

A Chance to Play is a Chance to Learn: Integrating Individuals with Physical Disabilities into Physical Education

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Abstract: Coaches and physical educators are likely to come into contact with numerous students under their care who have a variety of physical impairments. These impairments, on the surface, may appear to be significant deterrents to participation in physical education, sports, and/or physical activity. However, with some modifications and special attention to these students and specific activity selection, physical education and sporting experiences can be an extremely inclusive environment for students with physical disabilities and limitations. Therefore, the purpose of this article is to focus specifically on youth and pediatric physical disabilities and cognitive impairments, and the manifestations of particular symptoms as they relate to physical activity and movement opportunities in physical education. General backgrounds of the conditions are detailed, as well as recommendations to modifications of physical activity, and general safety/First Aid responses for individuals with these conditions. It is recommended that physical activities and physical education for each student be individualized depending upon one's particular set of conditions. For complete and fulfilling exercise and sport experiences, both static and dynamic exercises are encouraged, although it is important to consider the level of intensity of the exercise or activity. Furthermore, open circuit activities, like traditional team sports such as basketball or soccer, inherently possess more risks and concerns to safety than closed circuit activities.

1. Inclusive Physical Education and Physical Activity for Students with Epilepsy

Chances are if you are an educator for any more than a few years you are likely to come into contact with numerous students under your care who have a variety of physical impairments. These impairments, on the surface, may appear to be significant deterrents to participation in physical education or physical activity. However, with some modifications and special attention to these students, and specific activity selection, physical education can be an extremely inclusive environment for students with physical disabilities and limitations (Webb & Pennington, 2019). One such physical impairment which, with attention and modification, does not need to limit students' physical activity or physical education participation is epilepsy.

2. Epilepsy

Epilepsy is a neurological condition happening in the brain, which affects the nervous system which, in-turn, affects the rest of the body (Kozub, 2011). Epilepsy is also known as a *seizure disorder*. It is commonly diagnosed after someone has had at least two seizures that were not caused by some known medical condition (i.e. alcohol withdrawal or extremely low blood sugar). A seizure happens when a brief, strong surge of electrical activity affects part or all of the brain. The two kinds of seizures are *grand mal* and *partial*. Grand mal (or tonic-clonic) seizures result in a loss of consciousness and jerking movements. Partial seizures result from a disturbance in a single portion of the brain, thus affecting one area of control or mental activity. Some related disorders to epilepsy are Todd's Paralysis (weakness in partial areas of the body after a seizure) and Landau-Kleffner Syndrome-- most often affecting 3-7 year olds whereby there is a loss of speech and comprehension.

3. Physical Activity and Youth with Epilepsy

Epilepsy is a common disease found in about 2% of the population, affecting people of all ages (Kozub, 2011). Unfortunately, individuals with epilepsy have previously been discouraged from participation in physical activity and sport for fear of inducing seizures or increasing the frequency of seizures. Despite a shift in medical recommendations toward encouraging rather than restricting participation, the stigma remains and individuals with epilepsy continue to be less active than the general population (Arida, Cavalheiro, da Silva, & Scorza, 2008). Research reveals that despite the growing trend of youth with epilepsy to participate in sports activities, there continues to be a lingering hesitation among parents and children to engage in physical activity (Brna, Gordon, Woolridge, Dooley, & Wood, 2017). This is particularly concerning as children with epilepsy possess health habits that often translate to adulthood (i.e. reluctance to join sport leagues, running groups, etc.; Collard & Ellis-Hill, 2017). Youth with epilepsy in are found to adhere poorly to recommended physical activity guidelines, as well as elevated levels of sedentary screen time, and poor sleep duration – all which increases their risk for secondary comorbidities (Ronen & Janssen, 2018). Children and individuals with epilepsy suffer from a considerable lack of physical fitness that might have important impacts on other components of their general health and quality of life (Steinhoff, Neusiiss, Thegeder, & Reimers, 1996).

Insufficient knowledge among youth coaches and physical educators may be a factor in this lack of knowledge and/or opportunity to be physically active. Children and teens with epilepsy are at risk of social isolation. Participation in physical activity may improve self-esteem and social integration, leading to improved quality of life (McEwan, Espie, Metcalfe, Brodie, & Wilson, 2004). Physical education and physical activity programs that promote exercise in youth and adolescents with physical disabilities should be encouraged (Pennington, 2019). Such programs have been shown to improve their physical, psychological, and social well-being (Wong & Wirrell, 2006). Presented are some concrete ideas and suggestions for physical educators and youth physical activity directors to consider when facilitating physical activity with individuals with epilepsy. Also presented are safety tips, first-aid procedures, and organizations educators are encouraged to be aware of.

Modifications to Physical Activity. Regular exercise is important to normalize the electrical function of the brain and increases aerobic fitness levels. High-risk activities which require far more attention and supervision from the educator include: rock climbing, swimming, horseback riding, and anything that may include falling. These can be done, but with heightened caution and supervision – which would be true of any/all students under your care. It is recommended that

certain activities like rock climbing be performed on low walls (six feet or lower) or replaced with low-suspension balance activities (balance-beam, Acid River, etc.). Medium-risk activities include contact sports, which can be played, but need preventive measures (e.g. head gear or avoidance when safety modifications cannot be made). The more open circuit the activity the greater the risk to inviting unwanted physical contact. Educators may consider reducing the size of playing areas and limiting teams to as few players as possible to reduce the risk of contact. Manipulating game rules to emphasize penalties for physical contact is one suggestion to possibly reducing fouls and other contact. Also, foam and/or inflatable balls and light-weight striking objects may be preferred. Finally, some children with epilepsy may be more prone to seizures during high humidity and excessive temperatures. Outdoor activities may need to be moved indoors when weather conditions increase likelihood of risk. Regular water breaks and opportunities to pause play are recommended.

Safety Concerns and Tips. Scholars suggest some basic tips for maximizing the safety of individuals with epilepsy are to: (a) avoid head trauma, (b) be aware of physical activity that is above head height (rock climbing or playing on equipment above the ground), (c) receive approval from doctor/guardians and need to take precautions with a helmet, (d) be aware of physical activity in or near the water (wear appropriate safety equipment), (e) be aware of contact sports that will increase the chance of head trauma, and (f) be aware of medications students are taking and their side effects. Some examples of common side effects are reduced coordination, concentration, drowsiness, blurred vision, and reduced reaction time (Arida et al., 1996; Steinhoff et al., 1996; Wong, & Wirrell, 2006).

First Aid for Tonic-Clonic (General) Seizures. Often, children with repetitive seizures will have a warning sign before the seizure. If the child is wearing glasses, remove them. If the child has some type of mouth guard or prosthetic dental work, if possible remove it so the airway remains open. One should not attempt to restrain or put anything in their mouth. Make note of how long the seizure lasted. If the seizure lasts more than a few minutes, if it is a first-time seizure, or a seizure occurring in water, call for emergency medical help. If the seizure does not need medical attention, be sure to let the child rest. Inform the child and parents what happened and what was missed.

4. Epilepsy Conclusion

The majority of physical activities or sports are safe for individuals with epilepsy to participate in with special attention to adequate seizure control, close monitoring by educators of medications, and preparation of family or trainers (Willis, Hopping, Mahlberg, & Ronen, 2018). Evidence indicates that children and individuals with good seizure control can participate in both contact and non-contact sports without harmfully affecting seizure frequency (Arida et al., 2008), although most physical education programs should be cautious when introducing activities with high levels of physical contact, within reason, for all participants. Additionally, parents of children with epilepsy have also indicated personal emotional benefits as a result of their child engaging in quality physical education and/or physical activity programs (Willis et al., 2018).

Epilepsy-based Organizations. Finally, there are a number of organizations parents, teachers, physical educators and liaisons to physical activity may consult for additional support and information regarding facilitating physical activity in children with epilepsy. The National Association of Epilepsy Centers (<http://www.naec-epilepsy.org>) provides the resources for individuals with epilepsy to find appropriate care centers and doctors for proper diagnosis. The Epilepsy Foundation (<https://www.epilepsy.com>) seeks to improve and save lives through

community services, public education, access to care campaign, research initiatives, and new therapies funding. Lastly, the National Center on Physical Activity and Disability (NCPAD; <http://www.ncpad.org>) promotes physical activity for everyone while providing information on physical activity opportunities.

5. Facilitating Physical Activity with Individuals with Marfan Syndrome

Marfan syndrome is a genetic disorder of connective tissue found in approximately one in 5,000 to 10,000 individuals affecting all ethnic groups (Iams, 2010). The expressions of Marfan syndrome predominantly involve the cardiovascular, musculoskeletal, and ocular systems (Pyeritz, 2013). Individuals with Marfan syndrome are often tall and agile and possibly unknowingly participate in certain physical activities and sports, putting themselves at risk for aortic dissection (a serious cardiac condition possibly leading to sudden death). However, with appropriate diagnosis and treatment, an individual with Marfan syndrome can expect to live a long life. Most physicians, health professionals, physical educators, and coaches have little contact or direct experience with Marfan syndrome. This article will present guidelines for physical activity and exercise for young individuals with Marfan syndrome.

Marfan syndrome is a disorder of the connective tissue (Iams, 2010; Pyeritz, 2013). Connective tissue holds all parts of the body together and helps control how the body grows. The visual signs of Marfan are: (a) longer limbs and longer fingers which causes a tall, thin look, (b) possible curved spine (scoliosis or kyphosis), (c) abnormality of the chest (caved in), (d) possibly over crowded teeth (i.e. inability to wear a normal mouth guard), and (e) severe nearsightedness, detached retina, or dislocated lens. What cannot be seen is an enlarged aorta, which causes the most significant health risk. Additionally, the individual with Marfan syndrome may also possess blemishes in their lungs, which could potentially lead to a sudden collapse of the lungs (Iams, 2010; Pyeritz, 2013).

6. Physical Activity and Participation in Sports

It is very important that children participating in physical activity (i.e. physical education, interscholastic or club sports, exercise, and other forms of movement which elevate the heart rate) are properly identified as having Marfan syndrome before participating, because children with Marfan syndrome require modification to their physical activity (American Academy of Pediatrics, 1996). Parameters for exercise should be set by the child's physicians. The physical educator can then select activities for the child based on that child's needs, abilities, and limitations. The physical educator has an elevated amount of responsibility facilitating physical activity with individuals with Marfan syndrome because children— depending on age and maturity- may not be equipped with the skills required to properly manage the condition.

Because of manifestations of the condition to the child's musculoskeletal system, the individual with Marfan syndrome may lack muscle bulk and strength and joints may be hyperextensible and prone to dislocating. The combination of underdeveloped muscles and joint hypermobility can contribute to poor coordination and delay in acquiring gross and fine motor skills (American Academy of Pediatrics, 1996). Because of how Marfan syndrome affects the child's ocular system, the child may have difficulty with visual perception (nearsightedness, difficulty tolerating bright light, and difficulty in following the flight of an object) leading to poor eye-hand coordination. Because of how the condition affects the cardiovascular and pulmonary system, aortic dilation is of major concern, as well as weakened areas of tissue in the lungs leading to likely reduced exercise tolerance.

It is recommended that physical activities for each individual be individualized depending upon one's particular set of conditions, although the general use of protective eyewear is always recommended. For complete and fulfilling exercise and sport experiences, both static and dynamic exercises are encouraged, although it is important to consider the level of intensity of the exercise or activity. Furthermore, open circuit activities, like traditional team sports such as basketball or soccer, will inherently possess more risks and concerns to safety than closed circuit activities. For a child with Marfan syndrome to enjoy competitive sports, the teacher or facilitator of physical activity may select discrete skills or components of sports to enjoy in a closed circuit environment. For example, shooting a basketball or soccer ball on goal without a defender or dribbling a ball between cones. The closed circuit environment can still provide a setting for exercise and skill acquisition while avoiding the likelihood of physical contact and emotional stress that may accompany fully engaged competitive sport.

7. Guidelines, Safety Concerns and Tips

The National Marfan Foundation (<http://www.marfan.org/marfan/>) publishes a pamphlet, *Physical Education and Activity Guidelines*, which describes safe exercise programs for individuals with Marfan syndrome. Some of the guidelines are as follows:

1. Favor noncompetitive, isokinetic activity performed at a nonstrenuous aerobic pace
2. Stay at an aerobic level of work of about 50% of capacity; try to keep pulse under 100 beats per minute
3. Minimize sudden stops, rapid changes in direction, or contact with other players, equipment, or the ground
4. Avoid activities that involve isometric work such as weightlifting, climbing steep inclines, gymnastics, and pull-ups. Multiple repetitions at low resistance are better than a few repetitions with a larger weight.
5. Avoid testing limits!

Additional tips and guidelines for facilitating physical activity with individuals with Marfan syndrome can be found in Table 1.

Table 1. Tips for Physical Activity for Children with Marfan Syndrome

<p>Modifications to Physical Activity</p> <ul style="list-style-type: none"> • Decrease duration, playing field size or reduce the weight of the implement • Allow for frequent rests and promote proper breathing techniques • Permit participation at the child's own rate, with the freedom of rest on their own • Eliminate competitive and emotional stress factors • Modify activity but still keeping the activity looking like activities their peers are playing 	<p>Modifications for Visual and Perceptual Limitations</p> <ul style="list-style-type: none"> • Use brightly colored objects • Use Velcro for catching • Use soft objects (foam or Nerf) • Decrease distances <hr/> <p>Modifications for Contact Concerns</p> <ul style="list-style-type: none"> • Assign "play" zones • Use individual activities • Use "singles" rather than "doubles" in racquet games, to avoid accidental contact
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8. Marfan Syndrome Conclusion

To summarize, the physical educator, coach, trainer, and physician should individualize each program for children with the help from their physician. The program administrator and physical educator should avoid overly strenuous activities and contact sports because of the risk of damaging the aorta and injuring the eyes. Additionally, activities that involve rapid changes in pressure (scuba diving) and activities that involve isometric work (lifting heavy weight) should be avoided. Children with Marfan syndrome should be encouraged to engage in low intensity and non-contact activities while monitoring their heart rate with a heart rate monitor if possible. In addition, the team of health professionals and facilitators of physical activity should be aware of possible emergencies including collapsed lung and spontaneous aortic rupture or dissection. Finally, Tall Clubs International (<http://www.tall.org/>) and Connors Marfan Syndrome Support Group (<http://www.connersmarfansite.webs.com/>) are two online resources physical educators and health educators may consider using to further inform their decision making facilitating physical activity with individuals with Marfan syndrome.

9. Enhancing Physical Education for Students with Vision Impairment and Preventing Retinal Detachment

The specific nature of disabilities can have implications on individuals' experiences in physical education. Individuals with visual impairments (e.g. retinal detachment, low vision, complete blindness) tend to experience barriers that can limit vigorous participation in physical education (Haegele, Yessick, & Zhu, 2018). Research generally indicates that individuals with visual impairments and/or retinal detachment perform below the physical fitness levels of their peers (Winnick, 1985). Recent research has shown that physical educators perceive children with visual impairments to be one of the most difficult populations to include in general physical education (Lieberman, Lepore, Lepore-Stevens, & Ball, 2019). Peer social dynamics described by those with visual impairments across educational placements tend to emphasize instances of negative social interactions, such as bullying and social isolation, which are driven by perceptions of being "less able" (Haegele, Yessick, & Zhu, 2018). Even so, the fact is that children with a number of physical impairments have the potential to perform equally as well or better than their same-age peers when provided with equal opportunity and encouragement (Pennington & Webb, 2019; Webb & Pennington, 2019).

10. Retinal Detachment

The retina is the light-sensitive layer of tissue that lines the inside of the eye and sends visual messages through the optic nerve to the brain. When the retina detaches, it is lifted or pulled from its normal position. If not promptly treated, retinal detachment can cause permanent vision loss. In some cases there may be small areas of the retina that are torn. These areas, called retinal tears or retinal breaks, can lead to *retinal detachment* (Fraser & Steel, 2010).

Symptoms of retinal detachment include an increase in the number of floaters, flashes of light, and worsening of the outer part of the visual field. This may be described as a curtain over part of the field of vision. The mechanism most commonly involves a break in the retina that then allows the fluid in the eye to get behind the retina. A break in the retina can occur from injury to the eye or inflammation of the eye. Other symptoms include: flashes of light – very brief in the peripheral part of vision; a sudden increase in the number of floaters; a ring of floaters or hairs just to the temporal side of the central vision; a dense shadow that starts in the peripheral vision and slowly progresses towards the central vision; the impression that a curtain is drawn over the field of

vision; straight lines (e.g. edge of the wall, road, table edge, etc.) suddenly appear curved; central visual loss (Fraser & Steel, 2010).

There are three different types of retinal detachment. (1) *Rhegmatogenous* is a tear or break in the retina allows fluid to get under the retina and separate it from the retinal pigment epithelium. These types of retinal detachments are the most common. (2) *Tractional* is a type of detachment in which scar tissue on the retina's surface contracts and causes the retina to separate from the retinal pigment epithelium. This type of detachment is less common. (3) *Exudative* is frequently caused by retinal diseases, including inflammatory disorders and injury/trauma to the eye. In this type, fluid leaks into the area underneath the retina, but there are no tears or breaks in the retina (Fraser & Steel, 2010).

11. Tips for Physical Education

Young physical education participants with retinal detachment and other vision impairments will have difficulty activities that involve visual tracking [the ability to efficiently move the eyes from left to right (or right to left, up and down, and circular motions) or focusing on an object as it moves across a person's visual field]. Certain sports and activities that require visual tracing include tennis, baseball, basketball, and volleyball, as well as many other open-circuit activities. Although students who are visually impaired should learn about these activities for social-development reasons, may perform certain skills associated with these games, may be involved in special modified games with other visually handicapped youngsters, and may participate (with modification) in regular games from time to time, they ordinarily should not spend the majority of their physical education time in these activities in a mainstreamed setting (Winnick, 1985). Because of the great variation in sight ability among the community of the visually impaired (thus impacting their physical ability), physical education programs should be highly personalized, individualized, and modified to fit the abilities and goals of the student.

Modifications to Physical Activity. The limitations and risks for students with visual impairment require that teachers modify methods and activities in a way that maximizes auditory, touch and proprioception, and residual visual abilities. Examples of the use of tactual cues include (a) having students feel movements of others as they perform activities, (b) pairing students for running activities, relays, hiking, and other activities, (c) using different textures to define play areas and goals, (d) using guidewires or rails to enhance orientation and mobility, (e) including students in activities involving close contact such as dancing, (f) using tactual aids for support surfaces to steer students (i.e., moving along a floor marked with tape, raised edges for boundaries, moving on mats placed on a gymnasium floor). By using larger, brighter, contrasting balls, goals, lines, and other objects, teachers enhance the use of residual vision (Winnick, 1985).

High-risk activities for students with vision impairments and risk of retinal detachment include: baseball/softball, basketball, soccer, water and pool activities, and any other sports with fast pace moving projectiles. In addition, a study conducted by Curti, Coggon, Hannerz and Mattioli (2016) suggests that there may be heightened risk to heavy lifting and resistance training requiring exertion beyond moving more than the student's bodyweight. For students with recent retinal detachment surgery, it is highly recommended not to perform in high volume of exercise for two weeks after surgery, and children that have had surgery to correct the retinal detachment must wear eye protection during activity—especially open-circuit activities, dual/team sports, activities with flying objects, and activities with heightened chance of physical contact.

Safety Concerns and Tips. It may be pleasant to learn that students in physical education who have vision impairments statistically do not have any more accidents than their peers (Buell, 1982). Research also indicates that students with vision impairment and retinal detachment can

safely participate in sport, physical activity, and physical education by enacting a few common sense safety procedures. A few tips and concerns are as follows: (1) avoid physical activity immediately after surgery; (2) avoid head trauma; (3) be aware of physical activity in the water; (4) wearing protective eye wear (goggles) will prevent 90% of eye injuries; (5) possible balance issues may persist; (6) be aware of sensitivity to light/sun and glaring.

12. Retinal Detachment Conclusion

An important mission concerning integrating students with retinal detachment and visual impairments into physical education is to provide opportunities for physical activity, encourage vigorous participation, help students develop and use residual vision and other remaining perceptual and cognitive abilities to enhance mobility, and help eliminate barriers to participation in vigorous activity (Winnick, 1985). A study conducted by Haegele, Sato, Zhu, and Kirk, (2019) present concerns expressed by students who were visually impaired. Students reported feelings of not being allowed to participate, feelings of isolation, and the feeling that paraeducators were not adequately trained to handle their needs. These findings should be considered when using paraeducator support during physical education. Instead of relegating students with disabilities to sedentary roles such as scorekeepers, equipment managers, referees, or doorkeepers, an effort must be made to provide vigorous physical activities. Overprotection, a preconceived notion that the student lacks the ability to successfully participate in an integrated class, and the belief that students with retinal detachment require inordinate supervision, are obstacles that must be overcome if effective participation in physical education is to flourish (Winnick, 1985).

Retinal Detachment-based Organizations. Finally, there are a number of organizations parents, teachers, physical educators and liaisons to physical activity may consult for additional support and information regarding facilitating physical activity in children with vision impairment and retinal detachment. The Live Strong Organization (<http://www.livestrong.com/>) provides the resources and articles for the causes. Live Strong highly encourages persons after treatment to become active again. Camp Abilities (<http://www.campabilitiesbrockport.org/>) provides a one-week, developmental sports camp for children who are visually impaired, blind, or deafblind. Lastly, Prevents Blindness America (<http://www.preventblindness.org/>) provides information on all vision impairments, including vision screening centers, research, advocacy and information on keeping your eyes safe at the workplace.

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