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Evidence-Based Best Practices in Physical Activity for Children with Serious Disabilities A Synthesis of the Research Literature

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Evidence-Based Best Practices in Physical Activity for Children with Serious Disabilities

A Synthesis of the Research Literature

A Synthesis Project

Presented to the

Department of Kinesiology, Sport Studies, and Physical Education

The College at Brockport

State University of New York

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Education

(Adapted Physical Education)

by

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Abstract

Serious disabilities are diagnosed in approximately 1 in 100 of children who have serious disabilities (Jasma, 1988). The development of the psychomotor domain in children with serious disabilities is typically below the development of their peers without special needs (Jasma, 1988). Generally, children with serious disabilities tend to be sedentary or lack opportunities to participate in physical activity compared with their peers without disabilities (Jasma, 1988). Traditional assessments such as TGMD-3 (Test of Gross Motor Development) or Brockport Physical Fitness Test, are not designed or do not have accommodations for children with serious disabilities (Grenier, & Miller, 2018). The purpose of this synthesis is to identify, based on research the best practices and programing recommendations in physical education for children with serious disabilities. In addition, facilitators and barriers to this process will be explored. The intent of this synthesis is to determine how to best increase physical activity performance in students with serious disabilities. The results of this synthesis indicated Aquatic environment is the most appropriate environment for physical activity for individuals with serious disabilities. Literature reveals that the main barriers are people's perceptions of disability and level of support needed. Adequate professional preparation when working with and modifying activities for children with serious disabilities is extremely important for teachers and paraprofessionals.

Chapter 1

Introduction

Serious disabilities are diagnosed in approximately 1 in 100 children in the world (Jasma, 1988). Due to the increase of this population over the past decade, serious disabilities have become a priority for research, which has shown a least restrictive environment is suitable for academic success. The diagnosis of serious disabilities has the following parameters: a combination of mental and physical impairments before the individual is the age of twenty-one; limitations in three or more of the following areas of major life activities, self-care, learning, mobility, and self-direction (Jasma, 1988). The development of the psychomotor domain in children with serious disabilities is typically below the development of their peers without special needs (Jasma, 1988). Consequently, the motor development in this population requires a team of special physical educators, physical therapists, therapeutic therapists, occupational therapists, kinesiotherapists, disability sport specialists, and activity therapists enriching their psychomotor domain to be successful in their least restrictive environment.

Generally, children with serious disabilities tend to be sedentary or lack opportunities to participate in physical activity compared with their peers without disabilities (Jasma, 1988). In addition, the experience in physical education for children with serious disabilities must be an environment where the activities are designed according to the chronological age and functional development to cover the unique needs of the child. Educational experiences should provide enough time in physical activity to benefit the motor development of the child with serious disabilities (Jasma, 1988). Classes should be designed according to the child's preferences in an environment similar to natural environments, providing the opportunity to practice daily skills that can be used in community activities (Ofstedal, Bell, Davies, Ware, & Boyd, 2015).

Physical activity is considered an essential part of health during the child's development (Ofstedal, Bell, Davies, Ware, & Boyd, 2015). Globally, childhood obesity has increased by 80% over the last ten years (Jones & Mei-Po Wong, 2007). Childhood obesity is directly related to future prediction of the increase of obesity in adults. Healthy active lifestyle choices in children with serious disabilities can prevent the development of sedentary behaviors, avoiding the development of chronic health issues and hypokinetic diseases (Ofstedal, Bell, Davies, Ware, & Boyd, 2015). A prolonged time without movement or no movement at all in children with serious disabilities can increase spasticity, decrease bone density, and decrease muscle tone (Sato, Iwasaki, Yokoyama, & Takenobu, 2014). Also, physical activity offers the opportunity to increase motor functioning based on the child's chronological age (Ofstedal, Bell, Davies, Ware, & Boyd, 2015). For this reason, it is recommended that children with serious disabilities participate in physical activity in no less than 20-minute increments, three times a week to avoid sedentary behavioral disorders (Jones & Mei-Po Wong, 2007).

Most students with serious disabilities are not motivated to participate in physical activity because of their poor motor skills, further reducing their opportunities for improvement (Lee, Psotta, & Vagaja, 2016). At the moment, these children's need for the help from other people is apparent and the level of support for children with serious disabilities to be physically active needs to increase. Typically, these children demonstrate limited involvement or are significantly dependent on physical assistance or modifications in the real environment (Tunson & Candler, 2010). Ofstedal, Bell, Davies, Ware, & Boyd (2015) describe the case of a child with a serious disability and they studied the child's participation, performance, and capacity and found that the improvement of ambulatory and marginally ambulatory movements (Gross Motor Function Classification System; GMFCS I-III) in children with Cerebral Palsy can help in the

development of skills used in real life. This is the reason that any physical education program should be directly related to the development of the skills necessary to have an active healthy life. Then, these children can be successfully included in community activities or in the process of transition services.

Assessment is the process of learning measurement reported by students, parents and administrators (Grenier, & Miller, 2018). Effective teaching uses (1) appropriate assessment, (2) determines the needs of the student, (3) sets goals, (4) and monitors student progress (Horvat, Block, Kelly, & Croce, 2018). Traditional assessments such as TGMD-3 (Test of Gross Motor Development) or Brockport Physical Fitness Test, are not designed or do not have accommodations for children with serious disabilities (Grenier, & Miller, 2018). Therefore, alternative assessments should be considered when teaching children with serious disabilities (Grenier, & Miller, 2018).

Purpose

The purpose of this synthesis is to identify, based on research the best practices and programing recommendations in physical education for children with serious disabilities. In addition, facilitators and barriers to this process will be explored. The intent of this synthesis is to determine how to best increase physical activity performance in students with serious disabilities.

Operational Definitions-

Serious disabilities- a disability with requires multiple services over an extended period of time and results from amputation, blindness, cancer, cerebral palsy, cystic fibrosis, deafness, heart

disease, hemiplegia, mental retardation, mental illness, multiple sclerosis, muscular dystrophy, neurological disorders (including stroke and epilepsy), paraplegia, quadriplegia, and other spinal cord conditions, renal failure, respiratory or pulmonary dysfunction, and any other disabilities (Jasma, 1988).

Transition services- a coordinated set of activities for a student, with a disability, that: (A) is designed within an outcome-oriented process, that promotes movement from school to post-school activities, including postsecondary education, vocational training, integrated employment (including supported employment), continuing and adult education, adult services, independent living, or community participation; (B) is based on the student's needs, taking into account the student's preferences and interests; and (C) includes instruction, community experiences, the development of employment and other post-school objectives, and, when appropriate, acquisition of daily living skills and functional vocational evaluation (EHA Amendments of 1990, P.L. 101-476, 20 U.S.C. § 1401) (**Grenier & Lierberman, 2018**).

Barrier- A circumstance or obstacle that keeps people or things apart or prevents communication or progress (Oxford Dictionaries n.d., <https://en.oxforddictionaries.com/definition/barrier>)

Facilitator- A person or thing that makes an action or process easy or easier (Oxford Dictionaries n.d., <https://en.oxforddictionaries.com/definition/facilitator>).

Least Restrictive Environment- is the environment in which the child learns best (Lierberman & Houston-Wilson, 2017).

Authentic assessment- is an ongoing feedback system that monitors and records student learning and outcomes under what are termed authentic conditions. Authentic assessments are conducted in real-life situations and gives students a chance to demonstrate skills, knowledge, and developmentally appropriate functional activities (Grenier & Lierberman, 2018).

Assumptions

1. It was assumed that respondents provided honest expression of their knowledge and recollection.
2. It was assumed that all methods of data collection that were reliable and valid.

Limitations

1. Some studies use adapted physical education classes that vary in quality.
2. Sample size in some studies were often very small.
3. There were limited studies available in the literature that dealt with students with serious disabilities.
4. Some of the participants in the studies have different types or degree of severe/profound disabilities so it is very difficult to generalize to a larger population.

Delimitations

1. The review literature included articles only from 1988-2017.
2. The research articles used in this synthesis are limited to full-text articles in peer-reviewed journals.
3. The subjects of this synthesis are limited to students with serious disabilities.
4. Research articles are focused on physical activity during physical education or transition activities.

Research Questions-

1. What are the evidence-based practices for providing physical education services to children with serious disabilities?

2. What are the barriers/facilitators to providing effective physical education when working with children with serious disabilities?
3. What are the programmatic recommendations based on these evidences based practices and barriers?
4. What are the potential areas in need of further investigation for successful physical education instruction for children with serious disabilities?

Chapter 2

Methods

The purpose of this synthesis is to identify, based on research the best practices and programing recommendations in physical education for children with serious disabilities. In addition, facilitators and barriers to this process will be explored. The intent of this synthesis is to determine how to best increase physical activity performance in students with serious disabilities. Chapter two describes how the research was collected for this synthesis.

Data Collection

The information selected for this synthesis project was retrieved by computer database. This database generated resources of peer-reviewed and scholarly articles. Each of these different databases were found through the Drake Memorial Library in the College at Brockport or by faculty member suggestions. The article selection was provided by EBSCOHOST database. The articles must be published in pre-reviewed journals to be included in this critical mass between the years 1988 to 2016. In addition, the articles considered for this study must have one of the following keywords: (a) *physical activity with children with severe disabilities*; (b) *children with severe disabilities*; (c) *physical activities*; (d) *severe disabilities*; and (e) *for children*; and (f) *individuals with severe disabilities*.

The first search in the EBSCOHOST database was found in the SportDiscuss search engine. The key words *physical activity with children with severe disabilities*, *children with severe disabilities*, and *physical disabilities* were submitted in the search with a result of 76 results appropriate for the critical mass. Of the 76 results, five articles had the potential to be included in the critical mass. The second search in the EBSCOHOST database was under Academic Search Complete search engine. This search resulted in 192 possible articles for the critical mass. Of the 192 possible articles, four articles with the requirements to be included in

the critical mass. In total, this search resulted in the finding of nine articles that complied with the requirements of the keywords to be included in the critical mass.

One other search was done using the SPORTDiscuss search engine through the EBSCOHOST database. The keywords used were *physical activities, severe disabilities, children with severe disabilities, and individuals with severe disabilities*. Five articles were selected for their potential to be included in the critical mass. During the search, the word *children* was replaced by *individuals with severe disabilities*. The change of this keyword generated three articles with potential to be included in the critical mass. The total of this search concluded with eight articles that complied with the requirements to be included in the critical mass.

The final search was completed by advisement of a faculty member of the adapted physical education program at The College at Brockport. This advisement resulted in the finding of an article with high potential to be included in the critical mass. The final result of this last search was an article that complies with the requirements to be included in the critical mass.

The total of 18 articles were categorized in a folder in the Zotero program. The final selection was comprised of ten articles that complied with the requirements of being peer-reviewed and having the appropriate content to be included in the critical mass of this synthesis project. Three or more articles that did not meet the requirements were used for the construction of other aspects related to this synthesis. The articles of this synthesis were obtained from the following journals: *Performance Journal, Rehabilitation Research Development Journal, Journal of the American Society of Hypertension, African Journal for Physical, Health Education, Recreation and Dance, Adapted Physical Activity Quarterly, Disability and*

Rehabilitation An, International, Multidisciplinary Journal, Child: Care, Health and Development, Acta Gymnica, Informa Healthcare USA, and European Journal of Adapted Physical Activity.

Data Analysis

A coding research table was used to summarize the key data from each of the articles chosen for the critical mass. This coding research table included the purpose, participants, data methods and analysis, results, conclusion, limitations, and recommendations found in the articles. The coding research table included one qualitative article, six quantitative articles and three mixed studies that were both quantitative and qualitative.

During the quantitative studies, the researchers used different methods to collect data. One qualitative article by Aidar, Oftedal et al, (2007) used the “Pediatric Evaluation Disability Inventory” (PEDI) to assess social function, attendance, meaning of the words, understanding complex sentences, functional communication, problem solving, peer interactions and play skills. Another qualitative article by Barak oftedal et al, (2016) used Profile of Mood States (POMS) to assess six dimensions of transient mood states: anger, confusion, depression, fatigue, tension and vigor, the State-Trait Anxiety Inventory questionnaire to assess current anxiety symptoms and a generalized inclination to be anxious, the World Health Organization Quality of Life-BREF assessment to assess quality of life, and the Rosenberg Self-Esteem to assess individual self-esteem by establishing both negative and positive feelings about the self. Another article used batting average, on-base average, and total bases to assess student’s performance (Bernabe & Block, 1994). Two articles used the test of Gross Motor Function Measure (GMFM) to assess five dimensions of gross motor function, namely a) laying and rolling; b) sitting; c) crawling and kneeling; d) standing; and e) walking and running (Bhutia, Nair, & Surujlal, 2015). Another

article used the Groningen Care Barometer test to assess quality in support of parental or legal guardians (Bhutia, oftedal et al., 2015 & Vascáková, oftedal et al., 2015). Another article used the Taxonomy of biobehavioral states observable by Guess to assess: (1) asleep with eyes closed, no body movements, no vocalizations; (2) awake agitated with eyes open, crying, or fidgeting; (3) awake inactive with eyes open with no apparent movement; (4) self-directed with eyes open with some visual, auditory, tactile, or olfactory orientation toward self; (5) visually attentive with eyes open and exploring the environment visually with little motor movement; (6) active reaching with eyes open, oriented to environment, and reaching/grasping objects within reach (Tunson & Candler, 2010). Finally, the last article used the Water Orientation Test (WOTA) to assess quality of aquatic skills and the Halliwick Concept to assess: (a) individual approach, (b) personal one to one contact, and (c) independency of swimmers (Vascáková, Kudláček, & Barret, 2015).

The qualitative article (Sterbová, & Kudláček, 2014), utilized interview data to categorize themes. The researchers also used journal entries and field notes during observations in family camps.

The final two studies used a mixed method in their research. One article used fitness and health/hygiene tests and scores on the Adaptive Behavior Scale to assess the deinstitutionalized decision of five skills to have functional value. Those skills include: 300-yard run/walk (cardiorespiratory endurance), grip strength, modified sit-ups (abdominal endurance), modified bench press (upper body strength and endurance), and modified sit and reach (lower back and hamstring flexibility); and the qualitative data was the level of independence in the participants (Jasma, Decker, Ersing, McCubbin, & Combs, 1988). The last mixed-methods study used the McNemar test to analyze differences between children and parents and the Mann-Whitney U test

to assess differences in the number of experienced barriers and facilitators between active and passive children. The qualitative data used in this study was interviews, thematic analysis, video tape and transcript by the first author (Jaarsma, Oftedal et al, 2014).

In the ten articles selected for the critical mass, there were total of 2,185 participants, of which 1,809 were parents or legal guardians, 114 were adults with severe disabilities and 262 were children with severe disabilities. Most of the children involved in this study were male participants.

Chapter 3

Review of Literature

The purpose of this chapter is to review the literature based on the content of the synthesis. A total of 10 articles were used in this study. The results were categorized in the following: (a) evidence-based practices, (b) barriers, and (c) curricular ideas or programming.

Evidence-based practices

This subsection titled based-evidence practices includes two articles that explain the most appropriate teaching strategies for children with serious disabilities that can be applied in order to achieve the objectives set by the teacher. An example of this subsection is the use of the aquatic environment with 1:1 instruction.

The two articles found that water activities improve the motor development of children with serious disabilities and children with autism. The first study conducted by Vascáková, T., Kudláček, M., & Barret, U. (2015) titled, *Halliwick Concept of Swimming and its Influences on Motoric Competencies of Children with Severe Disabilities*. For this study, the authors studied ten children with cerebral palsy and combined impairments (six males and four females) with a mean age of 5.5. The researchers used the GMFM test was used to assess five dimensions of gross motor function: (a) lying and rolling, (b) sitting, (c) crawling and kneeling, (d) standing and (e) walking; Water orientation test (WOTA) was used to assess quality of aquatic skills. The Halliwick Concept is a specific form of water based therapy using aquatic environment to assess: (a) individual approach, (b) personal one to one contact, and (c) independency of swimmers. The instruction was 1:1 during ten aquatic sessions. Halliwick Concepts were used during aquatic session as a relaxation resource. Results revealed participants with a diparetic form of cerebral

palsy (two males and one female) improved GMFM scores by 4.25%. The participants improved gradually: (b) sitting -3.85%, (c) crawling and kneeling -2.81%, (d) standing -4.37%, and (e) walking, running and jumping -5.97%. In the WOTA score, participants had an overall improvement of 8.33 points. Participants with quadruparetic form of cerebral palsy (two males and one female) increased their GMFM scores by 5.20%. Improvements: (a) lying and rolling -5.40%, (b) sitting -7.20%, (c) crawling and kneeling -2.70%, (d) standing -3.75%, and (e) walking, running and jumping -1.75%. The WOTA scores increased by 9.67 points. Those scores demonstrated major improvement in the diparesis group with the difference of 1.34 points. Participants with autism (two males and two females) increased their GMFM scores by 1.57%. Improvements: (d) standing -3.50% and (e) walking, running and jumping -2.80%. In the WOTA scores, the participants increased by 1.16 points. This group was the higher scoring by 15.13 points. This study supports the idea that the Halliwick Concept is a successful technique to improve aquatic skills and motor skills performance in children with cerebral palsy and combined impairments.

The second study by Aidar, F.J., Silva, A.J., Reis, V.M., Carnerio, A.L., Vianna, J.M., & Novaes G.S. (2007) was titled, *Aquatic Activities for Severe Cerebral Palsy People and Relation with the Teach-Learning Process*. The researchers used 21 children (9 females and 12 males) with severe cerebral palsy aged between one and twelve years. The researcher chose the participants based on their locomotion ability and the diagnosis of severe cerebral palsy. Those interested in participating in this study signed the consent form. The “Pediatric Evaluation Disability Inventory” (PEDI) with manual abilities was used to assess the pre-test and post-test evaluation. The PEDI consisted of social function, attendance, meaning of the words, understanding complex sentences, functional communication, problem solving, peer interactions

and play skills. The evaluation with manual abilities consisted of the manipulation of paper and pencil. The study took place during sixteen weeks with two classes in the week (45 minutes each). The instructor submitted the pre- and post-test after completing ten sessions. The data was analyzed using the T-test in the SPSS program. In the presented results indicate that aquatic environment promotes social function and motor abilities in children with cerebral palsy. Results showed participants improved the level of social function and the ability to handle paper and pencil. Another result is the aquatic environment promote social function between children during aquatic physical activities. Also, aquatics games could facilitate the children cognitive, with improvement in prehension of objects, attention and learning colors. Moreover, water would stimulate circulation, breathing, and improve posture. This study demonstrated that physical activities improve the range of movement. Aquatic environment as the best exercise to maintain the conditioning of conditions, recreation, sport, and gets better cognitive aspects in children with cerebral palsy. Aquatic physical activity gives the opportunities for improve resolution of problems, interaction with companions, games with objects, domestic tasks, community functions and interactive social games. The water activities would be the best teaching-learning environment as they improve social skills, motor skills, and promote independence in individuals with severe cerebral palsy.

Both articles concluded that aquatic environment improves social skills, and motor skills in children with serious disabilities. On the other hand, the two articles showed that children with serious disabilities have better motor performance in aquatic environments. With the results of the articles, aquatic skills can be recommended to increase social and motor skills in children with serious disabilities.

Barriers

For this subcategory, barriers are defined as a circumstance or obstacle that keeps people or things apart or prevents communication or progress (Oxford Dictionaries n.d., <https://en.oxforddictionaries.com/definition/barrier>). Example of barriers include behavior, parental support, and sport participation. A total of four articles were chosen for this subcategory.

The article by Tunson, J., & Candler, C. (2010) was titled *Behavioral States of Children with Severe Disabilities in the Multisensory Environment*. There were three children (three to ten years) with multiple severe disabilities participating in this study. The participant's characteristics were no ambulation, no conventional communication skills, and dependent on others for basic needs. Participants had the parent consent to participate in this study. The researchers used the Taxonomy of biobehavioral states observable by Guess was used in this study to assess the following states: (1) asleep with eyes closed, no body movements, no vocalizations; (2) awake agitated with eyes open, crying, or fidgeting; (3) awake inactive with eyes open with no apparent movement; (4) self-directed with eyes open with some visual, auditory, tactile, or olfactory orientation toward self; (5) visually attentive with eyes open and exploring the environment visually with little motor movement; (6) active reaching with eyes open, oriented to environment, and reaching/grasping objects within reach. Data was recollected over eight weeks (three days per week) and videotaped for 30 minutes (8:25am-9:10am). The researchers did observation in intervals of 10 minutes. The data was analyzed after seventy-two observations and graphed by visual inspection. Results demonstrated Participant 1 demonstrated an increase in active reaching during this study. Participant 2 was engaged in awake, visually attentive behavior with intermittent inactive states during the study. Participant 3 was engaged

with visually attentive, self-directed, and active reaching behaviors without sleep terms but demonstrated a decrease in his self-directed behavior during this study. Based on the findings, behavioral states may be a resource to measure activity engagement in children with severe disabilities. This tool provides an opportunity to identify a list of unique behaviors for individuals with severe disability. Multisensory environment (MSE) promotes communication between professionals and individuals with disabilities, to avoid a lack experiences during physical activity.

The article by Jaarsma, E. A., Dijkstra, P.U., Blécourt, A.C.E., Geertzen, J.H.B., & Dekker, R. (2014), was titled, *Barriers and Facilitators of Sports in Children with Physical Disabilities: A Mixed-Method Study*. Thirty children with physical disabilities participated in this study. These children were registered at the Prince Johan Friso Mytyl school, Haren the Netherlands, a special school for children with physical disabilities. The parents were invited by mail to participate in the study. This study used a mixed-methods design. Questionnaires were completed by children and their parents and combined with interviews with health professionals.

Quantitative: This study used a chi-square test to analyze differences in barriers and facilitators between active and passive children. The McNemar test was used to analyze differences between children and parents. Also, this study used a Mann-Whitney U test to analyze differences in the number of experienced barriers and facilitators between active and passive children. Qualitative: The first author recorded the interviews, thematic analysis, video tape and transcript. For the security of the participants, each participant was assigned an identification number. The study found diversity factors during the sports activities in children with physical disabilities. The most frequently diversity factors were disability as a barrier to sports participation by children with disabilities. Another diversity factors are lack of sport facilities; transportation; children with

disabilities not feeling accepted by others; lack support from family; and organizing sports during school hours. Those factors create a challenging environment during sports activities in children with severe physical disabilities. Meanwhile, physical activity promotes psychological engagement.

Two of the four articles discussed parental support as a barrier. A study titled *Does the Severity of Disability Matter? The Opinion of Parents About Professional Support in Residential Facilities* by Luijkx, J., Ten Brug, A., & Vlaskamp, C. (2015) was done to determine whether and how the opinions of parents and/or legal guardians vary for different groups of persons with intellectual disabilities. The participants in this study included 1,824 parents or legal guardians of individuals with intellectual. The researchers used the Groningen Care Barometer was used to assess quality in support of parental or legal guardians. The researchers had the parents' council permission to participated in the study. MANCOVA were conducted to compare the opinions of parents or legal guardians. This study demonstrated that the parents or legal guardians of individuals with intellectual disabilities were given fewer opportunities to do leisure activities. The parents or legal guardians opinion depends on the level of severity in the individual with intellectual disabilities during leisure activities. Parents or legal guardians suggested collaboration in defining how leisure activities should be appropriate for individuals with profound intellectual and multiple disabilities. The researcher suggested increase facilities in volunteers to cater for quality in leisure activities. Also, parents or legal guardians have their own perspective on the quality of support during leisure activities. This study provided knowledge about developing better needs and preference support for individuals with intellectual disabilities.

A study done by Sterbová, D., & Kudláček, M. (2014) titled *Deaf-Blindness: Voices of Mothers Concerning Leisure-Time Physical Activity and Coping with disability*, involved five mothers of children with deaf-blindness who participated in this study. The authors had the following criteria: (a) deaf-blind has to be congenital, (b) child's age was between 15 and 21 years, (c) the child has to be in the community transition process. Interested participants have to consent to participation in the study. The researchers conducted pilot-interviews to obtain basic information about physical activities. The interview guide was approved by independent experts. The pilot interview questions were: (a) How important are leisure time physical activities in your family?; (b) Is your family taking part in organized leisure time physical activities?; (c) Which activities can be done with your child who has DB?; (d) Are the options of leisure time physical activities sufficient? The purpose of the mother interview questions was to recollect data about family life interaction between children with deaf-blindness. The researchers used identification of emergent themes analyze the data. The interviews were recorded by video tape. Also, the two researchers used journal entries and field notes during the interviews. This study shows, no families participated in adapted physical activities and none offered opportunities to the child to enjoy physical activity. Most mothers used the disabilities as a barrier to not participate in physical activities.

Emergent theme: needs of children with deaf-blindness and their families

Mothers believe that physical activity can improve the recognition of day/night activities in their children. In accordance with the participants' perceptions, the level of prompting is important to increase the physical activity engagement in DB children. Parents observed motivation, appropriate behavior and joy when their children participated in physical activity.

Mothers desired an increase in the facilitation of programs that include children with deaf-blindness with appropriate physical activity and communication techniques.

Emergent theme: Situation in families

The family composition of the DB children in this study was Caucasian. All children had personal assistants but they had independent mobility. All children attended a boarding school during the week.

The participants of this study believed in the benefits of physical activity as a way to facilitate a healthy life in their children with DB. They encouraged the facilitation of support, camps, equipment and paraprofessionals to share common family activities. Finally, both articles emphasized the support for parents, sport activities, leisure activities, and camps for children with severe disabilities.

Curricular Ideas or Programming

For this subcategory, curricular ideas or programming means the best way to introduce physical activities concepts to children with serious disabilities. Examples of this subcategory are modifying rules, exercise programs, adapted sports, and assessment. A total of four articles qualified for this subcategory.

The study by Bernabe, E. A. & Block, M. E.(1994) titled *Modifying Rules of a Regular Girls Softball League to Facilitate the Inclusion of a Child with Severe Disabilities*, explored one critical aspect of inclusion in youth sports: the feasibility of modifying a traditional park district girls' fast-pitch softball program. The researchers asked a 12-years old female participant with moderate to severe disability to participate in the study. The participant had the parents' consent to participate in this study. The study took place during a females' fast-pitch softball league.

Batting average, on-base average, and total bases were analyzed in this study. Also, the time per inning and balls hit to outfield positions were recorded. The collection of the data took place during team games. The researchers recorded the data in the statistical softball book. Correlation was used for batting and on-base averages. To compare female batting average, the researchers used one sample *t* test. During the descriptive aspect, the researchers used z scores, means and standard deviations. ANOVA was used to identify significant differences between the balls hit to center field compared with the balls hit to the other outfield positions. According to the batting results, the participant demonstrated success with her peers. The female has a difference in the batting average but if walks were eliminated for the other girls, the female has a similar on-base-percentage. The conclusion was that the presence of this female in softball sport did not demonstrate a difference in the time between the transitions of the game. The level of inclusion for this female was completely successful in her softball games and her peers experienced disability awareness during the activity. Nobody gave negative feedback to this player with severe to moderate disabilities. The coaches needed to be considerate and be careful with the students' modifications in terms of how well the individual could play during the game to avoid frustration. Finally, the females' peers looked to her as a productive member of their team.

A study titled *Psychosocial Effects of Competitive Boccia Program in Person with Severe Chronic Disability* by Barak, S., Mendoza-Laiz, N., Guiterrez-Fuentes, M. T., Rubiera, M. & Hutzler Y. (2016) was to analyze the effect of a competitive Boccia training program on quality of life, self-esteem, anxiety, and mood states compared to a recreational Boccia training program and no specific physical activity training in residents of a comprehensive rehabilitation center for persons with severe chronic disabilities. Forty-three participants with a severe disability participated in this study. All participants fulfilled the requirement by the researchers, (1)

disability involving four limbs to at least moderate extent, (2) functional ambulation with manual or power wheelchair, and (3) the ability to follow instructions and to complete questionnaires with or without assistance. Exclusion criteria was dependent on the changes in the medical condition. The researchers had the participants' consent to be part of the study. Participants were residents in Spanish State Referral Center (SRC). Participants were divided in four groups, two competitive Boccia groups: independent competitive (IC, 9) and nondependent competitive (NIC, 7), recreational Boccia (14) and control (13). The control group did not participate in any physical activity. The researchers used Profile of Mood States (POMS) to assess six dimensions of transient mood states: anger, confusion, depression, fatigue, tension and vigor; and State-Trait Anxiety Inventory questionnaire was used to assess current anxiety symptoms and a generalized inclination to be anxious. The questionnaire was composed of two sections: anxiety-state and anxiety-trait. World Health Organization Quality of Life-BREF assessment was used to assess quality of life and consisted of 26 items. Rosenberg Self-Esteem consisted of 10-items and was used to assess individual self-esteem by establishing both negative and positive feelings about the self. General Health Questionnaire-28 was used to assess common mental health problems of anxiety, depression, social withdrawals, and somatic symptoms. Most participants needed the fine motor control test by their occupational therapist to make the assistance decision. The pre- and post-test was administrated by qualified personnel of the SRC (two certified psychologists and a certified occupational therapist) and those tests had four months between the post-test measuring. The participants received practice with throwing balls to different targets, technical and tactical drills week training three times in the week (1.5 hours) and repetitive strength training two times in the week. Correlations were calculated in this study. During a mutual decision, the researchers used a statistical model with covariates for determined between-group

differences. To determine differences in dependent variables the multivariate analysis of variance (ANOVA) and to determine one-way multivariate analysis of variance the MONOVA was used by the researchers. The comparison between pre-and post-test was determined using a dependent *t*-test.

The Boccia Program gives opportunities to increase the physical-health- related quality of life in athletes with severe disabilities and positively related to psychosocial function. This study shows that persons with disabilities can increase overall mental well-being. The training must be according to the athletes' needs to avoid fatigue during rigorous training. The researchers recommended boccia and power soccer as sport for individuals with severe disabilities.

The other article titled *Effect of Physical Exercise Programme on Gross Motor Function of Children with Cerebral Palsy* by Bhutia, C.D., Nair, U.S, & Surujlal, J. (2015) was to measure the effect of a physical activity program on gross motor function in children with cerebral palsy using an accepted and validated outcome measure: The Gross Motor Function Measure (GMFM). Ten children (nine males and one female) with cerebral palsy aged 13-18 years participated in this study. For the criteria of this study, the only qualification was being diagnosed in the Gross Motor Function Classification System (GMFCS) levels I and II. They were from the Institute for Mentally Challenged in the Thiruvananthapuram district of Kerala, South India. The researchers used the test of Gross Motor Function Measure (GMFM) to assess five dimensions of gross motor function, namely a) laying and rolling; b) sitting; c) crawling and kneeling; d) standing; and e) walking and running. During the semester the experimental group performed the prescribed exercise three times for a week in a period of 12 weeks. Each session lasted 50 to 60 minutes. Data Analysis: GMFM scores were analyzed by using descriptive

statistics, ANCOVA, and paired t-test to ascertain significant differences between the groups. The level of significance were described as: $p < 0.01$ and $p < 0.05$. The pre- and post-test in the control and experimental group showed some differences in the lying and rolling; sitting, standing and the total GMFM.

The results did not show differences in walking; running and jumping; and crawling and kneeling in the experimental group. On another hand, GMFM for the control group did not show change during the training period. This study supports the claim that physically active children with cerebral palsy can improve their gross motor functions. Significant results occurred when the researchers include training session with strengthening exercise which resulted in an improvement in standing skill. The results suggested open space to encouraged experiences in different postures as a possible, such as lying prone (face downward), supine (face upward) and sitting positions. The researchers suggested freedom opportunities promote interaction among the children with severe disabilities. These results of the study should encourage physical educators to promote physical activity programs and more facilities for children with cerebral palsy.

The last article by Jasma, P., Decker, J., Ersing, W., McCubbin, J. & Combs, S. (1988) titled *A Fitness Assessment System for Individuals with Severe Mental Retardation*, was to present an overview of The Ohio State University's Project Transition and provide a detailed review and discussion of a research-based assessment system, with a particular emphasis upon scoring. One hundred fourteen adults with severe intellectual disabilities participated in this study. Those participants attended the Columbus (Ohio) Developmental Center. The researchers administrated the developed fitness and health/hygiene test and scores on the Adaptive Behavior Scale. This data was collected in 14 weeks for 45 minutes per session. This study demonstrates qualitative and quantitative measurements in the development of five skills to have functional

value. Those skills include: 300-yard run/walk (cardiorespiratory endurance), grip strength, modified sit-ups (abdominal endurance), modified bench press (upper body strength and endurance), and modified sit and reach (lower back and hamstring flexibility). A qualitative measure gives the level of independence in the participants. The independence test consisted of a response to a command and evaluation of the level of the prompts that the participants need. Some percentage calculations were based on the number of steps completed independently divided by the number of steps in the skill $\times 100 =$ percent score. Quantitative measure was used to assess performance in the five physical fitness skills. The participants needed to complete the skill's goal, instructional objectives, and task analysis steps. The results showed an increment in the level of abilities. The researchers found that level of dependence can be assessed with a task analysis checkmark assessment. The researchers found that the transition task analysis assessment can be a resource to evaluate individuals with severe disabilities. This assessment may include the evaluation of more than one task. The researchers recommended this assessment to measure performance outcomes in individuals with severe disabilities. Project Transitions assessment system is important because it provides a measure in the score sheet, specific information related to percentage of task completion, level of prompting, skill performance, task-analyzed step descriptions, and reinforcement strategy for individuals with severe disabilities.

Chapter 4

Discussion

The purpose of this chapter is to discuss the conclusions derived from the critical mass of articles on evidence based-practice in physical activity for children with serious disabilities. During this synthesis, 10 research articles related to physical activity for children with disabilities (from moderate to serious) were analyzed to determine the most effective and appropriate practices for this population.

The discussion of this synthesis will answer the following research questions: (1) What are the evidence-based practices to provide physical education services to children with serious disabilities?, (2) What are the barriers/facilitators to providing effective physical education when working with children with serious disabilities?; (3) What are the programmatic recommendations based on these evidences based practices and barriers?; and (4) What are the potential areas in need of further investigation for successful physical education instruction for children with serious disabilities?

What are the evidence-based practices to provide physical education services to children with serious disabilities?

After analyzing the results of the critical mass, literature suggest that the best evidence based practice to promote the development of an active lifestyle for children with serious disabilities is aquatics (Aidar et al., 2007; & Vascáková et al., 2015). Literature recommends aquatic activities as a resource to promote physical activity and the development of social skills in children with serious disabilities (Aidar et al., 2007; Vascáková et al., 2015; & Sato et al., 2015). Vascáková et al., (2015), recommend aquatic activities to promote the development of

motor skills of these children. The results of the Vascáková, et al., (2015) study demonstrated that aquatic activities could increase the child's orientation, gross motor skills, range of motion and ultimately interactions with peers in the aquatic environment. In addition, this study reveals that children that participate in aquatic activities can successfully increase their percentages in the measured aquatic skills (control of breathing to a 70%, improve their independence when submerging in water to a 62%, and increase their mobility in water to a 90%) after intervention. Further, in another study, Aidar et al., (2007) also provided evidence on how children with serious disabilities can benefit from aquatic activities, showing increases in motor ability and functionality.

Literature also suggests to physical educators working with these children in the aquatic environment that they must be trained to meet the needs of their students (Sato et al., 2015). Further, Vascáková et al., (2015) recommended the control of water temperature. They mention that providing warm temperatures in the swimming pool will help increase students' range of motion in body extremities. In addition, they recommended that physical educators must modify activities, use adapted equipment and provide information to the student to be successful in the aquatic environment. Lastly, the use of positive reinforcement and behavior modification techniques, for example using a token economy, should be used to increase student participation, effort and peer interaction during aquatic activities (Sato et al., 2015).

What are the barriers to providing effective physical education when working with children with serious disabilities?

Four articles from the critical mass were found that agree with the fact that the perception of people towards children with serious disabilities is the major barrier that these children encounter (Tucson & Candler, 2010; Luijck, Burg & Vlaskamp, 2015; Jaarsma et al, 2014; & Stérbová, & Kudlacek, 2014). Further, other identified barriers are: communication, lack of leisure/ recreational activities, lack of support and limited access to modified equipment, activities and rules. Many people assume that children with serious disabilities are not able to do anything but they haven't taken the time to get to know and understand the child.

Luijck, Brug & Vlaskamp (2015), discovered through their study that children with serious disabilities lack opportunities to participate in physical activity because event facilitators do not look for ways to include these children. In this article, they describe how parents feel when they saw that their children did not receive the same quality of services in comparison to other peers with less serious disabilities. For example, the level of support in the care homes or to how day-to-day support was provided to their loved ones by the staff. Parents emphasized that children with less severity received better opportunities and services. Further, parents mentioned that they were less satisfied with the support received during leisure activities. This is also true when talking about leisure/ recreational activities in the community (Samalot- Rivera, & Aiello, 2018).

Stérbová, & Kudláček (2014), highlighted how support groups with children with serious disabilities could help children feel more included in society. Likewise, the support of paraprofessionals or close family friends could increase the opportunity to participate in physical activity. The lack of these support causes that children with serious disabilities to have little

access to physical activity participation, creating a barrier in the creation of programs that meet the needs of children. Another barrier found in the literature was the lack of equipment modification or rules. Two articles discussed the importance of the instructor's knowledge when making a modification to equipment or rules during physical activities or sports.

Jaarsma, Dijkstra, Blecourt, Geertzen, & Dekker (2014); and Stérbová, & Kudláček, 2014, explored the teachers' knowledge about adapted sports. Teacher words were, "information, well, they will pay attention to that during the physical education classes, obviously. But I do not think that it is clear to everybody what possibilities there are "(Jaarsma, Dijkstra, Blecourt, Geertzen, & Dekker, 2014).

Tunson & Candler (2010), explained how to communicate with a child with serious disabilities through observation of behavior. It is difficult to measure communication outcomes between the student and the teacher when the student is non-verbal. Tunson, J., & Candler, C. (2010) used the Taxonomy of Biobehavioral States Observable by Guess (single-system system) to obtain a response on student behavior as a resource to evaluate student performance. Behavioral states could be an authentic assessment for those students who are not verbal and can be successful at physical activity.

What are the programmatic recommendations based on these evidences based practices and barriers?

Four articles were analyzed for answering this question. Literature suggested adapted sports, rules-team modification, task analysis, extracurricular activities, peer tutor, and paraprofessionals could help children with serious disabilities to be more successful during physical activity.

Barak, Mendoza-Laiz, Gutierrez-Fuentes, Rubiera, and Hutzler (2016) recommend appropriate modifications during the training of Boccia to increase the psychosocial status in the child. This study showed that individuals who participate in the sport of Boccia can increase their self-esteem, well-being, and quality of life and reduce stress or anxiety. In addition, Benabe, & Block, (1994), discussed how rules modifications in softball provided an opportunity to change the negative perspective of including children with serious disabilities in sports. Depending on the severity of the disability, the modifications are created and the children can be successful during physical activity. Benabe, & Block, (1994), suggested performing appropriate physical activity that impact on the child's transition to community activities.

Sandt, Flynn & Turner (2014), used golf as a long-term activity with the purpose of continuing practice in community activities. This type of physical activity offers the opportunity to promote independence. Samalot-Rivera, & Aiello (2018) recommend the following steps to promote recreational activities or sports transition to the community, (1) determine the needs and skills of the student; (2) take into consideration the student's and family members' interests; (3) identify available community: based-programs; (4) identify support personnel willing to collaborate; and (5) assess the student's level of satisfaction and progress over time. Sandt, Flynn & Turner, (2014), explained how these suggestions could have a positive impact on the future of those children because they can have a higher probability of acquiring independent living skills in the acquisition of employment.

Jansma, Decker, Ersing, McCubbin, & Combs (1988) used task analysis as an appropriate instrument for evaluating skills according to the level of percent independence. This assessment included task completion, prompting level, skill performance, task-analyzed step description, and reinforcement strategy with individuals with serious disabilities. Therefore, Houston-Wilson &

Block (2018), recommend the use of an assessment task analysis as a method of goal creation. Goals can help chart the level of independence, and the performance of children with serious disabilities. Houston-Wilson, & Block (2018), provided the authentic assessment task analysis in levels such as, (1) total physical assistance (those who must physically be put through the full motion of the task would receive a score of 1), (2) partial physical assist (those who require only guidance or touch cues would receive a score of 2), and (3) independent (those who can complete the task without physical assistance receive a score of 3).

Grenier, & Miller (2015), recommend the use of peer tutoring during physical activity to increase the interaction between students. Using peer tutoring promotes the creation of communication and being a strong commitment academically between students with or without serious disabilities. Also, Klavina, & Lieberman (2018), suggest a training for tutoring peers that includes:

- (1) Verbal instruction: Tell your friend what to do and how to do it. If they do not respond correctly, then add a demonstration or model.
- (2) Demonstration: Show your friend how to do it. If they do not respond correctly, then use physical assistance.
- (3) Physical assistance: Help your friend how to do it. Physical assistance is the highest level of prompting.
- (4) Positive specific feedback: Give feedback that is both positive specific feedback i.e., feedback that is both positive and related to the skill.
- (5) Error correction, if needed: Help your friend figure out the problem.

For this learning technique to be successful, the teacher must ensure that the goals are in accordance with the student's IEP. Peer tutoring ensures the interaction among students of the same age in an inclusive environment.

Aiello, & Lieberman (2018), recommend the use of instruction 1:1 between paraprofessionals and students. Paraprofessionals help in the teaching of children with serious disabilities during the school day. The role of the paraprofessional is important in the gym. Students with serious disabilities to have greater success in the physical education class with the help of a paraprofessionals. Aiello, & Lieberman (2018) recommended a training for paraprofessionals that includes: a clear job description for the role of the paraprofessionals in physical education; a review of goals and objectives for students with disabilities in physical education; use of a documentation log either electronically or written in which paraprofessionals can document daily notes; a supply of rubrics or observation tools for each unit; make modifications to equipment, rules, or activities to support student learning; creation of guidelines for interacting with the student; a review of guidelines for social interactions with peers; a description of the protocol for talking to the student in physical education; supervising the student during physical education; returning the student to the classroom; encouraging the paraprofessional to assist all students in the class when possible; provision of feedback before, during, and after class; and the provision of in-service days. Finally, paraprofessionals can contribute by providing valuable information about the student to classroom teachers, therapists and parents.

What are the potential areas in need of further investigation for successful physical education instruction for children with serious disabilities?

According to Sato et al. (2015), a review of the researcher of credits taken in Adapted Physical Education courses in teacher preparation programs and the impact of teacher candidates' knowledge have to be evaluated. Further, they recommend evaluating the teacher candidates experience in inclusive environments to change the teachers' perspective towards the diversity of disabilities. Stérbová, et al. (2014), urges that teachers have greater knowledge in adaptation in physical activity or equipment to increase inclusion in leisure activities for children with disabilities. They also recommend an increase in support for parents with children with serious disabilities in recreational activities. Further, they encourage greater access to special schools or care centers, special programs, camps, adapted equipment, parental support and additional paraprofessionals working with children.

Another are to be considered and in need of future development is the use of paraprofessionals and their role in adapted physical education (Aiello, & Lieberman, 2018). They recommend the use of paraprofessional training to provide the best possible education and services for children with severe disabilities. Paraprofessional' training should be part of every adapted physical education program to facilitate better instruction and proper development of children with serious disabilities (Aiello, & Lieberman, 2018).

Chapter 5

Conclusion

The purpose of this synthesis was to determine evidence based –practice, barriers, curricular ideas and programing for individuals with severe disabilities. Literature suggests that the aquatic environment is the most appropriate environment for physical activity for individuals with serious disabilities. The aquatic environment promotes in these children the opportunity to increase their motor performance, reduce spasticity, increase the range of limb movement and increase social interaction, which ultimately helps to develop social skills. It is recommended that all professionals that potentially will work with children with serious disabilities obtain professional preparation in adapted physical education, specially, aquatics to provide proper instruction and care for children with severe disabilities.

In terms of the barriers that children with severe disabilities encounter, literature reveals that the main barriers are people’s perceptions of disability and the level of support needed by the children. Many people get carried away by the physical aspect of the child and make assumptions about children’s motor skill abilities. Further, results from the literature reveal that parents expressed that their children with serious disabilities received less support than classmates with other disabilities. For example, the level of support in the care homes or to how day-to-day support was provided to their loved ones by the staff Parents expressed lack of inclusive recreational or extracurricular programs for their children with serious disabilities. On the other hand, literature suggests that the support of relatives, close friends or paraprofessionals would help the child participate successfully in leisure activities or in recreational programs.

An important suggestion in the literature was the importance of professional preparation when working with modifying activities for children with serious disabilities. Personnel working with this student population must get information or professional preparation on how to plan, teach, modify instruction and properly assist these students so they can fully participate and all their needs are covered.

Future Research

After conducting a literature review on this topic, it is evident that there is not a lot of research that involves students with serious disabilities in physical education or in a physical activity setting. In order to find more information on best practices to work with this population, research on the effects of physical activity and best practices needs to be done. One suggestion for future studies would be to focus on research that measures the effects of physical activity and its impact on the child's transition to community activities. Some articles focused on children's performance (psychomotor domain) and not on the affective domain of the child. Instructors need to be able to understand buoyancy, primitive reflexes, and biomechanics. Example: bring your knee to the chest to help with flotation.

Findings of this literature review present the benefits of teachers using adaptive sports when planning instructions for children with serious disabilities. Further it reveals the benefits of focusing on all three domains (cognitive, psychomotor, and affective) when developing goals for students' IEPs. Another area to explore will be the benefits and effects of children with serious disabilities when participating in extra-curricular activities like modified sports, and games. Also, more attention needs to focus on the use of modified equipment during adapted physical

education class. Finally, it is important that future professionals and researchers take to in to consideration the needs of support needed by parents and families of these children.

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Data Analysis Coding Grid

APA Citation	Purpose	Participants	Data Collection Analysis	Results	Conclusion	Recommendations Research Notes
Question 1						
Aidar, F.J., Silva, A.J., Reis, V.M., Carnerio, A.L., Vianna, J.M., & Novaes G.S. (2007). Aquatic Activities for Severe Cerebral Palsy People and Relation with the Teach-Learning Process. <i>FITNESS Performance Journal</i> , 6(6), 377-381.	The purpose of this study was to evaluate the process of teaching-learning in what is referred to as the social function and the ability of handling paper and pencil in children with Cerebral Palsy submitted to the program of aquatic physical activities .	This study was done in the period of March to June 2006. Twenty-one children (nine females and twelve males) with severe cerebral palsy aged between one and twelve years participated in this study. The researcher chose the participants based on the locomotion way and the diagnosis of severe cerebral palsy. Those interested in participating in this study signed the consent form.	The “Pediatric Evaluation Disability Inventory” (PEDI) with manual abilities was used to assess the pre-test and post-test evaluation. The PEDI consisted of social function, attendance, meaning of the words, understanding complex sentences, functional communication, problem solving, peer’s interactions and play skills. The evaluation with manual	In the presented results indicate that aquatic environment promotes social function and motor abilities in children with cerebral palsy. The participants improved the ability to handle paper and pencil. Another result is the aquatic environment promote social function between	This study demonstrated that aquatic activities improve the range of movement. Aquatic environment as the best exercise to maintain the conditioning of conditions, recreation, sport, and gets better cognitive aspects in children with cerebral palsy. Aquatic physical activity gives the opportunities for improve resolution of problems, interaction with companions, games with objects, domestic tasks,	Future research: Measure cognitive and affective outcome in children with cerebral palsy during aquatics activities.

			<p>abilities consisted in the manipulation of paper and pencil.</p> <p>The study took place during sixteen weeks with two classes in the week (45 minutes). The instructor submitted the pre- and post-test after completing ten sections. The data was analyzed using the T-test in the SPSS program.</p>	<p>children during aquatic physical activities. Also, aquatics games could facilitate the children cognitive, with improvement in prehension of objects, attention and learning colors. Moreover, water would stimulate circulation, breathing, and improve posture.</p>	<p>community functions and interactive social games. The water activities would be the best teaching-learning environment as they improve social skills, motor skills, and promote independence in individuals with severe cerebral palsy.</p>	
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Question 3

Barak, S., Mendoza-Laiz, N., Guterrez-Fuentes, M. T., Rubiera, M. & Hutzler Y. (2016). Psychosocial Effects	The purpose of this study was to analyze the effect of a competitive Boccia training	Forty-three participants with a severe disability participated in this study. All participants fulfil the requirement by the researchers,	Profile of Mood States (POMS) was used to assess six dimensions of transient mood states:	Between-Group Differences in Psychosocial Parameters did not reveal differences in the	The Boccia Program gives opportunities to increase the physical-health-related quality of life in athletes with severe disabilities	The researchers recommended creating careful volume and intensity of throwing training. For future studies, the researchers
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<p>of Competitive Boccia Program in Person with Severe Chronic Disability, <i>Rehabilitation Research Development Journal</i>, 53(6), 973-988.</p>	<p>program on quality of life, self-esteem, anxiety, and mood states compared to a recreational Boccia training program and no specific physical activity training in residents of a comprehensive rehabilitation center for persons with severe chronic disabilities.</p>	<p>(1) disability involving four limbs to at least moderate extent, (2) functional ambulation with manual or power wheelchair, and (3) the ability to follow instructions and to complete questionnaires with or without assistance. Exclusion criteria was dependent on the changes in the medical condition. The researchers had the participants' consent to be part of the study. Participants were residents in Spanish State Referral Center (SRC). Participants were divided</p>	<p>anger, confusion, depression, fatigue, tension and vigor. State-Trait Anxiety Inventory questionnaire was used to assess current anxiety symptoms and a generalized inclination to be anxious. The questionnaire was composed of two sections: anxiety-state and anxiety-trait. World Health Organization Quality of Life-BREF assessment was used to assess quality of life and consisted</p>	<p>study group. With-Group Changes from Pre-to Post-test expose improvement in the WHOQOL-BREF Physical/Psychological test and Rosenberg Self-Esteem test. The Group Size was affected during the Self-Esteem test. The World Health Organization Quality of Life-BREF (mood states) in athletes demonstrated</p>	<p>and positively related to psychosocial function. This study shows that persons with disabilities can increase overall mental well-being. Also, the researchers recommended boccia and power soccer as sport for individuals with severe disabilities. The training must be according to the athletes' needs to avoid fatigue during rigorous training.</p>	<p>can follow-up the psychosocial benefits of physical activity during postseason and take on account the age variable. Limitations The researchers used a generic measurement during psychological factors. Between groups the variability was large. Future research Include psychosocial effect of sport participation on person with severe disability.</p>
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		<p>in four groups, two competitive Boccia groups: independent competitive (IC, 9) and nondependent competitive (NIC, 7), recreational Boccia (14) and control (13). Control group did not participate in any physical activity.</p>	<p>of 26 items.</p> <p>Rosenberg Self-Esteem consisted of 10-items and was used to assess individual self-esteem by establishing both negative and positive feelings about the self.</p> <p>General Health Questionnaire-28 was used to assess common mental health problems of anxiety, depression, social withdrawals, and somatic symptoms.</p> <p>Most participants needed the fine motor</p>	<p>better results than medium/low level of physical activity participants. Also, the level of severity and sport type impacted the engagement of the athlete's mood state.</p> <p>Therefore, the decreased performance occurred during the training based on negative physiological effect.</p> <p>State-Trait Anxiety Inventory results demonstrated that lower anxiety</p>		
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			<p>control test by their occupational therapist to make the assistance decision.</p> <p>The pre- and post-test was administered by qualified personnel of the SRC (two certified psychologists and a certified occupational therapist) and those tests had four months between the post-test measuring. The participants tossed balls to different targets, technical and tactical drills week training three times in the</p>	<p>levels in athletes are related with the level of participation in exercise or sports activities.</p> <p>During the General Health Questionnaire-28 the participants demonstrated positive change in their mental well-being.</p>		
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			<p>week (1.5 hours) and repetitive strength training two times in the week.</p> <p>Data analysis: Correlations were calculated in this study. During a mutual decision, the researchers used a statistical model with covariates for determined between-group differences . To determine differences in dependent variables the multivariate analysis of variance (ANOVA) and to determine one-way multivariate analysis</p>			
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			of variance the MONOVA was used by the researchers . The comparison between pre-and post-test was determined using a dependent <i>t</i> -test.			
Question 3						
Bernabe, E. A. & Block, M. E.(1994). Modifying Rules of a Regular Girls Softball League to Facilitate the Inclusion of a Child with Severe Disabilities, <i>Journal of the American Society of Hypertension</i> , 19(1), 24-31.	The purpose of this study was to explore one critical aspect of “actively participation” (full inclusion) in youth sports. The feasibility of modifying a traditional park district girls’ fast-pitch softball program	A 12-years old female participant with moderate to severe disability participated in the study. The participants had the parents’ consent to participate in this study. The study took place during females’ fast-pitch softball league.	Batting average, on-base average, and total bases were analyzed in this study. Also, the time per inning and balls hit to outfield positions were recorded. The recollection of the data took place during experimental team games. The researchers	According to the female batting results, the participant demonstrated success with her peers. The female has a difference in the batting average but if walks were eliminated for the other girls, the female	The level of inclusion in this female was completely successful in her softball games. Her peers experienced disabilities awareness during sports activities. Nobody made negative feedback for a player with severe to moderate disabilities. The coaches needed to be considerate and be careful with the students’	

	could be included.		<p>recorded the data in the statistical softball book.</p> <p>Correlation was used for batting and on-base averages. To compare female batting average, the researchers used one sample t test. During descriptive purpose, the researchers used z scores, means and standard deviations. ANOVA was used to identify significant difference between the balls hit to center field compared with the balls hit to the other</p>	<p>has a similar on-base-average. The presence of this female in softball games did not demonstrate difference during game transitions.</p>	<p>modification to avoid frustration. Finally, the females' peers looked to her as a productive member of their team.</p>	
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			outfield positions.			
Question 3						
Bhutia, C.D., Nair, U.S, & Surujlal, J. (2015). Effect of Physical Exercise Programme on Gross Motor Function of Children with Cerebral Palsy. <i>African Journal for Physical, Health Education, Recreation and Dance (AJPHER D)</i> , 1, 1-13.	The purpose of the study was to measure the effect of a physical activity program on gross motor function in children with cerebral palsy using an accepted and validated outcome measure: The Gross Motor Function Measure (GMFM).	Ten children (9 males and 1 female) with cerebral palsy aged 13-18 years participated in this study. For the criteria of this study, the only qualification was being diagnosed in the Gross Motor Function Classification System (GMFCS) levels I and II. They were from the Institute for Mentally Challenged in the Thiruvananthapuram district of Kerala, South India.	The test of Gross Motor Function Measure (GMFM) was used to assess five dimensions of gross motor function, namely a) laying and rolling; b) sitting; c) crawling and kneeling; d) standing; and e) walking and running. During the semester the experimental group performed the prescribed exercise thrice a week in a period of 12 weeks. Each session lasted 50	The pre- and post-test in the control and experimental group showed some differences in the lying and rolling; sitting, standing and the total GMFM. The results did not show differences in walking; running and jumping; and crawling and kneeling in the experimental group. On another hand, GMFM for the	This study supports the claim that physically active children with cerebral palsy can improve their gross motor functions such as lying and rolling, standing, sitting, and leading. These results of the study should encourage physical educators to promote physical activity programs and more facilities for children with cerebral palsy. Also, physical activity has to be included in the intervention strategies for children with cerebral palsy. This	There was more time in motor gross activity during the training. The researchers could promote daily activities to prepare the student in the community transition process. The researcher did not use video tape for another type of data recollection. Limitation: Used a small group of APE students and generalized with the community of APE students class. Future research

			<p>to 60 minutes.</p> <p>Data Analysis: GMFM scores were analyzed by using descriptive statistics, ANCOVA, and parried t-test to ascertain significant differences between the groups. The level of significance were described as: $p < 0.01$ and $p < 0.05$.</p>	<p>control group did not show change during the training period.</p> <p>Significant results occurred when the researchers include training session with strengthening exercise which resulted in an improvement in standing skill. The results suggested open space to encouraged experiences in different postures as a possible, such as lying prone (face downwar</p>	<p>study contributes to the health promotion for children with cerebral palsy.</p>	<p>Include larger groups to investigate children with more severe disabilities.</p>
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				d), supine (face upward) and sitting positions. The researchers suggested freedom opportunities promote interaction among the children with severe disabilities.		
Question 3						
Jasma, P., Decker, J., Ersing, W., McCubbin, J. & Combs, S. (1988). A Fitness Assessment System for Individuals with Severe Mental Retardation, <i>Adapted Physical Activity Quarterly</i> , 5, 223-232.	The purpose of this article was to present an overview of The Ohio State University's Project Transition and provide a detailed review and discussion of a research-	A hundred fourteen adults with severe intellectual disability participated in this study. Those participants attended the Columbus (Ohio) Developmental Center.	The researchers administered the developed fitness and health/hygiene test and scores on the Adaptive Behavior Scale to assess when deciding whether to deinstitutionalize (process of put the patients in communit	The results showed an increment in the level of abilities. The researchers found that level of dependence can be assessed with task analysis checkmark assessment.	The researchers found that the transition task analysis assessment can be a resource to evaluate individuals with severe disabilities. This assessment may include the evaluation of more than one task. Project Transitions assessment system is	

	<p>based assessment system, with a particular emphasis upon scoring. This article addresses the issue of fitness assessment for use with individuals with severe disabilities.</p>		<p>y mental health centers) someone. This data was collected in 14 weeks for 45 minutes per session. This study demonstrates qualitative and quantitative measurements in the development of five skills to have functional value. Those skills include: 300-yard run/walk (cardiorespiratory endurance), grip strength, modified sit-ups (abdominal endurance), modified bench press (upper</p>	<p>The researchers recommended this assessment to measure performance outcomes in individuals with severe disabilities.</p>	<p>important because provide measure in the score sheet, specific information related to percentage of task completion, level of prompting, skill performance, task-analyzed step descriptions, and reinforcement strategy for individuals with severe disabilities.</p>	
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			<p>body strength and endurance), and modified sit and reach (lower back and hamstring flexibility).</p> <p>Qualitative measures give the level of independence in the participants. The independence test consisted of a response to a command and evaluation of the level of the prompts that the participants need. Some percentage calculations were based on the number of steps completed independently.</p>			
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			<p>divided by the number of steps in the skill x 100= percent score.</p> <p>Quantitative measure was used to assess the performance in the five physical fitness skills. The participants needed to complete the skill's goal, instructional objectives, and task analysis steps.</p>			
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Question 2

<p>Jaarsma, E. A., Dijkstra, P.U., Blécourt, A.C.E., Geertzen, J.H.B., & Dekker, R. (2014). Barriers and Facilitators of Sports in</p>	<p><i>Purpose:</i> The purpose of this study was to provide comprehensive information about the barriers and</p>	<p><i>Participants:</i> Thirty children with physical disabilities participated in this study. These children were registered at the Prince Johan Friso Mytyl</p>	<p><i>Data Collection analysis:</i> This study used a mixed-methods design. The questionnaires completed by children and their parents</p>	<p><i>Results:</i> <u>Personal Factors</u> Barriers: Teachers and health participants mentioned disability as a</p>	<p><i>Conclusion:</i> This mixed-study found diversity factors during the sports activities in children with physical disabilities. Those factors create a challenging</p>	<p><i>Recommendations- Research notes:</i> The researchers would utilize the interview to validate the parents and children concerns.</p>
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<p>Children with Physical Disabilities: A Mixed-Method Study. <i>Disability and Rehabilitation An, International, Multidisciplinary Journal</i>, 37(18), 1617-1625.</p>	<p>facilitators of sport participation of children with physical disabilities by triangulating data from children, their parents and their health professionals.</p>	<p>school, Haren the Netherlands, a special school for children with physical disabilities. The parents were invited by mail to participate in the study by completing a children's questionnaire.</p>	<p>were combined with interviews with health professionals.</p> <p><u>Quantitative</u>: This study used chi-square test to analyze differences in barriers and facilitators between active and passive children. McNemar test was used to analyze differences between children and parents. Also, this study used a Mann-Whitney U test to analyze differences in the number of experienced barriers and facilitators between active and</p>	<p>barrier to sport participation.</p> <p>Fatigue: Teachers and health professionals exposed the fatigue of the children because they have a long school day and long school travels.</p> <p>Health: Health professionals promote participation in sports (change in position of the body activities) for children in wheelchairs.</p> <p>Fun: The most important is</p>	<p>environment during sports activities in children with severe physical disabilities. Meanwhile, physical activity promotes psychological engagement. The most frequently diversity factors were disability as a barrier to sports participation by children with disabilities. Another diversity factors are lack of sport facilities; transportation; children with disabilities not feeling accepted by others; lack support from family; and organizing sports during school hours.</p>	<p>Limitations: The parents and child responses were not matched in the results sections. Researchers choose a small sample size. Results cannot be generalized in children with severe physical disability population.</p>
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			<p>passive children.</p> <p><u>Qualitative</u> : This study recorded the interviews, thematic analysis, video tape and transcript by the first author. For the security of the participants, each participant was assigned an identification number.</p>	<p>facilitated fun activities for children participating in sports.</p> <p>Internal motivation: The children required interest in physical activities.</p> <p>Strength : Parents and children mentioned strength as a personal factor for participating in physical activities. Meanwhile the health professionals did not mention this as a possible facilitator.</p> <p><u>Environmental factors</u></p>	
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				<p>Barriers</p> <p><i>Lack of sports facilities:</i> Teachers and health professionals discussed lack of opportunities in extracurricular and community activities with limitation in transportation.</p> <p><i>Lack of acceptance:</i> Children mentioned exclusion when they did not feel acceptance their peers.</p> <p><i>Lack of information:</i> Parents have a lack of informati</p>		
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				<p>on in adapted sports opportunities.</p> <p><i>Facilitators:</i> Children and parents mentioned social contact as a facilitator during sports activities.</p> <p><i>Family support:</i> Participants discussed that family support is a positive influence in the child environment.</p> <p><i>Sports activities during school hours:</i> It is a possible facilitator when the parents have a</p>		
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				busy schedule.		
Question 2						
Luijkx, J., Ten Brug, A., & Vlaskamp, C. (2015). Does the Severity of Disability Matter? The Opinion of Parents About Professional Support in Residential Facilities, <i>Child: Care, Health and Development</i> . 42(1), 8-15.	The purpose of this study was to determine whether and how the opinions of parents and/or legal guardians vary for different groups of persons with intellectual disabilities.	A thousand eight hundred twenty-four parents or legal guardians of individuals with intellectual disabilities participated in this study. All settings belong to the same government funded and services provider.	Groningen Care Barometer was used to assess quality in support of parental or legal guardians. The researchers had the parents' council permission to start the study. MANCOV A were conducted to compare the opinions of parents or legal guardians.	Parents of individuals with severe profound disabilities received less support than parents or legal guardians of people with a mild or moderate intellectual disability. Also, parents or legal guardians have their own perspective on the quality of support during leisure activities. Most parents or legal guardians of individuals with severe	This study demonstrated that the parents or legal guardians of individuals with intellectual disabilities were given fewer opportunities to do leisure activities. The parents or legal guardians opinion regard the quality of support, depends on the level of severity in the individual with intellectual disabilities during leisure activity. This study provided knowledge about developing better needs and preference support for individuals	Limitation: The influence of unknown confounding variables cannot be ruled out. The type of housing, and staff-client ratio can be unclear. Another limitation was the exposition of individuals with intellectual disabilities characteristics by their parents or legal guardians.

				<p>profound disabilities share the same perception of lower opportunities for leisure activities. The researcher suggested increase facilities in volunteers to cater for quality in leisure activities.</p>	<p>with intellectual disabilities. Parents or legal guardians suggested collaboration in defining how leisure activities should be appropriate for individuals with profound intellectual and multiple disabilities.</p>	
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Question 2

<p>Sterbová, D., & Kudláček, M. (2014). Deaf-Blindness: Voices of Mothers Concerning Leisure-Time Physical Activity and Coping with disability, <i>Acta Gymnica</i>, 44(4), 193-201.</p>	<p>The purpose of this study was to examine the beliefs of mothers regarding the leisure time physical activities of families of children with deaf-</p>	<p>Five mothers of children with deaf-blindness participated in this study. The mothers had the following criteria: (a) deaf-blind has to be congenital, (b) child age between 15 and 21 years, (c) the child has to be in the community transition</p>	<p>The researchers used identification of emergence themes to be categorized in possible topics. The interviews were recorded by video tape. Also, the two researchers</p>	<p>This study showed no families participated in adapted physical activities and none offered opportunities to the child to enjoy physical activity. Most mothers saw the</p>	<p>The participants of this study considered the benefit of physical activity to facilitate a healthy life in their children with DB. They encouraged the facilitation of support, camps, equipment and paraprofessionals to share</p>	
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	<p>blindness .</p>	<p>process. Interested participants have to consent to participation in the study.</p> <p>The researchers conducted pilot-interviews to obtain basic information about physical activities. The interview guide was approved by independent experts. The pilot interview questions were: (a) How important are leisure time physical activities in your family?; (b) Is your family taking part in organized leisure time physical activities?; (c) Which activities can be done with</p>	<p>used journal entries and field notes during observations in family camps.</p>	<p>disabilities as a barrier to not participate in physical activities.</p> <p>Emergent theme: needs of children with deaf-blindness and their families Mothers believe that physical activity can improve the recognition of day/night activities in their children. In accordance with the participants' perceptions, the level of prompting is important to increase</p>	<p>common family activities.</p>	
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		<p>your child who has DB?; (d) Are options of leisure time physical activities sufficient?</p> <p>The purpose of the mother interview questions was to recollect data about family life interaction between children with deaf-blindness.</p>		<p>the physical activities engagements in DB children. Parents observed motivation, appropriate behavior and joy when their children participated in physical activity. Mothers encouraged an increase in facilities or physical activities programs that include children with deaf-blindness with appropriated adapted physical activities and communi</p>		
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				<p>cation techniques.</p> <p>Emergent theme: Situation in families</p> <p>The family composition of the DB children was Caucasian. All children had personal assistants but they had independent mobility. All children attended a boarding school during the week.</p>		
Question 2						
Tunson, J., & Candler, C. (2010). Behavioral States of	The purpose of this study was to examine	There were three children (3-10 years) with multiple	Taxonomy of biobehavioral states observable by Guess	Participant 1 demonstrated an increase in active	Behavioral states may be a resource to measure activity engagement	Future research The researchers can generalize

<p>Children with Severe Disabilities in the Multisensory Environment, <i>Informa Healthcare USA</i>, 30(2), 101-110.</p>	<p>the behavioral states of individual children for evidence of responsiveness within and without a multisensory environment.</p>	<p>severe disabilities participating in this study. The participant's characteristics were non-ambulatory, non-conventional communication skills, and dependent on others for basic needs. Participants had the parent consent to participate in this study.</p>	<p>was used in this study to assess: (1) asleep with eyes closed, no body movements, no vocalizations; (2) awake agitated with eyes open, crying, or fidgeting; (3) awake inactive with eyes open with no apparent movement; (4) self-directed with eyes open with some visual, auditory, tactile, or olfactory orientation toward self; (5) visually attentive with eyes open and exploring the environment visually with little</p>	<p>reaching during this study. Participant 2 was engaged in awake, visually attentive behavior with intermittent inactive states during the study. Participant 3 was engaged with visually attentive, self-directed, and active reaching behaviors without sleep terms but demonstrated a decrease in his self-directed behavior during this study.</p>	<p>in children with severe disabilities. This tool gives the opportunity to identify a list of unique behaviors for individuals with severe disability. MSE promotes communication between professionals and individuals to avoid a lack of experiences during physical activity.</p>	<p>the results of a small sample within the severe disability population.</p>
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			<p>motor movement; (6) active reaching with eyes open, oriented to environment, and reaching/grasping objects within reach.</p> <p>Data was recollecte d over eight weeks (3 days per week) and videotaped for 30minutes (8:25am-9:10am). The researchers did observatio n in intervals of 10 minutes.</p> <p>The data was analyzed after seventy-two observatio ns and graphed by visual inspection.</p>			
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Question 1						
Vascáková, T., Kudláček, M., & Barret, U. (2015). Halliwick Concept of Swimming and its Influences on Motoric Competencies of Children with Severe Disabilities, <i>European Journal of Adapted Physical Activity</i> , 8(2), 44-49.	<i>Purpose</i> The purpose of this study was to analyze the impact of Halliwick Concept on specific adapted aquatic skills according to WOTA evaluation.	<i>Participants</i> Ten children with cerebral palsy and combined impairments (6 males and 4 females) with a mean age of 5.5 participated in this study. The participants were recruited from special school in the aquatic setting of the rehabilitation center Elpis.	<i>Data collection analysis</i> The GMFM test was used to assess five dimensions of gross motor function: (a) lying and rolling, (b) sitting, (c) crawling and kneeling, (d) standing and (e) walking. Water orientation test (WOTA) was used to assess quality of aquatic skills. Halliwick Concept was used to assess: (a) individual approach, (b) personal one to one contact,	<i>Results</i> The participants with diparetic form of cerebral palsy (2 males and 1 female) improved GMFM scores by 4.25%. The participants improved gradually : (b) sitting -3.85%, (c) crawling and kneeling -2.81%, (d) standing - 4.37%, and (e) walking, running and jumping - 5.97%. In the WOTA score, participants had an overall improve	<i>Conclusion</i> This study supports that the Halliwick Concept (specific form of water based therapy using aquatic environment to assess: (a) individual approach, (b) personal one to one contact, and (c) independence of swimmers) brings a successful technique to improve aquatic skills and motor skills performance in children with cerebral palsy and combined impairments. Children with cerebral palsy improved swimming skills (77%), breathing control (70%), and water submerge	<i>Recommendations research notes</i> The researchers recommend utilizing aquatic facilities with warm water to reduce spasticity, functional strength, mobility and proprioception improvements, reduction of subjective problems and physiological state. Limitations: It is challenging to teach children with autism in the pool setting. The researchers had lower scores in the gliding and relaxation activities post-test.

			<p>and (c) independence of swimmers.</p> <p>The instruction was 1:1 during ten aquatic session. Halliwick Concepts were used during aquatic session as a relaxation resource.</p>	<p>ment by 8.33 points.</p> <p>Participants with quadruparetic form of cerebral palsy (2 males and 1 female) increased their GMFM scores by 5.20%. Improvements: (a) lying and rolling - 5.40%, (b) sitting - 7.20%, (c) crawling and kneeling - 2.70%, (d) standing - 3.75%, and (e) walking, running and jumping - 1.75%. The WOTA scores increased</p>	<p>(62%). Also, the children improved water transfer (90%). It is recommended use warm temperature in the water for help reduce spasticity, functional strength, mobility and proprioception improvements, reduction of subjective problems and psychological state. As a final conclusion, Halliwick Concept is a resource to improve quality lives with children with cerebral palsy.</p>	
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				<p>by 9.67 points.</p> <p>Those scores demonstrated major improvement in the diparesis group with the difference of 1.34 points.</p> <p>Participants with autism (2 males and 2 females) increased their GMFM scores by 1.57%. Improvements: (d)standing - 3.50% and (e)walking, running and jumping - 2.80%. In the WOTA scores, the participant</p>		
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				ts increased by 1.16 points. This group was the higher scoring by 15.13 points.		
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