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GENERAL CONSIDERATIONS FOR INCLUDING STUDENTS WITH DOWN SYNDROME IN PHYSICAL EDUCATION ACTIVITIES

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Abstract

The purpose of this article is to provide regular and special teachers, school administrators, and parents with information regarding general safety concern, along with possible interventions to these concerns that must be considered when developing physical activity programs for students with Down syndrome. This article provides general guidelines for physical activity programming.

The inclusion of children and youth with disabilities into the mainstream of general education requirements has solidified the need for general and special education teachers and school administrators to be aware of the health and safety concerns related to students. Down syndrome is one of the most common disabilities in our schools, yet few authors of introductory texts in special education mention more than the outward appearances of students with this syndrome (Drew & Hardman, 2000; Heward, 2000; Kaplan, 1996; Turnbull, Turnbull, Shanck, & Leal, 1995; Wood, 1997). Though knowledge of these outward characteristics may be beneficial in recognizing and categorizing individuals with Down syndrome, it is extremely important to understand that these children and youth vary widely in the extent and/or possession of numerous growth and development deficiencies. Some of these deficiencies may pose possible health and safety concerns when these students are included in common physical activities included in the curriculum. The problem then, is the lack of knowledge of those responsible for providing physical education about these deficiencies and possible program modifications needed to successfully and safely include students with Down syndrome into an inclusive regular program of physical activity (Antony, 1989).

Down syndrome is a unique chromosomal condition characterized by short stature, distinct facial features, and physical and cognitive differences. In addition, there are some very important differences that need to be considered. Some of factors are cardiovascular, pulmonary, and bone conditions; joint laxity between the first two bones in the cervical (neck)

spine; susceptibility to particular diseases; low muscle tone; smaller oral cavities; visual and hearing impairments; kinesthetic and timing delays; and a distinct tendency for obesity. Each of these factors may pose specific problems in teaching or supervising and motivating students with Down syndrome to engage in physical activity. When developing individual education plans (IEP) for physical education, it is also critical to remember the great variability of the effects and manifestations of these conditions in each individual with Down syndrome. Thus, commercial computer generated IEPs should be used with caution.

The purpose of this article is to provide regular and special teachers, school administrators, and parents with information regarding general safely concerns, along with possible interventions to these concerns that must be considered when developing physical activity programs for students with Down syndrome. Further, this article provides general guidelines for physical activity programming.

Growth and Development

Sherrill (1993) stated that the average life span of individuals with Down syndrome is approximately 50 years. Studies have documented that as the person increases in age, muscle tone and strength seem to improve, and flexibility, self-care, and cognitive abilities seem to decrease (Block, 1991). In 15% to 40% of older individuals with Down syndrome, an early-onset Alzheimer type neuropathology (degeneration of the brain that results in premature aging) is manifested. Eberhard, Eterradossi, and Debu (1997) reported that older persons with Down syndrome had the following physiological characteristics: slow free fatty acid (body fat) metabolism at the start of exercise, low levels of high density lipoprotein (HDL) (good cholesterol), and high levels of very low density lipoprotein (VLDL) (bad cholesterol) at rest, indicating possible high risk for coronary artery disease. The authors also reported that these same individuals were able to obtain near normal blood cholesterol levels on completion of a 12-week cardiovascular program. The implication is that when individuals with Down syndrome engage in physical activity throughout their lives, the risk of cardiovascular problems are lessened as they age; thus the need to include these students in physical education activities from an early age.

Cronk (1978) reported that the greatest deficit in growth velocity for both length and weight was within the first two years of life. Therefore, even by age four to six years of age, the growth rate of children with Down syndrome is already behind their peers without Down syndrome. Though the tempo in which motor abilities are acquired is clearly slower in individuals with Down syndrome, the motor development of these children follows the same order of development (Vermeer & Davis, 1995).

A marked characteristic of children with Down syndrome is that motor milestones are not only achieved later. A comparison of the age ranges at which children, as a group achieve major motor milestones is provided in Table 1. Other areas of growth and development that may be of concern in IEP development for physical activities are perceptual impairments (Table 2) and structural conditions (Table 3). These concerns affect the student's safety and ability to participate in physical activities and require some specific modifications as included in Tables 2 and 3.

Guidelines for Interventions

The planning and programming of physical activity for students with Down syndrome may include the student, parents, teacher, adapted physical educator, physical educator, physical therapist, occupational therapist and/or physician. These individuals can provide the needed background information (i.e., medical form completed by the family physician, the student's current motor and functional abilities, preferred activities of the student and family,

Table 1
Motor Milestones of Infants and Preschoolers with Down Syndrome

	Children with Down Syndrome		Children without Down Syndrome	
Milestone	mean age months	(range)	mean age months	(range)
Good head balance	5	(3 to 9)	3	(1 to 4)
Rolls from back to stomach	7	(5 to 10)	5	(2 to 10)
Sits erect with head set forward (approx. one min)	11	(9 to 13)	7	(5 to 9)
Stands briefly with assistance	13	(6 to 24)	8	(7 to 12)
Creeps on hands and knees	15	(8 to 22)	10	(6 to 12)
Pulls self to a standing position	18	(11 to 30)	10	(8 to 13)
Walks with assistance	21	(12 to 38)	12	(9 to 16)
Walks without assistance	25	(13 to 48)	15	(9 to 17)
Climbs stairs with assistance	30	(20 to 48)	17	(12 to 24)
Comes down stairs with assistance	36	(24 to 60)	17	(13 to 24)
Runs	42	(28 to 60)	24	(17 to 30)
Jumps up and down with both feet	48	(36 to 60)	30	(22 to 37)
Can ride a tricycle	60	(46 to 72)	36	(25 to 42)

Modified from Vermeer & Davis (1995) and Share & French (1993).

Table 2
Specific Perceptual Concerns and Guidelines for Intervention when Teaching Physical Activity to Preschoolers with Down Syndrome

	Concerns	Interventions
Visual Impairments	Many children with Down syndrome have cataracts (clouding of the lens), strabismus (eye muscle imbalances), and nystagmus (rapid back-and-forth eye movement after spinning), and they may also have visual perception problems (i.e. problems in depth perception) (Block, 1991).	Yearly visual exams by a vision specialist are recommended. Encourage activities that use visual cues or stimulate visual tracking and acuity (i.e., hide and seek, follow the object with your eyes, catch or kick the rolled ball, and games that incorporate looking far and near); and remember to start with easy tasks and progress toward harder ones.
Hearing Impairments	Fifty-five to 60% of children with Down syndrome exhibit significant hearing impairment due to frequent upper respiratory infections and/or congenitally smaller ear canals. The most common loss is moderate sound conduction of high frequencies (Block, 1991). There may also be auditory perceptual deficits (i.e., an inability to locate sounds or distinguish between two sounds). Hearing loss may also affect speech and language development (Auxter, Pyfer, & Huettig, 1997).	Stress yearly auditory exams. Encourage activities that use auditory cues or require listening to complete (i.e., Hide and Seek with sound, animal sound guessing games, follow the sound around the room), and remember that an alternative method of communication may be necessary.
Balance/Kinesthetic/ Timing Deficits	Children with Down syndrome demonstrate significant decreases in static and movement balance (Connolly, Morgan, Russell, & Fulliton, 1993). They also show decreased ability in kinesthetic awareness (the ability to obtain information regarding the position and movement of the body in space), and “coincidence timing” (the ability to bolsters, rhythmic dance activities, anticipate conditions and know when to initiate movement in relation to some external event, are also decreased (Sherrill, 1993).	Encourage activities that safely challenge their ability to balance, cause them to spin, cause them to change direction, and/or cause controlled falling (i.e., walking a balance beam in different positions, log rolls, animal walks, climbing over, under and around different sized bolsters, rhythmic dance activities, sprints, relay races, and shuttle runs). Also, encourage activities that teach them to move or touch particular body parts (i.e., Simon Says, Do As I am Doing, and Head, Shoulders, Knees, and Toes).

Table 3
Specific Structural Concerns and Guidelines for Intervention when Teaching Physical Activity to Preschoolers with Down Syndrome

	Concerns	Interventions
Skeletal Abnormalities	Children with Down syndrome may exhibit development of the long bones of the arms, legs, fingers and toes, a smaller oral cavity; widening neutral of the bridge of the nose, cranial malformation; and most significant to physical activity, atlantoaxial instability (AI), or joint laxity between the first two bones in the cervical (neck) spine (Sherrill, 1993; Vermeer & Davis, 1995).	Children with Down syndrome decreased should undergo lateral view X-rays of the neck in flexion and extension. There is some indication that X-rays should be repeated about every five years (Dyment, 1989). If AI is present, avoid activities that put stress on the neck (i.e. forward/backward rolls, trampolines, diving, head stands, etc.).
Heart Disease	Heart disease is the most common medical condition, with 40% to 50% of children born with Down syndrome presenting it in some form (Block, 1991).	Check medical records and follow written guidelines established by the physician and stress cardiovascular endurance activities if appropriate (i.e., continuous walking, jogging, or aerobic dance).
Susceptibility to Pulmonary Problems	Persons with Down syndrome are highly susceptible to acute inflammation of the respiratory passages (bronchitis, brouchiolitis), with about 75% of those that are nonambulatory, dying of pneumonia (Sherrill, 1993). Respiratory problems may limit ability to participate.	Stress personal care (i.e., wearing weather appropriate clothing, getting enough to drink) and hygiene (washing hands and face frequently). Stress activities that encourage blowing (i.e., feather blowing, volleyball, ping-pong ball, and balloon blowing races).
Joint Laxity	Joint laxity is common in persons with Down syndrome. The concern is that it may lead to dislocations and/or permanent orthopedic disorders (Block, 1991).	Stress activities like sitting, crawling, walking, and moving through various positions to increase muscle strength, and encourage movement through a full range of motion.
Low Muscle Tone	Low muscle tone leads to a decreased ability to fully activate the muscles, decreased physical strength, and decreased ability to maintain certain postures (i.e., sitting and standing) (de Graaf, 1995).	Stress activities that cause weight bearing, muscle strengthening, and maintaining correct posture (i.e., walking, jumping, hopping, catching, striking, push-ups, and sit-ups).
Obesity and Decreased Metabolism	There is a strong tendency, usually apparent within the first three years (Cronk, 1978) to be overweight (Luke, Roizen, Sutton, & Schoeller, 1994). Obesity increases cardiovascular disease risk and decreases social acceptability and participation in fitness activities. Muscle hypotonia decreased metabolism, and a lack of success in and motivation for physical activity have been attributed as likely causes (Luke, Roizen, Sutton, & Schoeller, 1994).	Proper nutrition and weight control should be stressed. Diets should consist of 60% carbohydrates, 25 to 30% fat, and 10 to 15% protein. Vegetables and fruits are the best snacks. It is also important to select student preferred aerobic exercise and to encourage participation for 20+ minutes three to four times a week. Remember to start slow, progress gradually, and plan in success.

appropriate behavior management techniques) to help provide an appropriate individualized physical activity program for the student while in school or in a transition program.

General guidelines for intervention can be divided into three age ranges, infancy and preschool (birth to three yrs.), elementary (3 to 10 yr.), and secondary (10+ years) (Block, 1991). Between birth and three years, programming should stress (a) movement quality rather than achievement of motor milestones; (b) correct posture and mechanics of the body and head while lying on stomach, back, and side, sitting, being on hands and knees, and standing; (c) shifting and bearing of body weight, stretching, reaching, and grasping; and (d) infant exploration of a variety of objects, movements, and positions in various environments. The research literature is inconclusive whether early intervention decreases the deficits in motor development of individuals with Down syndrome (de Graaf, 1995). Early intervention has shown to improve the child's functioning in all areas. However, early intervention does not ameliorate the delays, but allows the child to approximate normal development. There is strong evidence that early intervention does increase the knowledge and participation of parents in the motor development of the child.

Between the ages of 3 and 10 years, individualized programs should (a) provide a variety of fitness activities on a regular and systematic basis that improve cardiovascular fitness, strength, stretching, and speed and agility; (b) provide activities that include visual, auditory, and kinesthetic (ability to obtain information regarding the position and movement of the body in space) challenges, presented in a problem solving approach; and (c) continue working on vestibular (balance) and tactile (touch) stimulation (Block, 1991). Finally, physical activities should also include a recreation component to instill within the individual the pleasure.

At approximately the 11 years, individualized programs should begin to emphasize (a) helping the youths select chronologically age appropriate, lifelong, and healthful activities that are of interest to them and their families, and that afford opportunities for interaction with non-disabled peers in the community; (b) development of an array of motor skills needed to successful participate in these activities as independently as possible (i.e. career/vocational); and (c) development of appropriate personal and social skills, such as money management, hygiene, and behaviors that relate to successful recreation participation. Planning for students' recreational, vocational, and physical requirements are incorporated into individual transition plans.

In summary, it is clear that there are many considerations that must be taken into account when planning and programming physical activities for students with Down syndrome. However, when these considerations are made, safe and successful participation in regular physical education activities is possible. In addition to the physical benefits, students with Down syndrome are able to successfully participate with their non-disabled peers.

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