD proper fitness and conditioning programs through appropriate pedagogical approaches. The experiences and values I hold as a researcher, and also those of the participants and trainers substantially influenced the collection of the data, and how I approached the analysis process (Wayhuni, 2012).

Theoretical Perspective

I employed a critical disabilities theoretical perspective (or I approached my research through a critical disability lens) for my research study. Critical theory, as a perspective, is concerned with empowerment of individuals, allowing them to surpass the constraints that have been placed upon them due to race, class, gender, or ability (Creswell, 2007). This empowerment cannot be obtained without the study of the processes and structure of power. To be empowered, the structure and the process of gaining power must be considered. Critical disability theory has a direct focus on individuals living with a disability, whether mental, developmental, or physical. It allows
a shift of focus from disability being a defect to a dimension of human difference
(Creswell, 2013) and it deconstructs and critiques hegemonic normalcy. It is about
understanding the sociocultural context of this population’s experiences, and challenging
the over-emphasized “medical model” (Mertens, 2009). The medical model treats
disability as a, “pathology, either a deficit or an excess with respect to some normative
standard,” (Straus, 2010, p. 538). This pathology is seen within the body of an individual,
at a specific location, and the goal of this medical model is to cure the disease (Straus,
2010). Although there has been much focus on possible interventions and medicines to
find a cure for this ‘disease’, one has yet to be found for ASD (Straus, 2010). This lack of
medical advancement in thinking about an increasingly prevalent way of being in the
world could be due to the lack of fit between autism and the “prevailing culture of
science based medicine”; autism is not a disease (Davis, 2010, p. 540).

Shifting the understanding to a social, not biological root, allows individuals with
disabilities to claim control over their own lives (Mertens, 2009). It turns the focus back
to the behaviours, abilities, and attitudes, which can be socially grouped together and
provided a coherent label (Davis, 2010). Critical disability theory shifts focus to a social
lens, views the disability as a consequence of the social structure of our world, and
believes that these socially constructed determinants can be recognized and addressed
appropriately (Pothier & Devlin, 2006). Disability is a socially constructed term, with a
self-formed culture with shared features that give groups an idiosyncratic identity (Davis,
2010). It is about addressing the meaning of inclusion and equality (Creswell, 2007),
equality in political, civil as well as social rights of Canadians living with disability
(Pothier & Devlin, 2006). However a “pattern of discrimination and inequality [still]
remains entrenched” in our society and in research due to the over emphasis of the medical model perception (Pothier & Devlin, 2006). Critical Disabilities Studies allows for a shift in focus to a more socially constructed view of disability, where disability is identified as a consequence of man-made barriers in society that restrict inclusion (Pothier & Devlin, 2006).

I feel that there is a need for critical disability oriented research to address the experiences and voices of marginalized groups, and to help elicit appropriate and meaningful change. Viewing research through a critical disability lens allows for separation between an individual and the socially constructed term, disability. It shifts the focus to equal rights and opportunities, and allows for these individuals to regain the visibility and access that they deserve in the world. This lens allows for a culture-centered (not biomedical) approach to disability and to individuals with autism; it shifts the power back to these individuals to help elicit meaningful change.

The AODA requirements must be achieved by 2025, but change cannot occur unless experts are consulted and modifications are made. All goods, services, structures, employment, and facilities must be accessible. Through the lens of critical disability theory, I addressed the inequality and the socially constructed challenges that are present in traditional fitness and conditioning settings, including appropriate pedagogical approaches of trainers, and training of individuals with ASD.

**Methodology**

**Case Study**

Case study research has continued to gain popularity in the social science and healthcare world; its methods of collecting and analyzing data lend themselves well to
qualitative research. Research based on a case study draws on ethnography, phenomenology, naturalistic, holistic, and biological research methods (Liamputtong, 2009). Case study research is used in many different situations to contribute to our knowledge of an individual, a group, an organization or a social or politically based phenomenon (Yin, 2009). It allows for holistic and meaningful characteristics of real-life events to be understood and examined (Yin, 2009).

A case study involves the study of an issue that is explored through one or more cases within a bounded system (Patton, 2002). Through detailed and in-depth data collection using multiple sources of information, one carries out an exploration of a case (bounded system), or cases (multiple bounded systems) (Patton, 2002). Through the use of observations, interviews, and field notes the case can be described and can be established. The focus is on the particulars of the case, and allows for exploration into the details. Cases can be defined as an individual, a group, an institution, and/or a community (Liamputtong, 2009). A case can be simple or complex, however is defined by a ‘bounded system.’ A bounded system refers to any complete unit of research that can be defined for a distinct entity (Liamputtong, 2009). These boundaries help to assist in data collection, but also provide guidelines as when to stop and limit the data collection. The cases need to be determined and decided upon before the research begins; “what the case is a ‘case of’” (Liamputtong, 2009, p.190).

For the research study, I used a comparative case analysis with multiple cases through my critical disability orientation. Through the use of comparative case study design, a bounded system within an authentic setting like Saturday S.N.A.P. can be defined and can be used when explaining cases. I wanted to describe the experiences of
each case or individual in the research study; each individual has a distinct and unique experience that I wanted to describe and explore, but also compare and contrast to one another. A case study design provides the thick description that is needed when comparing cases (Lincoln & Guba, 1985). When using multiple cases, the overall study is seen as more robust, having a greater breadth of data (Yin, 2009). Each case is carefully selected so that it fits within the bounded system, and the results can be compared and contrasted (Yin, 2009). A comparative case study design also allowed for the ability to include the nuances and the correspondences between myself as the inquirer and the individuals participating in my research study (Lincoln & Guba, 1985).

Comparative case study was chosen when working with individuals with ASD as well as the student-trainers to allow for a thick and rich description of their experience with a fitness and conditioning program. I analyzed each case as a whole, and then compared each case to one another in the bounded system that is Saturday S.N.A.P. and a fitness and conditioning program.

**Setting and Participants**

Saturday S.N.A.P. is a community service learning initiative at Brock University that is based upon movement education principles and an embedded curriculum and is offered to transition age youth and teens with ASD. This program is developmentally appropriate, emphasizing movement education. Saturday S.N.A.P. began in 2011, through the initiative of 16 undergraduate students in the Physical Education and Kinesiology Department who had a passion for providing meaningful movement opportunities to teens and TAYs with disabilities. In the first year of operation, Saturday S.N.A.P. had five to seven participants attending each week from 2:00pm until 4:30pm in
both the pool and Gym 2 at Brock University, working with the coordinating students of
the program in a 1:1 ratio. Now in its third year of operation, Saturday S.N.A.P. has
twenty or more participants that work 1:1 with Brock University student volunteers or
student-teachers, who facilitate activity and movement with these individuals. Saturday
S.N.A.P. is targeted towards individuals between the ages of 12-25 with ASD because
this is the dominant age group who are constantly under served and overlooked in
community programming. Saturday S.N.A.P. also provides Brock University students an
opportunity to work directly with teens and TAY with ASD, providing hands on
volunteer and course credit experience for the students as well as providing meaningful
movement experiences to these individuals from the Niagara community.

Saturday S.N.A.P. provides developmentally appropriate physical education to
these individuals, focusing on fine motor, and gross motor movements, games skills,
sensorimotor skills, and fitness and conditioning. This specialized program allows for
these individuals to focus on their movement repertoires, and to work on missed or
underdeveloped motor milestone movement patterns. The Brock students, for their
specific Saturday S.N.A.P. participant, create specialized and individualized movement
plans. The program is station based, with rotation occurring during the duration of
Saturday S.N.A.P. in Gym 2 (Appendix E). The set up includes a fitness and conditioning
station, a target station, a gross motor station (including the Canadian Climber, shapes
and trampolines), the somatic square, scooters and a sensory room located outside the
gym in the wrestling room. Saturday S.N.A.P. was the site for this research study from
November 2nd, until March 1st, 2014.
There were a total of four (4) participants that participated in the research. There were two different groups of participants in my research study; the trainers and the Saturday S.N.A.P. participants. To recruit the student trainers, I first contacted Brock University’s “The Zone” manager, Eric Walter. He then sent out an email to all thirty of his trainers on my behalf, inviting them to participate in my research. Of the thirty trainers that were contracted, only one trainer employed at Brock University’s “The Zone” responded in regards to participation in the research study. The second trainer that participated in my research study was recruited through personal contacts, and previous participants in the Saturday SNAP. This participant was a previous employee of “The Zone”, and was a Brock University graduate from both her Undergraduate and Master’s. The two (2) trainers that participated were both CPTN-CPT Trainers. The trainers ranged from 22 years of age to 34 years of age, one was female and the other male.

The other two (2) participants in the research study were current participants of Saturday S.N.A.P., and were 15 and 16 years of age. I used purposeful sampling by deliberately selecting individuals who were classified as ‘moderate functioning’ to participate in my study (Liamputtong, 2009). Purposeful sampling allows for the participants to purposefully inform me, the researcher, with an understanding of the issue, or the phenomenon of the study (Creswell, 2007). To be chosen to be a participant, the individual had to be recognized as having ‘moderate functioning’ ASD. ‘Moderate functioning’ individuals with ASD is an umbrella term to encompass those that are able to understand visual, verbal, and/or physical cues, able to follow a visual or verbal schedule/program, and having some fundamental movement skills and basic motor development. ‘Moderate functioning’ ASD can include some individuals that are non-
verbal, but these individuals are still able to understand spoken language, communicative aids, or visual prompts. Both participants selected were non-verbal, although both used vocalizations for expression and communication and one was able to use several words and sentences when motivated. The participants that were chosen also had some basic or fundamental movement skills and motor development (i.e. walking, running, flexion at the hip, knee, and shoulder joints).

**Participant Description**

I will provide a brief narrative summary of each teen and his unique experience during the research study. Each participant in my research, both trainers and participants was unique, and it is important to understand their experience and to know the distinct differences between the participants.

**Chris**

Chris is a sixteen-year-old male, diagnosed and identified as an individual with moderate functioning ASD. He is non-verbal, but understands both visual and verbal communication. He is tall, just less than six feet tall and weighs approximately 170 pounds. He can be echolalic, sometimes repeating words or phrases that are said to him. He can be loud, and has loud wailing outbursts at random during Saturday S.N.A.P. Chris always has his arms bent and hands by the opposite elbow, picking at his skin on his inner elbows. He does not like the pool at Brock University, because the water is too cold, so he spends most of his time in the pool in the shallow end.

**Roland**

Roland is a fifteen-year-old male, diagnosed with both moderate functioning ASD as well as Down syndrome. He is mostly non-verbal, but can understand visual and
verbal cues. Roland wears ankle braces on both feet at all times, except when swimming. He has webbed toes on both feet, and enjoys swimming regardless of the temperature of the pool. He is about five feet and four inches tall, and weighs about 160 pounds. His shoulders are rounded, and he does not swing his arms when he walks. His head and chin poke forward, and his eye gaze tends to be looking down. He cannot walk down stairs, and instead sits on his bum and “bums” down them. He also does not run, and walks at a very consistent but slow pace.

Trainer Description

It is important to understand the trainers and their previous experience not only working with individuals with disabilities, but also their experience with personal training. One commonality between the two trainers is that they both had minimal experience working with individuals with ASD; they both had never engaged in personal training with an individual with ASD. This lack of experience helped to open their mind to the experience but also to their participant. They did not come into the research with a predisposed idea of ASD and its manifestations and characteristics.

Carlo

Carlo is twenty-two years old, and is a third year kinesiology student. He is also a personal trainer at the Brock University gym, the “Zone,” and has been a CPTN-CPT for over two years. Carlo exclusively works with clients who are University students, predominantly female, who are looking to lose weight. He has also trained with elderly Niagara community members who are retired, but they too are also looking to lose weight and look better. He had volunteered at Saturday S.N.A.P. during the previous school
year, which allowed him to gain some experience working with individuals with special needs. Carlo was present at every Saturday S.N.A.P., and did not miss one session.

**Felicia**

Felicia is in her mid-thirties, and has both an undergraduate and Master’s degree. She works as a personal trainer, and instructs at Sheridan College in their Exercise Science and Health Promotion Program. She is a CPTN-CPT for over ten years, and has worked with a wide variety of clients. She is also an instructor and assessor for CPTN, and has taught many of the CPTN workshops in the Niagara Region. She has little experience working with individuals with cognitive, developmental as well as physical disabilities. She volunteered the summer prior at ASD Camp at Brock University, working as a group leader with undergraduate students. This would be the most experience that she would have had working in a physical activity setting with individuals with ASD. Felicia was recruited outside of the Brock University gym, through my supervisor, as well as my personal relationship with her. Due to previous commitments, Felicia was unable to attend one of the scheduled Saturday S.N.A.P.’s during the research study. She provided me with this information prior to the research study’s commencement, and I accommodated for her absence by pairing Chris with a Saturday S.N.A.P. volunteer the week she was away.

**Methods**

**Procedures**

The following section will focus on the procedures that I used throughout the research study which included: participant or case selection, gaining entry and consent,
data collection methods, data analysis methods, trustworthiness, and ethics. The selection of the program in which I conducted the research was purposeful; I have been a volunteer at S.N.A.P., a program coordinator, and now a mentor as a graduate student. I would not have chosen this path had I not been involved with this program. Saturday S.N.A.P. is one of the few programs for individuals with ASD in my focus age group (12-30 years old). This made Saturday S.N.A.P. a logical choice for my research; implementing a different and more specialized form of physical activity at the pre-existing and developed stations was not an issue. The lack of physical activity programs for this age group and population makes research nearly impossible in other settings. Because of my prolonged involvement in multiple Special Needs programs at Brock University, I developed a critical disabilities orientation, and approached my research using this position. I have worked with the programs and the participants for four years, and through this involvement and experience my critical disabilities orientation has developed and grown to allow me to use person-centered language, understand that it is the environment and our society that creates the disability not the individual, and that the individual is not defined by his or her disability. An individual living with a disability still must be provided the same respect and allowances a same aged peer without a disability would be provided, including individuals who are non-verbal. My critical disabilities studies orientation allow me to put the participants and their wishes first during each session, in both the planning, facilitation and observation of each session, as well as the analysis of the data collected.

My research study examined the implementation of a fitness and conditioning program for transition age youth with ‘moderate functioning’ ASD by CPTN-CPT
trainers. The focus of the research was how to establish baseline measures for this population, how to design a developmentally appropriate program for this age group, how to track progressions and implementation of fitness and conditioning exercises and how to develop and refine pedagogic strategies that were used to implement these fitness programs. I created the fitness and conditioning programs for each participant, and then met with the personal trainers to mentor them through the programs I designed to work through with their teens. The programs included MSE (Appendix F), CV, and FX stations and activities for each session. I created the programs through the use of movement profiles, or “pre-test” measures that have been done for each child in our program over many years of attendance, and through my long term exposure to both the program and the participants. I have been a member of the Saturday S.N.A.P. for three years, and used my experience and knowledge of the participants when designing each individual program for the teens. It allowed for a more individualized and appropriate program to be organically developed for the participants, which was one less thing that the trainers would have to worry about during the research process. They both had limited experience working with individuals with ASD, especially in a fitness and conditioning setting. As a movement educator, I was able to use my undergraduate education, experience with the program, knowledge of personal training techniques and knowledge of the teens and their movement profiles to create appropriate programs, which were individualized and appropriate for the participants.

**Gaining Entry and Consent**

Gaining entry into the field of research is important to collect thick and rich qualitative data. Patton (2002) states that there are two separate parts to gaining entry: (1)
negotiation with the gatekeepers about recruitment and the fieldwork being done, and (2) the physical act of being in the field and collecting data. These two parts go hand in hand when conducting research in the field, as the gatekeepers will help to establish how the fieldwork will play out, but they will also define the role of the researcher in the setting (Patton, 2002). There were multiple gatekeepers that were vital to gain entry into the field to conduct research. Eric Walter was a key gatekeeper in providing me with access to contact his employees to provide information about participation in my study, as well as informing past employees and friends of the research study. As Dr. Maureen Connolly is the supervisor of my research study, as well as the head of Saturday S.N.A.P., the research study was able to take place at Saturday S.N.A.P., with her approval.

I was also highly involved in the Saturday S.N.A.P. for close to four years. The participants of the program have been consistent over the years of my involvement, and have become familiar faces. I have also been able to become a familiar face to not only the participants of the program but their parents and guardians as well. The parents and guardians of these teens trust us, and trust that we will do what is in the best interest of their child.

The ethics process is extremely important when working with a human participant driven research population. Individuals with a disability are considered a vulnerable population; permission must be granted from their parents or guardians to participate in research, regardless if they are the age of majority. To ensure that the research study was conducted ethically, I submitted my Research Ethics Board (REB) forms in August, 2014. After multiple submissions to REB with multiple edits, my research study gained clearance in early October 2014. The parents of the Saturday S.N.A.P. participants were
then given a letter of invitation to participate in my research study at a Saturday S.N.A.P. session (Appendix A). If interested, letters of consent to participate in the research study were provided at that session, or were sent home for further review (Appendix B). Once signed and returned, their child was able to participate in my research study. In regards to the student trainers, their letter of invitation was provided through email (Appendix C). Letters of consent for the student-trainers (Appendix D) were then provided prior to the commencement of my research study at a meeting time that was convenient for each student-trainer, where I was able to outline their duties and roles during the research study. Once forms were signed and completed, the research study could commence.

Five individuals from Saturday S.N.A.P. who all met the ‘moderate functioning’ criteria returned their forms and were interested in participating in the research study. Due to the limited number of student trainers that were available to participate in the research, I unfortunately was unable to service all five individuals. I then had to base participation off of a ‘first come, first served’ basis. The two individuals who had all their forms signed and returned first were selected to participate in the research study.

**Data Collection**

When conducting a case-study, there are six sources of evidence that can be used as a focus of data for the research study (Yin, 2009). These sources include: documentation, archival records, interviews, direct observations, participant-observations (or field notes), and physical artifacts. For my research study, I used interviews and field notes, as well as observations to form the data sets that made up each case.

**Interviews**
Interviews allow for the collection of firsthand account of the participants in my research study, to gain insider information about their experience by allowing them to talk about events and experiences in great length (Liampittong, 2009). These interviews allowed me to understand their experience and to gain valuable sets of data to better understand the experience of the trainer, and also each training session. By conducting interviews with the student trainers who worked with the participants of Saturday S.N.A.P., I was able to understand the implementation and importance of physical fitness and conditioning for both the student-trainer as well as the impact that it had on each participant. Also, the interview allowed the individual being interviewed “[not only] the opportunity to describe experience, [but] it also require[d] him or her to clarify its meaning, and perhaps even realize it for the first time” (Dale, 1996, p.308). The interviews allowed for the participants to talk about their experience with the program and with the individuals that they were working with in great depth and detail.

*Interview Protocol*

A pre-study and post-study interview was conducted with each student-trainer. The pre-study interviews were conducted prior to the first session of the research study, and the post-study interviews were conducted no later than one week after the last Saturday S.N.A.P. session included in the research study. The pre-study interviews were brief interviews, each lasting no more than 10 minutes, to gain a better understanding of their previous experience working with individuals with a disability, as well and their expectations for the next 8 weeks. The post-study interviews ranged from 40-52 minutes and were conducted in a location that was mutually agreed upon by the student-trainer and myself. Prior to the commencement of the interview, I outlined the process for the
interview, and what would occur once the data were collected. The student-trainers were asked verbally, and were recorded, if they wish to continue with the interview process. Once verbal permission was received, the interviews began, following interview guides that I had previously created (Appendix J, Appendix K). These questions were used as a guide during the interview, however sub questions and probe questions were created and used during the interview to gain more insight and information in regards to the student-trainer’s experience during the research study.

I transcribed each interview verbatim and then sent each interview via email to the student trainer. They had the opportunity to review their interviews, make additions to areas that they wish to expand upon, or alter anything that they had said in the interview that they felt needed clarification or correction. They then sent their interviews back to me, and I used these copies during the analysis phase of my research.

Field Notes

Many options exist for taking field notes during the data collection process. It is dependent on the researcher and their use of short-hand, symbols and storage that make the field notes unique (Patton, 2002). In supplement to observations, I recorded field notes during each session. The field notes contained an in-depth description of was been observed, and anything that I believed was worth noting (Patton, 2002). My field notes were descriptive, and contained the date, time, setting, and all information that would help to clarify observations during the analysis process. Field notes also contain what people say (Patton, 2002); I included direct quotes from the sessions in my field notes, to provide the emic perspective to the experience and the case (Patton, 2002). The field notes also contained my own feelings about events and reactions to the experience.
Personal meaning and the significance of events were discussed and described in the field notes as they were the strongest at the time of the event.

Each week the field notes I wrote contained a description of the setting, dates and times, the participants present and anything significant that occurred that week for each participant. My field notes also focused on the activities and exercises as they occurred, and what was happening with each participant during each exercise. The field notes were organized into individual charts, in which each exercise was highlighted, and then described in detail (Appendix H). The notes were deeply descriptive and provided insight into the physical setting of each session each week. The more descriptive the field notes are, the better the recall to the setting during data analysis. I used the field notes to also provide insight to my feelings about that week and the events. After the session was over, I looked back on the field notes from that session, and added reflexive notes or elaborated on what happened that day.

**Observations**

“To understand fully the complexities of many situations, direct participation in and observation of the phenomenon of interest may be the best research method,” (Patton, 2002, p.21). Participant observation can be one of the most comprehensive of all types of research strategies, especially when working with a population such as individuals with ASD, as not all are verbal, or can communicate in typical fashions. Observing their actions and the interaction with others and their environment helped to uncover details and understanding of the program, as well as their relationship to the trainer during the sessions. The purpose of my observations was to help to take the reader to the setting or the case that was observed (Patton, 2002). Saturday S.N.A.P. is an
environment that is not well known, and is a unique movement experience for individuals with ASD. Including my observations in the data helped to illustrate the complexities of each case.

My observations occurred during each session of Saturday S.N.A.P., once both the parents of the participants and the student trainers had signed the consent forms and agreed to observations. The observations began by using a semi-structured chart format, through the use of headings. The use of semi-structured observations allowed me the freedom to include different aspects of the case that was observed, and also provided loose guidelines so that all cases were observed in the same manner. Some of the topics that were included were: interaction with the environment, interaction with the activities, the equipment, non-verbal communication, and reactions to behaviours and the individuals that they are each working with (participant’s interaction with the student-trainer, and the student trainer’s interaction with the participant). During the first session, when conducting my pre-test for each individual, I found that I was missing out on valuable observations that were vital to the session. The following week I switched to an audio recorder, in which I was able to record my observations as they happened, and then revisit them when I listened to them at a later date. In early January I also broke my right hand; a spiral fracture in my fourth metacarpal. I was unable to write, and typing was extremely difficult. Once the splint was off and I was finished with physiotherapy, I listened to each session in blocks of fifteen minutes and recorded important observations, focusing on each activity and what was occurring with the participant.

Saturday S.N.A.P. had three other graduate students who work as mentors, and are present during each session. It is not unusual for individuals at the program to have
observers during the sessions. I was the participant and observer, because it allowed me to still be involved with the program, and still have responsibilities during the duration of the program, while being able to actively observe each teen and case (Patton, 2002). As a CPTN-CPT trainer, I am responsible for ensuring that exercises are being delivered properly to the participants, and that they are taught in a manner, which is inclusive for individuals with ASD.

I observed the participants in both the gym and pool setting, as this gave a better insight into their relationship with the trainer, as well as context for the work in the gym that was to follow. A majority of my observations took place at the fitness and conditioning station, but some took place at other stations in the gym. Because the equipment is portable, fitness and conditioning alternative exercises were able to be done at other stations.

**Pre/Post Tests**

Not much work has been conducted in the area of adapted fitness and conditioning, especially for individuals who are ‘moderate functioning’ ASD. Due to sensory issues, such as smell, texture, lighting, pressure, and sound, traditional fitness tests are extremely difficult to do with this population. A VO$_2$ test, Wingate, or 6-Minute Walk Test would all be extremely difficult to conduct, in some cases near impossible. Because of these sensory issues, a different method of pre and post testing needed to occur. I chose to use “Functional Movement Concepts/Motor Milestones” evaluation tool developed by Lappano & Connolly (2013)(Appendix G; Appendix I). I chose to use this diagram because it focused not only on movement and motor milestones in the
individual’s repertoire, but also took into account sensory issues that can occur in this population.

Each participant was evaluated during the first session and the last session using the “Functional Movement Concepts/Motor Milestones” (Lappano & Connolly, 2013)(Appendix L; Appendix M). I used the “Functional Movement Concepts/Motor Milestones” sheet to observe each individual and evaluate his or her current movement repertoire and motor milestones in the pre-test, and then used these pre-tests to work comparatively during the post-test evaluations. I evaluated the progressions and improvements made in the post-tests in a synchronous comparative analysis of the participant’s physical abilities. The quality and frequency of the motor milestones and movement profiles was also assessed pre and post study (Appendix N; Appendix O). A hard copy description was also used from the observations from the first and last session, to help supplement both evaluations of the teens (Appendix P; Appendix Q).

Researcher Responsibility Description

It is important to define my role and the many different components that I was responsible for during the duration of the research. I was responsible for conducting the pre and post-tests with the participants at the beginning and end of the research study. I also used the pre-test to create and develop the activity plans for each participant and trainer each week. I would meet with the trainers prior to the sessions on Saturdays to discuss the previous session as well as introduce the plans that I had for the next session. I would go through each activity with the trainer, answering any of their questions in regards to the activities, modifications or concerns. I also would ask for the trainer’s input in regards to the activities, and would make appropriate changes using their suggestions if
needed. The opinions of the trainers were respected and helped to ensure that the activities and sessions were meaningful to the participant. These weekly meetings were important to ensure that the trainers were comfortable with the activities for the upcoming session, as well to get feedback about the activities and the participants from the previous sessions.

During the sessions, I would record my field notes and observations using an audio recorder. If the trainers needed assistance during the sessions with activities or with their participant, I was able to help them with both modifications and extensions of the activities. Although I was recording data during the sessions, the trainers understood that if they needed my assistance I was available to them at all times.

**Data Analysis**

There is no formula that exists for the transformation of my data into findings, because my research will be unique to my research study. The analysis phase of my research was the most difficult and organic part of my research study. It was constantly evolving with the study and the data to ensure that my analyses were recursive, confirmable and dependable. In case study methodology, it is important to understand that the analysis is a process (Patton, 2002). The process is recursive, with the purpose to create and gather comprehensive and in-depth information about each case (Patton, 2002). I attempted to make sense of the massive amounts of data, reducing the volume through multiple stages of analysis and then used this to mold it into my findings.

**Interviews**

I transcribed each interview verbatim, to ensure that I included everything that was said and not just sections of the interview that I felt would be beneficial to the
research, and were relevant and interesting to me (Taylor & Bogdan, 1998). I assigned pseudonyms to the participants to ensure confidentiality was kept during the analysis process. I then read each interview (pre and post study for each student trainer) as a whole, to familiarize myself with the collected data, as well to recall each interview and check that all ideas and concepts were complete. I then sent each interview (pre and post) to the respective student-trainer, to ensure that they were properly represented in the data as a form of member checking, to help increase trustworthiness of the data (Merriam, 2009). They were provided the opportunity to correct, add or clarify their interview, and then sent back the files once completed. Their edited transcripts were used during the analysis of both the pre and post interviews.

The in-case analysis of the interviews was to take place on two separate levels. The first level of analysis was focused on salience and pattern within the interviews, both pre-and post study. Each interview was read in-depth and independently, and terms that I believed were salient in the interviews were underlined. These salient terms were then organized in independent charts, and the significance of each salient quote was explained in-depth and in detail. Patterns that I noted in the data were then explored, and each pattern was highlighted in a corresponding colour. These patterns were then organized in a chart, using evidence from the interviews to support the patterns. Once salient terms and phrases were established, and patterns in the interviews were identified, the second level of in-case analysis of the pre and post interviews began.

Level two of the data analysis focused on the manifest and latent content of each interview. The manifest content was first explored, reading each interview in-depth, and looking at how the respondents answered each specific question. The objective of the
manifest content analysis was to make the obvious, obvious; it was about what they were saying in response to each question, how they were answering the question, and what words and phrases they chose to use. Each question was explored in-depth and independently. The data were then organized in a chart, divided by each question and answer, as well as the manifest content which was underlined, italicized or bolded. An example of how I explored the manifest content was looking specifically at how the trainer was answering the question that I asked during the interview. That is, I made the ‘obvious obvious ‘to myself and a prospective reader. What did the trainers say, how did they say it, what words did they use and how did they use them in their response. I then explored the latent content of the pre- and post -study interviews. The objective of the latent analysis of the interviews was to make to the obvious, dubious. I explored each response to the questions independently, within context of the four research questions. With the pre-study interviews, context was given to each response in terms of the trainer, and their background and supplementary information to allow for context for their response. For the post study interviews, each research question was assigned a specific colour. Each question and response was explored independently, using the research questions as a guide for the analysis at this level. I analyzed the interviews to unveil connections to the research questions. The responses of the participant were analyzed in context of the research questions, and I highlighted the corresponding responses according to their connection to each specific research question. If a salient term or quote was discovered, it was bolded and italicized for further exploration. An example of how I explored the latent content was looking at the responses of the trainer using the context of the research questions. I explored the answers to the questions asked during the interview
as more of a whole; what was the trainer’s experience, how did they come to answer this question in this way and why do I believe they chose to answer this question in this manner due to their experience in the research study.

I then began a cross-case analysis of each pre-study interview. The results from the pre-study interviews, using the level one analysis of salience and pattern were compared. The patterns were explored and cross-compared from each student-trainer’s pre-study interview. Common patterns in each interview were highlighted, and salient terms were noted in each interview. A cross-case analysis of the post-study interviews was then conducted. Using the second level of analysis, the latent content of the post-study interviews was compared between student trainers. The responses, which had corresponding context to the research questions, were examined, and compared.

Field Notes and Observations

The field notes and observation audio recordings were listened to in 15-minute intervals. Important and relevant observations to the research were recorded and organized into semi-structured observation charts (Appendix H). The typing of the field notes and observations helped to familiarize me with the data that I collected during the research study, and to re-immersme in each case. The pre- and post- observations for each participant were also typed up and recorded into designated charts, to allow for easy comparison in the analysis process.

Once I had established each case and they were complete, I performed an in-case analysis of each case, using observations and field notes from each session. Observations of each activity were compared within each week, and field notes of each session were compared. Once I had completed the in-cases analysis of the field notes and observations
for each participant, across-case analyses were then completed. The observations and field notes of each participant were then compared, and themes were established.

**Pre/Post Tests**

The pre/post- tests of each participant were organized into charts, to enable a more accurate and visually cohesive comparison. Functional Movement Concepts/Motor Milestones, hard copy descriptions, as well as the quality and frequency of movement were compared within case, pre-to post study. Once pre-and post-tests were compared within case, I consolidated themes and categories from the data. I then compared the pre- and post-tests of each participant across case, for themes and patterns between participants.

**Inductive and Deductive Analysis**

Inductive and deductive analyses were both present during the data analysis process of my research. Inductive analysis was about discovering the patterns, themes and categories in my data from my attention to pattern and salience, and manifest and latent content (Patton, 2002). This was done during the first levels of analysis, when looking for salience and pattern in the pre and post study interviews, as well as the field notes/observations and the pre- and post- tests, and then again during cross-case analysis. I looked for patterns and themes to develop from the analysis of the data set, without the use of frameworks or the research questions, to understand the experience of a fitness and conditioning program, and what occurred in each case during the research study.

With deductive analysis, the data were analyzed using an existing framework of my research questions that were previously established. Deductive analysis could only
occur once I had elucidated the themes, patterns, and/or categories in my inductive data analysis (Patton, 2002). Deductive analysis was present in the second level of analysis of both my pre- and post-study interviews with the student-trainers. I was able to take the themes, patterns, or categories established in the first level of data analysis and compare them to the framework that had been established by the research questions. This helped to confirm or disconfirm themes from the inductive data and theories influencing the questions.

**Trustworthiness**

To ensure that a study is trustworthy, it must be carried out ethically and fairly, with findings that represent the experiences of the individuals as closely as possible (Padgett, 2008, as cited in Liamputtong, 2009). Lincoln and Guba (1985) proposed that there are criteria that can be used to ensure that a study is trustworthy, which are appropriate to assess qualitative research studies (as cited in Liamputtong, 2009). Credibility and authenticity assess the fit between the participants’ experiences and the representation that I interpreted of these viewpoints (Liamputtong, 2009). These two criteria ask whether the explanation fits the description of the data (Liamputtong, 2009). Crucial strategies in the research design and processes such as prolonged engagement, rich and thick description, as well as reflexivity all contribute to the trustworthiness of the study.

**Prolonged Engagement and Fieldwork**

Prolonged engagement and fieldwork are strategies that helped me to reduce bias in my research. I am a familiar face at the Saturday S.N.A.P. program, and continue to develop a positive relationship with those participating in the program, especially those
participating in the research study (Liampittong, 2009). By making the student-trainers as comfortable with me as possible, I was able to draw more rich and thick descriptions from the interviews. Rich and thick descriptions are crucial components in the presentation of qualitative research (Liampittong, 2009). Having my participants feel comfortable to provide me with such in-depth and vivid accounts of their experiences helped to increase the reliability of the data. The more in-depth the description, the more data I was able to analyze, and the less I interpreted events and themes in the data.

One trainer was much more experienced working with individuals with disability than the other trainer. However, she was more experienced working with individuals with physical disabilities, and had not worked with individuals with such complex considerations. This trainer was also much older, and had much more experience working with a wide variety of clients. To ensure that both trainers were comfortable working with their participants, I met with them each week to discuss the session that had occurred, as well as what to expect for the session ahead. Because of my prolonged engagement with individuals with disabilities, I was able to provide the trainers with helpful information in regards to their participant, as well as understand their experience during the sessions. These meetings also allowed for the trainers to feel more comfortable with me as the researcher, as well as the participant that they were working with.

**Triangulation**

Triangulation is the most powerful component to strengthen the credibility of qualitative research (Liamputtong, 2009). There are three levels of triangulation in my research study; triangulation of sample, triangulation of data collection and triangulation of data analysis. There were three distinct components to my sample: the participants, the
student-trainers, and the researcher. Each was represented in both the data collection process, as well as the data analysis. Methodological triangulation, the use of multiple methods in the data collection process, is used in my research study (Liampittong, 2009). I used three different methods of data collection: interviews, field notes/observations, and pre/post-tests. Analyses triangulation was used in the analysis process, when I not only compared each data set within case, but also across case. I compared both the in-depth interviews of the student-trainers, as well as the field notes/observations and the pre/post-tests to help demonstrate richness, depth, breath, complexity and rigor of the study (Liampittong, 2009). Through the use of triangulation, I hoped to uncover complementary findings that provide a better and more comprehensive understanding of the phenomenon.

**Reflexivity**

Reflexivity is being able to acknowledge my involvement in the research, and how I was a key component in the shaping and analyzing of the data (Liampittong, 2009). I made explicit my beliefs, experiences and personal history in the area of study, and how these factors contributed to the interpretive process (Liampittong, 2009). With incidence rates of autism on the rise, there has been much attention drawn to individuals with ASD, especially children. It is believed that if we can find the cause we can find the cure. I have worked with individuals with ASD for the last five years, and have an immense interest in this population, however I do not seek to find a cure. I coordinated Thursday S.N.A.P. during the final year of my undergraduate degree, providing a place for these individuals to come and experience a meaningful movement program. I worked alongside many of the every-week volunteers, assisting with programming and
implementation. I then became a mentor in my graduate years, in both the Thursday and Saturday S.N.A.P.s. I worked with undergraduate student volunteers, assisting with administrative work and providing assistance to the students during the program planning and implementation stages. Acknowledging my involvement in these programs, and belief in their effectiveness due to first-hand experience with S.N.A.P. and Saturday S.N.A.P. during the research process allowed me to not only be honest about my experience with the program, but also properly identify my experience to help bracket this out during the analysis of the data.

Because of my experience with this population, I know that there is a need for meaningful and purposeful movement activities like Saturday S.N.A.P. One in 94 children are being diagnosed every year, and we have yet to find a ‘cure.’ Instead of searching for a cure, I chose to work with the individuals now, who are diagnosed, to provide opportunities to them that they may never receive otherwise. Wanting to improve motor function in individuals with ASD stems from my undergraduate Kinesiology degree, but my need to improve personal fitness and conditioning levels was the driving factor for the research study. This may also create a bias to find improvement due to the implementation of an adapted physical activity program, and an adapted fitness and conditioning program. My own personal belief in the importance of physical activity and movement for all individuals is important to recognize during the research process. I am prepared to admit that my values and personal beliefs do play a role in my research (Lincoln & Guba, 1985). However, I used the method of bracketing to better understand the cases as a whole, but also in comparison to one another (Patton, 2002). I attempted to
put my views and beliefs aside when conducting the analysis, so I could better understand the phenomenon from the view of the participants.

**My Role as a Researcher**

During the study I was responsible for many different components of my research, but also Saturday S.N.A.P. I am a mentor for Saturday S.N.A.P.; I helped and continued to assist in the recruitment of participants and student-teachers for the program, assisted with weekly meetings with the student-teachers, and assisted in the set-up and takedown of the gym each week. I created the fitness and conditioning programs for the participants, and explained how the student-trainers would be implementing these programs to the Saturday S.N.A.P. participants. In the first week, a basic assessment of the participants motor skill level was completed to establish a baseline for the fitness and conditioning program to begin (Appendix G). I was also the observer, recording field notes and observations during the sessions. In the final week of data collection, I assessed their motor skills once again, to establish a post-test level (Appendix I). I conducted the interviews with the student-trainers upon completion of the programs. As a researcher, I had many roles within the program, but also within the research. I was a large component of the research study, but also of the program itself. Although my role as a researcher was the priority during the sessions, I was not able to switch off being a program coordinator. If something occurred that needed immediate attention, I would attempt to continue my research, but address the issue as a coordinator of the program.
Chapter IV – FINDINGS

Overview

I will organize the following chapter according to the three levels of analysis that I conducted with the three sets of data from the research study: pre-study and post-study interviews with the trainers, the field notes and observations of the sessions and the participants, and the pre and post movement profiles. Using Case Study research it is important to identify that the word ‘case’ means a distinct data set, and that words ‘case’ (with the lower case letter ‘c’) and distinct data set may be used interchangeably in the findings section. Level one of my analysis involved the pre and post-tests/movement profiles of the participants, which I analyzed each distinct data set first, as a whole. I analyzed each distinct data set for revelatory phrases, patterns and salience. I then compared and analyzed the findings across case, to demonstrate consistency in findings, but also differences in the experience between the two participants’ experience with the fitness and conditioning program. Level two focused on the trainers, and their pre and post study interviews. I transcribed each interview was as a whole, and then I coded each interview to find patterns within each case. The in-case patterns I developed are discussed, and then compared across case. Level three involves both the inductive and deductive findings of the in-case and cross case analyses with respect to the research questions:

1. How can fitness baselines be established using fundamental movement concepts?
2. How can relevant individual fitness programs be established for teens and transition age youth with ASD?
3. How can progressions and improvements be tracked and evaluated?
4. What pedagogic approaches are effective when employing fitness programs with this population?

**Level One – Physical Abilities**

**Participant Pre-Tests**

I subjected the Saturday S.N.A.P. participants to a modified pre-test and post-test, to help establish a fundamental movement baseline, as well as to provide a starting point for the fitness and conditioning programs to be created. I conducted both the pre and post-tests, using a Functional Movement Concepts/Movement Milestones Analysis (Lappano & Connolly, 2013), an Analysis of Quality and Frequency of Movement, and a hard copy description of the quality and frequency of movement. Throughout the duration of the research, I also recorded semi-structured observations of the activities during each session. My observations were structured using the lesson plan for that week, as well as the overall goals for each participant’s program. I discerned patterns from the pre-tests, post-tests, and observations and summarized and organized them into the chart below (Table 1).

**Table 1: Pre-Test Participant Physical Abilities**

<table>
<thead>
<tr>
<th>Roland*</th>
<th>Chris*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td><strong>Pattern</strong></td>
</tr>
<tr>
<td><strong>Pre-Test</strong></td>
<td><strong>Pre-Test</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bending at the Knee</strong></td>
<td><strong>Flexion at the elbow</strong></td>
</tr>
<tr>
<td>Beginning of sessions, limited bending of knee</td>
<td>Elbows flexed and internally rotated</td>
</tr>
<tr>
<td>- Activities designed to promote bending of the kneed and limit bending at the hip</td>
<td>- Limited straightening of the elbow (flexed at all times)</td>
</tr>
<tr>
<td>- Bending of the knee improved and increased</td>
<td>- Arms internally rotated picking at elbows</td>
</tr>
<tr>
<td>- Now bending at the knee to get down to the ground</td>
<td>- Extend elbows when prompted in later sessions</td>
</tr>
<tr>
<td>Flexion/abduction of the shoulder</td>
<td>Flexion at the Knee</td>
</tr>
<tr>
<td>Flexion/abduction at shoulder poor during pre-test</td>
<td>Limited flexion of the knees in first sessions</td>
</tr>
<tr>
<td>- Unable to reach arms above</td>
<td>- Bends at the hip to</td>
</tr>
</tbody>
</table>

* Was used to identify that these are pseudonyms assigned to the participants of the research study to protect anonymity. These pseudonyms will be used for the remainder of the research paper in place of the participants names.
The information summarized in Table 1 reveals three distinct patterns, two for Roland and one distinct pattern for Chris. I discerned these patterns in the data consistently from session to session, and they were a significant component of each participant’s experience in the research study. There were also two relevant patterns in both participants’ physical abilities: flexion at the knee, and flexion and abduction at the shoulder. I will discuss the patterns identified in Table 1 in further detail below.

**Participant Physical Abilities Patterns**

**Roland**

There were two significant patterns in both the pre and post-tests, as well as the observations from each session with Roland: spinal extension and stair walking.
**Spinal Extension**

In the pre-tests, I identified that Roland had poor spinal extension. As he walked, his shoulders were rounded forward, and he led with his head during locomotion. His rounded shoulders are due to a lack of spinal extension, which has caused him to have weak scapular retractors, in turn compromising his posture. This lack of spinal extension was also a contributing factor to his inability to walk both up and down the stairs, as well as successfully climb up and down a ladder or the trestles. As the sessions progressed, there was an emphasis on spinal extension during multiple exercises. One activity that was a site of significant improvement in Roland’s spinal extension was the scooters activity, where scooters were placed under both his stomach and legs. Roland was to pull himself along a rope from one side of the scooters area to the other. In the beginning, this was extremely difficult, as he could barely keep his head and chest up while pulling. In the last session, his chest and head were completely up-right, and his spinal extension had improved and increased greatly. His posture had changed when walking, and now he was walking with shoulders back and head up, not leading with his head or chin.

**Stair Walking**

Stair walking was difficult during the pre-test for Roland. He was unable to climb the stairs with a mature walking pattern that is typically achieved in earlier stages of development, around age four or five (Gallahue, 1989). He would always lead with his left foot up the stairs, and would step up with two feet to the same step, resulting in a common issue that Gallahue (1989) identifies as the “improper sequencing of limb movements,” and the “inability to use alternating hand and/or foot placement,” (p. 245). He also was unable to walk forwards down the stairs without significant help. Using both
the railing and assistance from the student trainer, he would walk down the stairs, one step at a time, leaning over, flexed at the hips. Also as he would step down on to the stair, he would internally rotate the right leg, making it difficult to step down onto the step below. As the weeks progressed, I developed different techniques that Carlo used to help promote a mature climbing pattern for Roland. When walking up the stairs, physical and verbal prompting was used to promote the use of both legs up the stairs. Walking down the stairs was much more difficult; the extreme internal rotation on the right leg when stepping down made walking down forwards extremely difficult. Alternative methods of walking down the stairs were introduced, first sideways with both hands on the railing, and then backwards down the stairs. Walking sideways (both right and left legs leading) used the internal rotation on the right leg as an advantage when stepping down to the next step, and walking backwards down the stairs helped to promote a more mature stepping pattern of one leg and then the next to the stair below. As weeks progressed, forwards down the stairs was attempted again, and with physical and verbal prompting, a mature walking pattern both up and down the stairs was achieved, with no physical help (railing or student-trainer).

**Chris**

I noted one significant pattern in the pre and post-tests, as well as the observations from each session with Chris: flexion at the elbow.

**Flexion at the Elbow**

During the pre-test, I noted that Chris was always flexed at the elbow. His arms were also always internally rotated, and ‘picking’ at his elbows during the session. It was rare to see him without his arms flexed and by his sides during the first few sessions, and
trying to get him to straighten his arms, even during crawling was very difficult. As the sessions progressed, and more activities were introduced that focused on straightening of his elbows, including crawling and crab walking, a medicine ball was then able to be introduced into the sessions, and he was able to carry it in front of him during a circuit in the fitness area, and then above his head with minimal prompting. His arms were significantly straighter during activities, and minimal prompting was needed to straighten his arms, especially when crawling or walking with the medicine ball above his head.

**Across Case**

There were two significant patterns in both participants’ data: Flexion at the knee, and flexion and abduction of the shoulder.

**Flexion at the Knee**

I identified that flexion at the knees was an area of difficulty for both participants in the pre-study tests. In many of the activities, they both struggled to bend at the knee, or chose to complete the activity without bending at the knee at all. They both compensated for this by flexing at the hip. Both participants’ program plans had a focus on bending/flexion at the knees, while eliminating bending at the hip to compensate. Modified squats, and ‘tire’ pushing, flipping and pulling exercises were used to help increase flexion at the knee. As the sessions progressed, each participant improved their flexion of the knees, and were both compensating less with their hips. Roland began bending at the knees when getting down to the ground to complete an activity, and Chris fully flexed his knees when ‘tire’ flipping, and pushing the ‘tire’ across the gym.
**Flexion and Abduction of the Shoulder**

Both participants struggled with both flexion and abduction of their shoulders. For Roland his poor postural tone was a significant factor to this absence of movement, and for Chris it was his flexion at the elbow and internal rotation that contributed to the lack of shoulder flexion and abduction. In each participant’s activity plans, there was a significant focus on improving shoulder flexion and abduction not only to help with alternative activities, but also with activities of daily living each individual struggled with. Each participant had a component of dynamic flexibility in his sessions, and worked with his student-trainer specifically on flexibility of the shoulder flexion and abduction. Each participant attempted to perform arm circles with their trainer, but both needed significant help the first week these were introduced. Roland needed significant assistance completing the dynamic stretches, and his student trainer had to physically assist with the activity. Full circles could not be completed, so the exercise was simplified into anterior and lateral arm raises to overhead. As the sessions progressed, less assistance was needed to complete the arm “circles”, but the student-trainer still needed to assist Roland with the exercise. With Chris, the arm circles also had to be adjusted, but he did not need physical assistance when completing the activity. His circles also were adjusted and changed to be primarily shoulder abduction and flexion movements. As the sessions progressed, Chris’ elbows became much straighter when completing his arm “circles” and slowly progressed into more of a complete circle.

Each participant had alternative plans introduced by the trainer that encouraged and aided in the flexion and abduction to increase range of motion at the shoulder. Both participants’ plans had a significant emphasis on crawling, and weight bearing on the
arms and shoulders. As the sessions progressed, both participants became more efficient in crawling; their elbows became straighter, and more weight was on their shoulders than back on their hips and knees. To help increase flexion at the shoulders for each participant, alternative surfaces were used during the training sessions.

These activities aided in the increase in shoulder flexion and abduction in the activities in the sessions, but also in activities of daily living. Each week, the participants would struggle putting their backpack on when leaving or walking to change for the pool. They either needed significant assistance from their student trainer, or would just carry their bag in their hand. As the weeks progressed, each participant was able to put his backpack on with significantly less assistance, until they both were able to put their bags on with no assistance.

**Physical Abilities – Salience**

Over the course of the eight-week research study, there were two salient events that occurred during my observation of each participant in my research study. Each participant had his own salient event that occurred, explained below.

**Salient Event: Roland – “Go Away!”**

Both participants are classified as non-verbal, however they can both understand verbal communication and can communicate in alternative ways. In the three years that I have known Roland I have never heard him speak; at very best he grunts, groans and moans but never produces recognizable words. During the sessions, I would record my observations using an audio recorder because I had broken my hand in January. It was easier to record what I was observing using the audio recorder; I could say everything that I was seeing as I was seeing it. I didn’t miss anything because my head was down
writing, or I was writing too slowly to keep up with the activities. In the fifth session, Roland was doing the stairs portion of his activities, which was down a back hallway at Brock University. I was standing at the bottom of the stairs, observing Roland and Carlo complete the stairs using my audio recorder to capture the specifics of the session. Roland walked down the stairs and reached the bottom when he looked at me, and very clearly shouted “Go AWAY!” I was in shock; I haven’t heard a single word out of this teen that we believed was non-verbal in three years, but here he was telling me to go away. Leave him and his trainer alone so that they can continue doing what they do together each and every week. I respected his use of words and did as he said. I walked out of the corridor with the stairs and back to the gym, reflecting on the importance of this event. Roland had built a relationship with Carlo, much like the one traditional clients create with their personal trainers. Saturdays were their time to work together, their time to spend together and I was intruding with my loud and most likely annoying observations.

Salient Event: Chris – The Push-up

For weeks, the focus for Chris had been to minimize the amount of time that he spent with his elbows flexed and internally rotated. The ultimate goal was to be able to complete a push up with minimal assistance. For weeks, Felicia and I tried different ways of teaching the push-up to Chris. We used agility dots for markers for his feet and hands, and used different instructional cues to help the movement. It was the last week, and near the end of the session. I had almost completed my post-tests of Chris and was ready to start to tell them to clean up the equipment. In a way I was accepting defeat; his arms were straighter, and he was able to do different and a larger variety of activities easier,
but still no push up. For Felicia it was not quite over. She was still at the fitness station with Chris attempting the push-up one more time. Face to face on the matt, they both pushed up, their backs completely flat, and Chris lowered himself to the ground, straight. I yelled into the audio recorder, Chris had finally done a push up. As simple as a pushup is, we take for granted these exercises that do not need weights or equipment. Rarely are push-ups seen in contemporary training techniques but they are still a difficult exercise. Chris had completed just one, but that push up was the best push-up I have ever witnessed.

**Level One – Summary**

The modified pre-tests that I conducted with each teen allowed for a basis in which I developed and designed the individualized programs for the teens. For Roland, I discerned two significant patterns in the modified pre-test. His pre-test allowed me to identify that he had very poor spinal extension, and that he had great issue with stair walking. Using the modified pre-test I was able to identify that Chris had extreme flexion at the elbow. I identified two patterns that both Roland and Chris had: flexion at the knee and flexion and abduction at the shoulder. I created individualized fitness and conditioning training programs for both Chris and Roland, with each pattern I identified as a focus for the activities. Over the course of the research study, both Roland and Chris made observable improvements in the areas of focus, with Roland being able to successfully climb up and down the stairs with a mature stepping pattern with no assistance, and Chris able to complete a push up.
Level Two – Trainers

Pre-Study Trainer Interviews – Patterns

Transcribing, and then thoroughly reading through each pre-study interview of the trainers was extremely important to ensure I had a holistic and accurate interpretation of the data. The pre-study interviews were considerably shorter compared to the post study interviews, but were an important component of the research. It gave me as a researcher, a better understanding of the context and experience of each trainer and their training, as well as an orientation and question and answer period with the trainers prior to the commencement of the research. During the preliminary analysis of the pre-study interviews, I consolidated multiple patterns in the data. Each trainer had specific patterns that were unique to his/her case, but one theme emerged across each case. First, I will address the themes I consolidated in each trainer’s independent distinct data set, and then I will address the pattern that I discerned across both cases. I organized the patterns of the pre-study interviews in the chart below (Table 2).

Table 2: Student Trainer’s Pre-Study Interviews – Patterns

<table>
<thead>
<tr>
<th>Carlo</th>
<th>Felicia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td><strong>Significance</strong></td>
</tr>
<tr>
<td>Program</td>
<td>Program – discussed as an important part in any trainer/client setting A program is needed to work with a client especially in the fitness and conditioning setting</td>
</tr>
<tr>
<td>Weaknesses</td>
<td>Talking about weaknesses like he would typical clients, make weakness strengths Mentions weaknesses when talking about the programs and the clients</td>
</tr>
<tr>
<td>Communication</td>
<td>Communication mentioned three times in the interview in regards to the trainer/client relationship and interaction</td>
</tr>
</tbody>
</table>
The information summarized in Table 2 reveals that I discerned three distinct patterns for Carlo the trainer, and two significant patterns for Felicia in her pre-study interview. There was one relevant pattern that was present across both cases: Communication. I will discuss these patterns and their significance in further detail below.

**Student Trainer Pre-Study Interview Patterns**

**Carlo**

**Program**

During the pre-study interview with Carlo, he always circled back to the idea of needing a set program when working in fitness. He believes that a trainer needs a program to work with a client, and traditionally he would “…be able to just plan a program and be confident [with the program].” But in this situation, with little experience working with a very specialized and high needs individual, he was not planning the program, and he felt that if he was to plan a program he would not be as confident in what he planned because of his lack of experience. There was always a discussion of the program and the need for a planned program when working with an individual in a fitness and conditioning setting, and needing to be confident in the program. Because of this need and discussion of a program, as the researcher I planned the programs for the trainers, but also went into depth and detail with both trainers on the goals for each week, the activities and exercises outlined in the program plan, as well as how to teach or
facilitate each activity. These programs, however, were very untraditional in their structure as well as choice of activities. The environment was also not a traditional fitness and conditioning environment that they were accustomed to working in, so ensuring that they were confident in the plan given to them was extremely important, not only for their success as a trainer, but the participant’s success in the program.

**Weaknesses**

Carlo discussed weaknesses much in the same way that most trainers would talk of typical clients. He wanted to “…make their weaknesses strengths…” at the end of the program. Focusing on weaknesses allows for identifiable goals to be developed for the teens. These weaknesses would be the center of the program; you identify their weaknesses, and then make those weaknesses strengths through the development and progression of an appropriate fitness program. Carlo had little experience with individuals with ASD, but was still choosing to use language that trainers use with typical clients. He wanted to take an exercise or activity that these participants were not good at, and through modifications to the activities and appropriate progressions make these weaknesses strengths.

**Safety**

Safety was a large concern during the pre-study interview with Carlo. Safety was mentioned over five times in the short interview, whether indirectly or directly, when he would address the participant’s safety. A large reason that safety is such a concern is because the participant is non-verbal; they were not able to provide feedback to the trainer in a typical way. Because of the alternative forms of communication, and not
being able to verbally give feedback, he was especially concerned when doing exercises and activities that are not typically performed.

“Umm I want them not to get injured and so if they can’t do an exercise I’m not going to force them to do and exercise I’m not I’m not going to get them to climb something, go up high or put them in any hazardous situations.”

Traditionally, personal trainers are motivators; they push their clients to do more and extend themselves beyond their status quo. They get paid to ensure that their clients achieve that “next level” of performance. In Carlo’s case, he felt that he may not be able to push his participant for fear of their safety; he does not want to be the one to put them in a dangerous situation.

Felicia

ASD

During the pre-study interview, Felicia doesn’t know what terminology to use when discussing the participants’ diagnosis of ASD. She uses “ums” and “ahs” before she attempts to say “Autism” or “ASD” in a questioning tone. Stepping around the terms and terminology alludes to a lack of experience or confidence working with individuals with ASD, but also to being around individuals from the disability population. Being uncomfortable with the terminology can indicate an inexperience working with individuals with Autism Spectrum Disorder. Felicia explains, “[m]ost of my experience with disabilities have been physical disabilities or more in a rehab setting,” not in a fitness and conditioning realm. Working with physical disabilities can be very different than working with individuals with behavioural, cognitive, as well as physical impairments. Having little experience with such complex individuals can be intimidating, but also can make you question your choice of words and how you describe these
individuals. I believe that her lack of experience working with individuals with ASD caused her to second guess or question her word choice, I believe that the fact that she chose to question her choice of words shows that she cares not just about her quality of training, but the experience that the participant has in the program.

Different Experience

This is a different experience working with individuals with ASD for Felicia. “[I]n a formal fitness setting I have not had any experience one on one with a person um with uh Autism,” however she still remains optimistic and positive about the situation and the experience ahead. She recognizes that this is going to be “…[a] very good opportunity for myself as a trainer.” She is excited for the experience because it will be a different experience compared to what she is used to, working with individuals who are high level athletes or individuals looking to lose weight. Going outside her comfort zone will provide her with a different and new experience as a trainer but also a good opportunity as a trainer. It will allow her to gain experience with individuals with more complex needs, but also see the difference between working with athletes and individuals with physical disabilities.

Across Case

Communication

Both trainers discussed communication at length in their pre-study interviews. They both had concerns in regards to communication with their participant, as both participants were disclosed as being non-verbal to each trainer prior to the research study. Their typical forms of verbal communication would no longer be effective as a trainer, and they would now need to find alternative methods to effectively communicate with
their participants. As well, they recognized that they would not receive traditional communicative cues in return. Although both identified communication to be an issue when working with an individual with ASD, the trainer with less experience working with this population, Felicia, was less intimidated or concerned about the communication piece, “…because even though they may uh not communicate typically, they may be non-verbal there are still going to be uh signs and things like that that they are communicating so I need to get familiar with their cues.”

Carlo, who has more experience working with individuals with ASD, was more nervous about the lack of verbal communication with his participant. He explained that:

“…the person I’m going to be working with is non-verbal so I won’t be able to tell if the exercise is actually working in the way I want it to work, if it’s working um the muscle groups or say if we’re stretching if it’s if he’s actually feeling the stretch or not. Um he won’t be able to give me feedback in any sort of way.”

As a personal trainer, feedback from the client is important during your sessions; it can help you understand the needs of your clients better, or if the exercises are doing what you want them to be doing. It can also help assess level of difficulty of the sessions, exercises and activities. But without the verbal piece of the communication puzzle, both trainers recognize that the experience working with their participant will be different compared to what they are used to.

**Post-Study Trainer Interviews – Patterns**

Transcribing, and then thoroughly reading through the post-study interviews of each of the student trainers was also important to ensure a holistic and accurate interpretation of the post study research data. The post-study interviews with the student trainers were to allow myself as the researcher to better understand the experience that the student trainer had during the duration of the study. I also wanted to better understand
the specific strategies that were used during each session with each participant. During the analysis of the post-study interviews, multiple patterns I consolidated in the data. Each trainer had specific patterns that were unique to their case, but there were three themes that emerged across both cases. First, I will address the themes in each trainer’s independent case, and then I will address the three patterns that I noted across cases. I organized the patterns of the post-study interviews in the chart below (Table 3).

### Table 3: Student Trainer’s Post Study Interviews – Patterns

<table>
<thead>
<tr>
<th>Carlo</th>
<th>Felicia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td><strong>Significance</strong></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>Communication was a large piece in Carlo and Roland's training relationship. It was a bit of an issue at the beginning of the process, and was the largest consideration for Carlo during the process. The communication was not typical compared to other clients, and this was difficult, but Carlo began to understand Roland’s cues</td>
</tr>
<tr>
<td><strong>Functional movement and training</strong></td>
<td>Functional movement and training became a large focus in the interview and in Carlo’s training. He began to shift his view from more sets and reps and increasing weight and “getting bigger” to functional training. Getting Roland to walk up and down the stairs by himself was a huge accomplishment, and a result of taking a more functional approach.</td>
</tr>
<tr>
<td><strong>Feedback/Cues</strong></td>
<td>For trainers, feedback from clients is important during the training process to ensure that their client is safe, and optimally challenged. Feedback for Carlo was different compared to traditional clients. He brings up the lack of traditional feedback as an issue at the beginning of the sessions, how Roland did not give traditional feedback but did give physical cues for</td>
</tr>
</tbody>
</table>
feedback, Carlo just had to watch for these cues and interpret the feedback. This was difficult at first.

**Measurement techniques**

Carlo speaks a lot about measuring and about the focus of measurement of sets, reps, weight, and distance in the realm of personal training. In order for movement and training to be validated in the realm of personal training, there is a large focus on measurement. If the movement can be measured, then it may be seen as a more valid form of training.

**Partnership**

Felicia speaks of a partnership that has to be created between the trainer and the client during personal training, but how this partnership was also formed during her time working with Chris. This partnership was the best way to get Chris to participate, and participate fully.

**Aesthetic vs. Kinesthetic**

Carlo speaks a lot to the issue surrounding training and personal trainers and clients right now in terms of aesthetic vs. kinesthetic. He typically deals with clients who want to look better, but Roland was different. The fitness was functional, and more about making activities of daily living easier to achieve and perform. The process shifted Carlo’s view from the traditional aesthetic to kinesthetic. If you look like you are able, you should be capable.

**“Good” trainers**

She speaks a lot of “good” trainers and how “good trainers” are more in tune with their clients, and follow through with training principles and guidelines. “Good” trainers will do a pre-test and will create partnerships with their clients. They will still “tell, show, and then do” with the client.

The information summarized in Table 3 uncovers that there were two distinct and individual patterns for both Felicia and Carlo in their post-study interviews. However there were three patterns that emerged across both student trainers’ cases: communication, functional movement, and feedback/cues. These patterns and their significance are discussed in further detail below.

**Carlo**

**Measurement Techniques**

Carlo addresses the issue of measurement in his post-study interview, which can be found in the literature (Bullock & Mahon, 1994) to be an issue when incorporating
individuals with such high needs in a fitness and conditioning setting. Attempting to train individuals with a disability and attempting to stick to a rigid and strict program plan of a specific number of sets and reps of each specific exercise may be unrealistic. Carlo explains that:

“…it wasn’t so much geared towards um like improving or being very strict about the amount of reps and the amount of weight being used. It was more just doing the exercise properly. Full range of motion, um yeah just focusing…not focusing on reps at all, not focusing on weight at all really, but more just focusing on umm like safety and comfort…”

When working with such a complex client, Carlo stresses the importance of proper technique. Throw the idea of reps and sets out the window, because you might be spending multiple sessions just building up to a specific exercise. Traditional measurement techniques will not capture this important and significant progression.

_Aesthetic vs. Kinesthetic_

Fitness and conditioning as well as physical activity has been a constant factor in human existence to help individuals construct ideal and beautiful bodies (DePauw, 2009). Typical clients for Carlo are more focused on the aesthetics of physical activity and fitness; they want to look better for a class photo, or for a vacation with friends. “[M]ost clients are just looking to get bigger or lose weight and they’re not really looking for more functional um and kinesthetic ability they’re more just um aesthetic I guess.” Very few if any individuals seeking personal training understand the importance of kinesthetic, and being functionally fit. Working with Roland, Carlo was forced into the realm of functional fitness, and looking more at being kinesthetically aware while training. Carlo discusses his new approach to training and that it is about “…now trying to make my client recognize that working out should be less about amount of reps or like you know
focusing on getting bigger and the aesthetics, it should be more of functional kinesthetic approach.” Looking good, and being able to lift more than the person next to you at the gym may make you feel better, but it does not help you to increase your own body awareness, or improve in activities of daily living.

“[W]orking with Roland just completely revolutionized uh my training because working with him it’s like its much much more basic it’s just being a lot more functional just being able to getting him to be able to walk up a set of stairs and just getting him making him able to uh be mobile.”

Felicia

Partnership

In Felicia’s post-study interview, she spoke many times about the formed partnership between herself and Chris during the sessions. How working with him and creating this partnership was different from most clients that she had. The lack of verbal communication forced her to build this relationship in an alternative way. Just because he didn’t communicate in a typical way, didn’t mean that she was not able to connect with him during the sessions.

“Chris wanted a partnership; he wanted someone to be his, well friend is not the right word because we’re not friends but he’s like if I’m doing pushups and you’re doing pushups well we can do pushups together, yeah we’ll have sort of that partnership. He will do anything he is willing to do anything as long as there is a reward and there is time together.”

Being able to build that partnership, and do the activities and exercises together not only helped Felicia deliver the sessions, but also the compliance of Chris; he was willing to try what she asked him to, and would do it as long as she did it with him. He searched for the same partnership that typical clients make with their trainers, it just had to occur in an alternative way.
**Good Trainers**

When talking about accommodating differences from traditional sessions with clients, Felicia mentions the idea of ‘good trainers’ and that pre-tests and all trainers would do proper training technique, but this is not the case. ‘Good trainers’ are vigilant in their training techniques and implementing pre-tests. However, Felicia indicates that it is easy to get stuck in a routine, and it is easier to keep doing what you are accustomed to do each session, regardless of the client.

“I think that good trainers would do a pre-test with their client if they’re going to have any longevity in the business but if they’re new or don’t have that background, or they aren’t confident or they are lazy they won’t do a pre-test.”

Good trainers will continue to follow the principles behind personal training and working with clients, and continue to not only conduct appropriate pre-tests, but also build the relationships with their clients and continue to follow the ‘tell, show, do’ principle of training.

**Across Case Patterns**

**Communication**

Communication, again in the post-study interviews was a significant pattern in both student trainer’s interviews. They both spoke about communication with their client, and how the lack of verbal communication was a large consideration when working with their client. Both participants were non-verbal, but could understand visual, and/or verbal cues. Communication was difficult for both student trainers at the beginning of the process. They had to learn what to say, how to say it, and understand their participants’ alternative style of communication. Whether it is through gestures,
noises, or actions, the student trainers had to change their idea of communication to encompass not just verbal communication.

Carlo recognized during the process that he had to alter his training style in order to be effective when working with Roland. “I had to be much more assertive…being direct just like straight to the point[.]” It was a command-like structure due to the nature of the participant. If Carlo was to ask a question, and Roland was able to get a response, it would most likely be the response Carlo did not want to hear.

Felicia also had to accommodate for communication differences with her client, and had to alter how she chose to communicate with Chris. “The biggest difference would be communication so getting the instruction across to Chris and then providing him with meaningful feedback to him to get him to do whatever it is that we wanted him to do.” Recognizing that there needed to be a change in communication, and that the change needed to be relevant and meaningful to Chris was a large part of the experience for Felicia. She had to really cut back on what she said and the amount of information that she was giving to him. She explains that, “[a]pparently I have verbal diarrhea; I like to give lots and lots and lots and lots of information, and for Chris, he doesn’t need that.” Less is more in terms of verbal communication, and there is much more to communication than just the verbal piece. There is much more that you need to be aware of and more that you need to consider when working with an individual who is non-verbal. Felicia points out that:

“[w]ith a non-verbal person, you have to be much more aware of their other cues, which there are, there are, never assume they aren’t paying attention, but not having that verbal piece, you really have to explain. I have to explain everything, and then I have to show, but my show has to be bang on, like 100% if this is what I want because that individual will mimic me perfectly so if I didn’t do it right the
first time he’s not going to do it right the first time because I didn’t do it right the first time. And then the other thing is definitely doing with.”

There are many other forms of communication, other than the typical verbal communication that we automatically default to when training. For Felicia and Carlo it was about recognizing that typical verbal communication would not be the most effective form of communication, and changing their style of communication, whether it be through a command like structure, or a more “tell, show, and do” approach to training.

**Functional Movement and Training**

The concept of functional movement and functional training was a theme that was relevant in both Felicia and Carlo’s interviews. They both addressed the current trend of fitness training has moved towards more unconventional and ‘fad’ workouts, and away from the concept of functional fitness training. In the fitness realm, the concerns continue to be how much can I do, how many times can I do it, and how fast can I complete it. The need to always increase load and progress in visible and notable ways continues to be the focus in training. But both trainers acknowledged the fact that there needs to be a shift in focus to functional fitness and movement. Felicia talks about how functional training is important to teach the basics, and an important method of training that gets ignored much of the time.

“Keeping it simple. Getting back to the very very basics. And it’s the buzzword, functional movement, but getting Chris to bend at the hips and the knees to sit is huge, but we don’t think about that. Okay I’ve got to load him up, I’ve got to get him to do this with the medicine ball, how am I going to get him to do this with the bar but just the actual basic movement of doing that and getting back to those basics just with his body weight, that’s huge.”

Carlo also recognized the importance of functional movement and training to be functionally fit. He shifted his view as a trainer, from originally looking at improving
The experience working with Roland was much different than what Carlo is used to in terms of clients. He is used to people looking to lose weight, gain muscle, and essentially look better. Carlo recognizes the difference between his current clients and Roland as an aesthetic approach vs. a kinesthetic approach. His traditional clients may turn to fitness for kinesthetic reasons, but a majority of the time their motivation to participate in fitness is an aesthetic one. With Roland it was all about kinesthetic and functional movement:

“[W]orking with him it’s like much much more basic. It’s just being a lot more functional, just being able to getting him to be able to walk up a set of stairs and just getting him making him able to ugh be mobile.”

**Feedback/Cues**

Going hand in hand with the theme of communication, both student trainers spoke about the differences in feedback and cues from their participants. Because there wasn’t that verbal piece of communication, the feedback that they received was very different to what they were used to. Carlo explains that Roland “giving me feedback was rare[.]” At first Carlo was not used to not getting verbal feedback, but as the sessions went on he realized that he had to “use my own sense for feedback, so I had to just watch and observe and analyze a lot more intensely[.]” It was important to watch and observe each activity and movement, and then use these observations as feedback for the activity; feedback now became visual, and not verbal.

Felicia explains that with a “non-verbal person, you have to be much more aware of their other cues,” because these cues provide the trainer feedback in regards to the exercise and the activity as well as the client and their experience with the movement.
And that the feedback she was providing the participant as a trainer needed to be relevant and specific to the activity and to Chris. For Felicia “…providing him with meaningful feedback to him to get him to do whatever it is that we wanted him to do,” was important when working with Chris. Giving him feedback about the activity and the exercise that was specific, relevant and easy to understand was important. In terms of what the cues were and how they were delivered, Felicia explains that Chris needed “very simple cues, very straightforward cues very specific.” The more specific and straightforward the information was, the more dramatic the results were in the activity.

**Level Two – Summary**

In the second level of analysis, I focused on the trainer’s pre and post study interviews, and identified patterns within the pre and post interviews. In the pre-study interviews, I discerned three distinct patterns for Carlo: the idea of needing a program when working as a trainer, identifying a client’s weakness, and being able to keep his client safe during the research study. For Felicia, I identified two patterns in her pre-study interview: ASD and not being confident with her terminology, and the idea that this experience will be a very different opportunity for her compared to the typical population she works with. Both trainers discussed their concerns about communication in the pre-study interview, which I identified in both pre-study interviews.

The post study interviews were much more in-depth and gave me the researcher a better understanding and connection to the trainer’s and their experience during the research. In Carlo’s interview, I identified two patterns in both trainers’ interviews, which were different from one another’s experience. Carlo spoke in great detail about his now distinction between kinesthetic training and aesthetic training, as well as issues with
traditional measurement techniques. Felicia spoke about her experience and how she built a partnership with Chris during the sessions, and the idea of a ‘good trainer’ and how they are more in tune with their client. I consolidated three patterns present in both trainers’ interviews: communication and the role it played during their sessions, their shift to a more functional movement and training approach, and the differences in feedback or cues that they received from their teens during the study.

Level Three – Significance to the Research Questions

Level three of my findings looked at my four research questions of the study. I organized the post-study interviews with the trainers according to the research questions, first within case, and then across case. I summarized the responses and organized them by trainer response according to each research question, where I consolidated the themes to answer the research questions that I established. First, I will address the themes that emerged in each trainer’s independent case, and then I will address the three patterns that emerged across cases in regards to the research questions. I organized the post-study interviews in regards to the four research questions in the table below (Table 4).

Table 4: Student-trainers Interviews and Participants Physical Abilities – Significance to Research Questions

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Carlo</th>
<th>Felicia</th>
</tr>
</thead>
</table>
| How can fitness baselines be established using fundamental movement concepts?     | • Traditional pre-test – more focus on large muscle groups, multiple joint exercises  
• Pre-test with fundamental movement concepts – functional aspect of movement (ROM) in specific joints and body parts  
• Fundamental movement concepts – baseline and determine which is most limiting  
• Isolated exercises help to establish baselines and determine limitations | • Typical clients looks at posture – starts from the middle and works their way out  
• Largest difference – communication  
• In terms of movement and the pre-test the same parts are being examined and looked at  
• Many trainers do not do pre-tests anymore  
• This pre-test similar to what is taught – same pre-test different client |
| How can relevant individual fitness programs be                                   | • Use limitations as focus for the program  
• Make weaknesses strengths – | • Programs for individuals with ASD should have been created a long time ago |
### established for teens and transition age youth with ASD?

- Focus of most programs now is to make strengths, strengths
  - Program was not strict about reps and sets – focus on proper technique
  - Basic needs need to be addressed and incorporated into relevant plans (i.e. water/bathroom breaks)
  - Looking at the client’s biggest consideration and basing the program off of these weaknesses to make them strengths
  - Relevant and individual plans need to be functional for this population – focus shift to kinesthetic NOT aesthetics
  - Thresholds for individuals with developmental disabilities are lower
  - Progress is slow – understand results will not come right away
  - You need to have expectations of your clients, you establish their goals; shift focus to be more client centered
  - Structuring a program is still the same process – the issue is environment, cost, space, attitudes
  - Create a partnership through activities and movement when working with individuals with ASD; told what to do enough
  - Meaningful motivation and feedback
  - Needs structure and a plan
  - Build partnership in activities
  - Being able to modify and confident in modifications
  - Go back to the basics of training and movement
  - FUNCTIONAL MOVEMENT
  - Back to basics with just body weight – making sure the technique is there before loading
  - Get back to simple exercises that we take for granted

### How can progressions and improvements be tracked and evaluated?

- Use pre-test with fundamental movement concepts to create a goal for the client
  - Using the goal you develop a program to work towards this goal you want to achieve
  - Set up different measurements depending on the exercises/activities being used during the sessions
  - Use traditional measurements (sets, reps, load) in untraditional activities/program.
  - Improvements will be more fundamental than numerical
  - Sets/reps may not improve significantly, but fundamental movements (i.e. posture, gait, spinal extension) will be the focus and improve in the program
  - Traditional clients – hypertrophy, decrease body fat, increase cardiovascular capacity
  - Saw the change in leg strength and stability – able to walk up the stairs on his own; take each stair one at a time – traditional pre/post- tests do not measure this improvement
  - Need to think of alternative ways to measure (distance, number of times completed) BUT reps and sets are still possible
  - Improvements were noticeable
  - Untraditional movements are more applicable to everyday activities
  - Success and progress can still be measured but in alternative ways
  - Alternative equipment is a huge component of the move towards “functional fitness”
  - Use alternative equipment to make the movement meaningful, but still provide resistance
  - Shapes we used are awkward but still heavy
  - Traditional settings – many restrictions; equipment will always stay the same
  - Used untraditional environments but traditional movements
  - Improvements were seen in all areas, not just fitness and conditioning
  - MEANINGFUL CHALLENGES
  - More aware of his body
  - Load always increased; activities always progressed
## A COMPARATIVE CASE STUDY

### Improvements aren’t always something that can be measured; but improvements in these areas make everyday tasks easier

- Communication – client can understand verbal cues and communication, but doesn’t communicate in a typical way
- Verbal feedback is rare – need to watch and observe client for physical cues
- Ensure program is relevant and safe
- Changing the way that instructions are given – no questions, more direct
- Know that client understands everything
- Basic in communication – do not need to explain the exercises in detail and in depth
- Focus on the kinesthetic ability to help them improve in functional ways
- Training needs to shift focus; trainers need to switch pedagogic strategies to more functional training
- Change of focus as a trainer – from improvement of muscular strength/appearance to functional
- Body language and physical cues more relevant to this population
- Problem solving in the moment – plan may work in “theory” but might not work in session
- Modifications important to know and be able to do in the moment
- Observation important during the session
- Traditional strategies do not work with this population – no feedback
- Less “formal” but still professional
- Basic terms, short “command” like structure – less is more!
- This population is much like same aged peers – why would anyone do anything that was hard or strenuous for someone they

### Same principles different environment

- Some principles different environment
- Improvements in arms and shoulder flexion/abduction
- Being aware of where the client is when they start and observe and be aware of the changes

### What pedagogic approaches are effective when employing fitness programs with this population?

- Communication is biggest difference – not “issue”
- Communicating instructions in a relevant and meaningful way, and feedback needs to be relevant and meaningful
- Being aware that there are non-verbal cues and being aware of them – always listening
- BOTH verbal and physical explanation is important but it needs to be “bang on” when you show
- Doing the activity with the client to develop partnership with the client
- Respect and compliance if partnership is created
- Communication is not typical/traditional doesn’t mean they aren’t listening – easy to dismiss
- This population is often told what to do,
- Do not communicate typically but can still communicate with us
- Give correct information to the individual so they can be most successful
- More aware of body positioning as a trainer
- More aware of what is being said to the client –LESS IS MORE
- Simple and straightforward cues
- Does your show match your tell and do your cues match what you are DOING
- Being aware of what you are doing and what they are doing
- More mimicking than copying but making sure that you were doing what you wanted them to do – hard to do with no eye contact with the client but was best for their success.
- TELL, SHOW, DO – set up each exercise in the same manner; tell them what they are doing, show them the exercise and then do it with them
- Face to face better than beside
- Body positioning was a large change
didn’t like?
• Lack of internal motivation – need an external motivator
• Not only physical disability but developmental – need to accommodate more than one aspect when modifying (i.e. instructional strategy, equipment, environment, exercise, etc.)
• Have an alternative repertoire to broaden training style for traditional clients, but now also for individuals with disabilities
• ASD – do not like to be asked questions, prefer when you have a plan, and tell them what to do
• Because lack of access to program, need to be careful as to how much you make them do – tire easily, medications they are on etc.
• Lack of internal motivation = not going to do something just to do it – “waiting it out” isn’t going to work

• Repetition
• Be patient – may not understand what you are asking of them or the movement
• Persevere and be consistent
• Knowing your client and the demands of your client
• Well rested and not letting other things distract you
• See the whole picture
• See what they are doing or not doing
• Then works with the client to work through their movements
• Want client to work hard you should work hard with them
• Practice what you preach
• Giving up on the client is ineffective
• Able to read when you are frustrated and will respond to your emotions
• Working with this population is exhausting; commitment to working through everything – put in a lot to get a lot out
• It is easier to give up than push through but you can’t give up on them
• Know the difference between giving up and needing to move on
• Short verbal instructions – command style LESS IS MORE
• Specific verbal cues – Verbal and non-verbal match 100% - consistency
• Did more doing than watching
• Being aware of yourself as a trainer

The information in Table 4 has been summarized from the trainers’ post interviews in relation to the research questions. The research questions will first be addressed within case, in regards to each trainer, and then across case, identifying consistent themes that I consolidated in each student trainer’s post study interview.

**Research Question One: How can fitness baselines be established using fundamental movement concepts?**

**Carlo**
When addressing the concept of using fundamental movement concepts as a pre-test to help establish fitness baselines, Carlo first focused on traditional fitness and conditioning pre-tests. These pre-tests would typically involve more “full body exercises, and geared more towards measuring the client’s muscular strength, muscular fatigue or cardiovascular ability[.]” In regards to the modified pre-tests that were conducted using fundamental movement concepts, Carlo acknowledged that they are more about 
“focusing on the functional aspect of movement[.]” They are about really focusing on the client and their abilities at specific joints and areas of the body; can they flex and extend their knee fully, what is going on in each major joint and section of the body. It is more focused on “range of motion and flexibility” of the client. Using fundamental movements will help to determine limitations of the client because it is “assessing isolated movements” and these isolated movements will allow for insight into which body part is most limiting or which movement is most difficult. Being able to assess these isolated movements using fundamental movement concepts allows for insight into the client’s movement weaknesses, to help to design a program plan that is created specifically to make these fundamental movement weaknesses into strengths.

**Felicia**

For Felicia, there was not a large difference between the traditional pre-test that she employs with typical clients and with the fundamental movement concepts pre-test that was used with Chris. When Felicia is:

“…dealing with a client in the gym I look at their posture, so what’s going on at their shoulders, what’s going on with their spine, what’s going on at their hips and then I move to their elbows and then I move to their knees and then I move to their wrists and then I move to their ankles. So I start in the middle and work my
way out examining the major joints to see what they can do and what they cannot do.”

She is using fundamental movement concepts in her own pre-tests, looking at her clients’ major joints and muscle groups in individual parts, as a component of the body as a whole. She starts in the middle and works her way out, looking at each joint and movement specifically, to understand the client and which movements are limiting. For Felicia the largest difference was communication but “[i]n terms of what we are actually looking at it’s the same.” Unfortunately Felicia points out that most trainers, although taught and instructed to conduct pre-tests, are not following through with these important components of training. She explains “some people get into a routine of maybe doing machine based exercises until they build up to a certain weight,” but if trainers want to “have any longevity in the business” they need to start conducting pre-tests with their clients, regardless of whether they have a disability. Her biggest accommodation during the pre-test was the lack of traditional communication. She was unable to ask for feedback during the exercises, and was not able to communicate the exercises as clearly to the client.

Across Case

Back to the Basics

Both trainers discussed the basic fundamental movement pre-test as a basic and simple pre-test. For Carlo, the pre-test is more about the functional aspect of movement and getting back to the basics of the movements to assess them. He had to focus more on “…exactly what all the joints are doing during the movements,” and had to shift his focus from measuring muscular strength and endurance that he was typically used to evaluating. For Felicia, the fundamental movement pre-tests “essentially were the same
thing” that she does with a typical client. In “terms of the pre-test it’s basic in what it is supposed to do” and these basic movements allow her to establish baselines that can be used when developing programs for her clients. From the experience and the post-study interviews with the trainers, I determined that the most important concept when establishing fitness baselines for teens and TAYs with ASD using fundamental movement concepts is to get back to the basics. Look at each movement in its most basic form. Assess what is happening at each major joint during a movement, and this will help you to establish more accurate and more realistic baselines for your client.

**Research Question Two: How can relevant individual fitness programs be established for teens and transition age youth with ASD?**

**Carlo**

Program planning can be extremely difficult in the world of personal training; your programs need to be relevant, progress the individual, and also be enjoyable so that they continue to stick with the program. Making a relevant program for teens and TAYs with ASD is even more difficult. Carlo looks at the program and it’s development and progression in relation to the pre-test. Using the fundamental movement pre-tests allows for the assessment of isolated movements, and being able to assess these allows for “you to determine limitations of the client, so determining the limitations is great because you can focus on those weaknesses and design a program to build on those weaknesses until they aren’t weaknesses anymore.” Traditional training, individuals choose to make their strengths, strengths; it is easier to work on something that you are good at than something you are not. Individuals with ASD lack many of the fundamental movement patterns established in early development, lacking strengths in traditional movements. The
programs need to be “much much more basic; it is just being a lot more functional.” Programs need to be more basic and about functional movement because these are areas that are going to be weaknesses in individuals with ASD movement repertoires. Individuals with ASD do not know what their weaknesses are; it is about correctly assessing them using fundamental movement concepts, and finding out what needs to be improved, and designing a program that works towards improving these weaknesses.

Individuals with moderate functioning ASD are not typically approaching trainers and explaining their goals for a training program. They are not coming to you with expectations from a training program, and they do not know what they want from the sessions. Using the pre-tests you have to establish this for them, and also, basic needs need to be addressed that aren’t typically accounted for during traditional training. Bathroom and water breaks need to be incorporated. The simple things that are taken for granted in traditional programs have to be planned in programs for individuals with ASD, especially when communication is not typical.

Felicia

Felicia is a much more experienced trainer, and has had a few more years in the training industry compared to Carlo. When looking at creating relevant and individualized plans for teens and TAYs with ASD, she believes that “we could have done it a long time ago.” She believes that “…in terms of structuring a program there isn’t anything different than what you would do with an average person than an individual with a special consideration.” The program you design still has to progress them, and is has to be safe, and the FITT principle (Frequency, Intensity, Type, and Time) still needs to be addressed. There also has to be variation in the program, and most
importantly it needs to be safe. Felicia reveals in her interview that “the principles are universal, that’s not the issue. The issue might be the environment, having the space needed; it could be attitude, and it’s probably cost.” Trainers create programs; that is what they have learned to do and done for many clients before working with individuals with ASD. If the principles are the same, the issue of attitude, cost, time, and space are holding back trainers from working with a population that needs attention and resources to help with their own strength, but also activities of daily living.

Felicia also talks about “keeping it simple. Getting back to the very very basics.” Looking at functional movements, and the importance of flexing at the hip and the knee not just for training, but also for activities of daily living helps to put the program and the sessions in perspective for the trainer as well as the client. We should be focusing on technique and just doing movements and exercises with body weight first. Using “simple exercises that most people take for granted and we don’t really think about,” is important when working with individuals with ASD. Get back to these simple exercises and forget about the latest craze in the fitness world. Get back to the basics of training, and make sure that these basics are planned accordingly for your client, based on their pre-tests.

**Across Case**

**Meaningful Movement**

Individuals with ASD enjoy structure and schedules; they like to know what is happening now and what is going to happen next. The need for structure and certainty in their lives also leads to a very command-like structure to their lives; every minute is planned, and they are constantly told what to do. This transferred into their movement experiences at Saturday S.N.A.P. Their programs were planned and structured even more
than you would with a typical client. But, just because they enjoy a plan and they crave the consistency and the structure, they won’t do everything that you tell them to do, just because you say so. Carlo spoke about how his experience with Roland was so different from traditional clients, because he felt less professional. With typical clients he would explain the exercises and “tell them exactly what is happening in their body and why it is beneficial whereas with Roland it’s just like ‘this is going to make your life easier so let’s do this.’” The programs were not about achieving traditional training results, but were meaningful to the participant. Stair walking is not a traditional training modality, but it was meaningful to Roland, as well as his family. His mother told me that he was not able to go down the stairs alone, unless he ‘bummed’ all the way down. Being able to walk down the stairs alone, without assistance was meaningful to Roland, which is why the program was structured around this goal.

Felicia explains that not only meaningful movement, but also meaningful motivation is important.

“If you asked him to do the things he would do them, and then if you got down and did the things with him he was super good about going backwards, going forwards, crab walking, pushing things, pulling things, and he just needed to know that you were happy and sort of excited to be there.

The movements, like crab walking and pushing and pulling were untraditional fitness and conditioning exercises, but they were meaningful to Chris and addressed the goals that were developed from the pre-tests. But more importantly the motivation to do these movements was also meaningful. He responded well to the activities because the motivation of doing the activities with Felicia was meaningful.

It is important to recognize that the only way that improvements and progressions can be made is to make meaningful movement and activity plans. When designing a
program, you need to consider what the goals are, and design each activity to help improve these weaknesses to make them strengths. The movement needs to be meaningful for the individual, and relevant to the goals, but the motivation also needs to be meaningful, whether it be completing the activity together, and creating a partnership, or being able to complete something by themselves.

**Research Question Three: How can progressions and improvements be tracked and evaluated?**

**Carlo**

Concerns always surface when discussing programming around the issue of tracking and evaluating improvements during the fitness programs. Traditional methods of measurements such as sets and reps, heart rate, VO2 max, and the Wingate cannot be used when working with teens and TAY’s with moderate functioning ASD. Many individuals with ASD have complex sensory integration issues, and these tests and measurements cannot be conducted effectively without compromising their sensory issues. Measurements need to be adjusted or looked at differently to help track and evaluate improvements. Carlo indicates that depending on the goals that you determine during the pre-test, and that you use to develop the program, “you can set up different measurements[.]” Each activity can be measured, just in a different way. Whether the activity is measured in distance, time, sets or reps, there is always a way to measure activities and exercises, it just needs to be in a more creative way. Then using these untraditional measurements to track the progress of the participant from session to session can help to develop progressions for the client.

One key idea is that these improvements that you will see will be “much more fundamental,” as Carlo indicates. If the goals of the program are more fundamental, then
so will the measurements as well as the improvements. The improvements that Carlo saw in his client were different than traditional clients such as hypertrophy, decrease in body fat, improvements in cardiovascular capacity. The improvements that he saw in Roland were an increase in leg strength and stability, and improvement in postural, as well as balance and coordination. These improvements were tracked through observation, and measured in untraditional ways. Roland worked on stair walking each week, and the measurements that were used included reps and sets of the stairs, but were more focused on the quality of the movement, and the pattern of the stair walking. These improvements are not something that is typically measured, but it was a prominent improvement, and was functional and important to the client and the program.

**Felicia**

In regards to tracking and evaluating progressions and improvements, “how we are defining success needs to change.” Traditional training environments are too concerned about sets and reps, and being able to measure change and progress, and track it in traditional ways. Being able to complete an activity of daily living more efficiently or with less assistance is a prominent improvement for these individuals, but not considered a traditional improvement. It is making them more successful in their lives, but not considered success in the realm of fitness and conditioning. They may not ever be able to complete a bicep curl, or a proper front squat, so we need to alter the way that we view success. Because of the fitness and conditioning program, Chris was able to put on his backpack with no assistance, complete a full, unmodified push-up, and jumped into the pool on his own. And in terms of the program and the goals for Chris, these were major successes. It took almost six weeks to get him to jump into the pool, and almost
four weeks to understand what a push-up looked like. Success and progress can still be measured, just in alternative ways.

**Across Case**

*Conventional Measurements and Unconventional Movements*

For decades, reps and sets, VO2 max, and other traditional measurements have been widely accepted as the standard measurements for fitness and conditioning. They have continued to be used in modern programming, and are universal, across all exercises and contexts. However, the use of reps and sets can also turn away alternative methods of tracking progressions in fitness and conditioning programs. When using alternative methods of training, and alternative exercises it can be difficult to use such traditional measurements. Felicia indicates that “[w]e have to get outside of the box of thinking sets, reps, and how much weight people lifted.” The exercises and activities that were used in the programs elicited improvement, and allowed for the participants to progress beyond their baseline measures. In turn other activities became easier for them, and activities they once struggled with became easier. Carlo indicates that the easiest way to set up these different measurements is being able to “see what is most limiting and determine the goals that you want to achieve, and knowing the goals you can um set up different measures,” to track progressions and improvements. But because of the nature of the fitness and conditioning world, without being able to put these measurements and progressions down on ‘paper’ in traditional ways they can be considered as not as reliable activities and exercises.

Being able to get outside the box of thinking ‘just reps and sets’ will be a hard sell, and a long road to convert everyone’s way of thinking. Carlo indicates that you can
still use these traditional measurements in unconventional activities, but you may not see
typical improvements. Roland’s stair walking is a significant example. We can measure
the number of stairs on the stair case, and count the number of times he walks up and
down them, but being able to observe that “initially he needed something to hold on to by
like he would need a static rail there, but by the end of it I was able he would just be
holding my index finger very lightly and we would be walking up the stairs.” That is
something that you can’t measure with numbers. Felicia also points out that traditional
measurements can be used when working with clients with ASD in fitness and
conditioning environments and we can’t get away from using these measurements
because it is “what is acceptable by industry standards.” It is about looking at the
activities and exercises creatively and “thinking about how we are measuring things and
how we’re going to put that on paper. So, for example, we know the distance he crab
walked. We can measure that. How many times did he do it?” We can make it
measureable in traditional ways, we just need to be a bit more creative.

**Research Question Four: What pedagogic approaches are effective when employing
fitness programs with this population?**

**Carlo**

For Carlo, the largest difference working with this population was not getting
verbal feedback from Roland, and using his own observations of Roland as feedback for
the development and progression of program. “Initially, initially I wasn’t used to not
getting verbal feedback and now I have to use my own sense for feedback so I have to
just watch and observe and analyze a lot more intensely[.]” He wasn’t able to just ask
Roland how he was feeling during the exercise; was he comfortable, being challenged
enough, was something hurting or causing him pain? These questions a trainer is typically able to ask their client and receive important feedback in regards to the program Carlo was not able to use. He had to change his training strategies and use his own senses and his own perspective as a trainer to ensure that his client was being challenged, but also safe during the exercises. Observations became an important tool in Carlo’s training repertoire, as he had to observe Roland very intensely each session. This was the way that Carlo would be able to get the most accurate feedback back in regards to the program and the activities. The way instructions were given was also extremely important as well. They needed to be short, and basic in explanation; too much detail you would lose Roland’s attention.

“I knew Roland could understand me so I would be much more direct. I didn’t pose anything in questions, I couldn’t ask him anything because there would be no answer and if there was an answer it probably would be one I didn’t want to hear.”

Roland did not need to know each muscle that he was isolating and focusing on during the exercise. This was not relevant to him during the training sessions. What was relevant was the number of times that he had to complete an activity before it was finished, or knowing what activity was coming next. Carlo really had to shift his idea of what a personal trainer was to accommodate Roland and his differences compared to a typical client. All Roland wanted to know was what was relevant to him, and this made Carlo feel slightly less professional, but he still was a trainer the entire time. He still worked with Roland using a program we developed and progressed. The basic structure of personal training sessions were there, it was just in a different environment and with a different type of client. Carlo had to become more of Roland’s friend during the sessions, and less of a personal trainer. Being able to motivate Roland was an important pedagogic
approach for Carlo during the sessions. “I was more Roland’s friend and was a lot more informal but still being direct.” This friend mentality that Carlo developed and used during the sessions helped to motivate Roland, but also develop a partnership between Roland and Carlo. It helped them to create a bond that is typically made with traditional clients, and this bond helped Carlo to be able to get Roland to complete the activities in each session.

Felicia

Tell, show, do. These three simple principles of training and teaching were the pedagogic strategy that worked best for Felicia when she was working with Chris. “Okay so with personal training it is tell, show, do; this is how you set up the exercises. So I did the same as this with Chris. I would tell him what we were doing ‘cause he is listening even though he is not making eye contact or responding back. I then showed him what I wanted and this is probably where I improved the most. And then I would do it with him and as long as we have that partnership in the activity he would be very good at it.”

Many times trainers take advantage of the fact that most people they train understand basic principles of training, and have some basic and fundamental body awareness, so that if you verbally explain the exercise well enough, they will able to complete the activity. Individuals with ASD do not possess the same body awareness. They need to be shown what to do, and told how to do it. The combination of both verbal and visual instruction helps to support the movement and activity, as well as make the instruction process easier for the trainer. Felicia also talked about her body positioning during the show and do components of this strategy. “[I]n terms of my body position, what I would be demonstrating, and what I would be saying while I would be demonstrating it.” If she is asking Chris to square his hips up to the wall, but her hips are not, he will not be able to do what you are asking. Chris can mimic an activity well, and will pick up on what you
are saying while you are completing an activity, so it was important for Felicia to make
sure that what she was doing was matching what she was saying. But the most important
piece of the training strategy is the do.

“…a lot of times unfortunately this population gets told what to do and then
they’re expected to do it. And then they’re like well why are you not doing it?
Why do I have to do it if you’re not doing it? So if you make that partnership that
way with doing the activity versus that verbal communication you’d have with a
typical client if you can get in there and do the activity with them there is a lot
more respect and a lot more compliance.”

This population does do well with command like structure, they do prefer to be told what
to do rather than asked. They thrive in situations that have structure and are planned. But
they are still typical teens, and if they don’t want to do a specific activity they will find a
way to not do it. They want to create a partnership in the activities, and they want to do
them with you instead of for you.

Across Case

Understanding Relevant Modifications

Modifications are common practice among personal trainers. When a client is
unable to complete an exercise properly, it needs to be modified so that they can
complete it safely and be successful with the movement. Modifying exercises should be
simple, but it is where some personal trainers can struggle the most. They have become
accustomed to working with individuals who are able to complete most exercises well,
and need them to be extended to help progress the client to reach their goals. Working
with individuals with ASD, they are working with clients who have never worked with
personal trainers, and also have very limited movement profiles. ASD is such a complex
disability that very rarely is physical activity incorporated into the individual’s everyday
life. This means that not only do they lack experience and knowledge of exercises, but
they also lack body awareness. This deficiency in their movement repertoires does not allow for them to complete exercises, even in their simplest form. Exercises need to be broken down into their most basic components, almost to the point where they may no longer look like a squat or a bench press. Alternative equipment must be used to achieve similar results. Felicia alludes that “[i]t’s something I always knew but something I maybe didn’t always apply. Keeping it simple. Getting back to the very very basics.”

Keep it simple; this is something that is so easy to do but so hard to find trainers that are able to do this. In the training world, it is always about finding the next best thing. But what about the best thing for the client? These simple exercises and simple movements are the best for individuals with ASD. They have to be able to complete the simplest exercises well, and the movement competency of typical clients is taken for granted, and these simple basic exercises are taken for granted.

Working with Roland has helped Carlo to improve his modification skills, especially with other clients.

“I find it’s easier to problem solve, just to know what and why it isn’t working why the exercise isn’t working and with that I can cue the client to focus on a different thing during the exercise and bring the client’s attention to something different. Modifying the exercise for the client will usually help them throughout the exercise and complete the exercise.”

Working with Roland is one of the most extreme cases of modifications that Carlo may experience during his time as a trainer. He had to constantly observe and watch Roland to understand what was going on during each exercise, and understand what was limiting him. He needed to understand what was limiting to help him better modify the exercise so that he was able to attempt and complete the exercise.
Communication

For both trainers, communication was the largest consideration when working with their participant. Communication strategies had to alter the most to ensure that the program was being delivered most efficiently and effectively. Carlo explains that “I knew Roland could understand me so I would have to be much more direct. I couldn’t and wouldn’t pose anything in questions[.]” Roland could understand everything that Carlo was saying, but he couldn’t communicate typically back to Carlo. Felicia also talks about how “I basically found the biggest difference to be communication. In terms of ability, in terms of willingness, there was no issue that way.” The largest consideration in terms of pedagogic approaches was the communication pieces for both participants. Both participants were non-verbal; however they were able to understand verbal communication, and could communicate through alternative methods. They were able to express their emotions and opinions to the trainers, and the trainers had to learn to ‘read’ their client and their choice of communication. The trainers had to learn to understand these alternative forms of communication, and also understand that their clients understood everything that they were saying and all the instructions that they gave to the participants during each session.

As a society, we place such high value on verbal communication, and when that piece of the puzzle is missing it is detrimental to the dynamic of the relationship, especially between client and trainer. But as Felicia points out, “there are a lot of assumptions in verbal communication.” Tone of voice, intonation and inflexion of sentences, word choice, and sentence structure are important when typically communicating. Assumptions are made when these are misunderstood. Working with
Chris and Roland, the verbal piece was missing. The communication needed to be short, firm and direct. The structure for both Carlo and Felicia had to be more command like, and not allow for any ambiguity in the instruction. They both had to change their style to accommodate for these communication differences, to ensure their participants’ communication needs were being met. They no longer had to explain each exercise, and which muscle they were targeting and how it would help to develop this muscle which would aid this muscle group. Felicia talk about how “apparently I have verbal diarrhea; I like to give lots and lots and lots and lots of information, and for Chris, he doesn’t need that.” It is almost the opposite of traditional clients; the less information that you provide them the better. Giving them too much instruction can work against you because they may not know what they need to focus on. For Carlo he:

“just had to be much more basic in my communication with Roland whereas with a traditional client I could be a bit more complex in my explanations and actually um tell them exactly what is happening in their body and why it’s beneficial, whereas with Roland it’s just like ‘this is going to make your life easier so let’s do this’.”

The ‘why’ becomes much less important, and the ‘what and how’ become the focus of the program: what are you asking of them, and how do they do it. For individuals with ASD, less is more with verbal instruction and communication, and this also applies when working with them in a personal training capacity.

**Level Three – Summary**

For my third level of analysis the trainers’ post study interviews were compared to the research questions I developed at the beginning of the research. My first research question focused on fitness baselines and if or how they can be established using fundamental movement concepts. Carlo spoke about his experience during the research
study and using fundamental movement concepts in both the pre-test as well as the sessions. He spoke of fundamental movement concepts being a more holistic approach to a client, and instead of looking at individual movements and exercises, you are looking at the body as a whole. Felicia revealed that a fundamental movement concepts pre-test is one she already does, by looking at her client as a whole versus individual parts. Both Carlo and Felicia indicated that using fundamental movement concepts pre-test allows for both the trainer and client to get back to the basics, and provide a more in-depth assessment of the client’s strengths but also areas of weakness.

My second research question focuses on creating relevant and individualized fitness programs for teens and TAYS with ASD. Carlo realized that it is about assessing their weaknesses using a pre-test, and using these pre-tests to develop a program that is based on making their weaknesses strengths. Felicia put the idea of programming into perspective for myself as well as all other trainers: it is not much different than what is being done already. The most important thing is to keep it simple. Both Carlo and Felicia indicated that the most important aspect of an individualized fitness program for individuals with ASD is ensuring that the movement is meaningful to the individual.

My third research question focused on progressions and improvements, and how trainers can track and evaluate these. Carlo suggests that more untraditional measurements need to be used, because the changes are much more fundamental. Felicia indicates that how we are defining success needs to change. Both trainers identified that fitness and conditioning needs to step outside of the rigid box of sets and reps as measurements, and apply these measurements to unconventional movements. Everything can be measured, it is just about finding a more creative way to do so.
My final research question concentrated on pedagogic approaches, and which were effective when employing fitness programs with individuals with ASD. Carlo talks about the lack of feedback from the client, and how he had to shift his style of training to observe and analyze Roland’s movement more. Carlo also had to make the session relevant and meaningful to Roland so that he would participate. Felicia spoke about her approach of “tell, show, do” and how this worked for her and Chris. She would first tell him what they were doing, show him the exercise, and then do it with him. Both trainers spoke about the need to be able to understand and make relevant modifications to exercises so that their teen would be able to complete the exercise. It was important to understand why an exercise was not working, but also how to modify it to make it work.
### Table 5: Summary of Level 1 Findings

<table>
<thead>
<tr>
<th>Pre-Test Patterns Major Findings</th>
<th>Roland</th>
<th>Chris</th>
<th>Across Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Finding One</td>
<td>Poor Spinal Extension</td>
<td>Extreme Flexion at the Elbow – arms always crossed and hands at his elbows</td>
<td>Absence of Flexion at knee</td>
</tr>
<tr>
<td>Major Finding Two</td>
<td>Issues with Stair Walking – cannot go up the stairs without assistance; cannot climb down the stairs</td>
<td>Absence of Flexion and abduction at the shoulder</td>
<td></td>
</tr>
</tbody>
</table>

### Table 6: Summary of Level 2 Findings – Pre-Study Interviews

<table>
<thead>
<tr>
<th>Pre-Study Interview Patterns Major Findings</th>
<th>Carlo</th>
<th>Felicia</th>
<th>Across Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Finding One</td>
<td>Needing a program</td>
<td>ASD – not confident with terms when talking about the teens</td>
<td>Communication during the sessions with the client</td>
</tr>
<tr>
<td>Major Finding Two</td>
<td>May have issues identifying client’s weaknesses</td>
<td>Very different experience working with a different population</td>
<td></td>
</tr>
<tr>
<td>Major Finding Three</td>
<td>Safety – large concern during the training sessions</td>
<td></td>
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</table>

### Table 7: Summary of Level 2 Findings – Post Study Interviews

<table>
<thead>
<tr>
<th>Post Study Interview Patterns Major Findings</th>
<th>Carlo</th>
<th>Felicia</th>
<th>Across Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Finding One</td>
<td>Kinesthetic vs. Aesthetic when performing and teaching exercises</td>
<td>Building a partnership with the client</td>
<td>Communication with the client</td>
</tr>
<tr>
<td>Major Finding Two</td>
<td>Issues with traditional measurement techniques</td>
<td>Being a ‘good’ trainer at all times when working with your client</td>
<td>Taking a more functional Movement training approach</td>
</tr>
<tr>
<td>Major Finding Three</td>
<td>Different approach to both feedback to and from client</td>
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</tbody>
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**Table 8: Summary of Level 3 Findings – Question 1**

**How can fitness baselines be established using fundamental movement concepts?**

<table>
<thead>
<tr>
<th>Major Findings Related to Research Question 1</th>
<th>Carlo</th>
<th>Felicia</th>
<th>Across Case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major Finding One</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use fundamental movement concepts as a more holistic approach to training</td>
<td></td>
<td></td>
<td>Back to Basics of training and movements when assessing</td>
</tr>
<tr>
<td><strong>Major Finding Two</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Look at the body as a whole vs. separate parts</td>
<td></td>
<td></td>
<td>More in depth assessments</td>
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</table>

**Table 9: Summary of Level 3 Findings – Question 2**

**How can relevant individualized fitness programs be established for teens and transition age youth with ASD?**

<table>
<thead>
<tr>
<th>Major Findings Related to Research Question 2</th>
<th>Carlo</th>
<th>Felicia</th>
<th>Across Case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major Finding One</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess weaknesses and make weaknesses strengths</td>
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<td></td>
<td>Keep it simple</td>
</tr>
<tr>
<td><strong>Major Finding Two</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make the movement meaningful to the individual</td>
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**Table 10: Summary of Level 3 Findings – Question 3**

**How can progressions and improvements be tracked and evaluated?**

<table>
<thead>
<tr>
<th>Major Findings Related to Research Question 3</th>
<th>Carlo</th>
<th>Felicia</th>
<th>Across Case</th>
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<tbody>
<tr>
<td><strong>Major Finding</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use untraditional measurements</td>
<td></td>
<td>“How we are defining success needs to change”</td>
<td>Step outside rigid measurements of sets and reps</td>
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</tbody>
</table>

**Table 11: Summary of Level 3 Findings – Question 4**

**What pedagogic approaches are effective when employing fitness programs with this population?**

<table>
<thead>
<tr>
<th>Major Findings Related to Research Question 4</th>
<th>Carlo</th>
<th>Felicia</th>
<th>Across Case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major Finding</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shift training style – observe and analyze more, talk less</td>
<td></td>
<td>Training approach of Tell, Show, Do</td>
<td>Understand and be able to make relevant modifications</td>
</tr>
</tbody>
</table>
Chapter V – DISCUSSION

Overview

My experiences in fitness and conditioning, and working with different individuals to provide relevant and adapted programming have confirmed for me the need for motivated and interested trainers who are willing to learn to work with this population. The process of this research study allowed me to examine the service of personal training for teens and transition age youth with moderate functioning ASD. I organized my findings into three levels of analysis with the three sets of data from the research study: pre-study and post study interviews with the trainers, field notes and observations of the participant from each session, and the pre and post movement profiles of the participants.

The findings I consolidated through multiple levels analysis I then categorized into four individual sections in the major findings of the research study. These four sections individually reflect the research questions I established at the beginning of the research study. Regarding establishing fitness baselines for the participants, the critical consolidating I conducted revealed the need for trainers to return to the basics of training and functional fitness. Both participants had issues (what kind of issues?) with flexion at the hips and knees, as well as shoulder flexion and abduction, but traditional fitness tests would not identify these movements as limiting factors in their fitness profiles. Fitness continues to progress, but the principles remain the same. It is through these fundamental movement concepts and fitness principles that fitness assessments and baselines can be established.
Regarding designing relevant and individual fitness programs for teens and TAYS with ASD, my analysis established a need for meaningful movement to be incorporated into fitness programs for the participants. ASD has many different features, and manifests differently in each individual, but it is important to find meaningful movement and make this the focus of the program. The trainers discussed how they wanted to make their participant’s weaknesses, strengths, and how their focus shifted to safety and technique instead of progression and more aesthetic results. The focus needs to be shifted to functional fitness, using body weight, proper technique, and safety as the driving forces for trainers.

Tracking and evaluating progressions and improvements is an area of fitness and conditioning that cannot be avoided. Trainers would be unemployed if results could not be shown to clients in a measurable way. My analysis of the pre and post-tests of the participants, the interviews with the trainers, and my observations and field notes consolidated the need for the use of conventional measurements, but applying these traditional principles to unconventional movements. Fitness and conditioning programs for my participants were not traditional, but the measurements could still be recognizable. The trainers had to get creative with how to track their progression through the lesson plans, and I had to get creative in my measurements during observation, to understand when progression needed to occur, and when improvements were made by each participant.

In school and rehabilitative environments, there are principles that have been established in regards to effective pedagogic approaches when working with individuals with ASD. In regards to fitness and personal training, little has been done to establish
effective pedagogic strategies in a fitness and conditioning environment. Much of the
focus of therapy and rehabilitation focuses on behaviours and not physical activity; it was
important to analyze the trainer’s pre and post interviews to understand what they
viewed to be effective strategies. The trainers discussed the need for relevant
modifications to the exercises and activities to allow for their teen to be able to
participate in the program, and changing their traditional pedagogic approaches to
accommodate for the differences in their participant. The trainers both discussed how
‘less is more’ in terms of verbal communication with their participant, and how important
demonstration and a partnership in the activities was when working with their teens.

As the number of children diagnosed with ASD continues to climbs each year, I
feel that there needs to be more focus placed upon providing more age appropriate
physical activity options for this population. The findings that I consolidated through the
multiple levels of analyses that I demonstrated in the previous chapter have the potential
to inform not only future directions in the realm of research, but also provide trainers
with knowledge about options to work with alternative populations. In turn, these results
can help develop training for trainers to work with individuals with ASD, as well as
individuals with different developmental and physical disabilities. I believe that the
principles of working with and providing services to individuals with disabilities are
transferable, and I will be discussing these transferable strategies and principles in further
detail below, along with future directions for research and limitations of the research
study.

**Major Findings**

**Section 1 – Establishing Fitness Baselines**
“Assessment and evaluation are the corner stones of the education and health fields,” (Lloyd, Colley & Tremblay, 2010). Assessment provides individuals with measures of current health and functional status, and acts as an operational starting point for program planning. Fitness testing in schools began over 50 years ago, to help understand the current fitness status of children (Lloyd, Colley & Tremblay, 2010). But the current review of our evaluation techniques for youth in regards to traditional fitness testing is pointing towards a different approach to fitness testing for youth. It is argued that there are many more facets to physical fitness than we can understand and evaluate with traditional 12-minute run tests, push-ups and sit-ups. There continues to be mounting evidence that traditional fitness testing methods, especially for youth, are archaic, because activity evaluation incorporates fundamental motor skills, physical fitness, physical activity and connection knowledge and skills (Lloyd, Colley & Tremblay, 2010). My question is, if these current fitness evaluations are not appropriate for children to assess physical fitness, then how can they be acceptable for individuals with ASD?

It is now better understood that motor disorders are a major component of ASD, because of delays and impairments in motor functioning in the early stages of development (Cossu et al., 2012; Liu, 2012). These delays in fundamental movement skills significantly affect individuals with ASD motor skill acquisition, making skills such as running, hopping, and jumping difficult to perform. These motor skills are typical points of evaluation in traditional fitness testing, especially for assessing cardiovascular capacity and function. These traditional evaluations would not provide an accurate assessment of the capabilities and fitness profiles of individuals with ASD, because they
would not be able to complete these activities. Using alternative methods to assess and establish fitness baselines constructed upon these motor milestone and motor skill discrepancies allows for a more accurate and fair assessment of fitness baselines for individuals with ASD. Both trainers identified that the fundamental movement fitness assessment allowed for them to identify the weaknesses in their participants’ movement repertoires, and helped them to train their participant in more relevant ways. Carlo talks about the fundamental pre-test and how, “it’s just more focusing on the functional aspect of movement.” What is going on at each specific joint, and what is most limiting for the participant is needed for the trainer to understand and create a focus for the individualized programs to help to increase their fitness profiles.

For Felicia, the component of observation and fundamental movement assessment was no different from what she typically does with traditional clients. “I start in the middle and work my way out examining the major joints to see what they can do and what they cannot do.” Observing the movement capabilities of clients is what is expected when being certified as a personal trainer, but whether these trainers continue to complete these pre-tests and functional movement observations is up to the trainer. VO_{2max} assessment protocols and their validity for assessing cardiovascular function have been in question (Cavalcante da Silva, Monteiro & Farinatti, 2011). Muscular strength and endurance assessment protocols continue to evolve as well. The fitness world is shifting to more functional tests like the Functional Movement Screen (FMS) for clients but the shift is slow (Cook, Burton, Hoogenboom & Voight, 2014). FMS was created in 1995, and 20 years later we are continuing to use it as a model to help identify movement challenges and idiosyncrasies. These assessments still require some basic fundamental
movement concepts, and the sensory issues of the equipment and testing strategy of the VO\textsubscript{2max} test is far from beneficial for individuals with ASD who have complex sensory integration issues.

As a trainer, it is important be able to assess the client, and create a program based on this assessment. What can the client do well and what needs to be focused on? What are the client’s strengths, and what are the assessed weaknesses. Using a fundamental movement concepts assessment provides trainers with a profile of their clients’ strengths and weaknesses at specific joints and areas of the body. This is the baseline that a pre-test needs to account for. “Often good ideas seem so basic, we discount them on their simplicity,” (Boyle, 2010, p. 22).

This simplicity is what both trainers discussed in their interviews in regards to establishing fitness baselines. Getting back to the basics of what fitness, functional fitness, truly is, and allowing these basics to be the driving force for the creation and implementation of the assessment protocols. For both teens, their baselines indicated that they had minimal range of motion at the hip, knee, and shoulder, which also led to a lack of strength in these areas and corresponding muscle groups. I identified that they both flexing at the hip and knees, as well as flexion and abduction in the shoulder. Flexion at the hip and knee, and at the shoulder are fundamental movement concepts, and were identified as issues by the trainers and myself through observation and the use of the fundamental movement concepts assessment. These issues would not have been identified by traditional fitness assessments, as the participants would both not be able to complete a tradition fitness assessment protocol. The simplicity of using fundamental
movement concepts to establish fitness baselines helped to identify the areas that the teens needed to focus on in their sessions with their trainers.

Section 2 – Designing Relevant and Individualized Fitness Programs

As program development for individuals with ASD continues to improve, the APA approach of acknowledging the characteristics of the disability when designing the program must also be included as a key component of designing adapted and functional fitness and conditioning programs. Even with this knowledge, there are still limited opportunities for individuals with ASD to participate in relevant activity programs, which are age appropriate (Schuletheis, Boswell & Decker, 2000). Individuals who are placed on the moderate to low functioning end of the spectrum possess unique social and behavioural qualities that many see as barriers to creating physical activity programs, instead of starting points to creating individualized programs based on their idiosyncrasies and uniqueness (Schuletheis, Boswell & Decker, 2000). The TEACCH method takes into account the features of ASD, and attempts to minimize difficulties during activities using specific approaches that are specific to each individual’s needs and behaviours (Panerai, Ferrante & Zingale, 2002). The Miller Method is another alternative to provide individuals with ASD alternative ways to receive APA. The Miller Method is an integrated approach that addresses the issues of body organization, social interaction, and communication in all settings through a movement based intervention approach (Miller, 2007). However, TEACCH and The Miller Method have not been used to develop adapted fitness and conditioning programs for individuals with ASD. Indeed, fitness has been overlooked for these individuals because it is felt that many other areas such as behavior and sensory issues are seen as having more priority, and hence need to
be the center of intervention approaches. Choices still remain limited for teens and TAYs with ASD in the realm of physical activity.

Designing relevant and individualized fitness programs for individuals with ASD, regardless of their level of functioning, is achievable. When taking a functional fitness approach to program design, the focus is on technique, and safety (Boyle, 2010). Both trainers wanted to take the weaknesses that were assessed through the fundamental movement concepts pre-test and transform those into strengths for the participants, while training safely with proper technique. Carlo discusses how the program that was developed for his participant, “wasn’t so much gearing towards um like improving or being very strict about the amount of reps and the amount of weight being used. It was more about doing the exercise properly.”

When designing a relevant and individualized program for their participants, the trainers emphasized looking at the movement itself, and making the goals achievable. Both trainers discuss how contemporary fitness programs focus on loading the client up, and forgetting about the basic principles of the movement. It seems that the shift in training has gone more towards the aesthetics and not the kinesthetic. Being fit and active will cause changes in our appearance, but the underlying reason behind most training was to prevent and alleviate disease and illness and to promote wellness (DePauw, 2009).

Keeping in mind the weaknesses of the participant that were assessed using the fundamental movement concepts pre-test will help to design a program that is individualized to the needs of the participant. Carlo talks about how he needed to make their weaknesses strengths, and how the training program for his participant was much more functional. Shifting programs for individuals with ASD to be functional fitness, to
use body weight and focus on safety and proper technique will provide the participant with a more individualized and meaningful program to help increase their functional fitness. For Roland, I assessed during his pre-test that there was an absence of flexing at the knee. Traditional fitness programs would focus on exercises where the knees would flex and straighten such as squats, lunges, and deadlifts. For Chris, I observed during his pre-test that his elbows were in constant flexion and he rarely flexed and abducted at the shoulder. Traditional fitness programs would focus on exercises like shoulder press and triceps extension to target these areas. But for both Roland and Chris, their movement absences would need to be addressed before even being able to complete such complex exercises. Being able to shift the main focus of each program from traditional exercises like squats or triceps extensions, to a more functional approach with stair walking, arm circles, and crawling helped to bridge the gap between traditional and functional fitness. Before, Roland was unable to walk up the stairs without extreme assistance, and could not walk down the stairs, instead bumming down them. Chris would not extend his elbows, and could not bear much weight on his arms. At the end of their individualized programs, Roland was able to walk down the stairs forwards, backwards and sideways, and Chris was able to complete 5 push-ups. The programs focused in functional fitness are about helping participants walk up a set of stairs, or complete just one push up properly, rather than pursuing repetition for the sake of a protocol.

Meaningful movement, and meaningful programming will help to establish individualized and relevant fitness programs for teens and TAYS with ASD. The programs will account for safety and proper technique, but also movements that are meaningful to that specific teen. The focus will be about making their weaknesses
strengths, and making each day a little bit easier because their fitness program incorporates movements that are meaningful to the individual.

Section 3 – Tracking and Evaluating Progressions and Improvements

The FITT principle has been instructed as the gold standard for program development and progression in fitness and conditioning. Frequency, Intensity, Type, and Time, with training sessions focused on sets and reps of a specific exercise. However, this rigid way of tracking and evaluating progression and improvement does not always adapt well to unconventional exercises. Felicia explains that, “we have to get outside the box of thinking sets, reps, and how much weight people lifted. How we are defining success needs to change.” If it is difficult or seems impossible to count the number of reps and sets in an exercise that is far from traditional, it seems that the validity of the movement and its effectiveness is questioned. But as the trainers in my study explained, if we want to include individuals with ASD, we need to be a little bit more creative in the way that we track and evaluate progressions. Just because we are unable to identify the measurement right away does not mean it cannot be accounted for. For the participants in the study, they completed unconventional exercises in a nontraditional environment. Crab walking, stair climbing, pulling along a rope on a scooter are not considered traditional exercises in the realm of fitness and conditioning. But they still harnessed the same principles of functional fitness. They had push and pull movements, and incorporated both the lower and upper body. It is about understanding the movement and what muscles and muscle groups are being incorporated during functional movements, and being creative with descriptive tracking to help monitor the progressions over the course of the program.
The idea of quality over quantity has also been minimized in fitness and conditioning. The number of reps and sets that an individual can accomplish often outweighs the quality of the movements. Taking a functional fitness approach to working with alternative populations and employing adapted fitness and conditioning programs demonstrates that there is more to an exercise than just completing it as fast as you can, as many times as you can. The quality of the movement and the technique of the exercise become the focus, and are more integral to the progression of the program and the participant. Observing this quality of the movement is also important, and a vital component of training individuals with ASD using functional fitness concepts. It is important to watch for the proper technique of the exercise. Doing one set of stairs properly was more important to Carlo for Roland’s progression, than doing 10 sets of stairs with an awkward and uncomfortable walking pattern. Getting away from the rigid reps and sets to track progressions and improvements in fitness programs will allow for many different populations to seek the health benefits of physical activity and fitness programs. Being open and flexible in alternative methods of tracking and evaluating progressions and improvements will help individuals who have poor motor skills and fundamental motor skills like the participants, to be able to take advantage of individualized fitness and conditioning programs, and reap the health benefits of fitness and conditioning. Not focusing on reps and sets, and using alternative methods of evaluation would also be less intimidating to those who are unfamiliar with fitness and conditioning; knowing that there is more flexibility and accommodation in the activity would make fitness and conditioning an option for those otherwise afraid to participate.
Conventional measurements are always going to be a part of fitness and conditioning; it seems to be the easiest way to track and evaluate progressions and improvements. However as my consolidated analyses demonstrate these conventional measurements need not to be limited to conventional exercises. These measurements can be applied to unconventional movements, through the use of a little creativity. For Roland, the focus of his program was about flexing at the knees. He would complete sets of stairs each week, progressing the movement each session to a more mature stair-walking pattern. The number of times he went up and down the stairs can be used as a measurement, but also the number of stairs, their total distance, or even the time that each set was completed in. For Chris, extension at the elbow was the primary focus of the program. He would push objects from one end of the gym to the other, and crawl and crab walk until he could complete a push up. The number of times each activity was completed was used as the primary measure, but the distance he crawled and crab walked could be measured, as well as the distance he pushed each object. There will always be a way to measure movement conventionally, but it is finding a way to integrate it unconventionally that may be the more difficult challenge.

It is important to recognize that these teens acquired skills during the sessions. Roland is now able to walk up and down the stairs not only forwards, but backwards and sideways all without assistance and Chris is able to complete more than one push up. This skill acquisition that occurred during the sessions not only helped these teens to progress in their sessions with the trainers, but it can also transfer to other motor skills and to activities of daily living.

Section 4 – Effective and Less effective Pedagogic Approaches
I believe that the gap in the literature regarding incorporating individuals with ASD into adaptive fitness and conditioning is not due to a lack of knowledge about training principles and modifications. Rather, I believe that it is because of the lack of training trainers to use alternative pedagogic strategies and a lack of trainer exposure to alternative training populations. If trainers are constantly working with individuals that are high-level athletes or middle-aged men and women looking to lose weight, traditional pedagogic strategies as a trainer will suffice in these situations, and ensure that the client is achieving their goals during the sessions. Be professional and prepared; have a plan and implement it in a manner that allows the client to be receptive to the instruction. Trainers need alternative communication techniques when working with individuals who are non-verbal or understanding strategies related to clients’ non-verbal feedback. When working with individuals with ASD, the trainers in my study concluded that the most effective pedagogic strategies used were alternative methods of communication, relevant modifications to exercises, and building a partnership with the client. The specific alternative methods of communication that were effective for the participants were the way instructions were given; short, command-like instructions were most effective when working with the participants during the sessions. It was also important when providing the participant with instructions during exercises, that first the trainers would ‘tell’ them what they were doing, and then would ‘show’ them the exercise, followed by ‘doing’ the exercise with them. This model of “tell, show, do” was an effective pedagogic strategy when working with the participants. Being able to make effective and relevant modifications to exercises was also an important strategy for the trainers when working with the participants. Building a partnership with the participant, much like traditional
clients was also an effective pedagogic strategy for the trainers in my study. The way that client-trainer partnerships were created, however, was unique compared to traditional clients due to the lack of speech-language.

Felicia talks about her experience working with Chris in regards to communication, and that “I basically found the biggest difference to be communication. In terms of ability, in terms of willingness, there was no issue that way.” One needs to establish alternative communication strategies when working with individuals with ASD who are non-verbal because traditional strategies will not work. Individuals considered moderate to low functioning would most likely be non-verbal (Steadward, Wheeler & Watkinson, 2003). Instructions need to be short, simple and direct. Questions should not be asked, as they will not likely be answered, and as Carlo points out, “I couldn’t ask him anything because there would be no answer and if there was an answer it probably would be the one I didn’t want to hear.”

Partnerships and relationships that are made with traditional clients need also to be made with individuals with ASD. They may not look at the trainer when he speaks, or it may seem like they are not paying attention to what the trainer pointed out, but they are listening and understanding what you say. Both trainers admit that working with individuals with ASD is exhausting, and Felicia revealed, “You need to put a lot in to get a little bit out.” As a trainer you need to persevere, be patient, and create a partnership. At the end of the day, they are teenaged boys who want to do what same aged peers are doing. But most importantly, trainers need to be persistent in their training programs. “Tell, show, do.” It is getting back to the basics of training, first clearly communicating with the client and telling them what they are going to be doing using short and simple
cues. Then, it is important to show them what they are doing with verbal reinforcement during the exercise, and then have them do the activity *but* also doing it with them. Because of the nature of ASD, the most effective way that instructions are given is in a command like structure, with little room for ambiguity and confusion in what is being asked. This alternative structure to verbal communication with a client is the most effective way to work with an individual with ASD, however they still want to create a partnership with the trainer working with them. Doing the exercises and activities with them reinforces the verbal and visual cues you have given them, but also builds a relationship with the teen, that will be beneficial during your training sessions.

What is *not* effective is giving up on them. It is difficult working with individuals with ASD; if it were easy, more people would be doing it. There are so many considerations that need to be contemplated during program design and implementation that it turns away many individuals. Results may not be seen after three sessions, but being consistent and working with them through each activity is important, not only for the teen but for the trainer. Working through exercises will help build more creative trainers and broaden pedagogic repertoires to expand into different populations, not just individuals with ASD. It will be challenging, and it will be frustrating, but working with the frustration will help to create more innovative and accepting trainers, as well as a more diverse fitness and conditioning environment. This can only happen by promoting alternative training environments for these trainers to gain valuable skills working with alternative populations. I sent an email out to thirty trainers, and only two responded with interest to participate in my research. Fitness and conditioning with individuals with ASD is still a new concept, and one that is not promoted to personal trainers. Presenting the
idea of working with individuals with ASD to different training organizations, as well as well-established trainers would help to get trainers involved, and learn how to work with individuals with ASD.

Through my consolidated analysis I was able to identify the importance of the trainer’s use of communication with their teen, and the type of communication used. Verbal (speech-language) communication is taken for granted in the realm of fitness and conditioning, and trainers tend to use their words far more often than their bodies. When the trainers were working with their teens, they understood the importance of physical cues, and making their verbal communication more concise and accurate. They had to understand that less is more, but doing the exercise movement with their teen while instructing was an effective pedagogic tool. This helped to build a partnership with their ‘client’ and create the traditional relationship between a trainer and their client. The trainers had to remember to ‘tell, show, and do’ each time they did an exercise with their teen, regardless of the number of times they had done it in previous sessions. It was about persevering as a trainer, and getting back to the basic principles of training. But most importantly, these trainers acquired skills when working with their participants with ASD that are not only transferable to working with individuals with other disabilities, but to typical clients in traditional settings. These skills that they learned about partnership building, communication, persistence and patience can be transferable to multiple situations and multiple populations in not only physical activity and training, but activities of daily living. And, it seems that the two trainers also developed and deepened an ‘appropriate sensibility’ for working with difference with dignity.
Future Directions and Recommendations

Traditional Training and Functional Fitness

I adapted this fitness and conditioning program to take on a more functional fitness perspective. However the specific pedagogic approaches I developed during the process of the research study are transferable, regardless of functional fitness training or traditional training techniques. Further research is needed to investigate the differences in functional fitness versus a traditional fitness and conditioning training approach using the same pedagogic techniques.

I adapted this adaptive fitness and conditioning program in a pre-existing adaptive physical activity program; there was minimal equipment that would be considered traditional training equipment. The environment was also not typical of a traditional training facility. There were similarly functioning individuals around, with no music and minimal sensory issues (stimuli?) to take into consideration. A future direction would be to continue working with the functional training aspect of the program, but attempt to transition it into a more traditional training environment, slowly incorporating more traditional equipment as well. We are fortunate at Brock University to have access to this alternative equipment and this Adaptive Physical Activity Program; however, this is not the case for other research sites. I was fortunate to be able to complete my research at this program, but as training techniques continue to expand, and as we near 2025, in compliance with the AODA mandate, it would be the next step to expand this research into a more traditional training environment.

Low Functioning Individuals with ASD
Much of the research continues to work with individuals who are considered high-functioning ASD. There are fewer considerations in their movement repertoire as well as their behaviours that need to be considered when working with individuals who are high functioning. Typically, individuals who are considered high functioning ASD have problems with social interaction, and prefer to be alone. They can communicate typically, and do not have the same behavioural concern, like self-injurious behaviours. I chose to work with individuals who are considered moderate to low functioning individuals; they were able to understand verbal and/or visual communication, and could communicate back through visual or verbal prompts. There were minimal limitations beyond this requirement, and one participant had both ASD and Down syndrome, and required the use of ankle braces to walk. In future studies it would be beneficial to evaluate and adapt this program for individuals who are lower functioning, and see if it can be adapted and used for the full spectrum of individuals with ASD. There would be much more that would need to be considered (such as?) when working with these individuals, however I believe that the principles of the program could be used and adapted accordingly to work for these individuals.

**Focused Case Study**

Because the Saturday S.N.A.P. is such a unique program, it would be beneficial to understand how this program would work at an alternative training facility or health club that provides one to one training. Being able to conduct a focused case-study in a self-selected club on the participants and their experience of the adapted functional fitness programming over the course of 12-weeks would be beneficial for the trainers as well as
the participants. Sessions could be pre-scheduled with multiple sessions conducted during a week, at the participants and trainers convenience.

**Functional Fitness and Station Based Pedagogy**

Saturday S.N.A.P. is a program developed on a station based pedagogy concept; there are multiple stations that the participants rotate through with their student teacher, who has spent time creating an individualized activity and program plan. These plans are relevant and individualized for each participant of the program, and are created under the guidance of the program coordinator, graduate students, as well as the program director. For the participants in my research, the student trainers would use the stations at Saturday S.N.A.P. and create/implement functional fitness activities for their participant. Future research implementing functional fitness programs using a station based pedagogic approach for individuals with different developmental disabilities, as well as physical disabilities would be beneficial to evaluate the effectiveness of the station based pedagogy approach using functional fitness across a range of disabilities. Research has been done using station-based pedagogy, but its effect in functional fitness with individuals with disabilities has not yet been assessed.

**Limitations**

Although the findings of this research study offer valuable insights into the world of fitness and incorporating individuals with ASD, like any other research study it too is subject to potential limitations. All of these expressed limitations were out of my control as the researcher, and may be seen as a limitation to some, however I see them as points of growth and maturation not only for my study, but also for myself as a researcher. I have always believed everything happens for a reason; the reasons may not be subject to
explanation, but they have shaped and helped to form the research study, my research study, and I would not change the journey and events along the way. However, I will elaborate on these limitations, and why they may be seen as a limitation to others.

**Broken Bones**

I have been told I’m not the most graceful individual in the world despite my 18 years training in ballet; I fall up *and* down the stairs, I walk into doors and walls, and I often drop things. Unfortunately, life does not change because I am conducting my data analysis. I was in the kitchen of my apartment, during the winter break when I saw what I thought to be a glass cup falling off my counter. I turned and before I could think, I thrust my hand forward in attempt to catch the cup before potentially shattering all over the floor in the midst of me making dinner. Instead, I essentially punched the counter top, splitting it between my third and fourth finger on my right hand. After 5 days of excruciating pain and my right hand twice the size of my left, I finally went to the hospital. I had spiral fractured my fourth metacarpal in my fourth finger, and if I was not careful would need surgery to repair the damage. My traditional ways of collecting data, writing notes and observations during the sessions was no longer an option. I had to figure out and alternative way to collect data, and quick because the research would not stop for me. I had to turn to an audio recorder, and take voice notes during the sessions, describing what I saw when I saw it. I had to adjust for this sudden change in data collection method in my study as well as the program plans. Everything took me that much longer, and I now had to do everything electronically. I could not write, and even typing was interesting to say the least. However, I feel given the circumstances, I
adjusted my data collection methods as best I could to ensure that the research was not interrupted and continued with minimal issues.

**Winter Break**

Due to the nature of the schedule of the program, and the multiple resubmissions that I had to endure with ethics, my data collection began in the middle of the first session of Saturday S.N.A.P. This meant that in order to complete the eight week program, it would have to continue after the Christmas break. This month long break, where the teens were not working with their trainer, and most likely participating in minimal physical activity, required an adjustment in the program plans. Instead of constant progression, the week back after the break I had to adjust the programs to reflect the possible regression due to inactivity. I would have preferred to be able to continue with the program eight consecutive weeks, but unfortunately this could not occur.

**Synchronous Comparative Analysis**

During my post testing, I performed a synchronous comparative analysis, in which I used the pre-tests as a comparator during the post testing. I believed that it allowed me to better understand the participants’ improvements and changes throughout the process; however it can be seen as a limitation because I was using the pre-test to make comparisons, rather than observing and completing a non-comparative post-test.

**Observations**

During observations, it is important to understand that they are inherent. I can only see as much as I can at any given time. If Carlo was out in the stairwell with Roland working on walking up and down the stairs, I could only focus on that. I would have to leave Felicia and Chris in the gym, and shift my focus to Roland for that time. I also
could only get so close into the session and the activities without intruding on the trainers and their participants. I could only see and hear so much from where I was situated in the gyms. I did not get to experience the little events and occurrences that happened over the eight weeks between the trainers and the participants. I did not get to experience the subtle nuances that occurred from activity to activity, or the little moments that were funny or significant for the trainers. I had to rely on the trainers reporting back to me after each session, and taking notes on what occurred between each pair.

**Turning off the Program Coordinator Switch**

I am one of the coordinators of the Saturday S.N.A.P.; I had three fantastic co-coordinators that attended each week, and worked hard to make sure that I was able to play the role of researcher as much as possible. They would even exclude me at times in instances of crisis, because they knew it would draw my attention away from my research study. But I could not take a back seat in the program and fully shut off the facilitator switch. When multiple issues arose, and I was needed, I had to stop being a researcher and be a facilitator. At the end of the day, the most important and pressing concern is the safety of the children and the participants. Fortunately, this only occurred once during the duration of the study, but the efforts of my fellow facilitators did not go unnoticed.

A common limitation when working with individuals with ASD is the issue of attendance of the participants. Issues and illnesses arise that are out of our control, and it can make it that much more difficult to bring them to the program. It could be too windy out, and their child is fixated on the wind, or a meltdown can occur from something that happened last week that prevents them from getting out the door. However, attendance and compliance was not an issue for my participants. They were present and on time to
every session. I have their parents to thank for this commitment to the research, as well as the program. The parents are the reason that their teens were there each week, on time, and prepared.
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Appendix A:
Letter of Invitation-Parents

October 16th, 2013

Dear Parent(s) or Guardian(s):

The following package of information is to notify you of a study that I wish to conduct with your child during the gym portion of the Saturday Special Needs Activity Program (Saturday S.N.A.P.), and ask your permission for your child to participate in the study. The title of the research study is: *Fit for Action: A Comparative Case-Study of the Implementation of Adapted Fitness and Conditioning Programs for Teens and Transition Age Youth with High Functioning ASD*. The study will be conducted by Dr. Maureen Connolly, an associate professor of the Kinesiology Department at Brock University, and Andra Lenius, a graduate student in the Masters of Arts (Kinesiology) program at Brock University.

The aim of this research study is to better understand the importance of physical fitness and conditioning for teens and transition age youth with high-functioning ASD, and to develop pedagogic approaches as well as establish relevant fitness baselines, which need to be adjusted from traditional personal training methods to better accommodate individuals with ‘high functioning’ ASD. Your child will be asked to come every session to Saturday S.N.A.P. (Special Needs Activity Program) for eight (8) weeks. The program will take place from 2:45pm-5:00pm at Brock University; the research will be conducted during fitness and conditioning activities of the program. Your child will be working with a student-trainer (a CPTN-CPT certified student from Brock University who is also a trainer at the Zone) each week. Each week I will be creating the fitness and conditioning lesson for your child that will include components of muscular strength and endurance (MSE), cardiovascular endurance (CE), and flexibility (F). The first two (2) weeks all participants will be assessed using functional movement concepts (i.e. running, hopping, jumping, crossing the mid-line of the body, flexion at the ankle, as well as acceleration and deceleration during movement) to create a baseline for the lessons and activities. A CPTN-CPT certified trainer would employ the fitness and conditioning lesson that will be created specifically for your child. The fitness and conditioning program involved in the research study is strictly offered to study participants, and will be a more in-depth fitness and conditioning program than other participants of the S.N.A.P. program.

Participation in this research will be strictly voluntary. Should you wish your child to participate, you and your child will have the opportunity to withdraw from the study for any reason without consequence at any point. Should you wish to withdraw from the research study, please inform myself, or the faculty supervisor of the research study (Dr. Maureen Connolly) and your information will be removed from the study upon your request. All written documents will be shredded, and all electronic information will be deleted. You and your child have the right to not participate in any activities that you think would be inappropriate. Any of the participants that choose not to participate in the study will still be involved in the Saturday program, working one-on-one with a student-teacher, not a CPTN-CPT student trainer. They will no longer be observed during fitness and conditioning activities, and will not receive an individualized lesson plan from myself, for fitness and conditioning. Your child will still be engaged in all physical activities at Saturday S.N.A.P., including fitness and conditioning, and will have a designated student-teacher who creates an individualized activity program for your child each week. If your child cannot attend every Saturday S.N.A.P. session they can still partake in the research study.

In regards to the data collection all data will remain confidential, and the results will be kept confidential. Meaning, throughout all data collection at Saturday S.N.A.P., no child’s name will be written anywhere on the observation sheets or any other form of data collection. Aliases
will be created prior to research commencement, and will be used during the data collection, analysis and publication of results. Only myself, and the faculty supervisor Dr. Maureen Connolly will have access to the master list of the assigned aliases and participant names. The student-trainers or fellow mentors of Saturday S.N.A.P will not view any data that is being collected for the research study by the student investigator. Only the principal student investigator, the student-trainers and the research committee members will have access to the data. Participants’ parents/legal guardians will receive a folder with their individual results, progression, as well as a final written report with the results of the overall study upon study completion. Both results and progression during the research study will be will be kept confidential. The overall results of the study may also be published in or presented at various professional and scholarly journals or conferences. Any presentation, report or publication resulting from this study will not contain any identifiable information regarding your child.

The anticipated risk associated with the research study for yourself and your child in Saturday S.N.A.P. is directly related to the nature of the fitness and conditioning program. This is a physical fitness and conditioning based lesson plan, which means there is risk of injury occurring (i.e. muscle strain or sprain, falling or tripping over objects that are used in the lesson) during the muscular strength and endurance exercises, cardiovascular exercises, and stretching and flexibility exercises that will be occurring. The student-trainers, research study supervisor and program coordinator Maureen Connolly, as well as myself (the principal student investigator) are all CPTN-CPT certified, and are at minimum Emergency First Aid and CPR-C + AED certified. As parents of the Saturday S.N.A.P. program, you may feel obligated to take part in my research study, as I have been involved in Special Needs physical activity programs at Brock for the past four (4) years. Participation (or lack of) in the outlined research study will not affect the your child’s participation in Saturday S.N.A.P. Potential benefits for the participants of the study include an increase in general physical activity; an opportunity to work one-on-one with a personal trainer, to receive an individualized fitness and conditioning lesson plans, and the provision of individualized feedback related to their fitness and conditioning progress; an increase in fundamental motor skills; and increased opportunity for motor development.

The study has been reviewed and received clearance from the Research Ethics Board of Brock University (13-011-CONNOLLY) and the head of Saturday S.N.A.P. If you do have any questions or concerns about this study please contact either Dr. Maureen Connolly at (905) 688-5550 extension 3381 or email mconnolly@brocku.ca; or Andra Lenius (905) 932-5630 or email al08ts@brocku.ca; or the Brock University’s Research Ethics Office (905-688-5550 ext. 3035 or reb@brocku.ca).

Written consent is needed to allow your child to participate in the research study. To indicate your consent, please complete the enclosed Consent Form and return it to me during the meeting or I can be reached by phone or email (above) to come get it at your convenience. Thank you for your interest in providing this opportunity for individuals to receive adapted fitness and conditioning programs for a high-functioning ASD population.

Sincerely,

Dr. Maureen Connolly, Brock University, Faculty of Kinesiology

&

Andra Lenius, Brock University, Faculty of Applied Health Science (Kinesiology)
Appendix B:
Consent Materials - Parents

Date: October 16th, 2013
Project Title: Fit for Action: A Comparative Case-Study of the Implementation of Adapted Fitness and Conditioning Programs for Teens and Transition Age Youth with High Functioning ASD

Principal Student Investigator
Andra Lenius, Master of Arts Student
Faculty of Applied Health Science, Kinesiology
Brock University
(905) 932-5630
al08ts@brocku.ca

Faculty Supervisor
Dr. Maureen Connolly
Faculty of Kinesiology
Brock University
(905) 688-5550 x3381
mconnolly@brocku.ca

INVITATION

Your child is invited to participate in a study that involves research. The purpose of this study is to better understand the importance of physical fitness and conditioning for teens and transition age youth (12-25 years old) with high-functioning ASD, and to develop pedagogic approaches as well as establish relevant fitness baselines, which need to be adjusted from traditional personal training methods to better accommodate individuals with ‘high functioning’ ASD. Individuals participating in this research are participants of the Saturday Special Needs Activity Program (Saturday S.N.A.P.) This will be the only program that will be involved in the current study.

WHAT’S INVOLVED

As a participant, your child will be observed each week for eight (8) weeks, in the gymnasium or in the Brock University gym (The Zone) on their functional movement concepts, as well as their participation and progression in a fitness and conditioning program. This program will consist of 3 different components: muscular strength and endurance (MSE), cardiovascular endurance (CE), and flexibility (F). Your child will be working each week, at the Saturday SNAP program, with a student-trainer who is CPTN-CPT certified (Certified Personal Trainers Network-Certified Personal Trainer). Your child’s fitness and conditioning program will be individually constructed, involving muscular strength and endurance (MSE), cardiovascular endurance (CE), and flexibility (F) exercises. The program created by the principal student investigator will be individualized for your child each week, based on progressions through exercises and movements. This study will only be conducted during fitness and conditioning activities of Saturday S.N.A.P. and will not involve observation of your child during other activities at the program. If your child is unable to make every Saturday S.N.A.P., they are still able to participate in the research study. All observations will be written on a weekly basis. Further explanation of the purpose of the research will be discussed at a meeting held for all participants to attend before the research begins.

POTENTIAL BENEFITS AND RISKS

Possible benefits of participation for your child in this research study include an increase in general physical activity; an opportunity to work one on one with a personal trainer, to receive an individualized fitness and conditioning lesson plan, and the provision of individualized feedback related to their fitness and conditioning progress; an increase in fundamental motor skills; and increased opportunity for motor development. We are hoping to find out more about how we can improve the implementation of fitness and conditioning programs to individuals with ASD and increase their number of opportunities to be physically active. There are also some potential physical risks associated with the research study that include strained muscles, sprained ankle or falling over an object in the gym. These risks will be minimized whenever possible throughout the
research, as the student-trainer your child will be working with, along with the principal student investigator will be at a minimum Emergency First-Aid and CPR-C + AED certified.

CONFIDENTIALITY

The information you provide will be kept confidential. Your child’s name will not appear in any thesis, publication or report resulting in this study, as an alias will be assigned to your child at the beginning of the research process by Andra Lenius (the principal student investigator). Only Andra Lenius and research supervisor, Dr. Connolly, will have access to the master list with the alias and participant names. Access to your child’s completed Saturday S.N.A.P. profile will be needed for the purpose of data collection and analysis, but only your child’s diagnosis (i.e. high functioning ASD) will be included in publications. All other personal information from the Saturday S.N.A.P. profiles will not be included in any publication of data, and will be kept confidential.

Information collected during this study will be locked in a locker in the Graduate Studies Office at Brock University as well as stored on a separate USB drive. Data will be kept for approximately two (2) years after the study has been completed, at which time the written documents will be shredded, and electronic files will be deleted. Access to these data will be restricted to Andra Lenius (Principal Student Investigator), and members of the research study committee, all of who are professors at Brock University (Dr. Maureen Connolly, Dr. Gail Frost, and Dr. Jae Patterson). This research study involves ad small group of participants, as the minimum number of individuals needed to conduct the research is two (2) Saturday S.N.A.P. participants and two (2) student-trainers. This small participant group size may affect confidentiality. Other individuals at Saturday S.N.A.P., both student-teachers and participants may know that your child is participating in the study, however any information (i.e. performance results and feedback) will be kept confidential and will not be shared.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to participate in any component of the study. Furthermore, you may decide to withdraw from this study at any time, and may do so without any penalty or loss of benefits to which your child is entitled. The withdrawal process can occur in two ways: you may directly contact the principal student investigator by phone or email to withdraw your child, or the principal investigator may decide it is in the best interests of your child to be removed from the study due to a “3 strike meltdown” rule. If your child has three (3) “meltdowns” or disruptions during primarily fitness and conditioning activities, he or she will be withdrawn from the study. These three (3) “meltdowns” will be seen as your child’s communication to the student investigator that they no longer wish to take part in the research study. Your child may continue to participate in Saturday S.N.A.P. without being part of the research. Once the wish to withdraw from the research study has been expressed, all information, journals, recorded observations and data collected up to that point will be shredded and/or deleted.

PUBLICATION OF RESULTS

Results of this study may be published in professional journals and presented at professional development conferences. Feedback with regards to your child and their progression through the fitness and conditioning program will be provided to you once the data analysis is complete.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the Principal Investigator or the Faculty Supervisor using the contact information provided above. This study has been reviewed and received ethics clearance (13-011-CONNOLLY) through the Research Ethics Board at Brock University. If you have any comments or concerns about your
rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca.

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I provide consent for my child to participate in the study described above. I have made this decision based on the information. I have read in the Informed Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: ________________________

Signature of Parent: ___________________________ Date: ___________________________

Signature of Researcher: ___________________________ Date: ___________________________

Signature of Participant ___________________________ Date: ___________________________
Appendix C
Letter of Invitation-Students

October 16th, 2013

Letter of Invitation

Dear Mr. or Ms./Mrs.

The following package of information is to notify you of a study that we wish to conduct during the Saturday Special Needs Activity Program (S.N.A.P.) and ask your permission for you to participate in the research study. The title of the research study is: *Fit for Action: A Comparative Case-Study of the Implementation of Adapted Fitness and Conditioning Programs for Teens and Transition Age Youth with High Functioning ASD.* The study will be conducted by Dr. Maureen Connolly, an associate professor of Kinesiology at Brock University, and Andra Lenius, a graduate student in the Maters of Arts (Kinesiology) program at Brock University.

The aim of this research study is to better understand the importance of physical fitness and conditioning for teens and transition age youth (12-25 years old) with high-functioning ASD, and to develop pedagogic approaches as well as establish relevant fitness baselines, which need to be adjusted from traditional personal training methods to better accommodate individuals with ‘high functioning’ ASD. Should you consent to participate, you will be asked to come every Saturday for eight (8) weeks between the hours of 2:30pm until 5:00pm. The program runs at Brock University in gym 2, The Zone, and the Brock pool. On top of participation in the weekly Saturday program, you will be asked to meet once a week to debrief, ask questions and voice concerns, as well as have the opportunity to review the fitness and conditioning program for the child that you will be working with created by Andra Lenius (the principal student investigator) that will include muscular strength and endurance (MSE), cardiovascular endurance (CE), and flexibility (F) exercises. You will be responsible to be present and plan for the other stations at Saturday S.N.A.P. for the individual you are working with, but will be provided a lesson plan for fitness and conditioning activities. Other stations will be planned with the assistant of a Saturday S.N.A.P. student-teacher that you will be paired with for the duration of the session. You will be asked to work with a specific child, one-on-one or two-to-one (student-trainer and student-teacher to participant) for the entire Saturday Program each session, who is also a research study participant. The first two (2) weeks all participants with high-functioning ASD will be assessed using functional movement concepts to create a baseline for the lessons to progress from. During the weekly meeting time, I will be going over the lessons I have created for you, and how you should teach the exercises to each specific participant. Upon completion of the research study, you will be asked to take part in a brief interview that will take 30-35 minutes. The data collected will be transcribed. No personal information will be released from the research study or interview. Aliases will be used in the analysis of the data and publication of results.

Participation in this research is strictly voluntary. Should you wish to withdraw from the study for any reason, you may do so without consequence at any point during the research. If you wish to withdraw, you may contact the principal student investigator or research supervisor by email, and request to be withdrawn from the study. Your information and all data collected up to the point of withdrawal will be shredded and/or deleted. You have the right to not answer any of the questions during the interview if you so choose. If you withdraw from the study, you will still have the opportunity to continue to participate in the Saturday Program and will be asked work with another child in the program that is not taking part in the research study.

In regards to the data collection all data collected will remain confidential. This means that your name will not be written anywhere on observation sheets or on any other method of data collection. Both results and progression during the research study will be kept confidential. During the study and upon completion, you will be asked to keep all information in regards to the
study and the participant that you are paired with confidential. You will be provided with participants' personal and health information that you will be provided (i.e. name and diagnosis). This information must remain confidential, and should not be shared or discussed, except with the principal student investigator.

The overall results of the study may be published in, or presented at, various professional and scholarly journals or conferences. Any presentation, report or publication resulting from this study will not contain any identifiable information regarding yourself or any other research participants in the study.

The Zone will not be involved in the research study, apart from facilitating the initial recruitment letter that you receive through email. All responses should be sent or forwarded directly to myself, the principal student investigator. To ensure that as a Zone trainer you do not feel obligated to participate in the research study. Mr. Walters will not be informed of which individuals reply to the email of recruitment to ensure participant confidentiality. This study has been reviewed and received clearance from the Research Ethics Board of Brock University (13-011-CONNOLLY) as well from the head of Saturday S.N.A.P. If you have any questions or concerns about this study please contact either Dr. Maureen Connolly at (905) 688-5550 extension 3381 or by email mconnolly@brocku.ca; Andra Lenius at (905) 932-5630 or by email al08ts@brocku.ca; or the Brock University’s Research Ethics Officer (905-688-5550 ext. 3035 or reb@brocku.ca).

Written consent is needed to participate in this research study. To indicate your consent, please complete the enclosed Consent Form and return it to me during the initial meeting. I can also be reached by phone or email (above) to come and pick up the form at your convenience. Thank you for your interest in providing the opportunity for individuals to receive adapted fitness and conditioning programs for a high-functioning ASD population.

Sincerely,

Dr. Maureen Connolly, Brock University, Faculty of Kinesiology

&

Andra Lenius, Brock University, Faculty of Applied Health Science (Kinesiology)
Appendix D
Consent Materials - Students

Date: October 16th, 2013
Project Title: Fit for Action: A Comparative Case-Study of the Implementation of Adapted Fitness and Conditioning Programs for Teens and Transition Age Youth with High Functioning ASD

Principal Student Investigator
Andra Lenius, Master of Arts Student
Faculty of Applied Health Science, Kinesiology
Brock University
(905) 932-5630
al08ts@brocku.ca

Faculty Supervisor
Dr. Maureen Connolly
Faculty of Kinesiology
Brock University
(905) 688-5550 x3381
mconnolly@brocku.ca

INVITATION

You are invited to participate in a study that involves research. The purpose of this study is to better understand the importance of physical fitness and conditioning for teens and transition age youth (12-25 years old) with high-functioning ASD, and to develop pedagogic approaches as well as establish relevant fitness baselines, which need to be adjusted from traditional personal training methods to better accommodate individuals with ‘high functioning’ ASD. Individuals participating in this research are student-trainers from the Zone, and participants of the Saturday Special Needs Activity Program (Saturday S.N.A.P.). This will be the only program that will be involved in the current study.

WHAT’S INVOLVED

As a participant, you will be asked to volunteer with Saturday S.N.A.P., and meet once a week on top of coming to the Saturday program for eight (8) weeks. These weekly meetings will be used to debrief about the previous Saturday S.N.A.P. sessions, as well as to review the fitness and conditioning lesson plan with the principal student investigator for the next session. You will not be planning fitness and conditioning activities, as that is the area of focus of the research study. Andra Lenius, the principal student investigator, will provide you with the lesson plans for fitness and conditioning activities during Saturday S.N.A.P. At the meeting you will go over the plan created for that week, as well as creating a plan for the other activities at Saturday S.N.A.P. You will be responsible to help facilitate and create activities at the other stations for the individual that you are working with during the duration of the eight (8) week program. Your student-teacher partner, will help with planning for your child during the other stations of the program, and will assist you in creating these activities. You will be asked to take part in an interview after the eight week program has ended, which will take between 30-35 minutes. This interview will be audio recorded, however confidentiality will be maintained through the use of aliases created by the principal student investigator.

POTENTIAL BENEFITS AND RISKS

Possible benefits of participation in this research study include an increase in awareness of the need for physical fitness and conditioning for teens and transition age youth with ASD. Ultimately, we are hoping to find out more about how we can improve opportunities for high-functioning ASD individuals to be active in a traditional form of physical activity for same aged-peers by creating baseline measures, as well as sound pedagogical techniques that can be used in future by other trainers working with this population. There are also some potential physical risks associated with the research study. As a student-trainer, you may experience include strained muscles, sprained
ankle or falling over an object in the gym. These risks will be minimized whenever possible throughout the research by adhering to standard safety practices when working in the gym.

CONFIDENTIALITY

The information you provide will be kept confidential through the use of aliases, created by the principal student investigator. Your name will not appear in any thesis or report resulting from this study. However, with your permission, some confidential quotes may be used. Shortly after the audio recorded interview has been completed, a transcript of the interview will be transcribed, and a copy will be sent to you electronically. This will give you the opportunity to confirm the accuracy of the interview, and provide you with the opportunity to add or further clarify any points that you see fit. All information collected during this study will be locked in locker in the Graduate Studies Office at Brock University as well as stored on a separate USB drive. Data will be kept for approximately two (2) years after which time the written documents will be shredded and all electronic and audio documents will be deleted. Access to this data will be restricted to Andra Lenius (Principal Student Investigator) and members of the research study committee, who are professors at Brock University (Dr. Maureen Connolly, Dr. Gail Frost, and Dr. Jae Patterson).

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Furthermore, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled.

PUBLICATION OF RESULTS

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be sent out to the students that participated once data analysis is complete. This feedback will give an overall summary of the results.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the principal student investigator or the faculty supervisor using the contact information provided above. This study has been reviewed and received ethics clearance (13-011-CONNOLLY) through the Research Ethics Board at Brock University. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca.

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I agree to participate in the study described above. I have made this decision based on the information I have read in the Informed Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: ____________________________
Signature of Student: ____________________________ Date: ____________________________
Signature of Researcher: ____________________________ Date: ____________________________
Appendix E: Layout of Gym

The picture below is an outline of how Gym 2 looks on a week-to-week basis at Saturday S.N.A.P.. The program is station based; the participants move from one station to the next during the program.
## Appendix F: Example Lesson Plans

**Chris Week 1 Lesson Plan**  
**Saturday November 16\textsuperscript{th}, 2013**

| Overall Goal | Focus on flexion and extension at the elbow to improve arm extension  
Focus on rotation at the shoulder  
Get Chris into the Zone eventually |
| --- | --- |

<table>
<thead>
<tr>
<th>Area/Station</th>
<th>Goal(s)</th>
<th>Plan</th>
<th>Modifications/Extensions</th>
</tr>
</thead>
</table>
| **Pool** | • Get into waist deep or deeper water and keep him there  
• Keep him active the entire time; getting him in the pool right away | • Ask Mark to make a hard left when exiting the change room so as to eliminate the shallow end option  
• OR be outside the change room when they are finished changing – make a wall between Chris and the shallow end of the pool | • As long as he is swimming it is good, even if it is the shallow end |
| **Warm Up** | *On the Shapes – Make 2 Lanes*  
• Crawl forward through one lane, walk backwards through second lane (x3)  
• Crab walk forwards and backwards (x3)  
• Bear walk (x3 – x2) | | • If he can’t bear walk, use another form of locomotion (hopping, running, army crawl) |
| **Shapes** | • Low, medium and high levels (crawling, stacking, pushing pulling)  
• Weight bearing on arms and shoulders  
• Focus on upper body | • Using push towards Gladiator, two hand pull back towards trampolines (x4); tire flip towards Gladiator, roll back to the trampolines  
• Obstacle course with shapes, emphasis on crawling (over shapes, under shapes, across unstable surfaces)  
• Lying on cheese, head on thick side  
- Lifting "smaller" shapes from chest above head to the floor; pick up off the floor and bring back to chest  
- Chest press with the cylinder | • Decrease amount – only 2 push/pulls, flips/rolls  
• Incorporate into the obstacle course |
| **Scooters** | • Midline crossing – Hand over hand pulling  
• Focus on stomach (spinal extension); more emphasis on stomach but incorporate back as well | • Using the rope across the bench, pull along on stomach (2 scooters, one under his feet); switch to back  
• Using the rope, make an ‘x’ in the middle  
• Make Chris go to each ‘corner’ 3 -5 times, making him switch direction at the middle | • He will need you directing him, won’t know which corner to go to |
| **Fitness Station** | • Full body circuits, keeping him moving  
• Incorporate dynamic stretching in circuits  
• Back doing push-ups | • Make circuit using bosu, cheese, step ups, medicine balls and tchouk ball net  
- Crawl up cheese  
- Throw medicine ball on the tchouk net  
- Walk with ball above head  
- Center = dynamic stretches (arm circles, leg swings and crosses  
- Center = push up – start with bosu, hand clapping and extending, reaching, one leg, both leg  
• Core and balancing  
- Sitting on bosu, ball pass above head  
- Standing pass ball above head | • Flip over bosu – extend circuit to include use of the wall to incorporate wall push ups  
• Use agility dots for push up |
### Overall Goal
- Focus on:
  - Flexion of the knee – End goal is a squat and push off the wall on a scooter
  - Extension of the elbow
  - Spinal Extension – PULLING less PUSHING

<table>
<thead>
<tr>
<th>Area/Station</th>
<th>Goal(s)</th>
<th>Plan</th>
<th>Modifications/Extensions</th>
</tr>
</thead>
</table>
| Pool         | • Have Roland be able to push up out the pool onto the deck  
• Use the shallow end more than the deep end | • Avoid deep end at the beginning of the session; use the deep end as a reward – SHALLOW END FIRST!  
• In the shallow end, work on walking in the pool (forwards, majority backwards, sideways – with right leg leading) pushing on and off the wall floating on his back, using the stairs to get in and out of the pool | • Use the deep end as a reward for Roland – he enjoys swimming – use the rings and a bucket or a target to get him to put them in (I will have these ready for you)  
*Out of the water with the stairs Try and get him to jump in this week  
I will ask MOM again about bringing him in his swimsuit |
| Warm Up      | On the stairs coming down to the Cage or the Stairwell to the Fitness studio  
• Up and down the stairs – 4x  
• Go DOWN THE STAIRS SIDEWAYS ONLY this week – TRY more with RIGHT leg than left | | • UP the stairs is fantastic; on his way down let him use the railing NOT YOU this week  
• Try going down the stairs leading with his RIGHT FIRST, a majority of the time |
| Shapes       | • FOCUS MORE ON SQUATS THIS WEEK  
• Get him crawling and low levels; make him bend his knees as much as possible whenever we can | • Sitting on cylinder and standing up with a ball or object in his hands – change shape sitting on (stairs, cheese matt)  
• Make an obstacle course in the shapes with Roland, emphasis on crawling  
• Get Roland to move the shapes with you (stacking, pulling, pushing)  
• Use and pull it on the mats backwards, from the trampoline to Gladiator climber  
• PUSH the back to the trampolines | • Make Roland climb over and under shapes, across unstable surfaces IN THE OBSTACLE COURSE  
• Put something in Roland’s hands so he can’t use them to push to get up during the SQUATS – Try not to hold his hands or only give him one of your hands  
• Watch when he crawls that he doesn’t lay on his stomach and pull  
• No pushing an object this week – just crawling and keep him off his stomach as much as possible |
| Fitness Station | • Dynamic stretching of upper body at the beginning of the circuit – end with them as well  
• Make circuit at Fitness, and go through entire circuit – not just cheese with medicine balls  
• Push two medicine balls up the cheese while crawling (one in each hand)  
• LIFT a medicine ball above his head  
• Sitting down to stand up | • Make circuit using bosu, cheese, step ups, medicine balls, cylinder and boxes  
1. START = dynamic stretches (arm circles, kneel on bosu reaching one arm then other for “high five” with Roland)  
2. Crawl along the ground pushing the two medicine balls to the gymnastics box  
3. Sit down on the box – Pass medicine ball side to side  
4. Walk on bosu balls to steps – try for him to step from one to the other  
5. Crawl up cheese pushing two medicine balls | • Dynamic stretches will have to be co-assisted; START WITH STRETCHES  
• You may need to start with a regular ball first and then move to a medicine ball during the circuit  
• This circuit make take you a long time, shorten in depending on his day, but try and get everything in at least once  
• Try and help him as little as possible – want to see how much he can do now on his own without your help |
<p>| Gladiator    | • Get Roland to | • On ladders in the gladiator area | • Start with the small trestle/ladder |</p>
<table>
<thead>
<tr>
<th>Wall/Station</th>
<th>climb up and over the Trestles (or ladder) on his own</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>* Try the gladiator again</td>
</tr>
<tr>
<td></td>
<td>(I will bring these out for you each week)</td>
</tr>
<tr>
<td></td>
<td>* SMALL trestle/ladder</td>
</tr>
<tr>
<td></td>
<td>- CLIMB UP and OVER</td>
</tr>
<tr>
<td></td>
<td>- Watch when climbing he is pushing off his right leg – swings his left leg over the top every time</td>
</tr>
<tr>
<td></td>
<td>* Move to Gladiator – try to climb up one rung on the ladder</td>
</tr>
<tr>
<td></td>
<td>– 2 to 3x</td>
</tr>
<tr>
<td></td>
<td>* Move to the larger trestle/ladder</td>
</tr>
<tr>
<td></td>
<td>– Be careful on his way down</td>
</tr>
<tr>
<td></td>
<td>– DO NOT let him grab for you, help him turn around and climb down</td>
</tr>
<tr>
<td></td>
<td>– If he won’t turn and climb down make him go back the way he came</td>
</tr>
<tr>
<td></td>
<td>* Try the Gladiator – if you are working alone do it beside him. If you have a partner have them climb and you stand behind Roland and help him with his feet</td>
</tr>
</tbody>
</table>

![Diagram of exercises](chart.png)
Appendix G: Pre-test Outline – Functional Movement Concepts

Functional Movement Concepts/Movement Milestones

- Acceleration
- Sensory Considerations
  - Sight Sensitivity
  - Smell Sensitivity
  - Sound Sensitivity
  - Oral Fixations
- Upright Posture
- Hands Cross Middle of Body / Feet Cross Over Middle of Body
- Arms Straighten / Bend
- Picks Up / Holds Objects
- Hips Bend / Straighten
- Knees Bend / Straighten
- Speeds Up / Slows Down
- Palms Face Up / Face Down
- Walks on Toes / Heels Down

Student Name:
Age:
Diagnosis:

Date:
Pre-Analysis of Quality and Frequency of Movement

Frequency – $0 \ 1 \ 2 \ 3 \ 4 \ 5$
Quality – $-1 \ 0 \ +1$

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<thead>
<tr>
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<th>Quality</th>
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<tr>
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<tr>
<td>Bend</td>
<td></td>
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<tr>
<td>Stretch</td>
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<tr>
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<tr>
<td>Curl</td>
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<tr>
<td>Gestures</td>
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<td></td>
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<tr>
<td><em>Weight Bearing:</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands and feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landings</td>
<td></td>
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</tr>
<tr>
<td>Other</td>
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<td><em>Transfers:</em></td>
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<tr>
<td>Sit to stand</td>
<td></td>
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<td>Stand to sit</td>
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<tr>
<td>Rocking</td>
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<tr>
<td>Gliding or sliding</td>
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<tr>
<td><em>Balance:</em></td>
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<td></td>
</tr>
<tr>
<td>Maintain</td>
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</tr>
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<td>Regain</td>
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<tr>
<td><em>Locomotion:</em></td>
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<tr>
<td>Walk</td>
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<tr>
<td>Run</td>
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<td>Jump</td>
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<td>Hop</td>
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<tr>
<td>Skip</td>
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<td>Crawl</td>
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<td>Deceleration</td>
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<td><em>Body Parts:</em></td>
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<td>Lead/focus</td>
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<tr>
<td>Meet and part</td>
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<td></td>
</tr>
<tr>
<td><strong>Space</strong></td>
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<tr>
<td><em>Levels:</em></td>
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</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Direction:</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right/Left</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Pathways:
- Direct
- Indirect

### Reach:
- Close
- Far

### Effort
- Firm Weight
- Fine Weight
- Sudden Time
- Sustained Time
- Bound Flow
- Free Flow

### Relation
- Alone
- Partners
- Group
- Apparatus
- Implements

### Objects:
- Send
- Receive/Stop
- Retain/Carry
Appendix H: Field Notes and Observations

<table>
<thead>
<tr>
<th>Time and Activity Station</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>What time is in the session? What exercise is being done? What station did they start with?</em></td>
<td><em>Guiding thoughts for the observations included but were not limited to: How well are the exercises being performed? Should the child be progressed further or regressed? Is this exercise effectively working the desired muscle groups? Is the movement and activity being performed correctly? How many times? How is the trainer teaching the activity? How is the teen responding to the trainer and the activity?</em></td>
</tr>
</tbody>
</table>
Appendix I: Post-Test

Functional Movement Concepts/Movement Milestones

[Diagram of a human figure with various movements and sensory considerations indicated]

Student Name:  
Age:  
Diagnosis:  

Date:  

SENSORY CONSIDERATIONS
- Sight Sensitivity
- Smell Sensitivity
- Sound Sensitivity
- Oral Fixations

Upright Posture
Arms Straighten / Bend
Picks Up / Holds Objects
Hips Bend / Straighten
Knees Bend / Straighten
Speeds Up / Slows Down

Appendix J: Pre-Study Interview Guide for Trainers

The purpose of this interview is to gain better insight into your previous experience working with individuals with ASD in a fitness and conditioning atmosphere and what you plan to expect for the next few weeks. This interview is designed to understand your past experiences working with individuals with ASD, and what you will expect when working with individuals with ASD.

1. What is your past experience training and individual with ASD?
   a. What is your “typical” demographic for clientele?

2. What are your expectations when working with an individual with ASD?

3. What are you most concerned about when training an individual with ASD?
Appendix K: Post Study Interview Guide for Trainers

The purpose of this interview is to gain better insight into your time spent working with individuals with ASD in a fitness and conditioning atmosphere. This interview is designed to understand how working with this population differs from traditional clients in gym setting, and how these differences were accommodated during the research study.

1) How effective were the baselines established using fundamental movement concepts?
   a) How is this pre-test different from a traditional pre-test with a client in the gym?
   b) How do you think that using these fundamental movement concepts can aid in the creation of a fitness and conditioning program?

2) How can we now design relevant individual fitness programs for teens with ASD?
   a) How is this population different from a traditional client in the gym?
   b) How did you accommodate for these differences?
   c) What considerations did you notice that need to be addressed when designing a fitness program for a teen with ASD?
   d) How can these individualized programs be implemented in a more traditional fitness and conditioning setting (i.e. gym)?

3) How can we track and evaluate progressions and improvements?
   a) How are these improvements different from those of tradition clients?
   b) What was the most prominent improvement that you were able to see in your individual?
   c) In which area (MSE, CE, F) did your client improve most and least? Why do you think this was so?

4) What pedagogic approaches are effective when training individuals with ASD?
   a) How did your training style change when working with an individual with ASD?
   b) What training or teaching style worked best when working with your client?
   c) What was an ineffective strategy when working with your client? Why was it ineffective?
d) Did you alter your communication strategies during the duration of the fitness and conditioning program?
Appendix L: Functional Movement Concepts/Motor Milestones

Roland – Pre-Test

Student Name: Roland
Age: 15
Diagnosis: Moderate Functioning, ASD + Down syndrome

Date: November 2nd

SENSORY CONSIDERATIONS
- Sight Sensitivity
- Smell Sensitivity
- Sound Sensitivity
- Oral Fixations

- Smells objects
- Objects to mouth a lot
- Non-verbal

- Rounded shoulders
- Poor spinal extension
- Head sticking out forward
- Poor shoulder flexion

- Arms Straighten / Bend
- Will not straighten arms without assistance

- Hands Cross
- Middle of Body
- Feet Cross Over Middle of Body

- Arms do not swing when walking
- No crossing of midline

- Palms primarily face down

- Upright Posture

- Hips Bend / Straighten
  - Good flexion and extension @ hips
  - Extremely flexible hamstring
  - Hands to floor with straight legs

- Knees Bend / Straighten
  - Does not bend knees
  - Will bend @ hips before knees
  - Cannot walk down stairs

- Speeds Up / Slows Down
  - Moves @ one pace
  - No acceleration or deceleration
  - Slow

Roland – Post-Test

Student Name: Roland
Age: 15
Diagnosis: Moderate Functioning ASD + Down syndrome

Date: March 1st

SENSORY CONSIDERATIONS
- Sight Sensitivity
- Smell Sensitivity
- Sound Sensitivity
- Oral Fixations
- Spoke during one session "Go away"
- Upright Posture
  - Posture upright
  - Shoulders back
  - Improved spinal extension
- Hands Cross Middle of Body / Feet Cross Over Middle of Body
  - More efficient when completing activity
  - Swinging arms when walking
- Arms Straighten / Bend
  - Straighten arms more when holding an object + pushing
  - Picks Up / Holds Objects
  - Holding heavier objects
- Hips Bend / Straighten
  - Less bending at hips to complete tasks
- Knees Bend / Straighten
  - More bending at knee to complete stairs up and down
- Speeds Up / Slows Down
  - One pace
  - Ran in one session to Carlos

Walks on Toes / Heels Down
- Stance smaller, feet less turned out

Appendix M: Functional Movement Concepts/Motor Milestones

Chris – Pre-Test

[Diagram with notes about sensory considerations, motor milestones, and functional movement concepts related to Chris's diagnosis of ASD.]
Appendix N: Quality and Frequency of Motor Milestones and Movement Profiles
Appendix N: Quality and Frequency of Motor Milestones and Movement Profiles

Roland – Pre-Test
Pre-Test Motor Milestones Descriptions

<table>
<thead>
<tr>
<th>Levels</th>
<th>Considerations</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High – Sensory Considerations</td>
<td>Sight Sensitivity</td>
<td>- n/a</td>
</tr>
<tr>
<td></td>
<td>Sound Sensitivity</td>
<td>- n/a</td>
</tr>
<tr>
<td></td>
<td>Smell Sensitivity</td>
<td>- Smells most items – puts hands to face and mouth and nose often</td>
</tr>
<tr>
<td></td>
<td>Oral Fixations</td>
<td>- Non-verbal</td>
</tr>
<tr>
<td>Medium</td>
<td>Midline Crossing</td>
<td>- Lack of midline crossing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- A lot of “stimming” with ropes, socks, etc., simultaneously with both hands on opposite sides of the body</td>
</tr>
<tr>
<td></td>
<td>Palms Face Up/Down</td>
<td>- Palms primarily face down</td>
</tr>
<tr>
<td></td>
<td>Picks Up Objects</td>
<td>- Will pick up objects but with both hands at once</td>
</tr>
<tr>
<td></td>
<td>Arms Straighten/bend</td>
<td>- Arms typically at sides, will bend them; poor extension at the shoulders and elbows – will not bend arms without assistance</td>
</tr>
<tr>
<td>Low</td>
<td>Hips bend/straighten</td>
<td>- Hips extremely flexible (hamstrings also)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Will bend hips before knees</td>
</tr>
<tr>
<td></td>
<td>Knees bend/straighten</td>
<td>- Little to no bending of the knees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Only will bend if forced to</td>
</tr>
<tr>
<td></td>
<td>Speeds Up/slow down</td>
<td>- One speed at all times</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Extremely slow gait</td>
</tr>
<tr>
<td></td>
<td>Walks on Toes/heels down</td>
<td>- Walks with heels down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Wide stance</td>
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</tbody>
</table>

Pre-Test Analysis of Quality and Frequency of Movement
Frequency – 0 1 2 3 4 5
Quality – -1 0 +1

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<thead>
<tr>
<th>Area</th>
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<th>Quality</th>
</tr>
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<tbody>
<tr>
<td>Body</td>
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<tr>
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<td>Whole Body, Shapes and Functions:</td>
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<tr>
<td></td>
<td>Bend</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Stretch</td>
<td>0</td>
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<tr>
<td></td>
<td>Twist</td>
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<td>Category</td>
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<tr>
<td><strong>Weight Bearing:</strong></td>
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<td>-</td>
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<td>Feet</td>
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<td>Landings</td>
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A COMPARATIVE CASE STUDY

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Roland – Post-Test
Post-Test Motor Milestones Descriptions

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<td>Sound Sensitivity</td>
<td>- n/a</td>
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<td></td>
<td>Smell Sensitivity</td>
<td>- Smells most items – puts hands to face and mouth and nose often</td>
</tr>
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<td></td>
<td>Oral Fixations</td>
<td>- Spoke during one session of research study – “Go away”</td>
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<td></td>
<td></td>
<td>- Non-verbal</td>
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<tr>
<td>Medium</td>
<td>Midline Crossing</td>
<td>- Midline crossing more efficiently when needed to complete an activity</td>
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<td>Palms Face Up/Down</td>
<td>- Palms primarily face down</td>
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<tr>
<td></td>
<td>Picks Up Objects</td>
<td>- Picking up objects and holding (medicine balls)</td>
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<td></td>
<td>Arms Straighten/bend</td>
<td>- Arms still at sides, will straighten up above head when handling an object</td>
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<td>Hips bend/straighten</td>
<td>- Hips extremely flexible (hamstrings also)</td>
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<tr>
<td></td>
<td></td>
<td>- Less bending at the hip</td>
</tr>
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<td>Knees bend/straighten</td>
<td>- Bending at the knee has improved greatly</td>
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<tr>
<td></td>
<td></td>
<td>- Able to walk down the stairs on own</td>
</tr>
<tr>
<td></td>
<td>Speeds Up/slow down</td>
<td>- Still walking at one speed</td>
</tr>
<tr>
<td></td>
<td>Walks on Toes/heels down</td>
<td>- Walks with heels down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Stance has become smaller especially when walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Feet are less turned out</td>
</tr>
</tbody>
</table>
Post-Test Analysis of Quality and Frequency of Movement
Frequency – 0 1 2 3 4 5
Quality – -1 0 +1

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Appendix O: Quality and Frequency of Motor Milestones and Movement Profiles

Chris – Pre-Test

Pre-Test Motor Milestones Descriptions

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<td>- Loud “whaling” outbursts</td>
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<td>Midline Crossing</td>
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<td>Picks Up</td>
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<td>Arms Straighten/bend</td>
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<td>- Will bend at the hips to compensate</td>
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<td>Speeds Up/slow down</td>
<td>- One pace; does not slow down or speed up</td>
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<td>Walks on Toes/heels down</td>
<td>- Walks with heels down</td>
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Pre-Test Analysis of Quality and Frequency of Movement

Frequency – 0 1 2 3 4 5
Quality – -1 0 +1

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Chris – Post-Test
Post-Test Motor Milestones Descriptions

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</table>
| High          | Oral Fixations          | - Limited echolalia less prominent during session  
- Less of the loud “whailing” noises during exercises  
- Non-verbal; more communicative in the few words he is able to use |
| Medium        | Midline Crossing        | - Midline crossing improved                                                      |
| Medium        | Palms Face Up/Down      | - Very rarely has palms face up or down                                             |
|               | Picks Up Objects        | - Picking up objects  
- Use of one hand and both hand when appropriate                                     |
|               | Arms Straighten/bend    | - Arms straightened when prompted  
- Less internal rotation                                                              |
| Low           | Hips bend/straighten    | - Hips will bend and straighten                                                     |
| Low           | Knees bend/straighten   | - Bends knees during exercises  
- Less compensation at the hip                                                        |
| Low           | Speeds Up/slow down     | - Still moves at one pace; does not slow down or speed up  
- Less use of indirect pathways when going from one activity to the next; more direct with choice of path |
| Low           | Walks on Toes/heels down| - Walks with heels down                                                             |

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<td></td>
<td>Apparatus</td>
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<tr>
<td></td>
<td>Implements</td>
<td>2</td>
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<td>Objects:</td>
<td>Send</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Receive/Stop</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Retain/Carry</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix P: Roland’s Hard Copy Description

### Pre-Study Hard Copy Description of Roland

<table>
<thead>
<tr>
<th>Levels in the Body</th>
<th>Description</th>
</tr>
</thead>
</table>
| **High**           | – Shoulders internally rotated  
|                    | – Poor posture/postural tone  
|                    | – Leads with head during locomotion  
|                    | – Puts chin down on his chest as he walks  
|                    | – Needs assistance putting on backpack  
| **Medium**         | – Minimal arm sway when walking; doesn’t swing arms contralaterally during movement  
|                    | – Hands predominantly at sides during locomotion  
|                    | – To pick up objects knees do not bend  
|                    | – To get down on the floor does not bend knees; bends at hips and places one hand down on the floor then moves leg across and underneath himself  
|                    | – Walking **up** stairs – one foot then next; immature stepping pattern  
|                    | – **Cannot** walk down the stairs without assistance; wants to “bum” down the stairs  
|                    | – Will only carry one object at a time  
| **Low**            | – Wide base of support during locomotion – feet very far apart  
|                    | – Extreme shift of weight during walking  
|                    | – Will not jump over rope/small objects on the floor; just steps  
|                    | – Orthotic braces on each leg  
|                    | – Needs assistance walking backwards  
|                    | – Needs assistance to step up and down on small steps  
|                    | – Extreme internal rotation of left leg during stepping  

### Post-Study Hard Copy Description of Roland

<table>
<thead>
<tr>
<th>Levels in the Body</th>
<th>Description</th>
</tr>
</thead>
</table>
| **High**           | – Shoulders now back – less internal rotation  
|                    | – Posture improved – postural tone has increased  
|                    | – **Head up and chin up** during locomotion  
| **Medium**         | – Arm sway increased during locomotion  
|                    | – Hands and arms now moving during locomotion  
|                    | – Will bend knees to pick up objects off the floor; no longer primarily bends at hips  
|                    | – Walking **up** stairs – mature walking pattern; one foot on one step at a time  
|                    | – **CAN** now walk down the stairs, one stair and foot at a time, without the use of a railing or help  
|                    | – Can carry one object two hands, two objects two hands, and |
A COMPARATIVE CASE STUDY

<table>
<thead>
<tr>
<th></th>
<th>multiple objects in two hands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>– Base of support become smaller during locomotion</td>
</tr>
<tr>
<td></td>
<td>– Can “jump” on trampoline with rope assistance</td>
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<tr>
<td></td>
<td>– Still wears orthotic braces on each ankle/leg</td>
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<tr>
<td></td>
<td>– Can walk backwards alone on ground and balance beam</td>
</tr>
<tr>
<td></td>
<td>– Can walk up and down small steps without assistance</td>
</tr>
</tbody>
</table>
Appendix Q: Chris’ Hard Copy Description

<table>
<thead>
<tr>
<th>Levels in the Body</th>
<th>Description</th>
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</thead>
</table>
| **High**           | – Upright posture; shoulders internally rotated slightly  
|                     | – Looking up or around, never really focusing on the direction he needs to move in  
|                     | – Poor extension at the shoulder girdle – cannot rotate arms backwards or forwards  
|                     | – Difficult to place arms above head  
| **Medium**         | – Arms bent at all times and internally rotated  
|                     | – When crawling on the floor arms are straight  
|                     | – Pinching skin at elbows  
|                     | – Will flick arms and elbows straight and returns back to bent  
|                     | – Will straighten arms when throwing underhand  
|                     | – Little bending at the hips – upright position  
|                     | – Knees and hips straight when jumping/bouncing on springboard or trampoline  
| **Low**            | – Little bending of the knee – only bends knees when he has to  
|                     | – Little locomotion backwards  
|                     | – Push ups on wall – one foot forward; will not put feet together  
|                     | – Leads with the same foot (right) at all times  
|                     | – Wanders from station to station, no direct path  
|                     | – Feet turned out when walking  

<table>
<thead>
<tr>
<th>Levels in the Body</th>
<th>Description</th>
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</table>
| **High**           | – Upright posture; internal rotation at the shoulders is not as evident  
|                     | – Focused on trainer/partner; following from station to station  
|                     | – Can now rotate shoulders anteriorly and posteriorly (performs “arm circles”)  
|                     | – Will stretch arms above head when prompted; prefers internal rotation and arms bent but will stretch arms above head  
| **Medium**         | – Arms now only bent from one activity to another however are more by his sides between activities  
|                     | – Less Pinching skin at elbows  
|                     | – Movements have become less “sudden” and “fine” – less flicking of arms and elbows  
|                     | – Straightens arms when throwing underhand  
|                     | – Bending at both hips and knees during activities  
|                     | – Bends both hips and knees when jumping on both trampoline and springboard |
Low

- Increased bending at the knee
- Increased locomotion forwards, backwards and right and left in all planes
- When crawling on the floor arms are straight; when crab walking arms are now straight and support body weight
- Performs full pushups on the floor with some visual assistance; arms at shoulder width
- Right foot dominant – will continue to lead with right foot in all activities
- Feet less turned out when walking; foot pattern and placement during walking is more forward – less turn out