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Addressing Adapted Physical Activity Interventions for Children and Adults with Autism



Written by
Susan Crawford PhD: University College Cork
in Collaboration with
the Health Action Zone & Health Service Executive, Cork.

Health Action Zone

Sports Studies & Physical Education
B.Ed. Sports Studies & Physical Education

Dedicated to

Tomás,

Ever my inspiration,

With all my love.

ACKNOWLEDGEMENTS

My heartfelt thanks to the children, adults, parents, carers, Special Needs Assistants, Community Workers and teachers who make our initiatives and research possible. Individually and collectively you are all inspirational, may you continue to shed great light on the world of disabilities and autism.

I wish to acknowledge the many undergraduate students and graduates of our Sports Studies and Physical Education Degree programme in University College Cork, Ireland who have contributed to the development and delivery of quality physical activity programmes for children and adults of varying abilities across communities.

Thanks to the members of Health Action Zone, Health Service Executive, Cork for collaborating and supporting the development of Physical Activity and Health related resources and programmes for children and adults in our communities. I especially wish to acknowledge Stephen Murphy and Bernard Twomey of Health Action Zone, HSE, Cork who have worked with me tirelessly on all our initiatives and in ensuring this book came to fruition.

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About the Author



Dr Susan Crawford is a lecturer in Sports Studies and Physical Education, The School of Education, University College Cork, Ireland. She originally qualified as a Registered General Nurse, Midwife, Holistic and Sports Massage therapist before completing a BSc in Sport and Exercise Science. Susan practiced for many years in these combined areas before completing her PhD at the University of Limerick in the area of fundamental movement skill development and social responsiveness for children with autism (2004-2007), following the award of a Scholarship from The Irish Research Council for Science, Engineering and Technology. She has also completed post graduate studies; Certificate, Diploma and Master's Thesis in Teaching and learning in Higher Education in University College Cork (2008-2011).

Her research interests lie in the areas of fundamental movement skill development and motor impairment with specific emphasis on autistic spectrum disorders. Susan is also keenly interested in the areas of Teaching and Learning from Health, Adapted Physical Activity and Physical Education perspectives and actively supports academic - community collaboration across these areas.

Susan is the mother of a 17 year old boy Tomás, diagnosed with autism and learning disabilities. Tomás completed his second half marathon in May 2012. Susan recently completed a Handbook for parents "Autism and Physical Activity: what every parent needs to know" with the support of Health Action Zone, HSE, Cork, Ireland.

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Outline of the Book

Chapter 1. Context for the book: This chapter establishes the framework for the book. It identifies the key themes, main purpose of the book, and the significance of research findings for practitioners and policy makers.

Chapter 2. Education and Training in Adapted Physical Activity in Ireland: Chapter 2 examines education and training in adapted physical activity for children with disabilities, in relation to primary teacher training, physical education teacher training, health, leisure and recreational studies programmes and the work of Coaching Ireland. The chapter also includes examples of good practice in the area of adapted physical activity both nationally and internationally. This review highlights the need for appropriate training at undergraduate level and among practitioners in adapted physical activity for children and adults with disabilities.

Chapter 3. Understanding Autism: This chapter gives an overview of the condition of autism. It examines the evolution of the knowledge and understanding of autism through history, provides current definitions for conditions on the autistic spectrum, considers presentation of the condition, incidence, possible causes, theories of development of the condition, teaching interventions and evaluation of current provision for children with Autistic Spectrum Disorders (ASDs) in Irish Schools.

Chapter four: Movement Ability, Social Responsiveness and Autism: Chapter four examines research in the areas of both movement ability and social responsiveness and autism in the context of physical activity. It identifies the lack of intervention studies in the area of motor impairment, social responsiveness and autism. Physical activity intervention studies addressing movement abilities and stereotypical behaviours of individuals with autism are examined in detail. The chapter closes with a study providing an examination of participation trends of children with autism in physical activity.

Chapter five: Programme assessment, design and implementation for individuals with autism: Guidelines on programme assessment, design and implementation for this population are considered.

Chapter 6. Conclusions and Recommendations. Chapter 6 brings together the key conclusions and recommendations that emerged from the book (a) in relation to education and training in the area of adapted physical activity, (b) research issues in relation to autism as a condition and (c) research on autism and adapted physical activity. It considers the need for (d) appropriate APA provision for children and adults with autism and makes final recommendations on the way forward.

CHAPTER ONE

CONTEXT FOR BOOK

Physical activity is an important part of a healthy lifestyle for all people (U.S. Department of Health and Human Services, 1996). Participation in physical activity across the life span has been shown to have multiple benefits for all. Free play and sporting activity promotes fitness, endurance, co-ordination and self-esteem. Chang (2000) indicates that physical activity maximises muscle bone growth and strength, increases lean muscle mass, reduces body fat and prevents or reduces symptoms of depression and anxiety. Physical activity and sport provide children and adults with achievable goals that promote both confidence and self-esteem. In the United States one of the aims of the government's Healthy People 2010 initiative, is to have 85% of adolescents participate in vigorous physical activity for more than 20 minutes three times per week (U.S. Public Service, 2000). Similarly, The World Health Organisation (2004) indicates that much of the health gain from activity is obtained through at least 30 minutes of cumulative moderate physical activity every day.

The World Health Organisation (2004) summarises the benefits of regular physical activity:

"*Regular physical activity reduces the risk of dying prematurely; reduces the risk of dying from heart disease or stroke; colon cancer and type 2 diabetes; helps to prevent/reduce hypertension; helps control weight and lower the risk of becoming obese; helps prevent and reduce osteoporosis, reduces the risk of hip fracture in women; reduces the risk of developing lower back pain and knee pain; helps build and maintain healthy bones, muscles and joints and makes people with chronic disabling conditions improve their stamina; promotes psychological well-being, reduces stress, anxiety and depression; helps prevent or control risky behaviours, especially among children and young people".*

(The World Health Organisation, 2004, p.24)

Fentem (1994) debating the benefits of exercise and physical activity in health and disease argues that after regular exercise people of any age can work harder, longer and with less effort than previously and there is a reduced sense of effort for any given task. This is true for everyone and for all age groups. Fentem indicates that physical fitness is particularly important in the face of periods of immobilisation, hospitalisation or serious health problems. It contributes to the maintenance of functioning and prevents the development of new functional limitations. He further reports that wheelchair users who are physically active have a lower rate of absence from work, fewer hospital admissions, fewer pressure sores and kidney complications than inactive wheelchair users. Fentem states that exercise in the upright position reduces calcium loss after a spinal cord injury, improves muscle strength, motor skills and the speed at which manual work is performed for people with disabilities.

Chawla (1994) clearly indicates the potential role of physical activity and sport for people with disabilities:

"*Physical activity and sport is increasingly being used as treatment complementing the conventional methods of physiotherapy. It helps to develop strength, coordination and endurance. Some sports develop selected groups of muscles, for example weight lifting and archery help to strengthen the arm muscles of paraplegic patients,*

enabling them to gain independence in self care activities. Wheelchairs sports such as basketball help develop co-ordination, as the disabled person has to propel the wheelchair and learn to pass, catch and intercept the ball. Swimming is generally accepted as a valuable form of exercise and treatment. Over recent years it has become a popular sport. When someone is immersed in water, mouth and nose above the surface while breathing, the buoyancy of the water allows limbs to move freely within that person's abilities" (Chawla, 1994: p.1501).

In addition to physical benefits, physical activity has psychological health benefits for people with disabilities. Physical activity improves self-confidence and offers opportunities for social interactions. Studies indicate that low self-esteem is of particular concern in children with learning disabilities. In an experimental study, participants in Special Olympics were found to have greater self-confidence than non-participants (Edmiston, 1990). Dykens & Cohen (1996) also found that participants in Special Olympics had improved social competence and were more involved in extracurricular hobbies, activities and friendships than non-participants. Individuals with learning disabilities have a high incidence of behavioural difficulties and disorders. Kern, Koegel, Dyer, Blew and Fenton (1982) found that exercise was beneficial in reducing some of these behaviours especially in people with pervasive developmental disorders. Kern et al. also found that sports activities improved social adjustments in children with learning disabilities. Recreational activities provide the opportunity for children and adults with disabilities to be included in their broader communities. This is of benefit to those with and without disabilities. Those with disabilities learn important social skills while their typically developed peers learn sensitivity to others who were different (Batshaw, 2002).

In terms of understanding movement behaviour, a distinction between movement and motor is essential. Movement skills consist of goal-directed movements such as throwing a ball, which can be described according to the final outcome (i.e., 5 of 10 successful throws) or movement pattern used (i.e., over- or under-hand). Fundamental movement skills are the locomotor and object control skills that emerge following the ability to walk, between the ages of 1 and 7 years. These skills are considered "fundamental" in that they span ages and cultures and are assumed to be the basis of more advanced, or sport-specific skills (Burton & Miller, 1998). Motor abilities, on the other hand, refer to underlying capacities that contribute to performance of movement skills (Magill, 1998). Motor abilities are not directly observable and must be inferred from the performance of movement skills; scoring is based on a general ability such as balance or hand-eye coordination instead of the movement pattern used.

Autism is a lifelong developmental disability, typically diagnosed in early childhood and characterised by development that is delayed or what may be considered different than typical (Wing, 2002). In Ireland, the prevalence rate for autism is estimated at 15 per 10,000 live births (Irish Society for Autism, 2001). For individuals with autism, research indicates that normative development in the areas of movement ability and social responsiveness is either delayed or absent (Crawford, MacDonncha & Smyth, 2007; Todd & Reid, 2006). Many children with autism are also diagnosed with co-occurring general learning disabilities (Wing, 2002; Report of the Special Education

Review Committee, 1993; Evaluation of Education Provision for children with Autistic Spectrum Disorders, 2006). Children diagnosed with learning disabilities also experience varying degrees of delay in the areas of social responsiveness and fine and gross motor coordination. Addressing difficulties in the areas of movement ability and social responsiveness for individuals with autism and co-occurring learning disabilities is a challenge to educators and other professionals. Physical activity has been identified as a means of addressing motor impairments, reducing stereotypical behaviour (Levinson & Reid, 1993; Prupas & Reid, 2001), increasing appropriate responding (Kern, Koegel & Dunlap, 1984) and increasing the potential for social interaction (Berkeley, Zittel, Pitney and Nichols, 2001).

Individuals diagnosed with autism have experienced the positive effects of vigorous physical activity for promoting calmness and relaxation (Grandin, 1986; O'Neill, 1999). Researchers further indicate that physical activity needs to be appropriately adapted to accommodate children and adults with autism and co-occurring learning disabilities. An ecological approach to this adaptation is recommended, where the individual, environment and task are all considered in the overall programme planning (Crawford, McDonncha & Smyth, 2007; Henderson & Sugden, 2007; Reid & O'Connor, 2003; Block, 2000). Sherrill (1998) states that:
"*Adapted physical activity is the umbrella term for services that promote an active, healthy lifestyle by remediating psychomotor problems that interfere with goal achievement and self actualisation. Adapted physical activity services are delivered in both mainstream and non mainstream settings by generalists and specialists." Sherrill, 1998: p.5)*

There is a need for concrete research in this field to further establish effects of APA programmes for children and adults with autism. As Dewey and Tupper (2004) indicate research with this population in relation to movement ability is scarce. The need for the book is identified in the lack of information available in relation to current adapted physical activity provision for children with disabilities in both mainstream and specialist school settings especially in Ireland and in particular to identify where physical activity programmes can address delays in movement ability and social responsiveness for children and adults with autism.

Significance of the Book
The book has both a theoretical and practical significance. This can be seen in three main areas:

From the theoretical viewpoint, it will investigate the growing cohort of information that suggests that physical activity for people with disabilities and in particular those with autism, is beneficial. The literature on physical activity and disabilities in general is readily more available than that on physical activity and autism. This book is the only one to date to have considered on the effects of adapted physical programmes on movement ability and social responsiveness of children and adults with autism in the Irish context.

Impairments in motor skills are linked with difficulties in participating in activities of daily living in later life (Henderson & Sugden, 1992, Wright & Sugden, 1999). It is essential that difficulties in motor and social development are highlighted and

effectively addressed from an early age to promote independence in later life. This book identifies interventions that will help address this need for parents and practitioners in the field.

This book may give impetus to a more proactive stance by practitioners and various Government Departments and go some way to influencing policy and provision makers that quality physical activity programmes with appropriate support structures are needed and should become commonplace for all members of Irish society.

Clarification of Terminology used throughout the Book

For the purposes of clarity the term "autism" is used throughout the book as denoting one specific condition on the autistic spectrum. "Autistic Spectrum Disorder (ASD)" is used to denote autism, pervasive developmental disorders not otherwise specified and Asperger's syndrome as set out in the Diagnostic and Statistical Manual of Mental Disorders (2000). The term "Autistic Spectrum Disorder" is used in this book when referring to research and quoting publications that has specifically included individuals from the overall spectrum. This is done to maintain the integrity of these documents.

"Children with disabilities" is used throughout the book.
Disability is defined as "Any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being" (WHO, 2004).

"Learning disabilities" is used throughout the book, in accordance with recommended practice of the Department of Education and Skills in Ireland (Carey, 2005). This terminology is interchangeable with "Intellectual Disabilities" which is also acceptable in Ireland. In the U.S learning or intellectual disabilities may be referred to as "mental retardation". This is considered inappropriate for use in Ireland (Carey, 2005).

Special Educational Needs (SEN) refers to those children diagnosed as having such by appropriate professionals (Carey, 2005). As either terminology i.e. children with disabilities or children with special educational needs, is considered interchangeable and appropriate, "Special Educational Needs" is used in this study, as presented in publications and research throughout the book.

Inclusion in an educational context is defined as "the placement of a child with a special education condition in a mainstream classroom with all the necessary support and resources in place. Supports range from low-intensity such as preferential seating placement, or differentiated assignments, to high-intensity such as nursing care, assistance in feeding and toileting (Carey, 2005). Where it is beyond the scope of this book to deal with inclusion in depth, the promotion of concepts of inclusion is an implicit principle throughout this work.

Summary

The introductory chapter outlined the importance of physical activity for both the general population and those with disabilities. From within the disability spectrum, the population with autism was identified for further examination. The literature indicated that children with autism often present with co-occurring learning

disabilities. Difficulties in the areas of movement development and social responsiveness were identified as common to both diagnoses. Physical activity was considered a means of addressing these difficulties for children and adults with autism with or without co-occurring learning disabilities. Hence the overall purpose of the book was identified as examining the research on the effects of individualized adapted physical activity programmes on movement ability and social responsiveness of children and adults with autism. As a precursor to investigating the effect of physical activity interventions, it was considered important to outline current provision and practice of adapted physical activity in an Irish context.

The significance of the book firstly indicated the necessity to promote research in the field of autism and physical activity in the Irish context, secondly to impact on the long term independence of individuals with autism and thirdly to develop policies and awareness of practitioners and decision makers, to ensure individuals with autism participate in quality adapted physical activity programmes. The chapter closed with clarification of terminology used throughout the book. This leads into an in-depth examination of adapted physical activity and education, particularly in the Irish context in chapter two.

CHAPTER TWO

ADAPTED PHYSICAL ACTIVITY: EDUCATION AND TRAINING IN THE IRISH CONTEXT

The promotion of a physically active lifestyle has become an important issue in health policy in first world countries. As indicated in the opening chapter a physically active lifestyle is accompanied by several fitness and health benefits including physiological, psychological and social and benefits. Physical activity influences long-term health status and also general well being, personal and social development and achievement. Further psychological benefits include improved mood, confidence and self-esteem, a reduction of anxiety and depression and an increase in a person's ability to cope with a range of stressors. Individuals with a disability can particularly benefit from an active lifestyle: not only does it reduce the risk for secondary health problems, but also all levels of functioning can be influenced positively (Van Der Ploeg, Van Der Beek, Van Der Wounde & Van Mechelen, 2004).

Chapter two considers education and training in adapted physical activity and sport. The development of physical literacy is an essential component in the process of promoting participation in physical activity and is considered in the context of education and training (Whitehead, 2007). Chapter two also examines primary school teacher training, physical education teacher training, courses in sport and leisure studies and the role of Coaching Ireland in relation to physical activity educational development and support, with specific reference to people with disabilities all in the Irish context.

The chapter closes with a summary of findings, conclusions and recommendations, for the development of education and training to ensure quality physical activity programmes for those with disabilities in Ireland.

Sherrill (1998) states that adapted physical activity is mainly associated with physical education instruction. In general, APA and PE are interchangeable in Irish schools. The Taskforce for People with Disability in Sport was established in 1999, to examine provision for and practice of, people with disabilities in sport. This Taskforce conducted extensive research in the area of Adapted Physical Activity and training, in the Irish context through postal questionnaires. Findings indicated that teachers involved in primary mainstream and specialist settings, expressed a grave lack of self-confidence, due to lack of training, in the delivery of adapted physical activity/ physical education (APA/PE) to children with disabilities. It was also felt that available resources, were inadequate and non- user friendly. The National Coaching and Development Programme (1999) further reiterated these findings in relation to coaches and other sports providers. These findings were reiterated by Crawford (2011) when examining current provision and practice of APA in both primary and special schools in Ireland.

Education and training in Physical Activity and Sport in Ireland

This section will review how adapted physical activity provision in Ireland meets the needs of service users with disabilities. Education and training in physical activity and sport examines primary school teacher training, physical education teacher training, sport and leisure studies and the role of Coaching Ireland. The section opens with an examination of definitions and objectives of physical literacy, physical education in the Irish curriculum and physical education in the National Council for Curriculum and Assessment (2002), in its draft curriculum guidelines for teachers of students with learning disabilities.

The current working definition of physical literacy from Whitehead (2007) states:
"*Physical literacy is the motivation, confidence, physical competence, understanding and knowledge to maintain physical activity at an individually appropriate level, throughout life"* (*Whitehead, 2007: p .13).*

Whitehead indicates that physical literacy is the precursor to quality participation in physical activity and further breaks this into:

- "Physical literacy can be described as the ability and motivation to capitalise on our movement potential to make a significant contribution to the quality of life.
- As humans we all exhibit this potential. However its specific expression will be particular to the culture in which we live and the movement capacities with which we are endowed.
- An individual who is physically literate moves with poise, economy and confidence in a wide variety of physically challenging situations.
- The individual is perceptive in 'reading' all aspects of the physical environment, anticipating movement needs or possibilities and responding appropriately to these, with intelligence and imagination.
- A physically literate individual has a well-established sense of self as embodied in the world. This together with an articulate interaction with the environment engenders positive self-esteem and self-confidence. Sensitivity to and awareness of our embodied capacities leads to fluent self-expression through non-verbal communication and to perceptive and empathetic interaction with others.
- In addition the individual has the ability to identify and articulate the essential qualities that influence the effectiveness of his/her own movement performance, and has an understanding of the principles of embodied health, with respect to basic aspects such as exercise, sleep and nutrition".

The Physical Education Primary School Curriculum (2006) states that:
" *Physical education provides children with learning opportunities through the medium of movement and contributes to their overall development by helping them to lead full, active and healthy lives"(The Physical Education Primary School Curriculum, 2006:p.2).*

Its aims include:

- "To promote the physical, social, emotional and intellectual development of the child.
- To develop positive qualities.
- To help in the acquisition of an appropriate range of movement skills in a variety of contexts.
- To promote understanding and knowledge of the various aspects of movement.
- To development an appreciation of movement and the use of the body as an instrument of expression and creativity
- To promote enjoyment of and positive attitudes towards physical activity and its contribution to lifelong health related fitness, thus preparing the child for the active and purposeful use of leisure time".

It further differentiates physical education and sport:
"*Physical education and sport although closely linked are not synonymous. Sport is formalised physical activity involving competition or challenges against oneself, others or the environment, with an emphasis on winning. The focus in the physical education curriculum is on the child's holistic development, stressing personal and social development, physical growth and motor development. Goal setting within the curriculum focuses on individual improvement and not on winning and being best" (The Physical Education Primary School Curriculum, 2006: p.2).*

In relation to promoting concepts of inclusion in PE for the child with a disability, the Physical Education Primary School Curriculum (2006) states that:

"*The child with special needs should experience the enjoyment of participation and progression through the various stages of the physical education programme according to his or her ability. It is important that the class teacher encourages maximum participation in the physical education lesson by the child and provides the opportunity to benefit from a balanced physical education programme"*
(The Physical Education Primary School Curriculum, 2006: p.8).

The National Council for Curriculum and Assessment (2002) in its draft curriculum guidelines for teachers of students with learning disabilities states that:
"*Physical education develops the body's strength and physical well being and provides opportunities for the development of early physical development of body awareness and safety. Activities provide students with opportunities to improve fine and gross motor co-ordination, concentration, listening skills, self esteem, self confidence, games, skills, and the ability to cooperate and communicate with others" (The National Council for Curriculum and Assessment, 2002: p.93).*

An examination of all three working definitions clearly identifies the commonalities of objectives between physical literacy and physical education, as outlined in the Irish primary school curriculum and the Draft curriculum guidelines for teachers of students with learning disabilities. All take a holistic view of the benefits of movement to the overall development of the child, with particular emphasis on participation rather than winning. An examination of physical education provision to attain these goals for children with disabilities in Ireland is now considered.

Government Departments and other agencies are involved in development and training, in physical education and sport. These include the Department of Education and Skills, Department of Health and Children, Department of Arts, Sport and Tourism, the Higher Education Authority, the National Council for Curriculum and Assessment (NCCA) and the National Council for Special Education (NCSE). Also involved are the Irish Sports Council, the National Coaching and Training Centre (NCTC), the Institute of Leisure and Amenity Management Ireland, the Physical Education Association of Ireland (PEAI) and the Irish Adapted Physical Activity Alliance (IAPAA).

The National Council for Curriculum Assessment (NCCA) is actively involved in the preparation of syllabi and curricula. Relevant course committees carry out syllabi design. The Department of Education and Skills subsequently implement these.

In 2002, a series of draft guidelines were produced by the NCCA, to address the needs of students with mild, moderate, severe and profound learning disabilities from ages 4 to 15 years. Each curriculum subject was dealt with individually. Difficulties identified in the area of physical education included general fitness, co-ordination and balance, spatial awareness, behaviour issues, reaction and response and general body awareness. Curriculum content included athletics, dance, gymnastics, games, outdoor and adventure activities and aquatics. Guidelines on whole school and classroom planning were provided. Clear aims were outlined for each area of development within the subject and exemplars provided working examples of adaptations, to accommodate each degree of learning disability. While this is a positive development, emphasis in the document is placed on a "medical model" approach to disability:
The Draft Curriculum Guidelines for students with severe learning disabilities, Volume 3, states:

"Observation of the student's reaction to movement is critical, with activity immediately ceasing if changes in skin tone, such as pallor or flushing, or excessive sweating are noticed. Movement should also cease if there is excessive change in a student's breathing pattern"(The Draft Curriculum Guidelines for students with severe learning disabilities, Volume 3: p. 93).

There is no explanation given as to why this type of reaction might be anticipated from a student with moderate to severe learning disability, as this diagnosis does not infer physical disability or illness per se.

Teachers report successfully using the guidelines to adapt the primary school curriculum, but they would like practical workshops to support these adaptations especially in the area of autism (Evaluation of Education Provision for Children with Autistic Spectrum Disorders, 2006). This is an area that continues to warrant redress to ensure practical delivery reflects the theoretical content of the physical education curriculum and the Draft guidelines for teachers of children with learning disabilities. Concurrent guidelines for other types of disabilities e.g. Physical and sensory disabilities, also need to be developed and implemented, so that quality and safe physical education is available for all.

Understanding Models of Disability

The medical model of disability is a model by which illness or disability is the result of a physical condition, is intrinsic to the individual (it is part of that individual's own body), and may reduce the individual's quality of life and causes clear disadvantages to the individual. As a result, curing or managing illness or disability revolves around identifying the illness or disability, understanding it and learning to control and alter its course. Therefore, and by extension, a compassionate or just society invests resources in health care and related services in an attempt to cure disabilities medically expand functionality and/or improve functioning thus allowing people with disabilities a more "normal" life. The medical profession's responsibility and potential in this area is central (enableireland.ie, 2007). The medical model of disability is often cited by disability rights groups when evaluating the costs and benefits of various interventions, be they medical, surgical, social or occupational: from prosthetics, "cures", and medical tests such as genetic screening or pre-implantation genetic diagnosis (NDA, 2005). Often, a medical model of disability is used to justify large investment in these procedures, technologies and research, when adaptation of the disabled person's environment might ultimately be cheaper and more attainable. Some disability rights groups see the medical model of disability as a civil rights issue, and criticise charitable or medical initiatives that use it in their portrayal of disabled people, because it promotes a negative, disempowered image of people with disabilities, rather than casting disability as a political, social and environmental problem.

The British social model focuses more on society. It claims that people with disabilities are an oppressed social group; it distinguishes between the impairments that people have and the oppression that they experience and it defines 'disability' as the social oppression not the form of impairment (Shakespeare & Watson, 2001). Disability is seen as a social construct, which is built upon impairment but is not a necessary consequence of impairment. The nature and degree of impairment will impact on the child's competence to a varying extent depending on the context, including programmes and services in place from which the child has benefited and the supports currently available to him or her. The key to the definition proposed by this model is a focus on society and its disabling structures, rather than on the person or persons with impairment. In its extreme form, the British social model denies the existence of impairment in the individuals concerned, and it has been criticised for failing to encompass the personal experience of pain and limitation that is often a part of impairment. In addition, it should not be forgotten that some impairments are invisible but may have functional impacts and implications for personal identity and psychological well-being (Shakespeare & Watson, 2001). French (1993) comments 'Some of the most profound problems experienced by people with certain impairments are difficult if not impossible to solve by social manipulation'; and we are reminded that intellectual impairment, for example, exists in an absolute sense and that people with severe intellectual impairments will always need the assistance of the non-impaired, no matter what adjustments are made to the material circumstances in which they live.

As Good (2003) has pointed out, some critics have argued that the social model is insufficiently attentive to the differences between people with disabilities that exist alongside their commonalities and these critics argue for a theorisation of the

heterogeneity of disabled people as a group with diversity, based, for example, on gender, ethnicity, sexuality, age, etc. They would focus more on exclusion than on oppression. An additional point is made by McCarthy (2002), who points out that the social model does not always relate to the lived experience of people with disabilities. She also suggests that the social model's central concern with the deconstruction of power dynamics that create and reinforce the experience of exclusion for disabled people raises some challenging issues for researchers wishing to engage in disability research.

An adequate theory of disability should include all the dimensions of people with disabilities' experiences - bodily, psychological, cultural, social, and political. It should acknowledge that different kinds of impairment (e.g. sensory, mobility, communication, intellectual) have varied implications and that one kind of disability does not necessarily imply the co-existence of another in the same individual. An oppositional body of knowledge and practice is currently being developed that views disability, like childhood, as socially, culturally and historically variable (Barnes, Mercer & Shakespeare, 1999). This alternative model also incorporates the promotion of positive representations of disabled people; puts ' choice' in place of 'control' and, in terms of outcomes, is focused on 'social action' and 'collective identity' instead of on 'individual treatment' and 'individual identity' (Corker & Davis, 2002). It proposes that everyone is impaired or disabled in some way, but that society is more adapted towards the needs of some than of others. The extent to which individuals are enabled to participate in society is seen as crucial in this alternative model. Disability is seen as a dynamic process rather than as a static measure and as an interaction between an individual with impairment and the environment (Mathiowetz, 2001). A rights-based culture requires reciprocity and inclusion and does not focus on the promotion of individual advantage in isolation from or in conflict with the rest of society. It proposes that children should grow up in an environment that enables them to understand the mutuality and reciprocity associated with that respect (Lansdown, 1996).

Primary School Teacher Training in Adapted Physical Education in Ireland

Primary School teacher training is provided in teacher-training colleges, throughout Ireland. Primary school teachers are expected to deliver the entire curriculum including physical education, at primary level. The Physical Education (PE) training component of the course, for each of the teacher training colleges includes adapted physical activity training at undergraduate level. In all teachers training colleges a student passing the subject is deemed qualified to teach Physical Education (PE) to all class groups in our Primary schools, regardless of the child's ability or diagnosis of disability. Time allocation of teacher training colleges for adapted physical education training is as follows over a three year period: 1 hour per week for 22-24 weeks for all students; 1 hour per week for 22-24 weeks for all students; 2 hours per week for 22-24 weeks as an elective taken by 20-40% of students.

Research indicates, that primary school teachers in Ireland, feel that PE training at undergraduate level in teacher training colleges is inadequate for working with typically developed children or their peers with disabilities (Crawford, 2011; Report of the Joint Committee on Education and Science on The Status of Physical Education, 2005; Deenihan, 2005, Report of the People with a Disability in Sport

Taskforce, 1999). Many feel that a physical education teacher should teach physical activity in primary schools, while others argue that to implement the programme a teacher did not need to be a physical education teacher. The Physical Education Association of Ireland (2001) recommends establishing a postgraduate qualification in PE for primary school teachers and sharing a specialist PE teacher between primary schools.

Efforts have and are being made by the Department of Education and Skills and the NCCA to re-shape the Primary School Physical Education Curriculum in Ireland. The curriculum was revised in 1999, which was a definite step forward. However, the recommended time allocation to Physical Education (PE) was not revised and remains at one hour per week, which is currently the lowest in Europe (Canada, 2.5 hrs/wk, France 6 hrs/wk, Spain 3hr/wk, USA 3hrs/wk).

In-service training on this new curriculum was phased across two years. In year one (2004/2005), a one-day in-service was provided for all Primary School teachers in the elements of Games, Outdoor and Adventure activities and Aquatics. In year two (2005/2006), another one day in-service was provided in the remaining three elements of Athletics, Dance and Gymnastics. Teachers reporting on the in-service provision felt that while these days were useful, they were not enough (Deenihan, 2005). A support service for teachers called 'Cuiditheoiri' (usually primary school teachers with an interest in both PE and disabilities), who will assist in PE delivery, was also established. Schools can access this service, through their local teacher education centres. This in-service provision should contribute to some improvement in services in the delivery of Physical Education in our primary schools. As stated, continued difficulties remain both in time allocation and adaptation of curriculum content. There is a lack of support for teachers who have to adapt for children with disabilities.

In Ireland within the school structure, a Special Needs Assistant (SNA) is usually assigned to a child with disability, to support and assist the child during the school day. Special Needs Assistants also require appropriate training to ensure optimum and safe delivery of adapted physical activity (Carey, 2005).
"*Six years ago there were six hundred SNAs in the system, now there are six thousand." (Carey, 2005: p.200).*

This expansion in numbers of SNAs is believed to be due to the increased integration of children with disabilities/Special Educational Needs (SENs) into mainstream settings (Griffin & Shevlin, 2007). Although the role of the SNA is often poorly defined and understood in practice, the NCCA (Book 3 2003), clearly states:
"*A valued member of the school team and under the guidance of teachers, the SNA supports the development of skills and knowledge and assists with the learning needs of the pupil." (NCCA, Book 3 2003:p.17)*

There is evidence that the role of the SNA has expanded over the last number of years. Under the direction of teachers, SNAs are increasingly involved in supporting the learning needs of students (Griffin & Shevlin, 2007). The research of Lawlor and Cregan (2003) found that the SNA was concerned with tasks of an educational nature. However teachers indicated that they required further training in order to work collaboratively with SNAs in the research of Scanlon and McGilloway (2006). Craig

(2006) indicated that schools needed to develop a collaborative code of practice where the SNA works in partnership and contributes to:
"*Supporting students' learning, supporting the student's personal and social development, supporting the teacher and supporting the school." (Craig, 2006, p.251)*

In relation to APA delivery, the SNA can assist in the modelling of activities e.g. demonstrating activities, using hand over hand prompting for individual students (Reid & O'Connor, 2003), where she/he places her/his hands over that of the child's to guide him/her through an activity. The SNA can further support the student in skill generalisation i.e. performing the skill in different environments and small group assimilation i.e. moving from one to one tuition to one to two or three participants in a group (Henderson & Sugden, 1992; Henderson & Sugden, 2007).

It is essential that all SNAs have appropriate training and qualifications, to ensure the delivery of an optimum and safe service to all children with disabilities. This was a clear recommendation of the Autism Taskforce Report (2001). Currently the Further Education and Training Awards Council (FETAC) facilitate a module (recently updated, June 2007) for adults wishing to return to education, on 'Caring for Children with Special Needs' ran over a school year, which goes some way toward training SNAs to work with children with disabilities. Mary Immaculate College, Limerick, also offer a 6-week certificate programme for SNAs, funded by the Department of Education and Skills. A further development is that of The Inclusive Studies Diploma, established at The University of Limerick (May, 2007). This diploma provides comprehensive theoretical and practical content for those intending to work with individuals with disabilities. It runs over two years and includes a module in APA/PE.

Until such time as primary school teachers are appropriately trained in the delivery of adapted physical activity for children with disabilities, specialists experienced in adaptation of physical activity for this particular population would prove beneficial. However, in the current economic climate this is probably unlikely. It is also imperative that schools and educational institutes avail of the expertise of the National Governing Bodies of Sport (NGB) who have placed coaches into schools to coach in their own specific sports i.e. The Irish Wheelchair Association, Cerebral Palsy Sport, and the Football Association of Ireland. Representatives of the NGBs have indicated that schools in need of such support rarely contact them (Crawford, 2011; NDA meeting, Nov 2006). The Dept of Education and Skills should liaise with The Irish Sports Council (ISC) and other sporting bodies, to access all expertise available.

The "Buntus" physical education programme designed by the Irish Sports Council is being implemented by local sports partnerships (LSPs) in primary schools. This programme is developed to promote basic motor and movement skills. This programme is not necessarily delivered by trained PE specialists, but often by graduates of other programmes i.e. Health and Leisure, who may not have training in specific physical education curriculum areas (Personal correspondence, ISC 2006). The LSPs have developed the role of Sports Inclusion Disability Officers (SIDOs) to address the area of adapted physical activity and disability sport. This is dealt with in more detail later.

Physical Education Teacher Education in Ireland (PETE)

The Teacher Education Section (TES) of the Department of Education and Skills is responsible for approving undergraduate and higher diploma courses for teachers in physical education. The National Council for Curriculum and Assessment (NCCA) is the agency responsible for the design of each subject syllabus and the Inspectorate is responsible for evaluating the quality and provision of teaching and learning in the delivery of each of these syllabi. The Inspectorate is also responsible for evaluating the organisation and quality of school management, deployment of allocated resources and support for students, including those with disabilities (PE Inspectorate, Department of Education & Science, 2006).

Physical education teacher education was traditionally available only at the University of Limerick. However this has changed with the advent of new PETE in other higher education institutes (McPhail & Halbert, 2005). Traditionally in the Irish context, physical education graduates work within the post primary school sector. Physical education teachers have indicated that the physical education undergraduate training is also inadequate, with regard to preparing physical education teachers working with children with disabilities (Crawford, 2011; Report of the Joint Committee on Education and Science on The Status of Physical Education, 2005; Report of the People with a Disability in Sport Taskforce, 1999). In 2002, The Physical Education Association of Ireland indicated that 84% of P.E. teachers had not attended in-service training in the area of adaptation of physical activity for children with disabilities. This area is currently being addressed at third level institutes throughout the country. The University of Limerick runs both a theoretical and practical module in Adapted Physical Activity for physical education undergraduates. The University is now also host to The Erasmus Mundus Master's Programme in Adapted Physical Activity.

In the Department of Sport Science and Health in Dublin City University (DCU) an adapted physical activity module has been introduced into the 3rd year of the Sport and Health Science degree programme. Since 2006, DCU also offer a P.E degree including a module on adapted physical activity. University College Cork is host to a B.Ed. Sport Studies and Physical Education degree programme since 2006. A module on adapted physical activity is included in year 4, while Inclusive Games training and social mentoring training are now introduced in year 1. At the Institute of Technology, Tralee, Co. Kerry students of Health and Leisure programmes have options for adapted physical activity modules from year three. A recent study by Crawford, O'Reilly and Flanagan (2012) examining provision, practice and experience of initial PETE providers indicated that time allocation (semester long modules), working with children with disabilities in mainstream settings (school or leisure centre based), lack of collaboration with other PETE providers (n=4) and a need for continued professional development were themes in need of address.

A further attempt to address difficulties within the post primary sector has been the establishment of the Junior Cycle Physical Education (JCPE) support service.

" Through the introduction of the revised physical education syllabus at junior cycle; the JCPE support service aims to influence positively the quality of physical education in Irish post-primary schools. We work towards this aim by providing support, resources and opportunities for the professional development of physical education teachers." (JCPE: p.1, 2004).

The aims of the Support Service are identified as:

- To introduce the junior cycle physical education syllabus with particular focus on planning and pedagogy and assessment.
- To facilitate teachers in the implementation of the syllabus in addressing issues specific to their school context.
- To promote continuing professional development among physical educators
- To maximise the potential of the formal introduction of the syllabus to improve the quality of physical education provision in Ireland.

The support team comprises a National Coordinator and two Regional Development Officers, each team member being responsible for a specific region aligned to the Education Centre Network.
A range of support measures is in place. These include:

1. Provision of teacher guidelines in ring bound form to every participating second level school and a CD ROM version to every teacher.
2. Three one-day professional development courses with a practical focus.
3. School visits on request, for physical education teachers.
4. A dedicated website and biannual newsletter.

The coordinator further indicated that meeting the needs of children and teenagers with disabilities in physical education was a priority area. To this end a steering committee was proposed to bring together ideas as to how best to address this issue in a meaningful way (Personal correspondence, JCPE support service, Jan 2008). However, updates on this initiative are not currently available.

Sport and Leisure Studies Programmes
Courses continue to develop to meet the needs of the health, fitness and leisure industries. Here an opportunity exists to develop Adapted Physical Activity (APA) programmes. At the Institute of Technology in Tralee, Co. Kerry, The Bachelor of Science in Health, Fitness and Leisure Studies provides mandatory and elective modules in APA in both 2nd and 4th year respectively. The Batchelor of Science in Health, Fitness and Leisure Studies Department also provide a community adapted physical activity programme, for people with disabilities. This is in conjunction with different services that cater for a wide range of people with disabilities in Co. Kerry. This is a very positive example of the concurrent development of quality APA provision between a third level institute and community service providers and should be used to promote good practice throughout the country.

Coaching Ireland
Coaching Ireland, formally The National Coaching and Training Centre (NCTC) a Government agency, is based at the University of Limerick. It provides support services to athletes, coaches and National Governing Bodies of Sport (NGBs). Coaching Ireland has developed a disability awareness module for coaches and is currently promoting the Pathways approach for developing physical literacy and promoting individual development goals for all athletes including those with disabilities. Coaching Ireland works with NGBs of Sport for Disabilities to promote and support their work. The development of a disability awareness module for

coaches indicates the commitment of Coaching Ireland, to promote appropriate quality physical activity, for individuals with disabilities.

CARA Adapted Physical Activity Centre

In November 2007, the CARA Adapted Physical Activity (APA) Centre was established and supported by the Irish Sports Council and the Institute of Technology Tralee, county Kerry, Ireland. The main aim of the CARA APA Centre is to facilitate an increase in the number of people with disabilities participating in sport and physical activity. To this end, the CARA centre became the national coordinator of the National Sports Inclusion Disability Officer (SIDO) Programme. In 2008, a National Network of Local Sports Partnerships throughout the country was launched. Located within 20 of these Local Sports Partnerships, there is a local SIDO. This emulates the established model of good practice promoted in Wales by the Federation of Disability Sports Wales in 2003. The stated objectives of the SIDO role include: (a) to increase numbers of people with disabilities participating in sport and physical activity on a regular basis, (b) to support current work of disability sports and physical activity clubs and disability organisations (c) to encourage and support mainstream sports and physical activity clubs in including people with disabilities. A study by O'Reilly and Crawford (2009) examined the development of this initiative and found that while the stated objectives were being broadly addressed, SIDO's themselves identified a need for ongoing training from theoretical and practical perspectives in the combined areas of physical activity and disability awareness. SIDO's also indicated a need for community sport facilities to be more aware of disability and inclusion issues of access and fees.

International examples of Good Practice in the Provision of APA

There have been considerable developments in the last decade in terms of adapted physical activity provision for people with disabilities internationally. In Europe, the initial development in adapted physical activity saw the establishment of The European Federation of Adapted Physical Activity (EUFAPA) in the eighties. This organisation is concerned with

"The promotion and dissemination of experiences, results and findings in the fields of adapted physical activity and sport science and their practical application to the benefit of individuals across the life span."

A further development in APA in Europe is that of the establishment of The European Standards in Adapted Physical Activity (2010) which aimed to contribute to more social inclusion by setting up the standards for training professionals who will be responsible for inclusion in the areas of physical activities. The project presented a theoretical framework of professional competencies needed by those working in the area of APA. Contributors to EUSAPA identify the need to consider the development of the role of Adapted Physical Education Specialists as exists in the United States. However, in the current climate of European Economic recession this is highly unlikely. Meanwhile, the European Inclusive Physical Education Training, EIPET (Kudláček, Jesina, & Flanagan, 2010) has been designed to address emerging needs of ITT PE Provision and is readily available to all PETE providers. Aims of the EIPET project (2010, p.2) are:

(a) To transfer the innovative model at the Institute of Technology, Tralee (ITT), Ireland of teaching inclusive physical education to partner organisations in initial and continued vocational training, thus improving the quality and volume of cooperation

between institutions in Europe; (b) To critically examine and adapt the inclusive physical education training module in ITT with the guidance of internationally acclaimed partner organisations and associated APA network contacts; (c) To progress towards the Education and Training work programme 2010 priority areas through; advancing peer learning activities, facilitating the development of innovative practices, promoting excellence and equal opportunities, enabling learning to cater for rapidly changing work environments, and enabling efficiency and equity in education and training systems; (d) To empower teacher training providers and PE teachers with the knowledge, skills and competence to operate effectively in the work environment; (e) To facilitate equity of opportunity in Physical Education for all; (f) To develop a resource pack to accompany the model and modules and make it available for download from the project website (www.eipet.eu) or available on CD. This development very clearly embraces theoretical content and hands on praxis based on a successful example of good practice.

Examples of good practice in England, Wales, Northern Ireland, Australia, and New Zealand are now outlined.

Wales

In the 1970s and 1980s there were a number of National Disability Sports Organisations in Wales but there was little co-ordination between them. The Sports Council for Wales brokered a meeting with these organisations and in 1985 the Federation of Disability Sports Wales (FDSW) was born. FDSW Wales brings together National Disability Sports Organisations, which are catering for children and adults with autism, and sports-specific organisations (for sports such as Wheel-chair Tennis, Sledge Hockey, Cricket and Badminton).

For the first decade the FDSW struggled to survive. A turning point came with a number of developments in the mid-90s. These included the appointment of a Sports Development Officer for people with a disability (1995); a report to Sports Council Wales on professional structures (1998); the appointment of a Community Sport Co-coordinator/National Performance Officer (1998) and a commitment of lottery funding for Disability Sports Cymru that funds a grassroots scheme (1999). Disability Sport Cymru is a joint initiative between FDSW, the Sports Council for Wales and Local Authorities in Wales. From a base of 10000-15000 Pounds sterling per annum in the 1990s the funding stream is now 800,000 Pounds sterling per annum. The FDSW is a strategic development agency not a National Governing Body of Sport. It takes a pan-disability approach. It works with a wide range of partners including the local authorities. It focuses on investment in community sport and investment in National Performance Programmes. (Presentation, Jon Morgan, Director of Disability Sport Cymru, Wales at the 2nd National APA Conference in Ireland, May 2005). The FDSW is recognised by the Sports Council for Wales and the Welsh Assembly Government as the national governing body with responsibility for the strategic development of sport for people with disabilities. It promotes and develops quality sports opportunities. Its' aim is to be able to offer everyone with a disability including those on the autistic spectrum, the opportunity to achieve a full and active role within their sporting communities, whilst at the same time providing a structured "pathway" through which talented sports performers can compete at the highest levels of sport (www.fdsw.org.uk).

The achievements of the FDSW in the last number of years are impressive. There is a successful Community Sports Programme as well as success in elite competition (see appendix 3 for an exploration of the concept elite athlete). The FDSW planned three phases of development: (1) laying the foundation (2000-2003), (2) building the framework (2002-2004) and (3) focusing opportunities (2005-2008). In the first phase the strategy of the FDSW was to deliver National Sports Development Programmes locally. This involved working with all 22 local authorities and obtaining from them a commitment to host disability sport posts. Disability Sports Development Officers were initially part-time posts but now 70% of these posts are full-time and funded by the local authorities. There are 22 disability sports officers established in local authorities in Wales - one in every county. These officers work with individuals with physical, learning and sensory disabilities, without exception.

The second phase included training the disability sports officers to deliver a strategy that had clear aims and targets. They worked, first, to achieve participation and then to convert participation into membership. The National framework was used with a focus on clubs, coaches, volunteers and, finally, competitions. The outputs were significant between 2002-2004 with increased participation, 3,500 new members and 350 new or improved clubs. In the third phase there is an emphasis on developing programmes that reflect local need, providing strategic funding for community projects, providing both recreational and competitive programmes, responding to changing environments (integration/ education/ sport/ political climate/ health agenda), challenging opportunities across disability/impairment and providing foundation for a player pathway to higher levels of performance. Performance indicators in this third phase include numbers of club members, participation opportunities, coaches, volunteers, competitions and clubs by age, gender, disability/ impairment, sport (paralympic/ deaflympic etc), non-disabled/disabled split and recreation/ outdoor/ school into community.

A subsidiary Ltd Training Company has been set up for community training. It adopts a consortium approach with other providers and focuses on inclusive or adapted physical activity in the community, disability specific training, volunteering and club development. An inclusive document, *Climbing Higher* - 2020, sponsored by the Welsh Assembly, proposes that: everyone would reach 30 minutes of physical activity five times a week; all children of primary school age would achieve 60 minutes of physical activity five times a week and that 90% of children in secondary schools would achieve five 60 minute sessions a week and that all secondary schools would have two hours of curricular activity and one hour extracurricular physical activity weekly. Within this structure the physical activity needs of children with autism are assessed and addressed (Presentation, Jon Morgan, Director of Disability Sport Cymru, Wales at the 2nd National APA Conference in Ireland, May 2005).

In addition to increasing community participation there is a focus on *'Bridging the Gap*' from playground to podium - 'developing tomorrow's champions today'. Performance within paralympic sport, deaflympic sport, intellectual disability (including autism and learning disability), and sports specific competition has been targeted. Focus sports have been identified that reflect priority sports in the community. Geographical clubs have been targeted that can act as 'feeders' and

education and integration models are being developed for the focus sport NGBs. In addition, coach education, a strategic competition structure and a Welsh academic structure are being developed. This latter structure is a pan-disability academy system for athletes with potential and includes talent identification and development, appropriate athlete support and financial backing and corporate sponsorship. The Sports Specific Performance pathway is from Disability Sport at the base of the pyramid, through community clubs, sport specific clubs, academies of sport, the Welsh squad to the Great Britain Squad (Presentation Jon Morgan, Director of Disability Sport Cymru, Wales at the 2nd National APA Conference in Ireland, May 2005). The targeting of specific sports has paid dividends even in the short term. In swimming there has been a Welsh Assembly Free Swim Programme, the establishment of fifteen Halliwick Clubs, the provision of opportunities to learn to swim, the establishment of twelve development clubs and one performance club. In the Paralympics in Athens 2004, the Welsh team had five athletes who took fifteen medals in swimming - seven gold, four silver and four bronze, which amounts to 30% of Swim GB Total Medal Haul and 43% of Swim GB Total Gold Medal Haul. Again performance services and tight performance indicators have been developed (Gerwyn Owen, Swimming Development Officer, FDSW at the 2nd National APA Conference in Ireland, May 2005).

Australia

The role of the Disability Sports Unit (DSU), part of the Australian Sports Commission, is to ensure that all Australians have opportunities to participate in sporting activities at the level of their choice. To achieve this, the DSU provides direct practical assistance to national sports organisations to assist them with the inclusion of people with disabilities in both disability and non-disability specific sport. It provides a specialist national network of disability education and support personnel who can work with National Sports Organisations and other sports providers to increase their confidence, knowledge and skills to create better opportunities for more people with a disability.

The DSU has three programmes to further its aims:

1. The Disability Education Programme provides training and resource material for teachers, coaches, club administrators, leisure facility managers, officials and community leaders to help them include people with disabilities in what they do and to provide training modules designed to address a range of needs across sport, school and community. This resource material provides clear approaches to the inclusion of children with learning disabilities in physical activity and sport.
2. The purpose of the CONNECT project, a joint venture between the Australian Sports Committee and the Australian Paralympic Committee, is to break down the barriers to participation within disability and non-disability specific sport and to create sport pathways for athletes with a disability. They attempt to do this by negotiating a range of support programmes (awareness and skills training, accreditation and standards, classifier support, training and athlete support) with targeted national sports organisations.
3. The third programme, the Sports Ability Programme, was set up to encourage an increased rate of participation in sport by people with disabilities by

providing equipment, resource material and training for five specific disability sport activities to be delivered in 150 special schools and 20 indigenous communities. The programme primarily targets young people who have complex and higher support needs which incorporates individuals with autism and learning disabilities, although all the activities are designed to be fully inclusive in nature, providing a medium for the co-operative involvement of people with and without disabilities (www.ausport.gov.au, 2006; NDA, 2005).

England

In England, in 1998, the English Federation of Disability Sport (EFDS) was formed. It is a federation of voluntary organisations and regional bodies. The formation of the EFDS was initially driven by Sports England who wanted to negotiate with one umbrella body rather than with a multiplicity of bodies (Colin Chaytors, presentation at 2nd National Adapted Physical Activity Conference in Ireland, May 2005).

Sport England gives the EFDS more than one million pounds sterling annually in grant aid. Since its formation, the EFDS has made considerable progress in increasing sporting opportunities for people with disabilities through a number of initiatives. These include the *Inclusive Fitness Initiative* (Inclusive and Accessible Equipment provided in 150 sites across England and marketed to people with disabilities), *Ability Counts, One Small Step, Athletes as Advocates* and the first UK Disability Sports Conference in March 2003. The EFDS has formulated a Development Framework 2004 - 2008 called *Count Me In*. This framework outlines the core issues that need to be tackled, but how the core issues should be tackled is left up to each of the regions (Colin Chaytors, presentation at 2nd National Adapted Physical Activity Conference in Ireland, May 2005). The EFDS framework outlines core principles, key elements, objectives and a number of targets for each objective. It emphasises education and training, community based sporting opportunities, sporting pathways, mainstreaming, including Whole Sport Plans on the part of NGBs (participation, performance, gender balance, demonstrate how it is inclusive), talent identification and facilitating grassroots level provision. These developments are inclusive of all disabilities i.e. autism and learning disabilities.

New Zealand

In New Zealand, a government agency/ commission, the Hilary Commission (an independent statutory body established by the Sport, Leisure and Fitness Act, 1987) had the brief to ensure that all New Zealanders enjoyed sport and active leisure and engaged in physical activity. " No Exceptions" is the name of the policy and strategic plan formulated in 1998 by the Hilary Commission for New Zealanders with a disability. As with the Disability Sports Unit in Australia, the Hilary Commission has worked with national sports bodies, regional sports trusts, disability agencies and other national and regional organisations. In 2002 the Hillary Commission amalgamated with New Zealand Sports Foundation and the policy arm of the Office of Tourism forming a new body called SPARC - Sport and Recreation, New Zealand (www.sparc.org.nz, 2002).

The guiding principles of the policy and strategy " No Exceptions" include: that people with a disability engage in physical activity, leisure and sport for the same reason as all New Zealanders i.e. they want to enjoy themselves, be challenged and reap the benefits of a healthy lifestyle; they need opportunities to take part in sport at their own level of interest and ability; those who want to play sport in an integrated setting can do so in an environment that protects their rights and dignity; they are entitled to coaches, role models and leaders in their chosen sport or activity: they have access to services and support networks that enable them to excel in their chosen sport and sport facilities, clubs and public leisure areas are accessible to people with a disability and sport and leisure programmes are available to all people with a disability (www.sparc.org.nz). Again people with specific disabilities i.e. autism are included without exception.

Northern Ireland

Disability Sport Northern Ireland (DSNI), like EFDS in England, is an umbrella organisation for the NI Association for people with Learning Difficulties, N.I Blind Sport, N.I Association for people with physical disabilities and the Ulster Deaf Association was launched in 1998. Organisational changes in the DSNI in 2001 have brought responsibility for people with hearing, learning and physical disabilities directly under DSNI. NI Blind Sport continues to operate under the umbrella of DSNI. The reorganisation is an attempt to provide a more unified approach and stronger voice for disabled sport. The Department through the Sports Council have directly funded DSNI and the development of their strategic four-year plan. This includes the development of DSNI's Disability Sports Strategy and a range of disability sport programmes. The Sports Council also provides grant to the four sports represented by DSNI (www.ofmdfmni.gov.uk, 2006).

In distributing Lottery Funding the Sports Council in Northern Ireland prioritises projects that provide opportunities for people with a disability by providing a higher percentage of funding for these projects. In addition every capital project funded by the SCNI Lottery Fund is required to provide for people with a disability and the SCNI criteria are drawn up in conjunction with disabled groups. The Sports Council through the established DSNI group has attempted to ensure that full and equitable opportunities exist for people with disabilities to participate in and develop sport in Northern Ireland. The Sports Council also work to promote the inclusion of people with disabilities into mainstream sport and has provided assistance to some governing bodies such as swimming, tennis, athletics and sailing to ensure adequate provision for disabled people (www.ofmdfmni.gov.uk, 2006).

These examples of international good practice promoting the involvement of people with disabilities in physical activity including children and adults with autism are clearly structured in aims, objectives and realistic goals. Their respective governments are committed financially in developing physical activity for all. Clearly countries like Ireland need to use these templates of good practice to promote quality physical activity for children and adults with disabilities such as autism and learning disabilities.

Summary, Conclusions and Recommendations

The quality of physical education APA provision at third level institutes needs consideration. Undergraduate training at teacher training colleges must consider physical education for students with disabilities, in a realistic manner. Teachers need to focus on the potential and abilities of students with disabilities and to challenge them. Inclusive education involves a person centred, inter-cultural and integrated educational approach that validates the experience of all students. The inclusion of comprehensive modules in both physical education and its adaptation needs to be ensured for all trainee teachers at primary and post primary levels.

Monitoring and support of curriculum delivery at all educational institutes is essential to ensure the delivery of quality physical education for all. The role and training of the special needs assistant (SNA) is an area that also needs to be addressed. Use of NCCA guidelines needs to be supplemented with training. Draft guidelines are also required for teachers of students with physical and sensory disabilities. Training for service providers in the health and leisure industries is an area that also warrants attention. Coaches and NGBs of sport should also have relevant training in disability awareness.

In Ireland, examples of good practice e.g. the joint venture between service providers in the community and the Institute of Technology, Tralee, Co. Kerry, should be rewarded and encouraged throughout the country.

The role of the Irish Sports Council needs to be more clearly defined, in relation to Adapted Physical Activity development and provision. Direct liaison through Local Sports Partnerships (LSPs) and National Governing Bodies of sport (NGBs) could promote development at national and local level in the field of disability sport. The appointment of Sports Development Officers for people with disabilities, in both the ISC and LSPs, is an essential and positive development.

International examples of good practice in the delivery and funding of adapted physical activity for people with disabilities should be examined and where feasible emulated.

Overall, some progress has been made in Ireland, in relation to the promotion and development of education and training in physical activity structures and practice, for individuals with disabilities. However, greater commitment from relevant Government Departments and other official organisations is necessary to ensure greater progress is made at an educational level. Appropriate and quality physical activity provision is both a right and entitlement for all children and adults with disabilities.

CHAPTER THREE

AUTISM

Chapter three examines the condition of autism. This includes a detailed overview of autism including history, definition of the conditions on the autistic spectrum, how a diagnosis is reached, how autism presents, possible causes, proposed theories, interventions and an evaluation of current practice in Irish schools, catering for children with autism. The chapter closes with a summary, conclusions and recommendations.

History of Autism

Wing, 2002 and Frith, 2003 outline the history of Autism, especially "The Wild Boy of Averyron" which provided a poignant account of a young boy called Victor, who had been found living wild in the woods in the 1800s. He was placed in the care of a French doctor, Jean Marc Gaspard Itard. Victor presented with bizarre behaviours and no apparent speech, which Itard attributed to his previous lack of contact with other humans. However, Philippe Pinel a physician of that time disagreed with Itard, instead believing Victor had generalised learning difficulties from birth. Itard's papers were later collected and published. Many of the examples of Victor's behaviours concurred with that of a child with autism. He never learned to speak. When Victor wanted to ride in a wheelbarrow, he would take someone by the arm, place their hands on the handles and wait to be pushed. Victor had a 'decided taste for order' and would return items to their exact place when moved. Itard's attempts to develop Victor's play skills were unsuccessful, usually resulting in Victor destroying the toys when left alone. Already this points to a unique presentation of a condition that at that time warranted Itard to record Victor's reactions and behaviours as unusual.

Throughout the eighteen and nineteen hundreds, other accounts were written about individual children presenting with similar type behaviours, usually non-verbal and lacking in their ability to interact with others. In 1943, Leo Kanner published a paper about a group of children referred to his clinic with unusual behaviour patterns, which he termed 'early infantile autism.' Detailed descriptions of the children's behaviours were given. Those features essential for a diagnosis included lack of emotional contact with others, insistence on sameness in repetitive routines, lack of or delayed speech, fascination with manipulation of objects, strength in visual and spatial awareness, learning difficulties in other areas and an unusually attractive, alert appearance. Kanner felt the condition was present from birth, or within the first 30 months of life. Kanner's work is now the focus of much research, throughout the world.

In Austria, Hans Asperger (1944) published a paper, describing a group of children with another pattern of behaviour, now known as Asperger's Syndrome (AS). Features in this instance included inappropriate social approaches to others, intense interest in particular subjects such as timetables, monotonous speech, poor motor coordination, varied level of ability, often superior in one area but delayed in another and a lack of common sense. Asperger believed this syndrome was different to that of Kanner's autism, despite many similarities. Because of the Second World War, Asperger's work took some time to reach the international domain. However in

1981, the set of behavioural symptoms observed by Asperger in 1944 received a mention in a paper published by Lorna Wing. This mention was the beginning of the condition being recognised in the United Kingdom. Uta Frith wrote the first book in English on Asperger syndrome in 1991 and the condition was subsequently recognized in formal diagnostic manuals later in the 1990s.

After the publication of Kanner's paper, psychoanalysts (Bethelheim, 1967; O'Gorman, 1970) believed that autism was an emotional disorder caused by lack of parental bonding, a theory that caused further distress to already distressed parents and such theories abounded until the 1960s (Wing, 2002). In 1968, Rutter began to examine concepts of autism and language disorders and established that behaviours of children with autism should be viewed as disorders of development starting from birth or early childhood. In 1985 Rutter further differentiated between autism and childhood schizophrenia. Howlin (1998), outlined the differences between both conditions as follows: age of onset for autism is usually before 3 years, while schizophrenia is late teens to early adulthood, the course of the disorder is usually evident early on for autism, while schizophrenia rarely manifests with severe delay in early life, presentation of autism is usually associated with language impairment which is not evident in schizophrenia, cognitive impairments are common in autism and rare in schizophrenia, incidence is much higher in autism than schizophrenia, organic features i.e. epilepsy is more common in autism than in schizophrenia and to date there are no successful pharmacological treatments for autism while antipsychotic medication is successful in many cases in treatment of schizophrenia.

In 1962, voluntary organisations were established in both the U.K. and the U.S.A to support parents and professionals working with children with autism. It soon became clear that all children did not fit Kanner's description of autism. However, many had similar problems and needed similar help. These societies have helped raise awareness of autism and its varying presentations and are now commonplace, both at national (The Irish Society for Autism) and international levels (National Autistic Society, Autism Society of America).

In the U.K., in 1962 a group of parents, frustrated with the lack of provision and support for children with autism and their carers, and whose children had been labelled 'ineducable' came together and formed The Society for Autistic Children which later became The National Autistic Society (NAS). Their aim was to encourage a better understanding of autism and to pioneer specialist services for people with autism and those who care for them. Initially working out of Helen Green Allison's back room, with a handful of members and little funding, the NAS has come a long way since then. Today, the Society has grown into the UK's foremost organisation for people with autism and those who care for them, spearheading national and international initiatives and providing a strong voice for autism. The organisation works in many areas to help people with autism live their lives with as much independence as possible.

Bernard Rimland founded The Autism Society of America in 1965. His book, *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior*, was written in late 1964 and was one of the first of its kind. Over the last 40 years, the Society has grown from a handful of parents, into the leading source of information, research, and reference on autism. ASA is the oldest and largest grassroots

organization within the autism community. Today, more than 120,000 members and supporters are connected through a working network of nearly 200 chapters nationwide. ASA membership continues to grow as more and more parents and professionals unite to form a collective voice representing the autism community. ASA is dedicated to increasing public awareness about autism and the day-to-day issues faced by individuals with autism, their families and the professionals with whom they interact. The Society and its chapters share a common mission of providing information and education, and supporting research and advocating for programs and services for the autism community.

In Ireland, The Irish Society for Autistic Children (I.S.A.C.) was founded in 1963 and was renamed The Irish Society for Autism (I.S.A.) in 1992. After its foundation I.S.A.C. realised that the initial enthusiasm of professionalism and statutory bodies very quickly subsided and then failed to provide the specialised services required by children with Autism. The long campaign of education and creating awareness, insisting on the need for early diagnosis, early intervention and above all appropriate education began. While this campaign was in motion the Society in partnership with a Regional Health Authority, the Eastern Health Board, set about developing services for young adults with autism who unfortunately were at that time in totally unsuitable psychiatric hospitals. For some time the Society had been aware of developments in the U.K. and France, where community based rural projects had been established and had proven very successful i.e. the La Bourguette farm complex near Aix en Provence, in the South of France, and also Somerset Court, Longford Court and Anglesea Lodge in the U.K. The society was encouraged by the tremendous achievements observed in other places and used such templates to form the basis of the first development in Ireland of an integrated, rural based community for persons with autism. The Irish Society for autism is now joined by numerous registered charities and support groups, which collectively make up the autism alliance in Ireland. This development is further evidence of parental pro-action in the face of perceived inaction by government in meeting the needs of children and adults with autism in Ireland. As outlined in Carey (2005), driving these parental forces were the landmark cases of O'Donoghue (1992-1993), Sinnott (1998-2000) and O'Cuanachain (2005-2007): where parents of individuals with autism undertook to challenge respective Irish Governments in pursuit of their children's right to a fair, equitable and appropriate education.

These parent driven developments put autism research and development on the international stage, creating greater awareness of the needs and rights of this unique group within communities. Coupled with the development of voluntary organisations, in 1979, Wing and Gould examined the issue of autism and learning difficulties in the former borough of Camberwell in London. Their findings indicated that Kanner's autism and Asperger's syndrome were sub-groups among a wide range of disorders affecting social interaction and communication. They indicated that these sub-groups could be associated with any level of intelligence and that they were sometimes associated with physical, developmental and psychiatric conditions. This was to lead toward the concept of a 'spectrum' of autistic disorders.

Throughout the 1980s research also centred around the development of teaching and behavioural interventions for children and adults with autism; Applied behaviour

analysis (Lovaas, 1987 Maurice, 1993) TEACCH (Schopler, 1966; Mesibov, 1987), Daily life Therapy (Kithara, 1964, Quill, 1982) Picture Exchange Communication System (Bondy & Frost, 1982) to mention but a few emerged as being successful approaches for this particular population. Theses interventions are dealt with in detail later in the chapter.

Research into causative factors continues to be pursued. Genetic factors were examined from the 1970s to the present day (Rutter, 2000; Frith, 2003, Trinity College Dublin, 2006 -2012). Environmental issues are also the basis of research, with the MMR vaccine creating an international cause for concern. In 1998, a study of children with autism by Dr Andrew Wakefield raised the question of a connection between MMR vaccine and autism. The 1998 study had a number of limitations. For example, the study was very small, involving only 12 children. In addition, the researcher suggested that MMR vaccination caused bowel problems in the children, which then led to autism. However, in some of the children studied, symptoms of autism appeared before symptoms of bowel disease. In 2004, 10 of the 13 authors of the 1998 study retracted the study's interpretation. The authors stated that the data were not able to establish a causal link between MMR vaccine and autism. Other larger studies have found no relationship between MMR vaccine and autism. Researchers in the UK studied the records of 498 children with autism born between 1979 and 1998. They found the percentage of children with autism who received MMR vaccine was the same as the percentage of unaffected children in the region who received MMR vaccine. There was no difference in the age of diagnosis of autism in vaccinated and unvaccinated children. The onset of "regressive" symptoms of autism did not occur within 2, 4, or 6 months of receiving the MMR vaccine. Groups of experts, including the American Academy of Paediatrics, agreed that MMR vaccine was not responsible for recent increases in the number of children with autism. In 2004, a report by the Institute of Medicine (IOM) concluded that there was no association between autism and MMR vaccine, or vaccines that contain thimerosal as a preservative (www.cdc.gov.com, accessed April 23rd 2008).

Developments from Kanner's original diagnosis, have led to many questions being asked about this very unique condition. A proactive response of parents both internationally and nationally over the past thirty years has served to heighten awareness of autism including its presentation and different intervention approaches. Causative factors ranging from neurological dysfunction, genetic influences to environmental risks remain unsubstantiated without empirical research, indicating that autism still remains an enigma.

Autistic Spectrum Disorders

Autistic Spectrum Disorders (ASDs) is used to denote Autistic Disorder (also referred to as autism), Pervasive Developmental Disorders-Not Otherwise Specified (PDD-NOS) and Asperger's Syndrome as set out in the Diagnostic and Statistical Manual of Mental Disorders (2000). The two main classification systems used by health professionals include The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, (ICD-10, 1994) and the Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association, Fourth Edition, Text Revision, (DSM-IV-TR, 2000). Both classifications take Wing and

Gould's view of the existence of a spectrum of disorders, as outlined in the last section.

The Pervasive Developmental Disorders (PDDs) listed in the DSM-IV-TR system include:

i. Autistic Disorder
ii. Asperger's Syndrome
iii. Childhood Disintegrative Disorder (not an autistic disorder)
iv. Rett's Disorder (not an autistic disorder)
v. Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS)

In accordance with practice at the U.S. Department of Health and Human Services, Centres for Disease Control and Prevention, the term ASDs is used collectively to refer to numbers i), ii) and v) above.

Autistic Disorder

DSM-IV-TR (2000), states that autistic disorder presents with a child indicating difficulties or abnormalities in social interactions, communication and imagination. The child often displays both restrictive and repetitive behaviour. Diagnosis is usually made before the age of three years. Difficulties in diagnosis can cause a delay in establishing the presence of the condition. These difficulties are dealt with in greater detail later in the chapter. Autistic disorder is more common in boys. Autistic disorder and autism refer to the same condition.

Asperger's Syndrome

Asperger's Syndrome is also characterised by abnormalities in reciprocal social interaction and restrictive and stereotypical interests. However, it is distinguished from autistic disorder by:

"*No clinical significant delay or retardation in cognitive development or in language acquisition" (DSM-IV-TR, 2000, p.70).*

Diagnosis of Asperger's Syndrome may not be made until the child is four or five years old (DSM-IV-TR, 2000).

Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS)

This condition is characterised by severe and pervasive impairment in the development of reciprocal social interaction, associated with either verbal or non-verbal communication skills. The child may present with stereotypical behaviour but does not meet the diagnostic criteria for autistic disorder or Asperger's Syndrome (DSM-IV-TR, 2000). Age of onset for PDD-NOS is after three years of age.

Diagnosis of Autism

Diagnosis of autism is usually made by recognising patterns of behaviour present from early in life (Wing, 2002). The main systems for diagnosis are the DSM-IV-TR and the ICD-10 as previously mentioned. Concurring diagnostic factors include impairments of social interaction, communication and imagination. These are also accompanied by rigidity of routine and repetition of activities. Wing (2002) also indicates the importance of compiling a detailed personal history with parents. This should include the history of development from infancy and a detailed description of

current behaviour. The behaviour of the child should be observed. An experienced psychologist should carry out psychological assessment using a range of psychological tests. These are accompanied by questions designed specifically to diagnose autism.

Wing (2002) and Shattuck and Grosse (2007) indicate that difficulties of diagnosis can arise for a number of reasons. These include:

- Impairments can be shown in many ways, some of which are subtle and not recognisable, i.e. a child may chose not to make eye contact or use his repertoire of vocabulary for no apparent reason (Howlin, 1987; Wing, 2002).
- Varying levels of intelligence can accompany autism from high functioning to profound disability (Wing, 2002). Varying reports as to the incidence of co-occurring learning disabilities with autism lead to greater confusion. Reports of 25-75% of concurrent learning disabilities exist (Dewey & Tupper, 2004). Difficulties of diagnosis of both autism and co-occurring learning disabilities provide a huge challenge to diagnosticians and service providers (Evaluation of ASD provision in Irish Schools, 2006). Definitive diagnosis of autism and co-occurring learning disabilities is often not made until the child is school going age, approximately 4years old (Jordan, Jones &Murray, 1998).
- Autism can occur with other physical conditions e.g. epilepsy or psychiatric conditions e.g. schizophrenia (Wing, 2002, Frith 2003). In this instance priority is often given to the treatment of the physical condition, where medication may mask presenting characteristics of autism.
- Changes in behaviour can occur with increasing age (Wing, 2002; Frith, 2003, Reid & O'Connor, 2003). This is particularly so if a particular intervention is proving effective with challenging behaviour i.e. applied behaviour analysis (Greeen, 2003; Nikopoulos & Keenan, 2006).

- Environment can influence behaviour patterns. Wing (2002) indicates that home environments where parents have many competing demands for attention may lead to behaviour issues that may not occur in a well-organised school or workplace. Lack of structure and predictable routine can create difficulties in behaviour in changing environments (Mesibov, 1997).
- Behaviour can vary, according to the person the child or adult is with (Wing, 2002). Lack of familiarity can cause the child to withdraw or indeed react suddenly by biting or screaming (Mesibov, Schopler & Hearsey, 1994).
- Education can affect behaviour patterns. Jordan, Jones and Murray (1998) clearly identify the positive effects of early intervention for the child with autism. Mannerisms can be addressed; vocabulary both expressive and receptive can be encouraged and promoted. Alternative communication aids can be introduced which can lead to further reductions in behaviour issues. Interaction with typically developed peers can positively promote social interaction and communication, making definitive diagnosis more difficult.

- The individual's personality can affect behaviour. Wing (2002), Frith (2003) and Nikopoulos and Keenan (2006) all indicate that children with autism are a heterogeneous group, often presenting in different ways. Personality types can include the aloof, the passive, the active but odd and the over formal stilted groups (Wing, 2002). The behaviour of the passive group in particular, may not be an issue.

This array of difficulties with diagnosis identifies the need for comprehensive screening techniques and clearly defined diagnostic criteria to be established. This is particularly so where co-occurring morbidities may also be present. Difficulties and delay with the diagnosis of autism can lead to a delay in the implementation of intervention strategies necessary for overall child development to adulthood for this disorder. These interventions are essential for the overall holistic development of the child with autism to promote development of daily living skills, participation with peers and to work toward independence in the long term (Jordan, Jones & Murray, 1998; The Report of The Task Force on Autism, 2001).

In the Irish context, The Report of The Task Force on Autism (2001) clearly states that diagnostic criteria for ASDs need greater clarity, which can only be attained by revision of diagnostic manuals.

Presentation of Autism

Presentation of autism varies with each individual; however the triad of impairments of difficulties in reciprocal social interaction, communication and lack of flexible thinking are common to all.

> "*There are no behaviours per se that by their presence or absence indicate autistic spectrum disorders; it is the overall pattern and underlying difficulties that define autism" (Jordan, Jones & Murray, 1998, p.14).*

Constantino and Gruber (2005) describe social responsiveness behavioural observations as follows:

"(1) Social Awareness is described as the ability to pick up on social cues. Items in this category represent the sensory aspects of reciprocal social behaviour e.g. make eye contact. (2) Social Cognition is the ability to interpret social cues once they are picked. This category represents the cognitive-interpretive aspects of reciprocal social behaviours. (3) Social Communication includes expressive social communication. This category represents the motoric aspects of reciprocal social behaviour. (4) Social Motivation is the extent to which the individual is motivated to engage in social interpersonal behaviour; elements of social anxiety, inhibition and empathetic orientation are included. (5)Autistic mannerisms including stereotypical behaviours are a feature of the condition" (Constantino & Gruber, 2005, p.17).

For the child with autism difficulties occur in these areas of social development and is described as atypical (Wing, 2002). From early childhood this can be seen as a lack of interest in people, a failure to show eye contact, facial expressions and body language in which even young babies engage and indeed can be engaged (Mundy, Sigman & Kasari, 1994). These skills may or may not develop over time. This is often dictated by each individual's level of impairment of autism. Individuals with high functioning autism continue to experience difficulty with complex and subtle

rules of verbal and non-verbal behaviour that govern social behaviours. They may often appear disinterested, naïve or extremely awkward in their social relationships (Dewey & Tupper, 2004; Frith 2003; Wing, 2002). In individuals with moderate to severe degrees of autism, these basic skills may never develop (Dewey & Tupper, 2004).

Impairment occurs in both verbal and non-verbal communication. Some individuals with autism do not develop spoken language (Bryson & Smith, 1998). Individuals with autism may also have difficulty acquiring gestured communication skills (Seal & Bonvillian, 1997). Expressive and receptive language abilities are usually delayed or disordered: verbally able individuals with autism tend to be literal, pedantic and repetitive. Pragmatic skills are usually affected with the individual displaying a limited appreciation of others points of view (Frith, 2003; Dewey &Tupper, 2004).

Autism is also characterised by rigidity in both cognition and behaviour. Delayed development of play skills emerge early on in childhood (Wing, 2002; Frith, 2003). Stereotypical handling or arranging of objects e.g. lining up toys, tend to predominate over imaginative play. Autistic mannerisms including stereotypical behaviours are a feature of the condition (Constantino & Gruber, 2005). Changes in routines and surroundings can cause a high degree of distress to individuals with autism (Jordan, Jones and Murray, 1998). Preoccupations can develop with particular objects.

Repetitive motor mannerisms and adherence to behaviour routines are commonplace (Wing, 2002). These movements are usually associated with excitement, agitation or anger (Wing, 2002; Frith, 2003). Abnormalities of gait and posture may also occur. Children with autism often walk with shoulders and head bent forward and often climb steps without alternating feet. Difficulties can occur with fine and gross motor movements (Sherrill, 1998; Reid & Collier, 2002; Ghaziuddin & Butler, 1998). This is further reflected in participation in physical activities and games. Individuals with autism often prefer individual rather than team sports, as planning and organising movement can prove difficult. Children with autism often have difficulty imitating movements, which further impairs social behaviour (Howlin, 1997).

Reid and Collier (2002) indicate that an examination of movement behaviour of individuals with autism has led to a fundamental question. Does empirical literature support delayed, average or precocious movement skills in autism compared to their typically developed peers. In Kanner's original work in 1943 he said little about the movement skills of the children with autism. The only specific comments that could possibly be attributed to suggesting delayed motor skills were based on parental reports of walking occurring at 18, 20 and 24 months in three of the 11 children. Kanner also stated that several children were somewhat clumsy in gait and gross motor performance, but it was not clear from the individual case descriptions which children were implicated. Early reviews of autism concluded that motor development and movement skills followed a typical developmental pattern (Alderton, 1966; Rimland, 1964). Later research of Sigman and Capp (1997) and Smith (2000) reiterated these findings. However, more research confirming difficulties in motor development has provided a more definitive conclusion. These studies include that of Ornitz, Gutherie and Farley (1977), who established on parental reports, that children with autism had significant delays attaining motor milestones at 6 months when compared to typically developed peers. DeMyer (1976)

found that children with autism had greater delay in ball skills compared to children with learning disabilities. Reid, Collier and Morin (1983) further confirmed these findings when comparing children with autism to those who were typically developed. Berkeley, Zittel, Pitney and Nichols (2001) also found that children with autism fell into the poor or very poor categories on Tests of Gross Motor Development. These and other studies confirming motor impairment of children with autism are examined in detail in the next chapter.

The National Autistic Society (2001) highlights difficulties experienced by people with autism, in processing sensory information. Hypersensitivity to sensory stimuli can manifest as follows: Distressed by particular volume of pitch or sounds; distracted by visual information; patterns or movement, touch, textures and changes in temperature can be distressful; smells and perfumes can be overpowering and a general dislike of any flavoured foods can occur. Manifestations of hypo sensitivity can include staring intensely at lights, patterns and objects, listening to certain sounds and vibrations close to the ear, unreactive to pain and injury, liking of very strong smells and enjoyment of strong tastes (Grandin, 1996). Some individuals with autism fluctuate between hypo and hypersensitivity. Behaviours related to sensory perceptual difficulties include being able to process information from just one sensory channel at a time, having a fragmented perception of objects, people and situations, being easily distracted and withdrawing as they go into sensory overload (Wing, 2002).

Anxiety can be an issue among individuals with autism. This often arises in new or different situations, which they cannot understand. Wing (2002) indicates that individuals with autism often do not understand real dangers, are calm when others are anxious and vice versa. Temple Grandin, a woman with high functioning autism, wrote of fears of harmless items for no apparent reason (Grandin, 1996).

The individual with autism usually engages well in activities of interest to him or her (Wing, 2002). However, in activities that are not motivating to the individual, the attention span can be short. Howlin (1997) indicates that children with autism can become easily distracted and find it hard to concentrate and complete the task at hand. Many individuals with autism develop special skills and aptitudes at different tasks (Howlin, 1997; Frith, 2003). Visuo-spatial skills not requiring language are often better developed, than those skills that require speech (Wing, 2002). Many skills are often associated with repetitive action e.g. playing music.

Much has been written about the behaviour of children and adults with autism (Crawford, MacDonncha & Smyth, 2007; Reid & O'Connor, 2003; Wing, 2002; Frith, 2003, Jordan, Jones & Murray, 1998). Functions of inappropriate behaviours were identified as including the need for help or attention, escaping from stressful situations or activities, obtaining desired objects, protesting against unwanted events and obtaining stimulation (Wing, 2002; Frith, 2003; Reid & Collier, 2002). Behaviours can range from tantrums in public, to touching or kissing a stranger (Wing, 2002).

Theories associated with Autism

Understanding the condition of autism has baffled parents and professionals for centuries. The condition presents in many different ways, often for no apparent

reason. Frith (2003) postulates that three specific theories, can account for at least some aspects of autism. These include (1) The mind blindness hypothesis, (2) Difficulties of weak central coherence and (3) Absence of high level of control or action. These theories are now outlined.

The Mind-Blindness Hypothesis

According to Frith (2003), impairments in social interaction and communication are accounted for by the theory of mind-blindness. These impairments are present in every individual with autism, regardless of age or level of ability. The mind-blindness hypothesis indicates a lack of understanding of the mental states of others. Baron-Cohen (1995) previously described this theory, in relation to individuals with autism. For individuals with mild autism impairment, this is overcome to some degree, by compensatory learning, where individuals are then capable of manipulating and attributing mental states to others. However, as this is not an automatic response, its use in everyday life is often slow and often not sufficient for normal social interaction. Compensatory learning accounts for some such improvements, after long periods of learning.

The Theory of Weak Central Coherence

The theory of weak central coherence indicates that individuals with autism have a preference for a style of information processing, that is focussed on in detail. This explains why many people with autism have special talents or skills. This further explains why peaks in performance occur for all individuals with autism, regardless of age and ability (Frith, 2003).

Absence of High Level of Control or Action

Frith (2003) states that the absence of higher-level control of action and attention indicates a difficulty in the self-organisation of any behaviour, that is not routine. This impairment in executive function leads to stereotypical behaviours and narrow interests. Successful educational programmes show that weak control can be strengthened by external prompts. This structure, imposed from outside, becomes routine and leads to improvements over time.

Prevalence of Autism

The Report of the Task Force on Autism (2001), states that there are no reliable Irish studies of prevalence that have covered autism, Asperger's Syndrome and Pervasive Developmental Disorder not otherwise specified. The following reasons were cited as possible difficulties:

- Lack of a biological marker or medical test as a basis for diagnosis.
- Lack of full conformity between and specificity within the diagnostic systems in use.
- The extent to which periodic revisions in diagnostic systems, e.g. from DSM-III to DSM-IV-TR, affects the number of children to be included as having autistic spectrum disorders.
- Confusion arising from imprecise use of the terms autism, autistic spectrum disorders, PDD, Asperger's Syndrome.
- Lack of clarity among professionals not intimately familiar with the disorder, as to what criteria to apply during the diagnostic process.

- Similarities with other disorders, e.g. language disorder and attention deficit hyperactivity disorder, particularly under three years of age.
- Misdiagnosis or lack of diagnosis for children and adults on the high end of the spectrum (Asperger's Syndrome/High Functioning Autism).
- Variation between care-givers who provide information during the diagnostic process.
- Hesitancy on the part of some professionals to make a specific diagnosis.
- Absence of comprehensive screening and diagnostic procedures.
- Lack of a comprehensive national system for recording and counting those with a diagnosis of an autistic spectrum disorder, i.e. a national database.

These difficulties in establishing prevalence of autism can be further addressed with clarification of diagnostic tools as outlined previously. Respective governments also need to fund appropriate research within individual countries to examine prevalence in a comprehensive way. In November 2007, the European Union awarded €750,000 to Ireland to examine autism prevalence throughout the country, following submission of a proposal by Ms Kathy Sinnott MEP.

In the Camberwell, London, study of Wing & Gould (1979), prevalence was estimated that 20 in every 10,000 children tested had the triad of impairments. In a Swedish study in 1992, Gilberg found that at least 71 in 10,000 were socially impaired of who 36 in 10,000 had Asperger's Syndrome. More recently the studies of Chakrabarti and Fombonne (2001) estimated the prevalence of children with a Pervasive Developmental Disorder to be 62.6 per 10,000. The authors indicated that the assessment process, sample size, publication year and geographical location of studies all had an effect on prevalence estimates. These findings are comparable with those of the Northern Irish Task Force on Autism (2001), which revealed that over the next few years the rate of ASDs in Northern Irish Schools would increase to over 70 per 10,000. The Irish Society for Autism published a prevalence study specific to autism in 2001. They estimated that a likely prevalence rate for autism is close to 15 per 10,000 live births. For every female diagnosed with autism there are four males diagnosed (Frith, 2003). The reasons for the gender differences remain unclear.

Causes of Autism

Despite many differing theories, the cause of autism still remains unclear. In Kanner's earliest writing (1943) he considered autism to be 'a constitutionally determined developmental disorder, primarily affecting social and emotional understanding'. He later wrote that the condition might be a response to dysfunctional patterns of family interaction (1954). Subsequently for decades parents were viewed as the cause of their children's disability. Finally, empirical investigations by Cantwell (1979) and others provided no support for such views. Today, there is growing evidence of genetic, neurobiological and environmental links to the condition (Wing, 2002).

Folstein & Rutter (1977) published the first autism twin study, indicating some evidence of a genetic base for autism in identical twins. However, the rate of concurrence of autism in identical twins was later suggested to be as great as between 36-91% (Mesibov, Adams & Klinger, 1997). Frith (2003) indicated that the risk of a sibling being affected by a form of autistic spectrum disorder has been estimated at 3-6%, compared to a normal population risk of 0.6% making the risk of a second child

being affected, 5-10 times as high. By 2001, several researchers had completed genetic screens that identified several genomic regions containing genes that could be associated with autism (National Alliance for Autism Research, 2005). However, genetic research still remains inconclusive but is still ongoing.

Mesibov et al (1997) stated that brain volume and head circumference was frequently reported to be heavier and larger in individuals with autism, than those without autism. Unusual EEG patterns are common and 25% of people with autism develop seizures by the age of 18years. Again no scientific research exists, to explain this phenomenon.

Environmental risk factors have also been stated as a cause for autism. These include viral infections, autoimmune disorders and pre-natal birth complications (Wing, 2002). Controversy over the potential side effects of the MMR vaccine as a causative factor continues. However any of these findings have not been scientifically conclusive (Frith, 2003).

Conditions associated with Autism

Autism can occur together with any other disability, physical or psychological. The presence of autism will be a major factor in determining the overall care plan for the individual, despite other conditions that may be present (Jordan, Jones & Murray, 1998). Some of theses conditions include generalised learning disabilities, visual impairments, hearing impairments, developmental language disorders and disorders of motor coordination and perception (Wing, 2002, Frith, 2003, Jordan, Jones & Murray, 1998). As generalised learning disabilities has the highest incidence of concurrence with autism, it is outlined in greater detail. Twenty percent of individuals with autism have measured IQ s above 70 (Morin and Reid, 1985). Morin and Reid further state that only 40% of people with autism score above 50 on IQ scales, placing them toward the moderate category of learning disabilities.

Generalised Learning Disabilities.

Learning disabilities and autism can occur together in up to 75% of cases (Bryson & Smith, 1998). General learning disabilities are classified as mild, moderate and severe profound. The National Council for Curriculum and Assessment (2002) and The Report of the Special Education Review Committee, (1993), describe each type of learning disability as follows:

Mild general learning disability presents as delayed conceptual development, slow speech and language development, limited ability to generalise, limited attention span and poor retention ability. It also stated that a number of children in this category might exhibit poor adaptive behaviour, inappropriate or immature personal behaviour, low self-esteem, emotional disturbance and poor motor co-ordination. Children with mild general learning disabilities are described as having an IQ in the range of 50 to 70 on intelligence tests.

Moderate general learning disability is described as presenting with impaired development and learning ability in acquiring skills in relation to language, communication, social and personal development, motor coordination, literacy and numeracy, mobility and leisure pursuits. Children with moderate general learning disability are described as having an IQ in the range of 35 to 50, in intelligence tests.

Severe to profound general learning disability is categorised as severe impairment in the ability to function, in respect of a basic self-awareness and an awareness of the environment. The skills relating to perceptual and cognitive development, language and communication, self-care, motor abilities, social and perceptual development all required attention. Children with a severe general learning disability are described as having an IQ in the range of 20 to 35 and children with a profound disability as having an IQ below 20.

Interventions for Individuals with Autism

As autism has evolved to a condition with no known cause or cure, a number of interventions have been developed, to address different behaviours and characteristics that emerge and indeed re-emerge, for individuals with a definitive diagnosis. These interventions are often designed to suit the learning style of the individual with autism. This section outlines some of these in detail, in particular those used to address issues of difficulties in social responsiveness and movement impairment. These include Treatment and Education of Autistic and related Communication Handicapped Children (Division TEACCH), Applied Behaviour Analysis (ABA), Picture Exchange Communication System (PECS), The Son-Rise Programme, Pivotal Response Therapy (PRT) and Daily Life Therapy. These interventions can be classified according to the particular approach they adopt. Applied Behaviour Analysis and The Picture Exchange Communication are both considered behaviourist in approach. TEACCH and Daily Life Therapy follow a more eclectic model, incorporating cognitive, behavioural and ecological elements. The Son-Rise programme is an ecological intervention, incorporating the child, the environment and the task. The interventions listed are endorsed by the two largest societies of autism i.e. The Autism Society of America (ASA, 2004) and The National Autistic Society, UK (NAS, 2001).

Many other interventions exist but there is no research evidence for their effectiveness. Some of these include facilitated communication (Bicklen 1990), Vitamin B6 and magnesium (Rimland 1999), 'greenspan' floor method (Greenspan 1992), and medications (Posey & McDougle 2002).

Treatment and Education of Autistic and related Communication Handicapped Children (Division TEACCH)

Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH) is a programme of services for people with autism founded by Eric Schopler in 1966. It combines methods and techniques tailored to meet each person's needs and emerging capabilities. In 1972, the North Carolina General Assembly passed legislation, which resulted in Division TEACCH becoming the first comprehensive community-based programme of services, for people with autism and other developmental disabilities.

The general long-term goal of the TEACCH programme is for each person with autism to fit as independently as possible into society (Mesibov & Shea, 2003). The TEACCH philosophy emphasises a positive and practical approach in terms of accommodating the environment, to the related autism deficits, in an effort to teach an individual with autism new skills. For example, areas that may cause sensory

distractions are covered up, items or objects are put away, and workstations are designed to be free of any additional distractions (Rogers, 1999).

The adapted environment enables the individual to utilise his or her strengths and to counterbalance areas of difficulties (Schopler & Mesibov, 1986). In this way, strategies put forward by TEACCH do not address the difficulties related to autism directly, but they provide a 'prosthetic environment' in an effort to gain advantage over these difficulties (Jordan, Jones & Murray, 1998).

The basic components of TEACCH include behavioural, developmental and ecological theoretical frameworks. The sensory environment is viewed as a potential source of distraction. A variety of environmental adaptations are used in a TEACCH classroom, to help people with autism attend to tasks (Rogers 1999). The major approach of TEACCH is the teaching structure, whereby both educational learning and prevention of behavioural issues are promoted in individuals with autism (Mesibov, Schopler & Hearsey, 1994). This assumption was based on Schopler and Reichler's (1971) suggestions that children with autism, especially those at earlier development levels, needed a structured learning environment in order to learn new skills. Behavioural difficulties are viewed as the result of an individual's inability to understand and to cope with his or her environment. According to this perspective, visual skills and routines are used to create meaningful environments, where people with autism can potentially react and understand.

A social skills training model examines different approaches to teach social behaviours. These new skills are practised in individual sessions before they are generalised to group activities in the community, and eventually the individual's ability to understand social rules is enhanced (Schopler & Mesibov, 1986). A cornerstone of the TEACCH programme is the involvement of the parents as co-therapists, who implement the treatment interventions at home.

In general, the programme provides a lifelong continuum of services including assessment and diagnosis, individualised treatment procedures, special education, social skills and vocational training, consultation, community collaboration and family support services (Erba, 2000). TEACCH employs 'generalists' who may come from a variety of different disciplines such as early intervention, psychology, nursing, speech and language therapy or social work (Lord, Bristol & Schopler, 1993). Despite the claim that such generalists can take on the skills from their disciplines and integrate them into a holistic approach through training, such training yields uncertain outcomes (Jordan, 2001).

Since the initial formulation of the Division of TEACCH, seven essential programme components have been revised and evolved:

- University-based research provides knowledge regarding new treatment procedures.
- Parents are treated as treatment collaborators, rather than casual agents of their child's disorder.
- In some countries regional centres have been developed instead of having one central super-clinic.

- TEACCH centres have been established across the US, Latin America and Europe to provide diagnostic assessments and educational programmes to families with children with autism.
- Adaptations of educational services implementing TEACCH have been used.
- A continuum of services for the entire autistic spectrum across the life span has been evolved.
- Multi disciplinary training has been offered to students, professionals, and parents, typically in an intensive one-week course (Schopler & Mesibov, 2000).

Although TEACCH is regarded as one of the longest-established programmes with an international influence (Durham 2000; Fuentes, Barinaga & Gallano 2000; Roge 2000), there has been limited published evidence in terms of outcomes (Jordan, Jones & Murray, 1998). However, a few studies have demonstrated the effectiveness of the TEACCH programme in learning and behaviour generally (Schopler et al., 1971); compliance, appropriate behaviour and communication; imitation, fine and gross motor skills and non-verbal communications (Ozonoff & Carthcart, 1998); and reduction in stereotypic behaviours (Panerai, Ferrante & Caputo, 1996). Nevertheless, the above studies lack experimental control and demonstrate only short-term gains in limited areas of development (Jordan et al., 1998; Ozonoff & Cathcart, 1998) or are based on parental reports and questionnaires (Sines, 1996).

Given the nature of the condition of autism; clutter free environments, structured visual schedules, task breakdown and generalisation of skills are all positive aspects of this approach. Generalised learning can occur and behaviour issues can be addressed simultaneously. Further, parents and professionals can access training in the TEACCH methodology locally, nationally and internationally (Jordan et al, 1998).

Applied Behaviour Analysis (ABA)

The field of Applied Behaviour Analysis (ABA) is the scientific study of behaviour. It is a science that seeks to use empirically validated behaviour change procedures, in an effort to assist people in developing skills with social value (Skinner 1953). It is a behaviourally oriented approach including a large number of conceptually consistent techniques, which can be used in various combinations across different people and contexts (Romanczyk & Matthews, 1998). With respect to autism, a behavioural approach adopts the following guidelines:

- Emphasis is placed on the definition of the behaviour in question and then an objective system is constructed to measure the frequency or duration of its occurrence.
- Functional assessment and/ or functional analysis is carefully administered to establish factors that enhance or inhibit the expression of behaviour.
- A sequence of long-term and short-term goals are set as a result of the assessment, reflecting the collective priorities of all people involved (e.g. children, parents, multi-disciplinary team, service providers), and adapted to the current developmental level of the child.
- Selecting and systematically using rein forcers that increase the motivation of learning is essential.
- A specific and detailed plan is constructed, so that acquired new skills can be generalised in the absence of treatment.

- Criteria for the selection of any intervention are based on controlled research evidence regarding specific skills, behaviours or conditions for individuals with similar diagnosis and characteristics, which appear in the literature (Anderson & Romanczyk, 1999).

In practice, a behavioural analytic treatment for autism focuses on teaching small, measurable units of behaviour in a systematic way.

- Each skill that a child with autism does not demonstrate is broken down into small steps.
- A specific cue or instruction, called an 'antecedent' is presented in order that each step is taught effectively.
- At the beginning, an additional 'prompt' may by introduced so that a child begins a specific behaviour.
- When target responses occur, these are followed by specific consequences that have been found to act as reinforcers, which vary from child to child.
- Prompts are gradually faded out dependent on the child's performance.
- Learning opportunities are repeated many times until a child performs a response readily in the absence of prompts.
- In each trial, a child's performance is recorded and evaluated according to specific and objective criteria.
- These data are graphed and give the therapist a picture of a child's progress as well as information about the effectiveness of a specific treatment technique.
- Training is constructed in a way to meet a child's needs, learning style and pace (Green, 2001).

Active family participation is a core element for any behavioural programme. A home-based behavioural programme can yield substantial behaviour and developmental changes (Luiselli, Cannon, Ellis & Sisson, 2000; Sheinkopf & Siegel, 1998). This further empowers parents who with the knowledge and skills offered through ABA training can have a positive impact on the family as a whole (Dillenburger, Keenan, Galagher & McElhinney, 2002).

Research evidence has resulted in applied behaviour analysis, being regarded as an empirically evaluated intervention (Simpson, 2001). In the US, ABA has been recognised as a treatment for people with autism by the Surgeon General (US Department of Health and Human Services, 1999), by the State Governments in New York (Department of Health, 1999) and California (Collaborative Work Group on Autism Spectrum Disorders, 1997), as well as a collaborative group in Maine (MADSEC Autism Taskforce, 1999). In Ireland, the efficacy of ABA as a sole teaching methodology is still under consideration by the Department of Education and Skills. Its evaluation in 2006 will be examined in detail in the next section on teaching provision.

The general public interest in ABA grew after two main publications. The first was the study of Lovaas (1987) at the University of California, LA, while the second was Catherine Maurice's book 'Let Me Hear Your Voice', published in 1993, in which she described her children's recovery from autism. The Lovaas study reported on a two-year intervention study of 19 young children with autism, aged under 40 months (non-verbal) or under 46 months (verbal). The study compared three groups. Group

one utilised 40 hours of intensive 1:1 behaviour analytic treatment, per week. Group two had minimal treatment of less than 10 hours of 1:1 instruction. Group three had no specific behavioural intervention. Results from that study showed significant gains for the children following the intensive 40-hour weekly programme. Specifically, nine children (47%) of the group achieved typically developed educational and intellectual functioning in comparison to only 2.5 per cent of the control-groups children. Also, eight children (42%) in the minimal intensity group who did not achieve typically developed functioning still made significant gains in all areas of development. Two children (11%) made limited progress. None of the children in the control group made similar progress. A follow up study by McEachin, Smith and Lovaas, (1993) to assess whether improved quality of life, IQ changes and adaptive functioning had been maintained was carried out, two years later. Extensive assessment indicated that eight of the nine children who made the greatest progress on the first study, showed typically developed educational and intellectual functioning and were indistinguishable from other unaffected children, on tests of intelligence and adaptive behaviour.

Other studies have shown similar results. Anderson, Avery, DiPietro, Edwards and Christian (1987) for example demonstrated that 54% of the pre-school children, who participated in their study, progressed to regular kindergarten education. Other findings supporting the efficacy of an ABA treatment programme include Birnbrauer and Leach's (1993) study. In this study, 45% of the participants who attended a two-year treatment programme achieved substantial gains in IQ, language and adaptive behaviour tests. Harris and Handleman's (1994) study demonstrated similar gains, in intelligence and language performance.

Despite these findings, aspects of ABA remain controversial. Researchers, professionals and parents have indicated difficulties with the concepts of 'rote' learning, use of negative reinforcement and have questioned the ability of individuals with autism to generalise skills learned using this particular approach (Jordan, Jones & Murray, 1998; Mesibov et al, 1994). More details on findings of this approach in the Irish education context will be outlined in the next section.

Picture Exchange Communications System (PECS)

The Picture Exchange Communication System (PECS) was developed by Bondy and Frost in 1987, with the aim of enabling children with autism and other communication deficits to acquire key communication skills in a social exchange. Published data have also supported the improvement of social behaviours as well (Le & Charlop-Christy 1999). The PECS programme mainly combines prompting, reinforcement, error correction strategies and fading of prompts (Bondy & Frost 2001; National Autistic Society 2000). The programme relies on teaching a child that communication is an exchange.

- Initially the child is taught to make spontaneous initiations, two trainers usually take part:
- One who responds to the child's social request (the listener) and one who provides as much physical prompting as necessary and who does not interact with the child in any social manner.

- At any stage of the PECS training, the prompting is stimuli such as toys, food and activities in order to build requesting. This further develops to labelling and using language (Quill 2000).
- The child's favourite rein forcers are identified.
- The child is taught to pick up a picture of the preferred item, reach to a listener, and release the picture into the listener's hand.
- The child learns to persist in his or her communicative efforts.
- The child learns to discriminate between symbols in order that the message becomes more concrete.
- The child learns to construct a two-picture sentence and therefore the social approach necessary for communication is further enhanced.
- The child is taught to answer a question as a prerequisite skill before commenting e.g. the student answers 'sunny' at the question "what is the weather like?"
- The commenting phase concerns the development of spontaneous commenting contingent on an already learnt vocabulary (Bondy & Frost 2001).

This phased approached to initiating the PECS programme is clearly developed from a behavioural perspective. However its efficacy in promoting the development and use of language with the population needs to be further empirically investigated. In the field of communication, PECS has obtained a lot of respect and some research validates its usage. For example, Bondy and Frost (1994) reported that out of 85 non-verbal pre-school children, PECS promoted the use of picture symbols for communication and the use of a combination of speech and picture symbols in 80 and 65 children respectively. Other studies have demonstrated the importance of using this procedure to enhance spontaneous initiations in verbal children with autism (Quill 1995), or to increase word utterances in children with preverbal or limited functional speech (Gantz & Simpson, 2004). A study by Charlop-Christy, Carpenter, Le, LeBlanc and Kellet (2002) provided the first data on the effectiveness of the PECS programme, which further highlighted that children's social communicative behaviours increased after learning to use PECS. The study examined the acquisition of PECS with three children with autism aged twelve, three and five years old respectively, twice weekly in play and academic settings. Measures of social communication behaviours and problem behaviours were also recorded. A multiple baseline design was used, to evaluate the collateral effects of the PECS training on dependent measures in the domains of speech, social communication behaviours and problem behaviours. A follow up on one child, one year later indicated that spontaneous speech and imitation gains were maintained. Where the study demonstrated improvements across time following the PECS intervention, findings were not statistically analysed but rather descriptively reported. Statistical analysis examining normality of data, establishing probability of findings and effect size would lend greater credibility to findings. It would also have been useful to examine correlations between acquisitions of language and behaviour modification, in both settings to establish efficacy of PECS in addressing issues of both communication and behaviour for individuals with autism. Further research is needed to assess the impact of PECS on language and social development with greater sample size, with generalisation of settings and to establish maintenance of skills (Bondy & Frost, 2001).

This approach seems particularly suitable, for visual learners. The individual with autism can combine visual, oral and social interaction when using the PECS icons in a communication exchange. The programme is taught in stages and is readily available to parents and professionals. Icons for use are accessible via a computer package, but may prove expensive for parents. The input of a speech and language therapist (SLT) is necessary to commence and maintain the programme, which can pose difficulties due to a shortage of SLTs and isssues of recession currently both in Ireland and in Europe.

Son-Rise Programme

Barry and Samahria Kaufman (1976) developed The Son-Rise method for their son who was diagnosed with autism. The programme was based on an attitude of unconditional love and acceptance and was initially implemented as a home-based programme (Kaufman & Kaufman 1976). Following the programme, the Kaufmans felt that their son was functioning typically and they published their experiences (Kaufman 1981). Their experiences were also made into a film called 'Son Rise: A Miracle of Love'. As the public interest in the method grew, the Option Institute and Fellowship was established in the United States in 1983, and has offered training programmes for families of children with autism worldwide.

According to Son-Rise philosophy the programme evolves as follows:

- The child has to draw 'information', 'understanding' and 'insight' from the teacher.
- Gentle teaching, exaggerated responses and imitation are used to engage the individual in an interesting social environment.
- Materials are placed in a therapy room out of reach, and the individual has to communicate with the teacher in order to obtain access to these materials.
- The therapy room is designed to offer as little distraction as possible.
- Specific aspects of the programme include joining in a child's repetitive ritualistic behaviours, unlocking them, and therefore facilitating eye contact and social development.
- Utilising whatever motivates the individual is necessary.
- Teaching is carried out through interactive play while further promoting social and communication skills.
- Being energetic and enthusiastic to maintain the child's interest and attention is essential.
- Maintaining a safe, distraction-free environment, which facilitates teaching and learning is imperative (Autism Treatment Centre of America, 2004).

The Autism Treatment Centre of America provides an individualised one-week Son-Rise programme, which enables the parents to implement the techniques and to set up a programme at home. Additional advanced training programmes and supervision are also available (National Autistic Society, UK, 2000). The proponents of this approach have published case studies claiming extremely positive outcomes (Kaufman 1981, 1994). Although some of the components of the programme (e.g. a child being imitated) have been investigated (Nadel & Peze, 1993), the whole approach lacks any systematic evaluation and research (Jordan, Jones & Murray 1998; Trevarthen, Aitken, Papoudi & Robarts, 1998; Williams & Wishart, 2003).

In the description of the 'Son-Rise' programme, no detail is given about exactly how the child communicates with the teacher. There is also no explanation given as to how the teacher 'unlocks' repetitive ritualistic behaviours. These types of unanswered questions, and the expense of accessing the programme for parents, raise questions over the overall efficacy of the 'Son-Rise' programme.

Daily Life Therapy (Higashi School)

Daily Life Therapy was developed and pioneered by Kiyo Kitahara in 1964. It is based on the Japanese educational principles and philosophy, that all children have potential for learning. In 1987, the Boston Higashi School was established as the International Division, of the Higashi School in Tokyo. Although the Boston school maintains its strong philosophical links to the original Japanese school, it differs in that the former has only children with ASD, whereas the latter serves typically developing children as well (Quill, Gurry & Larkin 1989).

The Daily Life Therapy approach functions as a complete system that addresses both the content of the educational curriculum and the development of the social and emotional well-being of the children. According to Kitahara, the focus of Daily Life Therapy is on the social behavioural aspects of autism and it relies on three central points; (1) establishing a 'rhythm of life' and 'stabilising the child's weak emotions' by concentrating on physical training; (2) relieving the child from a 'spirit of dependence' through group-oriented education and (3) promoting the stimulation of the intellect through continuous repetition of the same actions and activities (Quill et al*.,* 1989).

In practice, Daily Life Therapy is an educational methodology based upon a development of group dynamics, rigorous physical education, arts and music, academic activity and vocational training. As far as possible, curricular activities are organised in groups and structured in order to enable the transmission of learning between the children, through imitation (Quill et al., 1989). Academic activities such as language, mathematics, social studies or science are taught as per the typical school curricula, to create inclusion opportunities for each child. (Trevarthen, Aitken, Papoudi & Robarts, 1998). Despite claims in the popular press about Daily Life Therapy having strengths, as an effective approach for children with autism (Richardson & Langley 1997), it still lacks empirical validation (Larkin & Gurry 1998). Larkin and Gurry (1998) undertook observational research of six target students, matched on chronological age and diagnosis. Each researcher observed the target students in weekly one hour sessions, recording student behaviour and teacher intervention at one minute intervals, for a total of thirty data points per hour. Two years later a follow up study was carried out on three of the students. Data reported on attending behaviour, appropriate and inappropriate responses. Findings indicated that students made gains in attending behaviours, but not in specific skill areas, as assessed by appropriate and inappropriate responses. Where these findings are a useful starting point, statistical analysis with greater numbers of subjects, to establish significance of findings is essential.

Rosemary Littlefield, the executive director, outlined the practice at the Higashi School in Boston (Personal Correspondence, Feb 2005). Physical activity schedules varied across age bands, with daily sessions included up to the high school division, where they were ran twice weekly for adolescents. The identified elements of the

physical activity programme included play, physical stamina, group activities and the use of age appropriate equipment. Play activities were not detailed. Physical stamina comprised of walking and running activities. Group activities included basic postures, assembling and lining up for class, transition and exercises. Age appropriate equipment included balls, tricycle, balance discs, roller skates, scooters, bicycle, unicycles and stilts. For teenagers aged 12-15 years, gymnastic activities were included.

From 15 years onwards emphasis was on team and community activities and use of a treadmill. Outdoor activities were included in the daily and weekend residential programmes. Sample activities included hiking, basketball, roller blading, bowling and swimming. Physical Education teachers were on staff, to oversee this element of the curriculum. The outlined schedule and content appears reasonably comprehensive and varied, but did not indicate how progression through activities was achieved. An outline on how activities and equipment were adapted, to accommodate individual needs and abilities of each child, would also be useful.

This centre provides an ideal base for a thorough empirical evaluation, with retention testing, of the efficacy of the approach with a population with autism. To date, this has not been carried out and the efficacy of the programme remains questionable. The Boston Higashi School is very expensive i.e. €68,000 per annum (2005). Parents have the added stress of the programmes being residential, for those outside the Boston area. Anecdotally, parents have reported that the children have returned home like 'robots' and had difficulties coping with integrating into a family environment.

Pivotal Response Training

Pivotal Response Training (PRT) also embraces the principles of ABA. However, PRT focuses on pivotal behaviours (e.g., motivation) that when targeted, produce positive change in other (untargeted) areas of functioning and responding (Koegel, Koegel, Harrower, & Carter, 1999). The overall goal of PRT is to provide children and adults with autism with opportunities for meaningful learning in their natural environments (Koegel & Koegel, 2006; Koegel, Koegel, & Carter, 1999). PRT emerged from the Natural Language Paradigm (Koegel, O'Dell, & Koegel, 1987) and early empirical support was based on the acquisition of language skills in inclusive environments by following a typical developmental sequence of learning (Koegel & Koegel, 2006). PRT differs from other interventions requiring structured environments in that it consists of a coordinated effort to provide consistent and ongoing intervention that is implemented across people, settings, and environments (Koegel & Koegel, 2006; R. L. Koegel, et al., 1999). It's about giving everyone the child interacts with, the skills necessary to play an integral role in their learning. PRT promotes both the acquisition and maintenance of skills, as many of these techniques become a natural way of interacting with the child that are easily integrated into daily routines and family life.

It is the "difficult to teach skills" that are targeted in PRT (Koegel & Koegel, 2006). PRT uses discrete trials including clear instructions, prompts and reinforcement. However, what is unique about PRT is that multiple behaviours are targeted at the same time and the reinforcements used are already found within the context of the task, making the interaction more natural and meaningful. Games and activities are considered part of natural interaction, along with turn taking, throwing, and social

communication. PRT is not about providing the child with a specific stimulus to respond to, but rather about creating multiple opportunities for them to initiate interaction, and essentially make them want to communicate and connect with others (Koegel, et al., 1999). Four specific pivotal areas are targeted with PRT: a) motivation to engage, b) responding to multiple cues, c) social initiation, and d) self-regulation (Koegel & Koegel, 2006). PRT aims to motivate children with ASD to become increasingly responsive to everyday stimuli, and tries to make these everyday activities intrinsically motivating.

A key PRT study by Stahmer (1995) examined motivation in the symbolic play skills of seven boys with ASD aged 4 to 7 years. Symbolic play and language training were implemented, both of which took place for one hour, 3 times per week, for eight weeks. Measures were taken pre- and post-training as well as three months follow-up to examine maintenance of skills. The boys with ASD learned to perform complex and creative symbolic play similar to typically developing, language-matched peers. Following training, they also began to respond more positively to initiations made by adults during play, suggesting possible generalization to other skills associated with the training. However, the children in this study did not improve in responses to peer initiations and still did not initiate interaction very often following training.

The primary teaching techniques advocated for in PRT to target motivation are: a) the provision of choice, b) providing direct and natural reinforcements, c) rewarding attempts, and d) interspersing acquisition and maintenance tasks (Koegel & Koegel, 2006). While all of these techniques are fundamental characteristics of quality teaching, it is about the consistent use of them across all learning opportunities and the structuring of the environment to create these learning opportunities that PRT is about. Some degree of choice can be integrated into almost any activity (Dunlap, et al., 1994). By providing choice in terms of activities, task goals, or even the equipment they use educators will learn what is meaningful to the children and adolescents with ASD, allowing them to be involved in and take ownership of their learning (Koegel, et al., 1999; Moes, 1998). Furthermore, the provision of choice is likely to increase (intrinsic) interest in the activity (Dyer, Dunlap, & Winterling, 1990; Koegel, Dyer, & Bell, 1987) and provide motivation for continued participation. Two studies found that when three children with autism and intellectual disability were given choice in the reinforcers to be used and the tasks to be performed (Dyer, et al., 1990) or the order in which the tasks were to be completed (Newman, Needelman, Reinecke, & Robek, 2002), significantly fewer disruptive behaviours were seen. While research examining the effectiveness of PRT in the acquisition of movement skills and participation in physical activity is limited, findings are promising. Parents can be trained successfully to implement PRT thereby increasing the number of opportunities for consistency, intensity, and sustainability of intervention (Bryson, Koegel, Koegel, Openden, Smith, & Nefdt, 2007).

In summary, all of the interventions outlined have some positive outcomes, for children and adults with autism. Structure, repetition, choice and reinforcement are aspects of all programmes and are avenues to address the theories of mind-blindness, weak central coherence and the absence of high levels of control and attention (Jordan et al, 1998). However, empirical research, validating the efficacy of all interventions over time, is essential before long-term effects can be generalised to the overall

population with autism. It is also important to consider the learning styles of each individual with autism and indeed if there are other co-occurring disabilities or conditions present, before deciding on any one intervention.

An Evaluation of Current Education Provision for Children with Autism in Ireland

In 1998, the Department of Education and Science in Ireland announced a major breakthrough in service provision for children with disabilities, with a move toward integrated education for children with autism. Pre 1998, children with autism were traditionally educated in special schools, catering for general learning disabilities. Since this time autism provision within the education sector has continued to develop. This provision includes mainstream classes, special classes, special schools and special centres for education. In 2001, the Report of the Task Force on Autism was published, with recommendations for further developing autism provision, especially in areas of education and health.

In 2004, The Department of Education and Science undertook an evaluation of education provision for children with ASD in Ireland, over a two-year period and its findings were published in 2006. A sample population of five categories of education provision were evaluated, with the stated aims:
"*To review the range of provision made, to identify good practice in different settings and to affirm the efforts made by all staff in providing for pupils with ASDs"*
(An Evaluation of Education Provision for Children with ASDs, 2006, p.9).

The sample of settings included centres in which applied behaviour analysis (ABA) is implemented, autism dedicated special schools and other special schools, autism dedicated classes in mainstream schools and finally mainstream classes supporting individual children with autism. Evaluation instruments included questionnaires for parents, school principals, and directors of centres and staff members. Quantitative and qualitative data was generated and analysed.

Findings were reported under the following areas; early identification and intervention, goals of education and the curriculum, staff members' professional qualifications, training and development, staff members knowledge and understanding of autistic spectrum disorders, accommodating general learning disabilities and other co-occurring disabilities in planning and implementing programmes, parental and family involvement, individual planning, assessment, information and communication technology, inclusion and availability of support services.

- The evaluation of services indicated that early identification and intervention were reliant on geographical location and parental income.
- The goals of education and curriculum were identified as needing to address each child's individual needs. With the exception of ABA units, all other settings used the primary school curriculum and Draft Curriculum Guidelines for Teachers of students with Learning Disabilities (NCCA, 2002), to provide children with individualised and group learning. Staff indicated that practical training in the use of the guidelines would be very helpful.
- Staff members professional qualifications, training and development were examined and indicated that with the exception of ABA centres, a selection of

teaching interventions were in use and teaching staff had a working knowledge of each approach. Staff in ABA centres was not necessarily teacher trained and only ABA was used.

- The evaluation report indicated that general learning disabilities and other co-occurring difficulties were given due consideration in planning and implementing programmes "in almost all settings". The evaluation indicated that ABA centres did not clearly accommodate such difficulties in curriculum planning and development.
- Parental and family involvement was supported in all settings and was clearly identified, as an integral part of the child's development. Whole school planning was evident in all settings other than ABA centres.
- The evaluation indicated that Individual educational plans (IEPs) were clearly defined and priority given to each child's development, as deemed necessary. In ABA centres, the links between data and assessment reports were not always clear.
- In the evaluation report, assessment was identified as an essential element of curriculum planning. All centres were found to carry out assessments on an ongoing basis. ABA centres did not retain work for reference.
- Information and communication technology were identified as having a key role in developing communication and social skills for children with autism (Ring, 2006) but could have been better utilised in all settings.
- The importance of inclusion was identified for the child with autism and his and her typically developed peers, and was addressed in all educational settings. Inclusive practices were promoted in educational settings using The Buddy system, Circle of friends and reverse mainstreaming as recommended by Howlin, (1997).
- Availability of support services was highlighted as essential for children with autism. Access to members of a multidisciplinary team was found to vary and was influenced by geographical location. The majority of ABA centres were found to have little if any multidisciplinary support, with parents expressing dissatisfaction with this lack of provision.

Overall improvements throughout ASD educational provision were identified. However issues of early diagnosis and intervention, training of staff and multidisciplinary team input all warranted attention. In particular ABA centres were identified as not complying with departmental guidelines in many areas.

Summary, Conclusions, Recommendations

Chapter three opened with an outline of the condition of autism. Autism was identified as a condition with difficulties in communication, social interactions and imagination. Diagnosis was based on both formal testing (DSM-IV TR, 2000; 1CD-10, 1994) and detailed family history. Presentation of the condition was broad ranging, from the triad of impairments to motor, sensory and behavioural difficulties. Distinctions between autism, Asperger's Syndrome and PDD-NOS were identified and the description of a 'spectrum' of disorders was justified. Difficulties in definitive and early diagnosis of autism continue to exist; this warrants greater clarification of characteristics in the diagnostic manuals and greater collaboration among professionals making diagnoses to make diagnostic criteria universal. The Irish prevalence rate specific to autism was estimated at 15 per 10,000 births (Irish Society for Autism, 2001) and mirrors that found internationally. Causes of autism remained unclear, but links were made to genetic, neurobiological and environmental

influences (Wing, 2002). Continued research and appropriate funding needs to be made available by respective governments, both nationally and internationally, so that causes for this particular spectrum of disorders can be identified. This has implications for parents of a child with autism, in terms of planning for future children and indeed for following generations.

Associated conditions included learning disabilities, sensory, language and motor disorders. Incidences of learning disabilities co-occurring with autism, estimated at 70%, pose a greater burden for parents and professionals. Appropriate support to address such associated conditions needs to be provided, when these additional conditions are identified.

A review of interventions currently available for children and adults with autism highlighted the abundance of such programmes available. Those examined included TEACCH, ABA, PECS, Pivotal Response Training, Son-Rise programme and Daily Life Therapy. Eric Schopler founded TEACCH, a programme of services for people with autism, in 1966. The basic tenet of the programme was the use of structure and visual aids, to support the education and development of people on the autistic spectrum and is well researched and implemented. TEACCH is well respected in educational settings as a valid intervention for this population. Applied Behaviour Analysis has evolved from the work of Skinner (1953). It was identified as a behaviour-oriented approach, which considered antecedents, behaviours and consequences as key areas to address for individuals with autism. In practice it focused on teaching small, measurable units of behaviour in a systematic way. Lovaas (1987) has validated ABA for use by children with autism. Where it has been demonstrated to be an effective intervention for individuals with autism, aspects of ABA remain controversial. Parents and professionals have indicated difficulties with the idea of 'rote' learning, negative reinforcement and ability of children to generalise skills.

The Son-Rise programme (Kaufman & Kaufman, 1976) involved the teacher interacting with the child with autism, at his level. The environment was engineered to promote responses. However validity of the programme remains questionable. The Picture Exchange Communication System (Bondy & Frost, 1987) was designed to help children with autism to develop communication skills in a social exchange, and its efficacy as a communication tool was validated (Charlop-Christy &Freeman, 2002). Daily life therapy, pioneered by Kitahara (1964), promoted the use of intense physical activity as an overall regulator for the child with autism, but remained to be empirically validated. Pivotal Response Training (PRT) (Koegel, Koegel, Harrower, & Carter, 1999) focuses on behaviours i.e. self regulation and motivation that when targeted produce widespread improvements and positives changes in other untargeted areas of functioning. Multiple behaviours are targeted simultaneously, discrete trials are also used and rein forcers are chosen from within the child's natural environment. Parents and family members are also trained in its underlying principles so that opportunities to learn are ongoing across a variety of settings. Empirical evidence exists supporting its use in physical activity settings.

This array of interventions is a nightmare for desperate parents to deal with. Many interventions claim to provide a 'cure' for autism. Parents have the stress of coping

with the many characteristics of autism, coupled with the expense of accessing interventions. For some parents, the additional guilt of not being able to afford these interventions is difficult, for all concerned. Parental efforts to meet the need of other unaffected siblings are an added burden. Government Departments and official agencies, both nationally and internationally, need to realistically address appropriate funding and research to establish efficacy of claims about interventions. This is to ensure parents make informed choices, have access to validated interventions and have realistic outcomes. Overall, no one approach has been found to be entirely successful, but rather the most effective approaches for individuals with autism incorporate a variety of interventions.

An evaluation of current education provision for children with autism in Ireland was reported in 2006. Findings indicated early identification and intervention was reliant on geographical location and parental income in all centres. Staff in ABA centres was not necessarily teacher trained and only ABA was used. ABA centres did not clearly accommodate co-occurring learning disabilities in curriculum planning and development. Whole school planning was evident in all settings other than ABA centres. In ABA centres the links between data and assessment reports were not always clear. ABA centres did not retain work for reference. Information and communication technology were identified as having a key role in developing communication and social skills for children with autism, but could have been better utilised in all settings. Inclusive practices were promoted in educational settings. Access to members of a multidisciplinary team was found to vary and was influenced by geographical location. ABA centres had little if any multidisciplinary input. Principals, teachers, tutors and parents from the other educational settings expressed dissatisfaction with the provision of psychological services, speech and language therapy provision and occupational therapy provision.

The report concluded that progress has been made in ASD provision in Ireland. It concluded that professionals and parents were generally pleased with educational provision, although delays in diagnosis and early intervention were a concern. Positive developments have occurred in the areas of teacher training. The report also stated that development of policy and educational provision should be based on research, the individual needs of each child and include early intervention opportunities, with a high level of parental involvement. It also identified the importance of access to an appropriate curriculum, with multidisciplinary input and ongoing staff training. This report was completed by inspectors from within the Department of Education and Science and comprised a sample of educational provision for children with ASD in Ireland. Firstly, an objective evaluation would be more meaningful were it carried out by independent experts from outside the Department of Education and Science, reviewing current provision and practice. Secondly, a more comprehensive report would include all educational facilities catering for children with ASD, not just a sample population. Further difficulties arise in relation to ABA centres, where expertise in the delivery of the curriculum was often absent (i.e. tutors without an educational qualification), whole school policies were not available, worksheets were not retained for inspection and multidisciplinary input was minimal. As those ABA centres reviewed come under the remit of, and are financed by, The Department of Education and Skills, it is imperative that the Department urgently address such shortcomings. The continuing lack of appropriate multidisciplinary input in all educational settings is also an area of great concern and

has not been addressed in a meaningful way by the government since the development of autism specific education in 1998.

CHAPTER FOUR

RESEARCH ON AUTISM AND PHYSICAL ACTIVITY

This chapter outlines research that has been carried out to date on individuals with autism, in relation to impairments in motor development. The review also examines physical activity intervention studies, used to address stereotypical behaviours, of children with autism.

Motor Impairment and Autism

The following section details research in relation to motor impairments of individuals with ASDs. Much of the motor impairment research, involving individuals with autism, tends to be comparative by nature, i.e. comparing motor skills of subtypes within the spectrum e.g. autism, Asperger Syndrome and PDD-NOS or comparing individuals on the spectrum, with their typically developed peers. Physical activity intervention studies addressing the issues of motor impairment and autism are not plentiful, but very essential (Hilton, Wente, LaVesser, Ito, Reed & Herzberg, 2007). Critics, of research on motor impairments of individuals on the autistic spectrum, indicate that diagnostic criteria are inconsistent across studies. Methodological weaknesses are also an issue, with a variety of assessment tools being used. Small sample sizes also pose difficulties with this population. This tends to make definitive conclusions on findings more difficult to validate (Dewey & Tupper, 2004).

Where research supporting the presence of motor deficits in individuals with autism is available, earlier reviews of autism and motor development concluded that movement skills followed a typical developmental pattern (Alderton, 1966; Rimland, 1964). Sigman and Capp (1997) and Smith (2000) concur with these earlier findings. However Reid and Collier (2002) stated:

"*General statements of skill delay or proficiency were best directed at groups of people and should be based on wide evidence, including empirical investigations, case studies and clinical observations. Given the available data, we believe the most appropriate conclusion is that movement skills are often poorly delayed in autism, individual exceptions notwithstanding" (Reid and Collier, 2002, p. 9).*

Studies of Motor Impairment of Individuals with Autistic Spectrum Disorders

In a study by Staples and Reid (2009) the performance on the *TGMD-2* of 9 to 12 year old children with ASD was compared to three groups of typically developing children matched on chronological age, movement skill, or cognitive ability. Children with ASD performed similarly on locomotor and object control subtests, demonstrating significant delays relative to their chronological age and majority performing similar to children approximately half their age (4 to 6 years). These movement skill impairments were also greater than would be expected given their cognitive level. The findings of by Pan, Tsai, and Chu (2009) also found significant group differences

based on performance of both locomotor and object control skills between 6 to 10 year old boys with ASD and their typically developing peers of similar age. This study also conducted separate analyses to examine the performance of individual skills in the *TGMD-2*; results demonstrated that children with ASD had particular difficulty with two locomotor (gallop and hop) and four object control (strike, dribble, catch, roll) skills.

A study by Hiton, Wente, LaVesser, Ito, Reed and Herzberg (2007) examined the correlation between severity of Asperger's Syndrome and motor impairment. Children with Asperger Syndrome (AS) aged 6-12 years of age (n=51) and a control group of typically developed children also aged 6-12 years (n=56), were assessed using the Social Responsiveness Scale (SRS) and the Movement Assessment Battery for Children (MABC). A bivariate correlational design was used to compare the scores, with a Spearman rank correlational coefficient. Significant differences were seen between typical, mild to moderate and severe categories of SRS scores. This was based on a Kruskal-Wallis one-way analysis of variance by ranks ($p< 0.05$). Strong correlations were found between the MABC motor impairment scores and the SRS severity levels. The researchers concluded that the degree of correlation indicated that motor skill impairment is a function of severity within SRS, for children with AS. This is useful in terms of programme planning for children with AS. Research involving other subtypes on the autistic spectrum is necessary to establish if this finding is confined to those with AS. The researchers in this study state that intervention programmes addressing motor impairments of those with AS, would add depth to this finding.

In the research of Berkley, Zittel, Pitney & Nichols (2001), the skills of fifteen children (10 male, 5 female) with high functioning autism were compared to national scores in the Test of Gross Motor Development (TGMD, Ulrich, 1985). 73% of participants were found to have delayed fundamental motor skills, placing them in the poor or very poor category of ability. The effect size for all participants denoted large differences. Eighty percent of the children were placed in the poor category for locomotor skills. In assessing object control, 53% were placed in the poor category. The boys scored higher than the girls in all categories. The researchers felt that the TGMD was very appropriate as an assessment tool, as it was of relatively short duration, with few pieces of equipment, keeping distractions to a minimum. However, they did indicate that the children had difficulty interpreting the locomotor tasks and many focussed on the end result i.e. getting from A to B rather than performing the actual skill requested i.e. run, skip or hop.

In the research of Manjiviona & Prior (1995), motor skills of children with high functioning autism (HFA), were compared with that of children with Asperger's Syndrome (AS). A total of 21 subjects participated in the study, 12 children had Asperger's syndrome and the remaining 9 children had high functioning autism. Motor skills were measured using the Test of Motor Impairment – Henderson Revision (TOMI-H, 1984). The children selected had IQ in the normal or near normal range, to facilitate comparisons between the AS and HFA groups. Findings indicated that 50% of the children with Asperger's syndrome and 66.7% of the children with high functioning autism had definite motor problems. The TOMI-H was a suitable test item, as tasks were clearly defined. The study clearly indicates that motor impairment is a commonality to those individuals on the overall autistic

spectrum and warrants further investigation and intervention studies. Limitations identified in this study were the lack of diagnostic separation of the HFA and AS groups in their original diagnosis and selection. Some of the subjects could meet diagnostic criteria for both disorders.

A comparative examination of 'clumsiness' in autism, Asperger's syndrome (AS) and Pervasive Developmental Disorder not otherwise specified (PDD-NOS) by Ghaziuddin and Butler (1998), found coordination deficits in all three groups. Children with AS (n=12) were found to be less impaired than those with autism (n=12) and PDDNOS (n=12). The Bruininks-Oseretsky test (Bruininks, 1978) was used to assess motor coordination. In this sample the mean full-scale IQ of the AS group, was significantly greater than that of the other two groups. When the data were analysed adjusting for the full scale IQ, no significant differences were found in the mean coordination test scores, for the three groups. These findings indicate that the children with AS may have less motor impairment than the other groups, due to their higher level of intelligence. The researchers in this study question the validity of the Bruininks-Oseretsky test, as it did not provide any information on the 'pattern' of deficits. They further question the test validity as it was based on timing of skills, which does not allow for quantifying subtle changes in motor performance.

In a study designed to clarify neuropsychological distinctions between Asperger Syndrome (AS) and High Functioning Autism (HFA), Miller and Ozonoff (2000) tested 40 children with Autistic Spectrum Disorder (ASD) aged between 6-13 years. All participants had IQ s above 70. Participants with AS (n=14), had intact early language and never met criteria for autism. The remaining participants met the criteria for HFA (n=26). The children's motor abilities were assessed using the Movement Assessment Battery for Children (MABC; Henderson & Sugden, 1982). Results indicated that only the manual dexterity subscore differentiated the AS and HFA groups, with children with AS showing more impairment. This result was obtained when IQ scores were covaried in the analysis. Test results were supplemented by parental reports. Sixty six percent of parents of children with AS reported their children were "clumsy." A further 85% of parents of children with HFA reported similar findings. The researchers repeated their analyses with subgroups of their sample, matched on IQ and found the pattern of results were unchanged. Miller and Ozonoff concluded that there is little evidence that AS is neurologically distinct from HFA. With reference to motor skills, they noted that their results showed some tendency to weaker performance, specific to fine motor skills for children with AS when IQ differences are controlled.

In earlier research, Morin & Reid (1985) examined whether delayed motor development was due to autism or learning disability. The two groups used were boys, one with autism (n=8) and the other group with learning disabilities (n=8) only. The groups were matched closely on chronological age and measured intelligence. Qualitative and quantitative scores for balance, catching, standing long jump were assessed using test items adapted from the Bruininks-Oseretsky Test of Motor Proficiency, (1978) and running and throwing were assessed using test items adapted from Rarick, Dobbins and Broadhead (1976). The boys with autism were also assessed, on the relationship between qualitative performance on the formal test items and the quality of motor patterns, elicited during guided play. The adolescents with autism received significantly inferior qualitative scores, compared to the adolescents

with learning disabilities, on throwing, jumping and running tasks. No differences were found between the groups, on qualitative and quantitative measures on ball catching skills. Findings indicated that the group with autism had better balance than the group with learning disabilities, but they moved at a slower more controlled pace than those with learning disabilities. Morin and Reid suggested that participants with autism might not have performed as well quantitatively, if the tasks were more difficult. Morin and Reid concluded that delayed motor function in low functioning individuals with autism, might be more reflective of accompanying learning disabilities than autism, which poses great concerns for practitioners in the field. This finding has major implications in programme planning, as characteristics of both autism and learning disabilities must be considered and programmes implemented and evaluated from both perspectives (Report of the Special Education Review Committee, 1993; Peeters, 1997).

Research by Schlein, Heyne & Berken (1988) examined the development of motor skills and social skills in children with autism, when paired with typically developed peers as gym partners, using an adapted physical education/ therapeutic recreation curriculum. Six children with autism aged between 4-12 years, participated with 50 typically developed peers in a 9-week, twice weekly physical education class in a primary school. All participants received training, which included a variety of lifelong recreation and physical education activities designed to teach social skills and fundamental motor skills. Social Play was observed in groups, with 3 participants observed during each assessment. The participants were presented with five activities one at a time, beginning with the isolate play level and ending with the team level. An observation- record procedure was used. The motor assessment instrument was a task analysed criterion-referenced checklist in which performance to the required task was evaluated. Paired t tests were used. Results indicated significant reductions in inappropriate play behaviour for the younger group at parallel and cooperative/ competitive and social levels of play. No other findings attained statistical significance. Further observations indicated increased involvement in the activities by the participants with reduced inappropriate play behaviour, reduced target inappropriate behaviours and improved motor proficiency in catching and striking skills. The authors predicted had the programme been ran for a longer period of time greater improvements would have been noted. Limitations indicate that programmes of longer duration and greater frequency may have yielded greater results. The subjective nature of the assessment instruments used may be considered limiting. This study has potential, in that it promotes the need to further investigate efficacy of physical activity programmes, for both motor and social development for children with autism. Children with autism playing alongside their typically developed peers showing improvements in motor proficiency and reductions in inappropriate target and play behaviours is of great importance to programme planners. Using the concepts of 'circle of friends', 'Buddy Systems' and reverse mainstreaming has potential to enhance these findings in a variety of settings, thus providing children with autism with greater opportunities to meaningfully interact with their typically developed peers (Whitaker, 1998; Howlin, 1997). As outlined in the evaluation of autism provision, this interaction is also of benefit to the typically developed child to learn acceptance for those with a disability (Howlin, 1997). This research needs to be explored further in a variety of settings and with different age groups.

Much of the previous research has concentrated on individuals with Asperger's Syndrome or High Functioning Autism. Research on children with autism who are not high functioning, is not as readily available. Hauck and Dewey (2001) examined the relationship between hand preference and autism. The researchers sought to examine findings on inconsistency of hand preference of children with autism. Twenty children diagnosed with autism, aged 2 –7 years participated in the study. Two control groups matched on mental age were used. The first group consisted of children with non-specific developmental delays, who were matched on chronological age, to the children with autism. The typically developed children in the second control group were on average 8 months younger on chronological age, than the children with autism. The Motor Domain of the Battelle Development Inventory (Newborg, Stock, Wnek, Guibaldi & Svinicki, 1984) was used yielding age equivalent scores, for fine and gross motor skills. The results confirmed that inconsistency of handedness is observed more frequently in children with autism, than in matched children with developmental delay. The fine and gross motor skills of the children with developmental delay were significantly higher, than that of the typically developed children in the control. Neither the fine nor gross motor skills of the children with autism differed significantly from that of either control. Analysis of trends showed that children with autism who had not developed a hand preference, showed relatively poor fine motor skills. The researchers concluded that there is a complex relationship between the development of hand preference and motor skill in autism that is unlike that observed in other children with developmental delays. This research raises questions about the developmental course of motor skill acquisition for this population that warrants further investigation.

A further study of interest in relation to motor skills and autism was that conducted by Rinehart, Bradshaw, Brereton and Tonge (2001). The researchers sought to examine whether motor dysfunction in autism was due to deficits in motor execution, or motor planning. A group of children and adolescents aged 5-19 years old with AS (n=12) and HFA (n=11) participated. Each group was matched to a typically developed control group on gender, age and IQ. A motor reprogramming task was used to examine the preparation and execution of movements. The tasks required participants to alternate between left and right buttons, in response to a light cue at the base of each button. On "oddball" trials the participants had to move to an alternative button, unexpectedly. Results indicated that speed of motor execution was consistent, throughout all groups. However both AS and HFA groups differed from controls, on movement preparation parameters. Children with HFA showed fast movement preparation across trials and were unaffected by the oddball trial. Controls were slower to prepare pre oddball movements, but responded faster on the trials immediately following the oddball trial. However, participants with AS were slower than their controls to prepare the first movement following oddball trials, thus demonstrating a response time cost, where controls showed a benefit. The researchers concluded that high functioning persons with autism show deficits in movement preparation, rather than execution. The differences in HFA and AS, in the pattern of impaired movement preparation were interpreted as evidence of different neuropsychological mechanisms, operating in both HFA and AS. Clearly this is an area that warrants further investigation. Research should ideally be conducted with control groups with motor impairments, to clearly isolate the relationship between motor dysfunction and autism.

A further area of research is that of using functional magnetic resonance imaging studies (MRI), to explore whether individuals with autism show different patterns of localised neural activation, during motor tasks. Findings of Muller, Pierce, Ambrose, Allen and Courchesne (2001) include evidence of atypical cortical activation, during the performance of simple visually paced finger movements, by eight adolescents with autism, compared with normal controls. Individuals with autism showed greater variability in their motor responses. Muller et al. interpreted these findings as indicative of abnormalities of both anatomy and functioning of the cerebellum and related structures in individuals with autism. These developments, in establishing underlying neurological abnormalities that may give rise to atypical motor performance in individuals with autism, are very positive.

In summary, motor problems are clearly common in individuals with autism. Different patterns of motor differences may be associated with subgroups on the autistic spectrum. Neuroimaging techniques are also opening up avenues for further research in this field. Research needs to explain if an interruption of one or more fundamental processes, leads to a cascade of developmental consequences.

Adapted Physical Activity Interventions and Autism

Self-stimulatory and stereotypical behaviours, which come under the heading of autistic mannerisms on the social responsiveness scale, present many difficulties for individuals with autism. As outlined in the previous section motor impairments are also an issue. This section examines findings in relation to physical activity interventions and individuals with autism. The research considers findings in relation to the effects of physical activity programmes for controlling behaviours and addressing motor impairments. Intensity, frequency and type of activity are examined in detail. A definite limitation of many of these studies is sample size. Measurement of intensity of activities, in many studies, is potentially subjective. However, the researchers explain that subjects with autism do not readily tolerate the use of actual monitors. Researchers in these studies reported findings in terms of percentage change, pre and post interventions. Statistical analysis would provide more information on the efficacy of interventions (Todd & Reid, 2006).

A study of Crawford and Dorney (2011) examined the effects of a community based, parent led physical activity programme on the fundamental movement skills of children with autism. The programme was run once per week for two hours over a twelve week period, with the support of a newly qualified Physical Education teacher. The programme provided participants with a variety of games based activities and taster activities of different sports i.e. soccer, rugby etc. Parents participated in setting up and running the sessions. The fundamental movement skills of participating children (n=14) were assessed using the Movement ABC Checklist (Henderson & Sugden, 1992) pre and post participation. Further qualitative data was generated using parental interviews (n=6) at pretest, at 6 weeks and post test at 12 weeks. Data was inputted into SPSS Version 18. Paired t tests indicated there was a statistically significant decrease in MABC total scores from pre test ($M = 56.90$, $SD = 20.09$) to post test ($M = 51.36$, $SD = 19.70$), $t(10) = 2.86$, $p < .017$ (two tailed). A statistically

significant decrease occurred in section 3 where the child was stationary and the environment changing. The scores ranged from Pre test scores (M = 14.45, SD 6.42) to post test (M = 11.81, 6.32), t (10) = 3.74, p< .004 (two tailed). In section 5 which examines behaviour change a further statistically significant decrease occurred from pre test (M = 13.36, SD 6.05) to post test M = 10.45, SD = 4.82), t (10) = 3.97, p<.003 (two tailed). These changes are indicative of a positive intervention effect. Key themes emerging from parent interviews included parental belief in the benefits of FMS programmes from both skill development, health accrued benefits, enhanced social responsiveness and reduced stereotypical behaviours; overall desire to be included and actively involved in their children's development and progress; lack of facilities, training and support for parents to encourage meaningful participation; lack of established physical activity/sports programmes for teenagers with autism and enhanced feelings of positivity toward their children. This study clearly indicates that when parents are given the opportunity to learn and implement skills that will improve their child's functioning, increased positive affect (Koegel et al., 1996; Solomon et al., 2008), reduced stress (Symon, 2001) and improved self-efficacy (Feldman & Werner, 2002) occurs. When parents are considered partners or collaborators with practitioners in parent education programs where they help develop goals and programmes along with the facilitators, results revealed lower parental stress, higher levels of confidence, and more positive parent-child interactions (Brookman-Frazee, 2004). Parental knowledge about the child's needs, preferences, and history will better guide the approach or any accommodations that may need to be made. Families are important participants in the development and implementation of programmes because they are the most stable and knowledgeable people in the child's life (Lucyshyn, Horner, Dunlap, Albin, & Ben, 2002). When parents are collaborators in treatment, they can learn to use techniques such as differential reinforcement of alternative behaviours (DRA; Neidert, Iwata, & Dozier, 2005) at home to help their child appropriately express their needs and prevent the occurrence of behaviour problems. In this instance parents were confident to work on FMS with their children, and had reduced fears to increase intensity of activity with appropriate training. Parents and other family members can be taught how to incorporate many different treatment techniques and skills into everyday life in this instance FMS (Lucyshyn et al., 2002). Treating children on the autism spectrum involves more than individual therapy and should include the family and any others who spend time with the child. By including families in treatment, the child's prognosis improves as does other factors that are critical to providing a successful treatment (Simpson, 1999).

The research of Crawford, MacDonncha and Smyth (2007) sought to assess the effects of individualised adapted physical activity programmes, on the movement ability and social responsiveness of children with autism and co-occurring learning disabilities. The study involved 17 students with autism and learning disabilities participating in an adapted physical activity intervention over a 10-week period three times per week, in a special school setting. A non-active group (n=7) with motor impairment and co-occurring learning disabilities were used as control. Quantitatively, movement ability was assessed using Movement ABC (Henderson & Sugden, 1992) and Social Responsiveness was assessed using the Social Responsiveness Scale (Constantino & Gruber, 2005). The intervention consisted of an obstacle course with a variety of fine, gross and organisational activities. Applied behaviour analysis principles were used including 1:1 instruction, model and physical prompting and reinforcement. Results of paired t tests indicated significant

improvements occurred for the intervention group in ball skills, static and dynamic balance, social communication, social motivation and autistic mannerisms. In the qualitative analysis using the pupil evaluation checklist (Wright & Sugden, 1999) improvements occurred in physical, intellectual, social, emotional and attitude components for the intervention group. No changes occurred for the control group. A limitation of the study was the inclusion of a control group with other motor impairment disabilities not on the autistic spectrum. However, all participants were in the same special school environment. Overall results indicated the benefits of APA programmes in promoting movement ability and social responsiveness, for children with autism and co-occurring learning disabilities. Findings also indicated that appropriate support and training was essential for teachers and special needs assistants to deliver quality APA programmes to this population and to children with other disabilities in an Irish context.

Todd and Reid (2006) investigated the outcomes of a physical activity intervention programme, using snowshoeing and walking/jogging for individuals with autism. The programme was of 6-month duration and included three teenagers diagnosed with autism. A changing conditions design was used and included a self-monitoring board; verbal cuing and edible reinforcers. Each session lasted thirty min with both edible and verbal rein forcers phased out. The self-monitoring board remained constant throughout. The researchers recorded the number of circuits by the 'smiley faces' on the self- monitoring board. The distance covered over the total number of sessions, were the reported findings. The researchers indicated that further investigation using a research design, would provide more information on the efficacy of each intervention. Results indicated that the distance walked/ jogged/ snow shoed increased, despite reductions in edible and verbal reinforcers. These results suggest that interventions can be successfully developed, to promote sustained participation in physical activity, for individuals with autism. Where these findings are extremely positive some limitations exist in the study. It can only be inferred that the self-monitoring board was the prime mediator of performance in this study. Another limitation identified by the researchers was, the baseline measurements at the beginning and end of the study were different; the first baseline was snowshoeing and the final baseline involved walking/jogging, which was of greater intensity than snowshoeing. Further research into the effectiveness of self-monitoring devices, to encourage sustained participation by individuals with autism, is warranted.

Prupas and Reid (2001) examined the effects of exercise frequency on stereotypical behaviours, on four children with developmental disabilities. The children ranged in age from 5 to 9 years. Two children displayed autistic characteristics and tendencies symptomatic of pervasive developmental disorders, while the other two were diagnosed with autism and Fragile X syndrome. A six-week observation period where behaviours were confirmed and recorded occurred prior to the study. Two exercise frequencies were implemented. The single frequency exercise treatment consisted of one daily 10 min walk/jog session, while the multiple frequency treatment involved three ten minute walk/jog sessions per day. Stereotypical behaviours were observed prior to the exercise sessions, as well as immediately after the sessions. Intensity of exercise was assessed informally, using signs such as high or low respiratory rates and a flushed face, as indications of whether the subjects were exercising at high or low intensity. Stereotypical behaviours were recorded

throughout. Subjects demonstrated a mean reduction of 51.6% in the single frequency condition and a mean reduction of 58.9%, following the multiple frequency condition. The researchers did not indicate if any statistical analysis was used to establish normality of data or assess effect size. The only data provided were percentage mean frequencies. Statistical analysis to establish statistical significance of findings would have been useful. The multiple frequency condition was considered the more effective intervention of the two, as the reduction in stereotypical behaviour was maintained throughout the day at different periods. Occasions where exercise was followed by only a modest change in stereotypical behaviours coincided with an unstructured environment, such as break time or free play. Observation in the classroom also suggested that as the structure of the classroom increased, stereotypical behaviours decreased. The researchers stated that exercise combined with a structured classroom, yielded an optimum decrease in stereotypical behaviours. Implications of current findings reiterate the importance of considering multiple frequency exercise programmes as part of the daily school timetable, for children with developmental disabilities. Further research on the duration of reduction in stereotypical behaviours during the day is necessary. The effects of other types of exercise in reducing stereotypical behaviours should also be evaluated, to promote a variety of skill development and create greater opportunities for choice for the children involved (Collier & Reid, 2003). The combined benefits of exercise and a structured classroom, contributing to reduced stereotypical behaviours warrants further investigation. This finding reiterates the importance of taking an 'eclectic' approach, where a combination of approaches may be necessary depending on the individual child, when developing programmes for children with autism and other developmental disabilities (Jones 2002; Jordan, Jones and Murray, 1998).

Celeberti, Boho, Kelly, Harris and Handleman (1997) examined the differential and temporal effects of antecedent exercise, on the self-stimulatory behaviour of a six-year-old child with autism. The researchers examined the effects of walking versus jogging, in suppressing self-stimulatory behaviour. The exercise programmes were carried out before classes of academic programmes and were of 6 min durations. Self-stimulatory behaviours were separately tracked. The intervention period was of three-week duration. Data from this intervention was descriptively presented with means and standard deviations showing patterns of change, over intervention type and time. No reference was made to using statistical analysis to establish normality of data or assess if effect size was significant. Findings indicated a decrease in physical self-stimulation and 'out- of- seat' behaviour after the jogging intervention only. A reduction in these behaviours occurred immediately after the jogging intervention and gradually increased, but did not return to baseline levels, over a 40min period. This finding concurs with earlier research supporting the benefits of antecedent exercise in reducing maladaptive behaviours (Kern, Koegel, Dyer, Blew & Fenton, 1982; Thibadeau & Rose, 1992). Other researchers have also used jogging as the preferred form of antecedent exercise (Kern et al, 1982; Yell, 1988).

Positive effects have also been found with roller skating (Powers, Thibadeu & Rose, 1992), aerobic exercise (Bachman & Sluyter, 1988) and non-structured exercise (McGimsey & Favell, 1988). However, findings of no change in behaviour problems after 15 min of antecedent jogging have also been reported (Larson & Miltenberger, 1992). The duration of the intervention, both on a daily basis (6min) and overall time

period (3wks) is questionable. An intervention of only 6 min appears very limited and poses questions as to the intensity of a jogging programme, in that length of time. The overall time period of three weeks, seems very short for assessing the efficacy of an intervention study. The use of 5 experimenters delivering the jogging programmes questions the likelihood of intensity of the jogging being consistent. However, the research does open up avenues for further research in the areas of antecedent exercise being part of the school curriculum, especially in relation to potentially enhancing overall skill acquisition, improving classroom performance and increasing levels of attention in academic settings. This type of intervention, at frequent short intervals during the day, may not suit all children with autism and needs to be assessed on an individual basis, over time.

Levinson and Reid carried out further research examining the effects of physical activity on self-stimulatory behaviours, in 1993. The researchers chose three children with low functioning autism, aged 11 years old, to participate in activity programmes with varying degrees of intensity, over a nine week period. Each subject was videotaped and the occurrence and frequency of stereotypical behaviours were recorded pre intervention, during intervention and post intervention. Radial pulse rates were used, to monitor intensity of programmes pre and post exercise. The mild programme consisted of walking for 15 min, while the moderate programme was 15min of jogging. Self-stimulatory behaviours increased with the mild programme for two of the participants and decreased with the moderate programme, for all three participants. The decrease lasted for 90 min, after which increases in stereotypical behaviours returned to pre activity levels. The greatest change was observed in stereotypical behaviours with a motor component after exercise of vigorous intensity, with a mean reduction of 17%. This change was no longer evident after 90 min, as the subjects' levels of stereotypical behaviours returned to, or exceeded, their pre-exercise frequencies. Findings were not analysed statistically, rather descriptive percentage changes as demonstrated visually on graphs were used. Again statistical analysis would prove more conclusive. A possible limitation was the subjective measure of exercise intensity, by manually recording heart rates; ideally heart rate monitors should have been used but may have proved too invasive for these particular subjects. The increase in self-stimulatory behaviours with the programme of mild intensity warrants further examination. Did the exercise of mild intensity act as a stimulant for two of the subjects? Details were not given of the types and frequency of the behaviours of these particular subjects, so was it possible that the feedback from the walking was similar to the feedback from the specific stereotypical behaviours of two of the subjects? It is also interesting to note that stereotypical behaviours for all three subjects decreased, with the moderate programme and lasted for 90 min. This is useful to note for curriculum planning, as desktop activities could be introduced in this particular time scale. It would also be useful to assess each child's ability to attend to tasks in a school environment, and to further establish if cognitive benefits were attained.

The reduction in behaviours with a motor component is of interest and caused Levinson and Reid to propose that exercises that closely resemble the specific individual's stereotypical behaviours be used. Berkson (1983) stated that stereotypical behaviours are maintained by resultant feedback from the behaviours. Berkson further stated that in order to maintain these sensory input, behaviours must be repetitive and move in a rhythmic repetitive nature. He also noted that removal of

sensory feedback eliminated stereotypical behaviours. An example given was that of spinning an object on a table. When a cloth was placed on the table the associated whirring noise stopped. Once this auditory feedback was eliminated the behaviour ceased.

Schleien, Krotee, Mustonen, Kelterborn and Schermer (1987) investigated the effects of integrating children with autism into a physical and recreational setting. The researchers sought to establish if changes occurred in subjects' social, leisure and adaptive behaviour skills from pre to post physical activity programme treatment. Attitudes of typically developed peers toward children with disabilities were also assessed. Two children with severe autism and 67 typically developed children participated in the study. A trained observer using the Social Interaction Observation System (SIOS) observed each subject with autism. The SIOS observed the subjects social skills, orientation toward peers and objects, appropriate and inappropriate play behaviours and target behaviour patterns. An attitude acceptance scale was administered, pre and post programme intervention, to the typically developed group. The three-week physical activity programme consisted of three 40- min activity periods, including cooperative sports and games, swimming and gymnastics followed by a 30 min open recreation session. Children from the typically developed group volunteered to act as 'buddies' and were rotated on a weekly basis. Details were not provided on whether 'buddies' received specific training before the programme and if so, what it entailed. Findings indicated positive increases occurred in appropriate play behaviour and positive orientation to play objects and peers. There were substantial decreases in inappropriate play behaviours. Attitudes, toward the subjects with autism by their typically developed peers, revealed positive but insignificant improvement. The researchers did not indicate how long the gains in appropriate behaviours and reduction in stereotypical behaviours lasted. The programmes throughout the day were of 40 min duration, which might be a factor in why the effects were so positive. Positive attitudes of typically developed peers are important. This finding is in keeping with research of Hamilton and Anderson (1983) who found that direct contact and frequent interaction, between individuals with and without disabilities, stimulates the formation of more positive attitudes. It is possible that an intervention study of longer duration may have produced greater results, for promoting further increases in play behaviour and indeed continued acceptability by peers without disabilities.

Kern, Koegel and Dunlap (1984) examined the effects of mild versus vigorous exercise, on stereotypical behaviours of three children with autism. The interventions used were jogging and ball skills, for 15 min periods. A simultaneous - treatments design (Kazdin & Hartmann, 1978) was used, in which sessions of one condition (jogging), were alternated with sessions of the other (ball skills). The first condition presented per day, was alternated across days and across children. Each child was observed for a 90 min period, after the exercise intervention. Intensity of exercise was measured by observing the child's response i.e. flushed face and increased respiratory rate. Results were presented in terms of percentage change, with no supportive statistical analysis. The results showed that non-vigorous exercise had little effect on stereotypical behaviours, but vigorous exercise caused a decrease in stereotypical behaviours. The researchers did not assess how long the effect of the reduction in stereotypical behaviour lasted. Further research is warranted to establish duration of this effect.

Research on both motor impairments and social responsiveness of children with autism produced interesting findings. Motor and social impairment for this population is clearly verified in research. Validated intervention studies, addressing motor impairment issues are needed. This research needs to address appropriateness and efficacy of programmes over time, for individuals with autism. Interventions addressing issues of social impairment e.g. stereotypical behaviour need to be conducted for longer periods and effects validated for maintenance and generalisation.

Comparative Study of Physical Activity levels among Children with and without Autism

Recent comparison of physical activity levels between children with and without autism, by Sandt and Frey (2005) presented some interesting findings. The researchers compared daily physical education, daily recess and after school moderate to vigorous physical activity levels, between children with and without autism. Fifteen children with autism and thirteen children without autism, aged 5 to 12 years, participated in the study. Measurements were taken for five days, over a fourteen-day period. Assessment methods used were accelerometry and direct observation. Findings indicated that there were no differences between children, with and without autism, at any physical activity setting. Both groups were more active during recess than after school. Children with autism were similarly active in recess and physical education classes. The researchers indicated that many of the children with autism acquired 60 min of physical activity overall per day, but this could potentially decrease with age, as opportunities for recess and physical education are eliminated.

These findings did not concur with previous research of Davies and Joughlin (1993), who reported that children with learning disabilities were less active than those without disabilities. However, Fasion-Hodge and Poiretta (2004) found that children with learning disabilities were similarly active to children without disabilities. The inconsistency of findings clearly indicates the importance of a more uniform approach to collecting data. It is also important to avoid using subgroups of different disabilities in making claims about disabilities as a whole.

A limitation of the study was that of duration. Was 5 days long enough to get a clear picture of physical activity patterns? With such a short duration it was easier for teachers and parents to possibly influence patterns of activity, than with a programme of longer duration. The researchers found that children from both groups engaged in sedentary, technology based activities after school. As this may be indicative of future activity trends, this presents as a concern for all participants especially for those with autism. Raitakari, Porkka, Taimela, Telama, Rasanen and Viikari (1994) indicated that physical activity participation rates, decreased from childhood to adolescence generally. If children with autism do not develop participation in active leisure time activities, it is likely they will become increasingly sedentary with age. This will further predispose individuals with autism to chronic illnesses, associated with inactivity. This warrants addressing both in school and community settings.

Summary, Conclusions and Recommendations

Chapter four examined research on motor impairments, social responsiveness issues, physical activity interventions and autism. Difficulties with motor development was identified in individuals with ASDs, in individuals with autism when compared with the national scores and in those with autism compared with individuals with learning disabilities. Research examining deficits in motor execution and motor planning was also presented and opens avenues for further research. The use of magnetic resonance imaging, to establish abnormalities in neural underpinnings of motor control, is a welcome one. As stated at the outset, motor dysfunction of individuals with autism, poses concerns for parents and professionals. Delayed motor development will impact on physical activity participation and the development of daily living skills for individuals on the autistic spectrum. This clearly indicates the need for intervention studies to examine the effects of physical activity on the motor development of individuals with ASDs.

Physical activity intervention studies addressed stereotypical behaviours for children with autism and examined intensity, frequency, duration and types of activities. In relation to addressing stereotypical behaviours, physical activity was found to be effective when the multiple frequency condition was used in conjunction with a structured classroom. Vigorous antecedent exercise was found to be effective for controlling behaviours, for a 40 min period. Further research concurred with the finding of the effects of vigorous physical activity for controlling stereotypical behaviours, especially if the behaviours had a motor component. The integration of children with autism into a physical and recreational setting with typically developed peers produced positive results. The children with autism showed reductions in stereotypical behaviours. Typically developed peers indicated positive attitudes towards children with autism, following participation in an outdoor recreation programme, over a three-week period.

The chapter closed with research on activity levels of individuals with autism compared to non-disabled peers. This report indicated activity levels between the two groups were similar, with both tending toward sedentary activities after school hours, which is of concern. Activity trends of both individuals with ASDs and typically developed peers warrants addressing, so that physical activity can become a part of daily life promoting positive health influences and overall independence, for those with and without autism.

CHAPTER FIVE

ADAPTED PHYSICAL ACTIVITY PROGRAMME ASSESSMENT, DESIGN AND IMPLEMENTATION FOR INDIVIDUALS WITH AUTISM

Justification for examining motor impairment and social responsiveness for children with autism and learning disabilities has been identified in earlier chapters. This justification was particularly identified in relation to development of daily living skills, promoting participation in physical activity for this particular population and furthering research into efficacy of APA intervention studies for children with autism. In relation to assessment tests, the movement assessment can be norm- or criterion referenced. A norm-referenced test compares the child's performance to that of a normative group, and quantifies the child's movement skill competence. A criterion referenced test compares the child's performance to predetermined criteria. A criterion-referenced test takes into account the qualitative aspects of the movements required to perform the movement skill item. A further form of movement skill assessment is through pupil monitoring instruments and is mainly used by teachers.

Many factors must be taken into account when deciding which method should be used for a particular assessment, including the aim of the assessment, characteristics of the participants and the resources available. There is an abundance of literature and studies dealing with the assessment of movement ability of adults and adolescents without disabilities, unfortunately there is not a wealth of information when it comes to children, particularly children with a specific disability, such as autism (Henderson & Sugden, 1992; Wright & Sugden, 1999). Assessment tools that allow for a variety of measures i.e. quantitative (to establish definitive measures) and qualitative (to examine additional characteristics) must be considered so that clear and comprehensive findings can be established.

Explanation and Justification of Assessment tools available

To ensure comprehensive assessment in the identified areas of movement ability and social responsiveness, it is necessary to review assessment tools that deliver accurate findings for the population with autism.

Assessment of Movement Ability of Individuals with Autism

Movement ability tests assist in screening, planning implementing and evaluating APA programmes. However, not all tests are suitable for all children. Specific tests of movement assessment include some of the following: Movement Assessment Battery for Children (Henderson & Sugden, 1992), Peabody Developmental Motor Scales- Second Edition (PDMS-2) (Folio & Fewell, 1983; Folio & Fewell, 2000).
Test of Gross Motor Development 2 (Ulrich, 1985), Bruininks-Osteretsky test (Bruininks, 1972) and the Manchester Motor Skills Assessment (MMSA) (Bond, Colea, Crookb, Fletchera, Lucanzb & Noblea, 2007).

Movement Assessment Battery for Children (Henderson & Sugden, 1992: Updated Henderson, Sugden & Barnett, 2007)

The Movement assessment Battery for Children (Movement ABC) is the common assessment tool of choice for children with movement difficulties in Ireland, the United Kingdom and throughout Europe (Henderson, Sugden & Barnett, 2007). The Movement assessment Battery for Children (Movement ABC) by Henderson and Sugden (1992) has evolved from the popular Test of Motor Impairment (TOMI) by Stott, Moyes and Henderson (1972), later referred to as the TOMI – Henderson (Riggen, Ulrich & Ozmun, 1990) and has been updated again in 2007. The 1972 edition of TOMI had 45 items, 5 at each of nine age levels and proved to be impractical for use in the field (Henderson & Sugden, 1992). In contrast, the Movement ABC has 32 items organized by four age levels so that the general movement competence of a child can be assessed with 8 items.

The MABC examines manual dexterity (e.g. writing, cutting and peg boards), ball skills (e.g. catching and throwing at targets), static and dynamic balance (e.g. board balance, jumping and clapping and walking backwards) over a range of tasks. These tasks are carefully selected to be easy for most children in a designated age band, while the primary focus of the test is on the objective assessment of movement difficulties in children. Performance in the test is recorded in several ways. Raw scores i.e. number of seconds taken to complete a task are noted. These raw scores are usually converted into scaled scores, in order to ascertain where the child's performance lies, in relation to the standardization sample. This can be done at the level of individual items or for the total score (i.e. manual dexterity, ball skills and static and dynamic balance).

Raw scores falling below the 5th percentile should be considered as a definitive motor problem, while scores between the 5th and 15th percentile are indicative of borderline difficulty. Percentile norms for total impairment scores indicate that for age 6 years and above scores above 13.5 on MABC, are considered below the 5th percentile. Total impairment scores between 10 and 13.5 are considered below the 15th percentile. Scores above 13.5 are considered below the 1st percentile. In the subcategories for manual dexterity scores from 6.5 to 5 are between the 5th and 15th percentile. For ball skills, scores between 5 and 2.5 are between the 5th and 15th percentiles. For static and dynamic balance scores between 7.5 and 5 are between the 5th and 15th percentiles.

In addition to the quantitative data, which the test provides, there is also a qualitative element. For each item in the test the assessor is encouraged to record how the child performs by using a series of descriptors (e.g. posture, ability to control hand movements) which draw attention to difficulties the child may have concerning control of his/her body and adapting to the particular requirements of the task. Both the test and MABC teacher checklist (detailed in the next section) provide the guide to behavioural factors that may influence motor performance.

Studies pertinent to this particular population include that of Manjiviona & Prior (1995), who used Movement ABC to compare the functioning of children with Asperger's Syndrome with those of children with high functioning autism on a test of motor impairment. O'Brien, Cermak and Murray (1988) used Movement ABC to examine the relationship between visual perceptual motor abilities and clumsiness in children with and without learning disabilities. Movement ABC was the test of choice for Schoemaker and Kalverboer (1994) when they examined social and

affective problems of children who are clumsy. The test was used to obtain measures of motor competence and impairment. The psychometric properties of the test and the checklist have been assessed and validated. Reliability and validity of the test have been clearly established (Henderson & Sugden, 1992).

The Movement ABC checklist has been designed as a support checklist for completion by teachers and other professionals both in establishing if a child is presenting with movement difficulties and also to evaluate an intervention. There are five parts to the checklist; the first four address interactions between the child and the environment while the fifth section examines behaviours related to physical activity. The checklist is scored for the first four components and the fifth is not given a score but rather a pointer toward behaviours that may occur. Test - retest reliability for the MABC checklist has also been established.

The overall effectiveness of the MABC is summarised by Henderson and Sugden as follows: (1) It is concerned with the identification and description of impairments of motor function. (2) It provides information on how well children perform in a one to one situation or a group setting. (3) The checklist is ideal for screening purposes. (4) The test provides objective quantitative data on performance. (5) Administration of the test takes approx 40min. (6) The formal assessment is paralleled by an observational approach designed to help the examiner observe how the child performs each task in the test, and to pinpoint emotional and motivational difficulties the child may have in relation to motor task. (7) It provides a structure within which to identify a child's strengths and weaknesses and to indicate directions for further assessment or remediation. (8) A section supporting the management and remediation of difficulties is included. (9) MABC has been used effectively to assess children with autism and with learning disabilities, where difficulties with participation of assessment tasks and following of instructions did not arise.

Peabody Developmental Motor Scales- Second Edition (PDMS-2) (Folio & Fewell, 1983; Folio & Fewell, 2000).

The PDMS-2 is a movement skill assessment tool that measures gross and fine movement skills. It focuses on assessment and intervention or treatment programming for children with disabilities. The test manual states that the test estimates a child's motor competence relative to his or her peers, determines the balanced development of fine and gross motor movement skills, identifies skill deficits and evaluates progress. Therefore, it can be used as a research tool. The PDMS-2 is a revision of the original PDMS published in 1983. It consists of 6 subtests of which 4 involve gross and 2 involve fine movement skills. The test is designed to assess movement skills of children from birth to 6 years of age. The gross movement subtests include: reflexes (8 items), stationary performances (30 Items), locomotion (89 items) and object manipulation (24 items). The fine movement subtests include: grasping (26 items) and visual-motor integration (72 items). The PDMS-2 is a standardized instrument with established reliability and validity scales. The total motor score is the sum of all 6 subtest scores. The test uses a 3-point rating system of which 2 equals an attained skill, 1 a developing skill and 0 a non acquired skill. Every item includes criteria for each rating. The administration of the test varies between 45 and 60 minutes. The PDMS-2 test has optimized reliability

and validity new score criteria have been added to and illustrations have been included.

Test of Gross Motor Development, Second Edition (TGMD-2) (Ulrich, 1985; Ulrich, 2000).

The TGDM-2 measures gross movement performance based on qualitative aspects of movement skills. The test can be used to identify delay in gross motor performance, for programme planning and to assess changes as a function of increasing age, experience, instruction or intervention. The TGDM-2 is a revision of the original Test of Gross Motor Development (TGMD), published in 1985 (Ulrich, 1985). The age range is 3-10 years. The test includes locomotion and object control skills. The locomotion part consists of six consecutive items: running, galloping, hopping, leaping, horizontal jumping and sliding. The object control subtest consists of six consecutive items: two-hand striking a stationary ball, stationary dribbling, catching, kicking, overhand throwing and underhand rolling. The child has to perform every item twice. When the performance is correct a score of 1 is marked, incorrect performances are scored 0. The sum of both performances represents the final score for each item. Standard scores for both locomotion and object control parts can be calculated and age equivalents can be derived. The test is administered in 15 to 20 minutes and requires equipment that is commonly used during PE. The test revision shows several improvements. Ulrich (2000) reports on reliability and validity issues which have been thoroughly revised: internal consistency and stability coefficients have been added and reliability coefficients have been computed for subgroups of the normative sample, validity for a wide variety of subgroups has been obtained. The TGDM-2 also includes qualitative aspects in the assessment. The TGDM-2 is a process and product-oriented test that refers to a criterion and a norm.

Bruininks-Oseretsky Test of Motor Proficiency (BOTMP-BOT-2) (Bruininks, 1978; Bruininks and Bruininks, 2005).

The Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) and its review the Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT-2) are tools to assess fine and gross movement skill development. They are used to identify individuals with mild to moderate motor coordination deficits. The test is suitable for individuals aged 4 to 21 years. The complete BOT-2 features 53 items and is divided into 8 subtests: fine motor precision (7 items), fine motor integration (8 items), manual dexterity (5 items), bilateral coordination (7 items), balance (9 items), running speed and agility (5 items), upper limb coordination (7 items), strength (5 items). The items in every subtest become progressively more difficult. A short form of the BOT-2 can be used as a screening tool to achieve rapid and easy scoring reflecting overall motor proficiency. The BOT-2 Short Form comprises a subset of 14 items of the BOT-2 Complete Form and was constructed from data gathered in standardization (Bruiniks and Bruininks, 2005). The Short Form features items from all subtests.

The selection of the items was based on the following criteria:
To provide a broad and general view on the movement skill development status of a child; to represent significant aspects of motor behaviour; to emphasize motor activity; to provide the opportunity to discriminate between a broad range of motor

abilities; to fall within the possibilities of mild and moderate mentally retarded children; to appeal to limited memory capacity and vocabulary of the child; material has to be easily transported.

The scoring system varies according to the individual items; it ranges from a 2-point scale to a 13-point scale. The raw scores can be converted into a standard numerical score. Results can be aggregated into a fine manual control composite, a manual coordination composite, a body coordination composite and a strength and agility composite. The sum of scores results in a total motor composite. The time required to assess one individual varies between 45 to 60 minutes for the complete test and between 15 and 20 minutes for the short form. The revision goals included quality improvement of kit equipment, improvement of item presentation, improvement of measurements on the youngest children (4- and 5-year olds), improvement of functional relevance, expansion coverage of fine and gross motor skill and extension of age norms to the age of 21. The use of the test is recommended for motor impairment diagnosis, screening, placement decisions, development and evaluation of motor training programs and supporting research goals. The BOTMP is frequently used in adapted PE, occupational therapy and physical therapy (Burton & Miller, 1998). According to Rosenbaum et al. (2004), the BOTMP is designed for assessment of motor skills in children, for those with motor dysfunctions in particular. Bruininks and Bruininks (2005) proved test validity for BOT-2 for individuals with developmental coordination disorder (DCD), mild to moderate learning disabilities, and high-functioning autism /Asperger's Disorder. However, the test is only obtainable by medical and paramedical professions. For some of the younger children the time required to complete the test is too long, so it is recommended to spread the assessment over two test sessions.

Manchester Motor Skills Assessment (MMSA) (Bond, Colea, Crookb, Fletchera, Lucanzb & Noblea, 2007).

The Manchester Motor Skills Assessment (MMSA) is designed to be quick and easy for teaching staff and assistants to complete, with the dual purposes of informing group programme planning and demonstrating an individual child's progress following a period of intervention. Inter-rater reliability checks were conducted during initial assessments of 37 children in 11 schools. The MMSA comprised of 2 Appendices. Appendix 1 is designed for children aged between 4 and 6 years of age. Appendix 2 is designed for those aged 7 to 9 years old. Teachers mark students using a four point scale on each activity in fine, gross and organisational skill categories. The scoring system for the total was as follows; 0 = Fail; a score of 1 – 10 = poor; 11 – 20 = fair and finally 21 – 30 = good. Both teachers and SNAs report its ease of administration for both assessment and programme planning (Crawford, 2012).

Assessment of Social Responsiveness of Children with Autism

As indicated in the opening chapters, difficulties with social responsiveness are characteristic of autism and learning disabilities (Wing, 2002; O'Connor, French & Henderson, 2000). Measurements of social responsiveness in children with autism

have often involved the administration of several different tests where behaviour and social competence are assessed independently. An example of one such assessment tool is the Social Responsiveness Scale (Constantino & Gruber, 2005).

The Social Responsiveness Scale (Constantino & Gruber, 2005)

The Social Responsiveness Scale (SRS) is a 65-item questionnaire. It covers various dimensions of interpersonal behaviour, communication, and repetitive/stereotypic behaviour that are characteristic of autistic spectrum disorders. A Likert scale format is used. The SRS is used both as a screener and an aid to clinical diagnosis, for such conditions as Autism, Asperger's Syndrome and Pervasive Developmental Disorder not Otherwise Specified.

The test questions focus on the behaviour of children and adolescents aged between 4 and 18 years. Both parent and care worker/teacher can complete the SRS. Interpretation of the test is centred on a single score, reflecting the sum of responses. Five treatment subscales are provided: (1) Social awareness, (2) social cognition, (3) social communication, (4) social motivation and (5) autistic mannerisms. These scales are particularly useful in designing and evaluating treatment programmes, as deficits in each subscale, can exist (Constantino & Gruber, 2005).

As indicated earlier, the SRS has a major advantage over other instruments used in the assessment of autistic conditions. Most existing rating scales are designed to establish an "either/or" decision regarding the presence or absence of such a disorder. Over the past decade autism has been identified as a spectrum disorder (Wing & Gould, 1979; Wing, 2002). This view requires the use of instruments that are specifically designed to assess autistic impairment on a quantitative scale across a wide range of severity. The quantitative scale provides a concise scale that can be compared to establish norms and can identify where an individual falls within the entire range of behaviour that exists in the general population (Constantino & Gruber, 2005). This is important as even mild degrees of impairment can have significant adverse effects on social functioning. The brevity of the SRS makes it useful for both screening and for clinical applications, its quantitative nature making it useful for measuring responses to interventions. Total raw scores and subscale scores are converted to T-scores using pre-designated tables (Constantino & Gruber, 2005). It's reliance on observations by parents and teachers make its application in clinical and educational settings easy.

The SRS was developed over a 4-year period in the context of several widely reported studies of autistic spectrum disorders (ASDs) and has well-established reliability and validity. The initial study that launched the SRS as a research tool involved 158 child psychiatric patients (with and without ASDs) and 287 randomly selected children from a US suburb. Among the child psychiatric patients, social deficits ascertained on the SRS were continuously distributed and reliably distinguished children with autistic spectrum conditions from those with other psychiatric conditions (Constantino, Przybeck, Friesen & Todd, 2000). Elevated scores were associated with clinical diagnoses of autistic disorder, Asperger's syndrome and pervasive developmental disorder not otherwise specified but not with other child psychiatric conditions or IQ. When latent class analysis and factor analysis were applied to the data from the school children, there was no evidence that deficit in reciprocal social behaviours, communication and stereotypical behaviours aggregated independently.

The results were consistent with the existence of a single underlying, continuously distributed variable with disparate manifestations across the three criterion domains for autism.

A study by Constantino, Davis, Todd, Schindler, Gross and Brophy (2003) examined validity of the SRS against the Autism Diagnostic Interview Revised (ADI-R). The study involved a clinical sample of 61 child psychiatric patients who were assessed with both the SRS and the ADI-R. Scores from the SRS were first plotted against the DSM-IV algorithm score for the social deficits criterion generated by the ADI-R. The comparison indicated a very strong association between the two instruments.

In relation to standard error of measurement scores (SEM), Constantino and Gruber (2005) state the SEMs express the variation of expected scores around the obtained scores given the scale standard deviations and the reliability estimate. The SEMs were calculated from the reliability statistics. The SEMs are applied to final total t scores for the overall SRS and subscales.

The SRS has some advantages over other autism rating scales. (1) Firstly it can quantify subtle differences in degrees of impairment. (2) It has established reliability and validity. (3) The SRS is also useful for assessment of symptoms associated with the full range of social impairments e.g. Asperger's syndrome, Pervasive Development Disorder - Not otherwise specified. (4) Unusually low scores are indicative of high levels of social competence. (5) The SRS is completed in naturalised settings where subtleties in interpersonal behaviour are often elicited (Althaus, Minderaa & Dienske, 1994).

Checklist for Pupil Evaluation and Feedback (Wright & Sugden, 1999).

It is essential to have ongoing pupil evaluation and feedback from the teacher and special needs assistant (SNA). (1) These are the professionals in daily contact with the children concerned, whose opinions on the programme design and delivery are necessary on a regular basis. (2) They are also considered optimally situated, to observe emotional and behavioural responses, to programmes over time. To achieve this Checklist for Pupil Evaluation designed by Wright and Sugden (1999) is often used as an assessment and evaluation tool. The checklist is considered appropriate, as it was designed for use by teachers, to evaluate efficacy of programmes, in an adapted physical activity setting.

The checklist is comprised of closed and open-ended questions. Separate items on the Pupil Evaluation checklist included (1) physical, (2) intellectual, (3) social, (4) emotional and (5) attitude components. The Pupil Evaluation checklist has not been designated a numerical scoring system. For the purpose of evaluation, a scoring system can be generated. Each item on the Pupil Evaluation checklist is rated on a four-point scale (1= always, 2= sometimes, 3= rarely, 4= never) so that percentage change over time can be evaluated.

Promoting and Maintaining Participation in Adapted Physical Activity for Children with Autism

Encouraging individuals with autism to participate in physical activity can prove challenging and maintaining participation rates even more so. This final section examines research on effective participation (Reid & Collier, 2002; Reid & O'Connor, 2003; Reid, O'Connor & Lloyd, 2003; Collier & Reid, 2003) and finally reviews activity levels of individuals with autism when compared to their non-disabled peers (Sandt & Frey, 2005).

Assessment for Activity Selection for Individuals with Autism

Research on physical activity programme planning for individuals with motor difficulties, especially those with autism, indicates that ecological interventions are the most effective (Reid & O'Connor, 2003; Block, 2000; Henderson & Sugden, 2007; Sugden & Chambers, 2006). This ecological approach to examining stability and change in the progression of children's difficulties concurs with Bronfenbrenner & Morris' (1998) explanation of development where multilayered influences create changes and act upon the whole situation. In relation to physical activity selection for individuals with autism, Reid and O'Connor (2003) state that:

"Content *for instruction should be based on the interests, needs and supports of the individual, rather than a label of autism. The goal is not therapy but enhancing the ability and desire to engage in independently selected physical activity" (Reid & O'Connor, 2003, p.20).*

Block (2000) recommends an ecological or 'top-down' approach in relation to activity selection. This approach takes account of the individual's interests, abilities and probability of repeated exposure to the activity, in the current and future life of the individual. It involves an examination of what is currently available in the individual's school, home and community setting (Kozub, 2001). Reid and O'Connor (2003) indicate the following specifics that need addressing in relation to activity selection:

- Individual interests and strengths that accommodates choice.
- Age; where activities are age appropriate.
- Peer interest in community and culture; establishing what peer interests are in the community
- Parent interest so that compliance in activities is at a maximum.
- Social and cognitive demands should reflect the comprehension and tolerance of each individual with autism.
- Consideration of competition and co-operation, where cooperative activities may be appropriate.
- Assessment for physical activity programme planning should be viewed as part of a continuous process where the interrelated nature of the individual, tasks and the environment needs to be considered.

Understanding the Individual

Understanding the individual with autism is a key component of the assessment process and involves liaison with parents and professionals, who play an integral role in the individual's life. Reinforcers, motivators, potentially stressful environments can all be identified (Reid & O'Connor, 2003). Individual areas of strength are

important. Combined with family interests, individual strengths can provide positive and successful starting points, which increase the likelihood of the individual with autism remaining with the activity (Simpson & Zionts, 2000; Kozub, 2001). Where possible, the assessor should communicate directly with the individual, using the preferred modality of communication, i.e. visual aids, communication board etc (Jansen, 1996).

Understanding the environment

Understanding the environment is essential so that potential interferences can be identified. It is important to establish if the individual is hypo or hyper sensitive to sounds, smells or large numbers of people present (Simpson & Zionts, 2000). Eliminating environmental issues is a key component to promoting participation for the individual with autism (Wing, 2002, Grandin, 1996).

Understanding the task

The individual's understanding of the task is also a key element of the assessment process. It is essential that the assessment consider the individual's learning style (Jansen, 1996). A task analysis of the target skill is also essential, so that each component part of that skill is also assessed (Block 2000). Assessment should also consider the individual's reaction and interaction with others and any unusual behaviour is noted (Reid & O'Connor, 2003). Finally the assessment process should identify current and future recreation activities, environments and specific skills required for participation in activities. New skills should be the focus of learning experiences while acquired skills should be part of a maintenance programme (Block, 2000; Reid & O'Connor, 2003).

Intervention and Programme Planning for Individuals with Autism

As stated earlier due to the heterogeneity of individuals with autism individualised approaches are essential when designing a physical activity intervention (Reid & O'Connor, 2003; Wing, 2002, Jordan, Jones & Murray, 1998). What is clear from consideration of the characteristics of autism and subsequent interventions available, some definite pointers arise in intervention delivery for physical activity facilitators. As many of these have been dealt with in detail in the intervention section, their specific application in a physical activity setting will be considered here.

Reid and O'Connor (2003) identified these as:

- Individual instruction.
- Low student to teacher ratio.
- Task variation.
- Stimulus generalisation of learning.
- Self-determination.
- Structured learning environment.
- Physical structure; schedules, work systems and routines and transitions.

Individual instruction

Individual instruction considers the likes and dislikes of the individual so that activities are enjoyable, meaningful and likely to lead to success (Wing, 2002). Particular preferences are considered and accommodated e.g. if a child has a preference for a specific ball and bat it may help sustain interest in the activity.

Low student to teacher ratio

Low student to teacher ratio and one to one interactions are often beneficial especially for individuals with co-occurring learning disabilities or behaviour issues (Schmidt, McLoughlin and Dalrymple, 1986). Using 'The Buddy System' to promote peer interaction and to provide demonstrations and guidance can be effective (Jordan et al, 1998). Peers can demonstrate activities (catching, throwing, jumping), assist with physical (help shoot for a basket) and verbal prompts (throw ball) and act as a partner. The special needs assistant has been found to have a major role in promoting participation for the individual with autism in an educational setting, giving support, instruction and hand over hand prompting (Ring, 2006; Task force on Autism, 2001).

Task variation

An alternative approach to constant task instruction for the individual with autism is that of task variation. Task variation involves teaching new skills, interspersed with skills already mastered i.e. catching a ball is followed by kicking to a target (Weber & Thorpe, 1992, Henderson & Sugden, 2007). This approach is associated with decreased aggression and self- stimulation (Dunlap, 1984). It has also been found to be appropriate for younger children with autism and those with co-occurring learning disabilities where attention and concentration is often difficult (O'Connor, French & Henderson, 2000). O' Connor et al (2000) also recommended that practice trials of new skills could be interspersed with previously mastered skills, every two to three minutes.

Stimulus Generalisation of Learning

Stimulus generalisation of learning has been identified as requiring different cues, materials, people and settings (Heflin & Alberto, 2001). Activities of interest to the individual with autism and especially those that are also of family interest should be included to promote generalisation to a variety of settings (Kozub, 2001). Using a variety of balls, targets and shapes helps promote generalisation and reduce fixations on any one dimension of equipment (Schultheis, Boswell & Decker, 2000).

Self Determination

Self Determination where the individual with autism makes choices is an essential component of intervention delivery (Reid & O'Connor, 2003). Individuals who chose their own activities, locations and materials were more likely to engage in those activities and have less behaviour issues (Newman, Needleman, Reinecke & Robek, 2002). Self-management and personal goal setting is another aspect of self-determination. The individual with autism is encouraged to count laps, jumps on the trampoline etc and assisted to record same so that new targets can be set (Todd & Reid, 2006).

Structured learning environment

A structured learning environment is identified as a necessary component of intervention delivery for individuals with autism (Mesibov, Browder & Kirkland, 2002; O'Connor et al, 2000, Reid & O'Connor, 2003). These researchers indicate that structure provides clarity and predictability to learning, assists in transitions,

helps individuals to reorganise and fosters independence. Structure is also advocated as reducing and eliminating difficult behaviours (Mesibov et al., 1997).

Physical Structure

Physical structure involved reducing distractions and increasing time on task, as much as possible. Schultheis et al (2000) stated that used room dividers, covered windows and provided 'wait' chairs for programme participants were effective in promoting independent behaviour, increased time on task and fostering emotional security.

Schedules

The use of schedules, a sequence of activities, is also advocated to provide structure and guidance, promote in dependence, reduce attention difficulties, be used as a communication aid to indicate what comes next and make transitions from one skill to another easy (Schopler & Mesibov, 1998; Schultheis et al, 2000; Mesibov et al, 2002).

Work systems

Work systems provide precise instructions to guide the individual with autism and are often in picture form. Each task is broken down into component parts and each component forms part of the work system (Reid & O'Connor, 2003) i.e. swimming activity could be depicted in a series of icons showing goggles, swimsuit, entering pool, submerging in the water and swimming.

Routines and transitions

Routines and transitions are essential components of intervention planning and delivery. These help to increased familiarity and reduce anxiety for the individual with autism (Jordan et al, 1998). Reid and O'Connor (2003) recommend that physical activity facilitators start and finish lessons in a consistent manner i.e. warm up and cool down sessions. Myles (2001) suggests that 'priming', where an activity is introduced prior to its use, might be useful when the individual is making the transition from one task to another.

Maximising Skill Acquisition

Researchers indicate that maximising skill acquisition and promoting participation is reliant on the following factors (Schopler & Mesibov, 2000; Schultheis et al, 2000; Mesibov et al, 2002; Reid & O'Connor, 2003; Block, 2000). These include:

- Allowing time for familiarity.
- Promoting eye contact.
- Use of clear language.
- Being aware of sensory preferences and over selectivity.
- Balancing social skills training and physical activity objectives.
- The use of applied behaviour analysis.
- Use of recording format.
- Use of prompts.
- The use of reinforcements.
- Use of incidental teaching
- Use of pivotal response training.
- Use of TEACCH components.

Allowing time for familiarity

Take the child to the venue/hall/outdoor facility for physical activity session several times prior to actually starting the session. Allow the child to walk around the venue, so that he/she may become familiar with the area prior to starting the activity. He/she may wish to touch the wall perimeter, examine the layout of the area. Be aware that he/she may need to become familiar with sounds which may echo, birds/animals in the outdoors, other people using the facility, smells associated with a new facility. He/she should be introduced to the toilet facilities and how to be safe in a public facility. Chat about new premises/facilities with enthusiasm at home. With permission, video the area so that he/she can revise/revisit in his/her own time. Staff should be introduced one by one. Allow the child to initiate contact when ready. If others are assisting you with your physical activity programme ensure they are familiar with the child's likes, dislikes, issues that may arise and safety issues.

Case Scenario: Mother of 10 year old boy with moderate autism and moderate learning disabilities.

"We decided to take Tommy swimming. For the first week we went along for three days without ever suggesting he enter the actual pool. We would walk through the reception, introducing him to the staff by name. They were wonderful. Tommy walked around the pool touching the walls and the floats. We sat at the side of the pool area, getting him used to the smell, the sounds and turning on and off the showers. There was a disabled changing room which meant he was safe in every way changing and we had privacy to assist him when he needed it. On the second week we took out the swimming gear and Tommy changed and sat on the poolside, dangling his feet in the water. Out of the blue he just slid into the water and we have never looked back. It's great, almost like he could sense he was in safe hands!"

Promoting eye contact

Introduce the child to other buddies, participants, family members participating in the activity as appropriate. Encourage the child to look at each individual prior to activity. Be at eye level with the child and encourage others to do likewise when communicating initially. Promote choice of activity and respond to the child's choice. This will provide more potential for positive eye contact and engagement. Allow the child space: do not try and force eye contact; he/she may need time to assimilate to new people, tasks and surrounds. Praise and reinforce positive eye contact i.e. "good looking".

Case Scenario: Teacher of a 5 year old boy with moderate autism

"I always ensured Michael looked at me when I spoke. When he indicated he wanted something I praised him saying "good looking". In the early days, I would move in front of him. I insisted all our students and teachers did likewise. I also rewarded him for looking at new people whenever he met them. I know it probably sounded unusual to others but he seemed to understand and made an effort to make eye contact when he met people. I also insisted people got down to his level when they spoke to Michael. It became automatic with us all. After a while we didn't need to do this as much as Michael was looking at us 90% of the time. Now sometimes if he is tired the eye contact is not as consistent."

Use of clear language

Use the appropriate communication modality for the child i.e. visual aids e.g. PECS, ipad, and pictures making sure to bring it to all activity sessions. Ensure coaches/teachers/tutors are familiar with this aid. Use two/three word sentences during activities, depending on the child's comprehension and increase the word count accordingly. Gain the child's attention first by calling his/her name before activities. Do not give long instructions or complicated rules during activities/games time. Go through rules in a non game situation, until the child understands what is expected of him/her. Build on communication, comprehension and language at the child's pace.

Case Scenario: Mother of 16 year old boy with moderate autism, moderate learning disabilities and severe speech and language disorder.

"Almost at the beginning, John was introduced to basic photographs. He was non verbal. We would show him a photo of a particular venue/activity e.g. beach and then make sure we took him there. The Picture Exchange Communication System (PECS) was introduced when he was about 3 years old. We worked on it all the time and had soon graduated to two and three icons making a sentence. He took to it immediately and would walk up to me with the sentence strip all ready. He was also able to use a similar icon if the actual one wasn't there. I remember we were in a hotel and he realised there was a swimming pool downstairs. We didn't have an icon for pool so handed me the sentence strip with "I want bath" on it. I couldn't believe it. Each time he handed anyone the sentence strip, they read it out as a sentence. He had remained non verbal, until just before his 5th birthday, he handed me the strip with "I want ball" on it. I said the sentence and out of the blue he went "ball". This was one of the most incredible days of my life. I endeavoured then to persevere and now he can ask for whatever he wants. I encourage him with "use your sentences."

Being aware of sensory preferences and over selectivity

Complete a sensory profile on the child with parents/carers and the Occupational Therapist to identify what sensory preferences or issues he/she may have. The sensory profile needs to be updated regularly. Some children with autism may be hypo or hyper sensitive to particular stimuli and it is important to identify these before starting a session to limit issues of difficulties that may occur. These sensory preferences may change over time and a child who initially presented as hypo sensitive to sound may become hyper sensitive to that particular sound and become disruptive when it is used.

Case Scenario: Parent of a 9 year old girl with mild autism

"Mary really disliked having her head touched. We were called to the unit (ASD unit in mainstream school) as she had lost it in the yard when one of her "buddies" touched her head playing tag. We hadn't stressed it enough at the previous meeting, I suppose. The other children got an awful fright too. We worked with the O.T (Occupational Therapist) on brushing and deep pressure programmes to help her overcome it."

Balance social skills training

Where physical activity is an important goal, social skills training can also take place.

Start with one to one interaction and slowly increase to small groups as tolerated. Encourage the child to respond when addressed. Introduce the child to each participant and encourage acknowledging others. Encourage turn taking in activities, "wait your turn". Reward good waiting and good turn taking. Encourage to assist with setting up of activities with others and to tidy up after. This will go from parallel engagement where the child will concentrate on the chore to actually becoming aware of and engaging with buddies and team mates who can be encouraged to initiate engagement. After a session try and include a snack/drink at the end for all to ensure the social aspect of engagement is maximised. Encourage the child to draw a picture/ write a story of the activity. Build a book of buddies and events that he/she can return to.

Case Scenario : Mother of 17 year old boy with moderate autism, moderate learning disability and severe speech and language disorder.

"Tomas was always a runner: at the start, up at night running up and down the hall, you name it. I decided to turn it to our advantage and began to take him out for short walks and run home. The distance increased and he really seemed to like it. After a few months of just the two of us, I asked my friends if they would join us on Sunday mornings and they agreed. We soon had a routine of long Sunday runs, followed by breakfast together. In time Tomas was setting the table for the others. Funnily, when he ran his first half marathon with the group, one of the gang was struggling at the end to keep up. He told us to head on without him but Tomas refused to leave him, insisting we all stay together and finish together. What about that for loyalty born from running."

Use Applied Behaviour Analysis

As outlined earlier Applied Behaviour Analysis is commonly used as a teaching methodology/technique with children/adults on the spectrum. Break skills down into smaller parts as necessary i.e. extending the child's arm to catch a ball; throwing a ball a short distance and increase as success is achieved; use of a big ball reducing the size as progressing. Work one to one with the child until he/she achieves fluency i.e. can participate in the skill/activity .without prompting. Reward/reinforce each success with a treat and/or praise. Use repetition until a skill is mastered. Ensure the environment is uncluttered when teaching new activities, keeping distractions to a minimum. Provide demonstrations and prompts as necessary.

Case Scenario: Father of 18 year old boy with mild autism and mild learning disabilities.

"We were using applied behaviour analysis from when Aidan was 3 or 4 years old. We learned the basics through workshop training organised by an amazing dad of a

young boy with autism. So whenever we wanted to teach Aidan a new skill, we would look up Cathering Maurice's book "Hear your Voice" and use it as our guide. We bought a timer and counted how often he did each skill or part of a skill in a minute and graphed our findings. Aidan learned to catch, throw, jump and run by breaking each of the skills down, working one to one with him and using constant repetition and reinforcement. We still use ABA 15 years later and it still works. You get used to breaking everything down and finally putting it all back together again."

Use of Recording Format

Begin by recording what the child can do i.e. catch, throw, run, and jump. Quantify how much of each skill your child can do i.e. 10 throws to a hoop, 10 laps of the track. Is he/she using arms, trunk or legs with different activities? Document short term goals and build toward long term goals. Keep a daily/weekly diary of activities participated in: note details of your child, the activity and the environment. Record the child's reaction to and engagement with others. Use a written diary, voice recorder, video with itouch, ipad, video recorder, pictures. Encourage the child to write up/draw/record his/her experiences also, these can be used to reinforce positive activities and promote recurrence. Keep a record of reinforcers and note if primary reinforcers i.e. food, objects are being replaced by secondary reinforcers i.e. praise. Record if the child has difficulties or appears unhappy with any particular activity. Note what happened before the activity, during the activity or after the activity.

Case Scenario: Mother of 7 year old girl with mild autism.

"As a family we always videoed our kids playing, outdoors you know the usual. When Anne was diagnosed with autism, we were able to look back and see the delays that were there, especially in her walking, climbing the stairs. When we were encouraged to promote fundamental movement skill programmes we were told by the facilitator to video all activities and use them to set new targets. It was great advice, now we use the iphone all the time. Its non invasive, can pick up spontaneous activities, engagement and different successes. Anne likes looking at them too. Parents of children with autism should be encouraged to record how their children are doing in different settings; how they interact with others and if they do well."

Use of Prompts

A prompt is used to elicit a response but should be faded when not needed. Verbal prompts can be used depending on the child's comprehension of language. Record prompts to help the child understand what comes next. Use visual prompts where possible i.e. pictures, schedules, video and the written word. Physical prompts can be used to give the child the "feel" for an activity e.g. extending the child's arm to catch a ball. Model prompting involves demonstrating an activity firstly in its entirety and then breaking it down and modelling in parts until the child correctly responds to each part. Reinforce success but prepare to fade prompts as the child participates more.

Case Scenario: Swim Teacher of a 14 year old boy with severe autism and learning disabilities.

"I was working on teaching John how to swim. I used a visual schedule showing him

what the day involved. I then had a work schedule to break down the actual skill of swimming from arriving at the pool to getting him into the water. I model prompted each part of the swim as my swim tutor had taught me. I used to move John's arm through each of the skills, getting him used to the feel of it both in the water and out of it. The more he practiced the less prompts he needed both verbally and physically. To me prompting is essential for the child's success and it's never too late to use them."

Use of reinforcers

Reinforcers can be important tools to promote the child to engage in physical activities so choose wisely. Ask the child! Consider the child's age, interests, likes and dislikes. Reinforcers can be primary/tangible i.e. material objects, or secondary i.e. activity based or social based. Always accompany reinforcers with praise. Know what reinforcers you will use before embarking on activities. Reinforcers should only be used if the target activity has been completed. At the beginning reinforcers should be immediate with delays between activity and reinforcement being introduced as tolerated.

Case Scenario : Mother of 17 year old boy with moderate autism, moderate learning disability and severe speech and language disorder.

"Over the years I've seen Tomas reinforcers change from his favourite sweets when he was very young to going for a swim now he is older. I used to cut jelly tots into tiny pieces and whenever he achieved success at a task I'd reward him. Each time he got a sweet, I'd praise him being specific as to what he had succeeded at i.e. good throwing. He loved praise and would smile at any enthusiastic encouragement. Soon we were able to replace some of the jelly tots with praise. I also introduced a star board and encouraged Tomas to earn a star with each additional lap or jump he achieved. He loved this and it also helped his counting. His most recent reinforcer is his love of having a shower. He now looks to go running each day and on the way back he talks about his shower. I use it as a positive, healthy reinforcer. Parents should monitor what motivates their children and build on skill development with their individualised reinforcers. Make a list; watch what makes them light up. All children like tangible or edible reinforcers at the start but they will learn to work for praise especially as they get older."

Use of Incidental Teaching

Learning in other areas can be incorporated into any physical activity programme. Encourage the child to monitor his or her own progress e.g. counting laps, successful catches, throws, jumps. Use the changing environment to comment on other aspects of daily life i.e. weather, animals/birds outdoors. Avail of opportunities to promote use of vocabulary, sentences, develops comprehension. Develop opportunities to engage in activities with others promoting social interaction. Concepts of size, shape, rules can all be explored through activity. Body awareness can be developed: labelling body parts, changing direction, feeling the impact of activity on bones, joints and posture.

Case Scenario: Father of 12 year old boy with moderate autism.

"We live by the ocean and I take Cathal walking there several days a week. While we're walking I choose different routes across rocks, grass and sand. This really helps

his posture, coordination and balance. We chat about the weather, the number of people on the beach, comment on the different activities going on i.e. surfing, sailing, and swimming. We talk about the Atlantic Ocean and the countries it touches. I am constantly teaching and Cathal is constantly learning while engaging in activity, it's our endless blackboard! Activity provides all round opportunity for incidental teaching."

Use of Pivotal Response Training

Pivotal response training is a useful tool to consider when engaging in activity. Pivotal Response Training considers those activities that will motivate the child to engage i.e. enjoys water so will run so he/she can have a bath/shower. PRT looks at activities that promote the child to respond to multiple cues i.e. running outside promotes use of seeing, hearing, smell and instruction. PRT aims to promote the child's social interaction i.e. catching and throwing games with a buddy. PRT seeks to promote self regulation for the child i.e. enhanced feeling of wellbeing and "happy in his/her own skin" after a game of football.

Case Scenario : Brother of 13 year old boy with mild autism.

"I enrolled John in the Special Olympics athletics team. I wanted him to be a part of something that would involve activity and training. I also wanted to give him the chance to meet others. It has been incredible what we have all gotten from this. John is motivated to train, has friends, can tolerate crowds, noise and is much calmer and more regulated after training sessions. He and all of us have also had the experience of succeeding and winning gold."

Use of TEACCH Components

TEACCH uses a highly structured environment: distractions are reduced. The physical environment is actively organised i.e. an obstacle course is clearly set up with each area of equipment clearly marked. Skills are broken down into small parts i.e. start with dipping toes in the pool until child is comfortable to submerge with assistance. Visual schedules indicates what the activity session involves i.e. Drive to park, kick football, have picnic, return home. Work schedules further breaks this down i.e. take ball from car, place on the ground, and swing with right foot, kick ball, and score a goal. Routine is integral to the success of the programme i.e. be consistent when planning and delivering a programme.

Case Scenario: Mother of an 8 year old girl with moderate autism and learning disabilities

"We are using TEACCH for the past 3 years with Mona. Firstly we have our daily visual schedule that's like a timetable. Activity of some kind is a part of every day and Mona chooses which activity she wants for each day and we put the icon on the board. Once the activity is completed she takes the icon off the board. We use the work schedule to break down any new activity. This summer Mona joined a surf camp for children with autism. We did a work schedule of pictures starting with the beach, the surf board, the wet suit, surfers, carrying the board to the water, lying on the board with support and coming in from the water. We also used the iphone to video Mona on the board and she can look back at it after each session. We did warm

up sessions beforehand, jogging up and down the beach and then doing the stretches. We finished off with a similar cool down and kept the routine consistent. The structure and routine of TEACCH really suits Mona. The whole family is used to it."

Summary, Conclusions and Recommendations

This chapter opened with an overview of specific tests of movement assessment as follows: Movement Assessment Battery for Children (Henderson & Sugden, 1992), Peabody Developmental Motor Scales- Second Edition (PDMS-2) (Folio & Fewell, 1983; Folio & Fewell, 2000). Test of Gross Motor Development 2 (Ulrich, 1985), Bruininks-Osteretsky test (Bruininks, 1972) and the Manchester Motor Skills Assessment (MMSA) (Bond, Colea, Crookb, Fletchera, Lucanzb & Noblea, 2007). It further introduced the Social Responsiveness Scale (Constantino & Gruber, 2005) and Pupil Evaluation Checklist (Wright & Sugden, 1999) as tools for assessment, programme planning and evaluation. The tools used should be based on understanding the individual, the task and the environment.

Promoting and maintaining participation in physical activity for children with autism, identified the need for detailed assessment for activity selection. An ecological approach to physical activity participation for individuals with autism was recommended. This considers the interrelated nature of the individual, the task and the environment. Intervention programme and planning needed to address individual instruction, low student teacher ratio, task variation, stimulus generalisation of learning, self-determination, structured learning environment and finally routines and transitions.

Research on specific instructional methods allowed time for familiarity, promoted eye contact, used clear language, accommodated sensory preferences and over selectivity, balanced social skills training and physical activity objectives, used applied behaviour analysis, promoted incidental teaching, accommodated pivotal response training, used TEACCH components and principles, adapted tasks and building success experiences and ensured the individual with autism was motivated to participate.

In relation to findings on activity selection, programme intervention and planning, many areas need to be addressed; these involve time, extra support staff and additional training of professionals involved, so that optimum participation can occur for the individuals with autism.

CHAPTER 6

CONCLUSIONS AND FUTURE DIRECTIONS IDENTIFIED

Chapter 6 considers conclusions and overall recommendations for future research and developments in the areas of autism and physical activity.

Research in the field of adapted physical activity needs to be promoted and developed both at national and international levels. This includes intervention studies addressing timing, duration, frequency and intensity of activities for individuals with autism and indeed other disabilities. Research needs to consider impact of age, influence of co-occurring learning disabilities and other co-occurring morbidities. Research on the factors that influence participation and the participation rates of individuals with autism in physical activity, needs to be empirically investigated. Ideally future research should include children with autism and co-occurring learning disabilities as participants of control groups.

Current research in the field of ASD tends to be orientated toward High Functioning Autism and Asperger's syndrome. Low functioning autism and co-occurring learning disabilities need to be researched too, especially as up to 75% of the autism population also have co-occurring learning disabilities.

As regards education, issues of lack of knowledge and lack of experience working with children with disabilities and especially those with autism, needs to be addressed at undergraduate/pre-service level at third level institutes especially in the area of APA. This includes teacher training at primary, secondary and third levels. Teachers and other professionals currently working in the area of adapted physical activity need to be provided with appropriate in-service and practical workshops to support theoretical materials. Quality university validated courses should be made available to those who wish to undertake more detailed study in this particular area. Training of SNAs is also an area that warrants attention.

Gaps in the provision of quality adapted physical activity need to be addressed, in the interim. Adapted physical activity specialists should be available to schools, until such time as newly qualified personnel are part of the education system. Many postgraduates have completed Master's theses and studies in APA, such expertise should be incorporated into school curricula. Links should be established between National Governing Bodies of Sport, The Irish Sports Council and the Department of Education and Skills so that schools and communities can access the expertise of these bodies.

Appropriate supportive educational materials need to be developed and readily available. These include DVDs, visual aids and modified/adapted equipment in a variety of shapes and sizes.

Whole school approaches need to be fostered and developed. This ensures issues of inclusion and delivery of quality programmes start at the top down and ripple throughout the school community. Both children with disabilities and typically developed children hence learn and develop the tenets of fair play and equality for all.

In relation to the condition of autism itself, research into different aspects of the condition is necessary. Research into genetics and underlying biological mechanisms need to be explored. Research in the area of diagnosis would help to refine existing diagnostic tools. Existing interventions and methodologies for those with autism need to be empirically validated, so that parents and professionals can make informed choices as to what interventions are appropriate for this population.

Clear outlines of the role and delivery of different Government Departments, needs to be established in relation to education, APA and sport provision for individuals with autism and indeed other disabilities. Links between Government Departments and other official agencies need to be clearly established and defined. Existing steering committees need to be more proactive in their promotion of adapted physical activity, for individuals with autism and other disabilities. Establishment of disability-orientated provision, in the field of adapted physical activity, in line with examples of good practice from other countries, is essential.

Implementation of the recommendations of many state funded reports needs to be addressed with urgency: Report of People with Disability in Sport Taskforce (1999), the recommendations of the Joint Committee on Education and Science, 3rd Report, The Status of Physical Education (2005) and the recommendations of the Irish Taskforce Report on Autism (2001). The sooner these recommendations are implemented, the greater the opportunities for children and adults with autism and other disabilities to attain their true potential, with appropriate support. This has huge economic implications for any forward thinking legislators.

Finally and most importantly, the opinions of parents, carers and especially children and adults with autism should be sought and listened to, so that quality adapted physical activity is customised and readily available to all.

> "*You are a child of the universe, no less than the trees and the stars; you have a right to be here. And whether or not it is clear to you, no doubt, the universe is unfolding as it should."*
>
> *Desiderata, (1692)*

GLOSSARY OF TERMS

APA	Adapted Physical Activity
AS	Asperger's Syndrome
ASD	Autistic Spectrum Disorders
HFA	High Functioning Autism
LSP	Local Sports Partnership
IEP	Individual Education Plan
ISC	Irish Sports Council
MABC	Movement Assessment Battery for Children
NGB	National Governing Bodies
PDD-NOS	Pervasive Developmental Disorders Not Otherwise Specified
PE	Physical Education
SEN	Special Educational Needs
SNA	Special Needs Assistant
SENO	Special Educational Needs Organiser
SRS	Social Responsiveness Scale

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