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A Panoramic View of How Physical Activity Impacts Students With Disabilities, With an Emphasis Focused on Students on the Autism Spectrum

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A PANORAMIC VIEW OF HOW PHYSICAL ACTIVITY IMPACTS STUDENTS WITH DISABILITIES, WITH AN EMPHASIS FOCUSED ON STUDENTS ON THE AUTISM SPECTRUM

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Abstract

Today a majority of adolescents do not participate in the recommended daily level of physical activity. Students with disabilities, including students on the Autism Spectrum scale, especially lack participation in physical activity. The benefits of regular physical activity include better physical health, improved cognition, and increased social skills. However, a significant number of barriers prevent students from participating in physical activity. Lack of physical activity has severe consequences for adolescents. Students may be more susceptible to illness, develop poorer motor skills, have reduced focus ability, focus resulting in emotional hardships and fewer opportunities to socialize with peers. Educators, family, friends, and community members need to work together to combat barriers that exist for students. Interventions, training, increased funding, more appropriate facilities and equipment, and more physical activity opportunities, are only a few of the ways to increase physical activity levels. Researchers should continue to study which strategies are most beneficial for increasing physical activity levels among adolescents.

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CHAPTER I: INTRODUCTION

What level of physical activity is ideal for adolescents? Does this level change based on the age of the adolescent? Are adolescents with disabilities, both physically and intellectually, expected to have the same level of physical activity as adolescents without disabilities? Do adolescents who have been diagnosed with an Autism Spectrum Disorder (ASD) engage in physical activity as often as their peers? These questions are difficult to answer due to varying opinions throughout the limited research that exists related to the level of physical activity required for adolescents with disabilities, specifically those who have ASD. This paper will focus broadly on several concepts including; the benefits and importance of physical activity for adolescents with disabilities, the barriers that exist in adolescents who receive and have access to physical activity, potential consequences for not being physically active, and recommendations for how to increase the level of physical activity for adolescents with disabilities.

Physical Activity (PA) is defined as 'getting your body moving' and requires increased energy compared to being in a state of rest. The appropriate level of PA required for individuals across any age group among various health related organizations. For the purpose of this literature review, the author will examine PA levels in school-aged adolescents (4-17 years), with an emphasis on adolescents who have been identified with either a physical or intellectual disability. Brown (2007) quoted in a study by Parmenter (2011), stated that the literal sense of an intellectual disability "refers to some restriction or lack of ability having to do with human intellect" (as cited in Parmenter, 2011, p. 304). Meaning and terminology to describe intellectual disabilities has changed significantly throughout the years and no single definition exists today. In the past, the

term “mental retardation” described individuals with intellectual disabilities, physical disabilities or a combination of both. However, this term is no longer deemed appropriate ~~to use~~ in most professional and social settings, but may still be found in older research. The term Intellectual Disabilities encompasses a multitude of challenges relating to processing information mentally. Individuals may receive either a label from an academic institution, a medical or therapeutic facility, or both. In an academic setting, students are assessed and provided an academic label if qualifications are met in a specific disability category. For example, a student may meet the disability criteria in the area of Specific Learning Disability (SLD) in the areas of Writing, Reading or Math, or a Speech or Language Impairment (SLI). Professionals or organizations in a medical setting diagnose intellectual disabilities, such as depression or anxiety, which may or may not meet disability criteria in an academic setting. The focus of this paper will not explore the source of the diagnostic label, but simply acknowledge a disability exists.

A physical disability can be defined as an impairment or limitation pertaining to the physical body. Though physical disabilities are generally visibly common, this is not always the case. Physical disabilities may manifest internally and thus not observable. Additionally, what appears to some to be a physical disability (limitation or impairment), may not actually be a physical disability. For example, although being obese may limit someone from physical activities, this may not be categorized educationally as a physical disability. For the purpose of this literature review, Autism Spectrum Disorder is the only individual disability that will be considered. In addition, the setting in which an adolescent received a diagnosis, whether academic or outside an academic setting, will

not be reviewed. Understanding Physical Activity (PA) and disability, will be sufficient, as these terms are used consistently throughout this review.

Autism Spectrum Disorder (ASD) is a neurological disorder. According to Szatmari, of the Department of Psychiatry and Behavioral Neurosciences at McMaster University, symptoms of ASD such as "developmental delay," "epilepsy," and "extremes of head size," may all "represent non-specific signs that autism is a neuropsychiatric disorder" (Szatmari, 2003, p. 173). Historically, Autism was considered a stand-alone disability, but in recent years has evolved to include order disorders such as: Asperger syndrome, disintegrative disorder, and atypical autism. Asperger Syndrome is no longer recognized as a disorder according to the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5). These disorders evolved into a spectrum under the name, Autism Spectrum Disorder (ASD) (Szatmari, 2003, p.173). As the definition of ASD has evolved over time and as people have become familiar with the disorder, the number of people diagnosed with ASD has increased. In an article by Simpson, Gaus, Biggs and Williams (2010), Metzger and Simpson (2008) noted that ASD is more common now than childhood cancer, diabetes and Down Syndrome, and the second most common and serious developmental disability behind mental retardation and intellectual disabilities (as cited in Simpson, Gaus, Biggs & Williams, 2010, p. 48). According to the Centers for Disease Control and Prevention (CDC), about 1 in 68 children have been identified as having ASD (Centers for Disease Control and Prevention, n.d.). Data from the Autism and Developmental Disabilities Monitoring Network, as cited by authors Pontifex, Fine, Cruz, Parks and Smith (2014), revealed that the frequency of those being diagnosed with ASD has increased 23% since 2006 and 78% since 2002 (Pontifex, Fine, Cruz, Parks &

Smith, 2014, p. 100). The broad scope of this paper will target how PA impacts adolescents with disabilities, with specific attention delineating the ways PA impacts those with ASD.

Physical Activity is beneficial for people of all ages and all abilities. However, the ideal level of PA for any particular age category varies among health organizations and researchers. Pan, Tsai and Hsieh (2011) noted that in a school's physical education setting, students should be engaged in physical activity for at least 50% of lesson time. This information was based on guidelines from the U.S. Department of Health and Human Services in 2000 (Pan, Tsai & Hsieh, 2011, p. 491). Similarly, in another study by Pan (2007), the researcher stated that according to Healthy People 2010 guidelines, the suggested amount of physical activity for children was at least 50% of class time. This allows for a more meaningful contribution to daily moderate-to-vigorous physical activity (MVPA) accumulation in a physical education setting (Pan, 2007, p. 1293). In other words, half the time spent in a physical education class should be spent engaged in physical activity, and the amount does not fluctuate based on the adolescent's ages. The World Health Organization (WHO) recommends that adolescents age four to seventeen should engage in 60 minutes of MVPA daily, according to Schwarzfischer et al. (Schwarzfischer et al., 2017, p. 1). An article by Janssen (2007) reviewed guidelines from 1998 that were developed after examining the PA levels for children and youth, and found that the recommended amount of daily moderate-intensity PA should be at least 60 minutes, (Janssen, 2007, p. S110). The article further detailed findings from a study conducted on the physical activity of Canadian youth ages six to fourteen. The expectation was that they were physically active for up to 90 minutes a day, five days a

week. Promotional materials provided information to families about physical activity and encouraged adolescents to increase their current PA by 30 minutes a day until they reached 90 minutes. A conservative estimate of results showed that less than half of the youth population was considered physically active. In fact, compared to multi-national statistics, only 44.9% of Canadian's youth were classified as being physically active, but yet were ranked third highest amongst 34 countries examined, (Janssen, 2007, p. S112-S113). Researcher Pan (2007) stated from Foley (2005) that children without mental retardation (intellectual disabilities were 53% more physically active during recess and 133% more active during a physical education class than peers with mental retardation (as cited in Pan, 2007, p. 1293). Stated differently but with similar meaning, other researchers found that the amount of time students with disabilities spent being physically active in a physical education setting, tended to be far less than the recommended 50% of lesson time, compared to their peers without disabilities, (Pan, Tsai & Hsieh, 2011, p. 494).

Pan conducted a study measuring the daily levels of physical activity for adolescents' ages seven to twelve. The study focused on 24 Taiwanese students with ASD and 24 students without disabilities. Their daily activity was monitored over the course of five days by an accelerometer attached to their hips at the start of the school day and removed at the end of the school day. The results revealed that overall, children with ASD showed lower activity levels during recess than same-aged children without disabilities (Pan, 2007, pp. 1294-1296). Furthermore, children without disabilities were more likely to engage in MVPA accumulation than their counterparts with ASD, (Pan, 2007, p. 1296). Not a single study researched for the purpose of this literature review,

revealed statistics suggesting that adolescents with disabilities were more physically active than adolescents without disabilities. Why is there such a discrepancy between adolescents with and without disabilities and the amount of time they are physically active? Before examining the answer to this question, one must ask why is being physically active important?

CHAPTER II: LITERATURE REVIEW

Benefits of Physical Activity

From an early age both at home and in a school setting, most children are given opportunities and encouraged to play outside, run around and be physically active. Physical activity is a way of allowing children to express themselves and expunge their energy. Some children do this on a playground during recess, while others in organized sports or athletics. Whatever the medium, getting children to be active seems to have become a norm in many societies. There are numerous studies that exist that examine the positive affects physical activity has on the body physically, mentally or cognitively, and emotionally. However, the literature regarding how PA impacts students with disabilities is fairly limited. PA can describe activities with low levels of rigor, such as walking, to higher levels of rigor such as jogging. The studies within this paper primarily examine moderate-to-vigorous physical activity (MVPA) levels and the impact it has on students with disabilities, as there is a direct correlation between the level of PA and the benefits individuals with disabilities receive. Some of the benefits addressed include: physical benefits pertaining to how students feel, emotional benefits in regards to how students behave and view themselves, and cognitive benefits relating to their ability to focus and perform academically.

Authors Klein and Hollingshead (2015) explained in their article the benefits physical activity has on all students, with a specific focus on receiving PA in a physical education (PE) setting. Taken from Bailey (2006) and Burgeson (2004), Klein and Hollingshead asserted that PE might be the main source of PA for students and therefore, the main contributor to students learning how to be active and maintain an active lifestyle

(Klein & Hollingshead, 2015, p. 163). Furthermore, the authors examined the benefits of an active lifestyle, including, increased blood to the brain, mental alertness, and better ability to maintain a positive attitude, as indicated by the National Association for Sport and Physical Education (NASPE) (Klein & Hollingshead, 2015, p. 163). These benefits relate specifically to the physical and cognitive processes within an individual. They further went on to assert that exercise increases the heart's ability to sustain efficiency and help prevent illness, which in turn may help to prevent students from missing school. Additionally, regular PA can raise student's self-esteem and therefore may decrease the likelihood of students developing intellectual disorders, such as depression or other mental illnesses (Klein & Hollingshead, 2015, p. 163). As a point of clarification, while the authors use the term 'disorder,' this term is fairly synonymous with the term 'disability.' A disorder is typically defined as a dysfunction within an individual that affects them cognitively, physically or emotionally. A disability is defined as a physical or mental impairment that limits an individual from an activity or activities. While both terms might be used in academic settings, the term 'disability' is more common and is necessary for students to receive Special Education services. An individual may have a disorder, but not to an extent that it significantly impacts academic performance, and therefore do not qualify for Special Education services. The remainder of this paper will use both terms, but primarily the term 'disability.' Getting students to attend school more frequently through the reduction of illnesses and intellectual disorders, which are often associated with physical, mental, emotional or social struggles, can significantly impact student's academics and achievements.

Finally, according to the NASPE as sighted by Klein and Hollingshead (2015), students need sufficient movement throughout the day. PE is a significant outlet that provides students movement throughout their day in school. Aside from the benefits previously mentioned, giving students movement allows them to have mental breaks. (Klein & Hollingshead, 2015, p. 164). Mental breaks allow students to shift their mental focus temporarily, which can provide relief and has the potential for students to be better focused upon returning back to structured classroom time. Similarly, physical activity in PE familiarizes students with various "fitness components" (Klein & Hollingshead, 2015, p. 164). Throughout their education, students are introduced to a variety of sports, exercises, strength training techniques, and skills that they can in turn utilize later in life. Learning PA fosters healthy lifestyle choices as students' mature, leave home and become more independent. Although students with and without disabilities may choose not to be physically active as they age, they will have had numerous opportunities to develop skills and learn activities that could be implemented later in life.

Physical Activity has the potential to decrease undesired behaviors and increase motor skills for students, specifically those with a disability. Writers Sorensen and Zarrett (2014) compiled information from different sources that focused on the benefits PA had on students with ASD. Their overall conclusion was that PA promoted healthy development and reduced (negative) symptoms that are often associated with ASD (Sorensen & Zarrett, 2014, p. 347). Some of the physical benefits of PA they found that were common in the studies they examined, included an increase in: motor skills, endurance, strength, cardiovascular fitness, and flexibility (Sorensen & Zarrett, 2014, pp. 346-347). These increased physical abilities can contribute to students being able to

better physically engage in PA in PE classes, during recess, or playing on a sport's team in and outside of school. While their physical skills may not be completely normalized when compared to students without a disability, students' increased physical abilities can close the gap between the groups. Sorenson and Zarrett (2014) also found that with increased PA, there was a decrease in stereotyped and repetitive behaviors in students with ASD (Sorensen & Zarrett, 2014, p. 344). Although the symptoms of ASD can vary widely, some common repetitive behaviors include: hand flapping, rocking back and forth, and fidgeting. These symptoms often imply that a student is overstimulated, which can be uncomfortable for a student and lead to unexpected behaviors. If PA can help reduce the amount of repetitive behaviors a student experiences, the likelihood of unexpected behaviors and a student feeling uncomfortable may also decrease. Other studies examined indicated a decrease in abnormal behaviors and unwanted vocalizations (Sorensen & Zarrett, 2014, pp. 347-348). The direct correlation between physical activity and a decrease in undesired behaviors, is an asset in any setting, especially an academic setting. Undesired behaviors are all too prevalent in a school environment among all students for varied reasons, so having strategies that can be implemented by staff helps calm and prepare the environment for maximum learning. When a student with ASD displays undesired behaviors, either physically or vocally, this has the potential to disrupt a class, interfere with learning, and as an extreme, harm the individual student or others. PA should be considered for each student when creating their daily schedule at any grade level, based on the data that PA has the potential to reduce the number of undesired behaviors.

Another physical benefit of PA is the strengthened connection between both hemispheres of the brain when the body is in a physically active state. Nicholson, Kehle, Bray and Heist (2011) cited Dennison (1981) in regards to the Brain Gym Program," which referred to distinct body movements and breathing that stimulated both hemispheres of the brain. The two sides are connected through nerve fibers called the corpus callosum. While both sides have their own functions and control over various parts of the body, their integration is necessary for learning a new task (as cited in Nicholson, Kehle, Bray & Heest, 2011, p. 199). Witcher (2001) further explained that "Learning can be enhanced through simple, specific, movements that stimulate both hemispheres of the brain to work synchronistically" (as cited in Nicholson, Kehle, Bray & Heest, 2011, p. 199). Imagine the profound impact PA could have on students where both hemispheres of the brain are working together as students are learning and developing new skills. A stronger connection between hemispheres could be especially beneficial for students who have a disability, as either side of their brain might not be functioning normally in comparison to their peers.

Physical activity has not only physical benefits, but many cognitive or mental benefits as well. The words cognitive and mental can be used interchangeably as they both refer to processes pertaining to the mind and can be used to describe the intellectual ability of an individual. Either term may appear throughout this paper. In their paper pertaining to children with developmental disorders, authors Pontifex et al. (2014), sighted a multitude of case studies that explored the benefits and barriers to learning based on the existence of PA. One such case study from Medina and colleagues (2010), examined 25 boys who were diagnosed with Attention Deficit Hyperactive Disorder

(ADHD), after 30 minutes of high level exercise. They found that when given a task directly after the exercise, the boys displayed "greater sustained attention and decreased impulsivity" (as cited in Pontifex et al., 2014, pp. 95-96). An increase in sustained attention can greatly impact an individual's ability to engage and learn both in and outside of an academic setting. Focused attention is essential for learning when students are listening to a lecture or a lesson, given independent work time or listening to directions before a hands-on activity. Outside of a school learning environment, as adolescents age and begin to drive and find employment, focused attention is also vital for safety and success to perform tasks well. Decreased impulsivity reduces the amount of potentially undesirable behaviors or poor decisions a student may exhibit. This in turn can increase the positivity within an environment and reduce the amount of consequences a student may incur. Another study referenced by Pontifex et al. (2014) focused on a control group of students who did not receive PA and another group of students that received 45 minute PA three days a week over the course of 10 weeks. The students ranged from ages 7 to 12 years old and all had a diagnosis of ADHD. Verret, Guay, Berthiaume, Gardiner, and Béliveau (2012) found that students in the group receiving regular PA showed, enhanced information processing, visual search, and sustained attention, and reductions in social, thought, and attentional problems when compared with peers in the control group (as cited in Pontifex et al., 2014, p. 98). These benefits are significant when it comes to maximizing learning in the classroom. Students who are more capable of processing information, sustaining focused attention and emotional and physical regulation, have an increased likelihood of success. Outside of the classroom

these benefits are just as significant as students participate in athletics, jobs, volunteer work, and any situation that requires attention and decision making.

Other cognitive benefits of physical activity identified throughout the research included improved social skills, self-management and increased engagement in the classroom. Duronijić and Válková (2010), as cited in Pontifex et al., investigated the effects that 60 minutes of PA twice a week for 8 weeks had on children with ASD. They discovered that both motor and social skills for these children were improved (as cited in Pontifex et al., 2014, p. 102). Similarly, Sorensen and Zarrett explained from exploring various studies, that MVPA improved self-management and social and emotional functioning (Sorensen & Zarrett, 2014, p. 348). A key component of ASD relates specifically to an individual's ability to socialize. Although all people diagnosed with ASD fall on a spectrum and display different symptoms, a majority struggle with socialization skills. Improved social skills for individuals with ASD is paramount to their well-being and ability to function both in and outside of a school environment. Students with ASD may receive classes specifically centered on functional and social skills, sometimes taking these classes in place of other valuable classes. Improved social skills from PA may be enough to eliminate a social skills class from a student's schedule and replace it with another important class. These same social skills can help improve student's ability to work cooperatively in small groups, socialize with peers at lunch or recess, help students when developing and maintaining relationships, and with general communication. Social skills are inevitable in everyday life and developing those skills can only benefit an individual. Students who are able to articulate their feelings and advocate for themselves are more likely to be more successful in their surroundings than

students who cannot communicate for themselves. Likewise, students that are better able to self-manage, may be better equipped to manage their time more wisely and their emotions in difficult situations. Overall, self-management is an important skill that students should improve as they get older, as it spans any setting. Self-management encompasses a student's ability to be engaged in their environment. Authors Nicholson et al. (2011) discussed in their article a study conducted utilizing four students with ASD who were each given several weeks of a PA intervention and then observed for their level of academic engagement. The intervention included jogging for 12 minutes followed by an immediate five-minute cool-down period. Student one started the intervention and then every week another student was added to the intervention until all four students received the intervention, with the fourth student having received at least two weeks of the physical activity. The students were then observed for several weeks using the Behavioral Observation of Students in Schools (BOSS) defined by Shapiro (2004) as a tool that looks at a student's engaged time in an academic setting, with the time being categorized as either passive or active. The BOSS considered writing, reading aloud, answering questions, raising one's hand, or discussing with peers as active engaged while passive engaged time included tasks such as: silent reading, looking at the teacher or blackboard during instruction, or silently attending to academic materials (Nicholson et al., 2011, p. 201). The article did not differentiate whether active or passive engagement was better – both are necessary in a classroom at appropriate times. The results indicated that the PA intervention increased the observed academic engagement for the students. Consequently, students who were more active during the invention, such as jogging the entire time or exerting more effort, showed even more of an increase in academic

engagement compared to the students who walked more frequently or put in less physical effort (Nicholson et al., 2011, p. 208). Increased engagement in a classroom is preferential from a teacher's viewpoint as many goals of the classroom aren't solely centered on classroom management, but also a student's ability to connect and engage with the lessons and activities for enhanced learning and enjoyment.

A final idea related to the benefits of physical activity includes how PA affects the mental and emotional health of an individual. In their article, authors Hamm and Driver (2013) pointed out a statistic from the CDC from 2011 that explained how regular PA had been shown to improve mood and mental health (Hamm & Driver, 2013, p. 4). This is chiefly important for students with ASD as many often struggle with their own mental health. They further went on to explain the Self-Determination Theory, cited by Deci and Ryan (1985), which explained that highly motivated individuals must have perceived relatedness, competence and autonomy. They defined perceived relatedness as an individual's experience to human connection (as cited in Hamm & Driver, 2013, p. 4). As previously mentioned, relationships can be challenging for individuals with ASD, therefore, their perceived relatedness might be low or completely nonexistent. Competence was defined as the need to understand and feel successful at a chosen activity. While most students, even those with a disability, feel some sort of competency in a subject, activity or with a skill, there are most definitely areas of incompetence. Feeling incompetent in an area has the potential to increase undesired behaviors such as shutting down or being off-task as students struggle to find a way to simply get by. Additionally, subjects or activities that elaborate on previous attained knowledge, may further frustrate a student as they are unable to keep up. Lastly, autonomy is defined as an

individual's ability to make their own decisions (Hamm & Driver, 2013, p. 5). As students age, both those with and without disabilities, autonomy becomes increasingly significant. Students move from relying mostly on parents and teachers, to relying on themselves for daily care and educational needs. Furthermore, a large goal in the high school environment is to prepare students for independent living following high school graduation. Although this route might look different for students with severe disabilities, the goal is explored with significant modifications. Students with a disability such as ASD, may mature and acquire transition skills at a slower pace in comparison to peers without a disability, which in turn may slow down their ability to be autonomous. According to the Self-Determination Theory, students need be have perceived relatedness, competence and autonomy in order to be highly motivated intrinsically. Employing PA to improve the mood and mental health of an individual has tremendous value on how a person feels and in turn, thinks and acts. With all the research published detailing the physical, cognitive and emotional benefits of PA, why is PA less common for students with disabilities in many settings? What barriers are in place that prevent students from receiving an adequate amount of PA? These questions are examined in the next section.

Barriers to Physical Activity

The benefits of physical activity are countless, but so seem to be the barriers that exist that keep individuals with disabilities from getting the recommended daily allotment of PA. A barrier can be defined as an obstacle or situation that keeps people or things apart or prevents communication or progress. This section will examine what barriers prevent students with disabilities from being physically active. There are biological

components that may make PA more challenging for students with disabilities, particularly ASD, compared to same-aged peers without disabilities. Authors Menear and Neumeier (2015) suggest in their article targeting students with ASD, that there are structural brain differences between individuals with and without ASD (Menear & Neumeier, 2015, p. 44). Although current research is not certain how these structural brain differences specifically impact individuals with ASD, some research suggests that difficulties with motor coordination may be partially explained by the differences. Such differences may thus negatively impact a student's ability to perform tasks and activities within physical activity. Not being able to adequately perform tasks, skills or activities can lead to frustration, which in turn may keep students from participating in PA. For example, students who are not as coordinated may miss out on structured play at recess, such as tag, shooting baskets, or climbing on playground equipment. Similarly, physical education classes typically offer structured activities and sports, which again, may challenge students with disabilities that lack certain motor skills and decrease their level of participation. As students mature, sports offered within and outside of school become increasingly more competitive and demand advanced physical and cognitive skills, according to research conducted by Nicholson et al. (Nicholson et al., 2011, p. 199). The competition and more refined skills can easily be a deterrent for students with disabilities, limiting the number of opportunities they have to be physically active on a regular basis as new opportunities are not being developed to sustain the numbers of individuals with disabilities. Equivalently, in a school environment, course offerings related to physical education (PE) generally decreases as students enter high school. Roughly, around 9th grade, physical education is no longer a required course, which allows students the

flexibility to decide whether or not to take a PE class. Essentially, students are able to make the decision whether or not they want to be physically active. Interestingly enough, many students with disabilities do not choose to take a PE class.

Researchers Luiselli, Woods, Keary and Parenteau (2013) created a study that examined participant's opinions about exercise, athletic, and recreational activities available for students at their school. The participants were 75 practitioners at a residential school for children and youth with Intellectual and Developmental Disabilities (IDD). They were given a questionnaire with different sections that asked them to rate the benefits, pre-requisites and potential negative outcomes of physical activity within their school (Luiselli, Woods, Keary & Parenteau, 2013, pp. 486-488). Many of the negative outcomes reported seemed to function like a barrier and related largely to biological and personal factors pertaining to a student with disabilities. The list included the following concerns: distraction from school activities, criticism from peers, poor self-esteem, non-injury health risks, increased problem behaviors, physical injury, and safety. The practitioners rated the top three barriers which included: safety concerns, physical injury, and increased problem behaviors (Luiselli et al., 2013, p. 490). The top two responses relate or connect directly to the idea that students with disabilities may not be adequately prepared for physical activity. Though the article does not provide more detail about the responses, based on previous studies one can infer that students with disabilities that have biological and physical differences, may not be as equipped for traditional types of physical activity due to those limitations.

Another response detailed in the top three, described unexpected behaviors that can stem from PA. Again, though the article did not explain in-depth the rationale behind

the responses, with some students the physical, auditory and social stimulation received from PA increased negative unexpected behaviors. Loud noises, crowds of people, the way objects feel, and getting worked up through movement are all variables that can overstimulate a student with disabilities. Authors Healy, Msetfi and Gallagher (2013) expressed that the most common sensory issues for students with ASD, resulted from auditory, heat and tactile sensitivity (Healy, Msetfi, & Gallagher, 2013, p. 224). When senses are triggered for students with disabilities, students may experience heightened anxiety causing them to act out. Students with ASD especially often exhibit unexpected behaviors based on what are called triggers, most commonly pertaining to their senses. A trigger is a term that means 'to cause a situation to occur', and everyone has them. An individual with ASD however, typically has more sensory-driven triggers than individuals without ASD. In a PE class, the loud noise of an activity or game can physically hurt a student's ears, increasing frustration or anxiety, which then causes acting out or shutting down. Another example of a trigger is that some students do not like the feeling of sweat, which typically occurs after vigorous PA. The students, or educational staff who work with them, who are aware of these triggers, may decide that PA is not worth the risk of the potential negative behaviors that may occur.

There are other biological barriers to PA that are better explained through a psychological lens. In a study pertaining to how children with ASD experience physical education, Healy et al. (2013) interviewed children with ASD to determine their perception of PE. The participants were recruited from a summer camp specific to hosting children with ASD, in Ireland. The participants included eleven boys and one girl between the ages of nine and thirteen who were asked questions such as: "How do team

sports make you feel?" and "If you could plan a PE class, what would it be like?" (Healy et al., 2013, p. 223). The responses from the students were categorized into three themes: individual challenges, peer interactions and exclusion. Under the theme, individual challenges, the number one issue reported was physical ability, followed by sensory issues and a fear of injury. Similar to the practitioner's responses in the earlier study, when asked questions comparable in nature, students seemed to report the same issues. While possibly realistic, students had a negative perception of their abilities and triggers as they related to physical activity in a PE setting. An additional response under the theme, peer interactions, included children who reported negative peer interactions stemming from PE classes; and in extreme cases, bullying. Students who struggle with poor athletic ability may receive negative criticism from peers who are frustrated with them. Younger children do not always understand or notice the differences in physical ability among their classmates. During team activities or play, some children use verbal criticism as a way to get another child to perform differently or better. Other children refuse to work with challenged students or select them on a team if that child demonstrates a lack of physical skills, which validates the final theme, exclusion. The majority of the children interviewed expressed that their lack of ability was the main reason for being excluded from an activity, which often led to them asking to be excluded during certain parts of a class (Healy et al., 2013, pp. 224-225). The article by Pontifex et al. (2014) cited Obrusnikova and Miccinello's (2012) work that asked parents their opinions on factors that limited their children from participating in PA. The primary barriers stated were psychosocial, such as: decreased engagement, teasing or bullying, and social isolation (as cited in Pontifex et al., 2014, p. 103). Negative interactions with

peers was an analogous response from students, parents and educational staff alike. How do these interactions prevent students from being physically active? While not mentioned in the articles, negative relations, in extreme cases, bullying, may lead to low levels of self-esteem. When students are unable to form positive relationships with peers or are consistently internalizing rejections or criticism from peers, low levels of self-worth and self-esteem are bound to occur. Having low self-esteem can easily influence the decision-making process when it comes to selecting activities. If being physically active increases low self-esteem, those activities may become the least likely chosen by students. After examining how negative participatory interactions impact PA, how does decreased engagement and social isolation impact PA?

Obrusnikova and Cavalier (2010) conducted a study asking students to wear an accelerometer while they logged their physical activity for a week. After a week, the results were examined and the students were asked what barriers and facilitators existed connected to their level of PA. The students ranged from ages 8-14 and identified on the Autism Spectrum. The students' responses were then categorized into the following areas: intrapersonal, interpersonal, institutional, community, and physical (Obrusnikova & Cavalier, 2010, p. 196). The most universal barriers and facilitators of PA fell within the category of intrapersonal. Intrapersonal can be defined as what exists within one's own mind, otherwise described as psychological factors. Within the category of intrapersonal, the most common barrier expressed by the students was their lack of interest in PA compared to their interest in more sedentary (inactive) activities, especially activities involving technology. With advances in technology and increased accessibility to individual devices and screen time, there are more opportunities for individuals to

isolate themselves with individualized entertainment. Students physically less capable of being active may opt for activities more aligned with their interests and abilities, particularly activities that do not involve PA. This results in decreased interest in physical activities and increased interest in more inactive sedentary activities. Notably, students with ASD are known to have an increased attentiveness to technology in comparison to other interests. As mentioned by both students and parents, the fascination with technology becomes a barrier for being physically active. Students would rather fill their time with technology-driven activities than activities requiring more physical demands. Schools may also be partially to blame for the low interest levels in PA students have. According to Pan as cited in Pontifex et al. (2014), "physical activity opportunities such as physical education and recess are often reduced or eliminated for children with ASD to provide additional classroom instruction" (Pontifex et al., 2014, p. 102). In other sections of this paper, the reasons behind reducing access to PA were discussed, but never pertaining to academics. Educators should be creative with student's time when they start to struggle academically. In some cases, this means eliminating classes or activities that are deemed unnecessary. This solution may not be as predominant in elementary schools unless a student is significantly struggling. However, in advanced grades, such as middle school and especially high school, classes are selected largely based on graduation requirements. Students are not only given more independence in selecting classes, but the importance of good grades increases significantly. If a student fails a class or struggles with a particular subject, educators start to consider what classes can be removed from the schedule to create space to retake a class or enroll in additional classes to aid the subject that is weaker. These options, coupled with a student's lack of interest in PA, are

more than enough to deter students from being involved in a PE class. Although the value of PA is high, the academic demands are seemingly more valuable.

A final barrier explored in this paper relates to structural barriers within an environment that impede access to PA. Authors Menear and Shapiro (2004) explained that there are both architectural and natural barriers impacting PA. Architectural physical barriers can include: stairs, narrow hallways, curbs on the sidewalk and narrow doorways. Natural physical barriers can include: steep hills, rough terrain or too many trees (Menear & Shapiro, 2004, p. 10). Both types of barriers can be controlled to some extent. However, funding was a variable cited within several articles as the limiting factor. In terms of a school setting, considerations need to be made whether playgrounds and gymnasiums are designed to accommodate students in wheel chairs or students with other physical disabilities. If the answer is no, how can students be expected to fully participate in physical activities in dangerous areas? Other public facilities such as a fitness gym or spaces for sports play may also have similar physical barriers. For example, limited access into a pool may deter an individual from swimming. Likewise, if a facility does not have an elevator and an individual is physically unable to walk up a staircase, they have limited access to what can be utilized on the upper level. Natural barriers can include parks and trails. Families that want to engage in outdoor activities might be restricted by the natural barriers that exist. Trails that are not paved or well-cleared limit who is able to utilize them. Access getting to a park may be difficult depending on the terrain surrounding the park. Writers Rimmer, Riley, Wang, Rauworth and Jurkowski (2004) explained that making the physical environment more accessible for everyone (fitness facilities) would be beneficial. However, budgetary restraints,

especially in rural communities is a substantial challenge (Rimmer, Riley, Wang, Rauworth & Jurkowski, 2004, p. 421). Exercise equipment designed for individuals with disabilities is also a limiting factor for being physically active. This barrier is also often tied to budgetary restraints. When facilities encounter financial difficulties and work within a modest budget, upgrading to improve accessibility becomes a minimal concern. A copious number of barriers prevent students and other individuals with disabilities from participating regularly in physical activities, and while this paper provides a rationale for the benefits of regular PA, the consequences of not being physically active are equally important to note.

Consequences of a Lack of Physical Activity

The consequences of not being physically active are fairly common among all individuals regardless of whether or not an individual has a disability. Although consequences may be manifested differently from one individual to the next, consequences are imminent. The term consequence is defined as the result of an action or condition and although neutral by definition, will be used throughout this paper to highlight the negative results not being physically active has on the body. Nearly every study examining the effects of not getting enough daily PA, reported negative consequences. Within those studies, youth with disabilities were more likely to be less physically active than their peers without disabilities. Broken down even further, some studies looked at how being physically inactive affected individuals within various disability categories, such as ASD. According to the 2003-2004 National Survey of Children's Health as cited by Pan, Tsai, Chu, Sung, Ma and Huang (2016), youth with ASD are 40% more likely to be overweight and obese than their peers without a

disability. The 2007-2008 National Health and Nutrition Examination Survey (NHANES) which compared both youth with and without ASD, discovered that obesity in youth with ASD varied by age. Youth ages two to five had a higher occurrence of being overweight and obese, compared to youth ages five to eleven who demonstrated a higher occurrence of being underweight (Pan, Tsai, Chu, Sung, Ma & Huang, 2016, p. 512) – both conditions result in negative consequences to the health of an individual. For example, obesity alone can impede many of the daily physical functions of an individual. Walking, getting dressed, maneuvering in tight spaces, performing chores or tasks, and having sustained stamina are all examples of instances where obesity limits daily functions. Applied to a school environment, being obese can provide other challenges for youth. Youth may struggle to participate at recess due to exhaustion from movement whether on playground equipment or participating in running activities with peers. Sitting at a desk or classroom seat may prove to be uncomfortable, as well as maneuvering in a bathroom facility. Participating in physical education classes during exercises, activities and assessments may also be challenging due to a potential lack of flexibility, endurance and other physical limitations. Being underweight also creates challenges for youth, from not having the strength to complete tasks or function normally, to not receiving the appropriate levels of nutrients the body requires to function properly. The negative consequences of being obese or underweight listed above are only some examples of a large number of consequences that exist.

Pan et al. (2016), investigated a study by Tyler et al. (2014) that looked at the PA levels of youth ages 9 to 18 with and without ASD. Tyler et al. observed that youth with ASD were substantially less physically fit in the strength domain compared to their peers

without ASD (as cited in Pan et al., 2016, p. 512). Although physical strength is not an essential life skill, lack of strength is commonly viewed as a negative consequence and can create limitations in various areas of life, such as: physical activities, exercises, sports and specific occupations. Pan et al. (2016) conducted a study that assessed the physical activity levels of male students. More specifically, 70 Taiwanese students ages 12 to 17 with and without ASD were recruited from secondary schools and separated into two groups. The control group consisted of 35 students without ASD while the other group consisted of students with ASD. The students wore an accelerometer for seven consecutive days that recorded their physical movement. The device could only be removed during water activities, such as swimming or showering. Participants recorded in a log from the time the device was put on in the morning and removed each night. Students were given several physical assessments before and after the trial period. Assessments included: a 20 minute Progressive Aerobic Cardiovascular Endurance Run (PACER) to assess aerobic functioning, a push-up test to assess upper body strength and endurance, a curl-up test to assess abdominal strength and endurance, and a sit-and-reach test to measure flexibility (Pan et al., 2016, pp. 513-514). The results indicated a significant difference among the two groups of students regarding the physical assessments. Overwhelmingly, the students with ASD demonstrated lower levels in all areas compared to their peers without ASD. While indisputable causes to lower levels of strength and endurance were not addressed in the study, the authors did claim that physical inactivity was associated with the lower levels (Pan et al., 2016, p. 516). These results only further highlight the physical discrepancies that exist between youth with and

without disabilities. From a broader perspective, the results also substantiate the idea that lower levels of PA create more negative consequences for individuals.

Other studies reported similar results that a lack of PA has on the physical health of individuals. An article by Place, Dickinson and Reynolds (2014) cited Lloyd, Colley and Temblay (2010) stating that "the physical health of this generation of children is at greater risk than previous generations, (as cited in Place, Dickinson & Reynolds, 2014, p. 200). Citing numerous other authors they further explained that being physically active is correlated with metabolic health and cardio-pulmonary fitness. Simply stated, metabolic fitness pertains to the metabolism in the body and cardio-pulmonary fitness pertains to the state of the heart and lungs. Furthermore, cardio-pulmonary fitness has the potential to decrease blood pressure and cardiovascular disease (Place et al., 2014, p. 200). So how do these associations connect with PA levels? While not directly stated, it is implied that a lack of physical activity can decrease the metabolic and cardio-pulmonary systems within the body, increasing the likelihood of blood pressure and cardiovascular disease. Authors Place et al. (2014) reinforced this idea through a study they conducted examining children with Autistic Spectrum Condition (ASC), equivalent to ASD. The research study included children ranging in ages five to fifteen from three different schools that offered educational services for students with ASC, all of which had no physical disorders or illnesses that would impede their ability to participate in fitness tests. However, all the students had moderate to severe learning disabilities. Background information was also collected for each child prior to the study, including: the family makeup, medical conditions and other pertinent information that would help the researchers divide the students into testing groups. The students were given the Eurofit Physical Fitness Test

Battery that measured their flexibility, speed, endurance and strength through a series of tests and were carried out during the student's physical education classes. The researchers determined that students with ASC who also have moderate to severe learning disabilities, showed a wide range of fitness abilities, as measured by the VO_2 max score, a majority having a surprisingly low score. The VO_2 max score was expressed as an "optimum measure of fitness, being the strongest independent mortality predictor for cardiovascular disease in healthy people" (Place et al., 2014, pp. 201-208). What does this exactly mean in terms of the physical health of youth with ASC? Again, research states that students with disabilities are less physically active and are at a higher risk of cardiovascular disease than those without disabilities who are more physically active. Additionally, authors Lindhom, Lahti, Rahkonen, Lahelma and Lallukka (2013) disclosed that based on numerous studies, physical inactivity increases type two diabetes, some cancers and mortality rates (Lindhom, Lahti, Rahkonen, Lahelma & Lallukka, 2013, p. 2). Based on the data, physical inactivity appears to have the potential to lead to a diverse number of negative consequences on the physical health of an individual.

In addition to the physical consequences that stem from a lack of PA, cognitive consequences may also exist. In an article that explored the association between PA and obesity in relation to academic achievement, authors Kantomaa, Stamatakis, Kankaanpää, Kaakinen, Rodriguez, Taanila, Ahonen, Järvelin and Tammelin (2013) reported that physical inactivity may have harmful effects on adolescents' cognitive functions and academic success (Kantomaa, Stamatakis, Kankaanpää, Kaakinen, Rodriguez, Taanila, Ahonen, Järvelin & Tammelin, 2013, p. 1917). They further concluded that obesity is one of the most typical consequences of a sedentary lifestyle.

As previously mentioned, an increasing number of students, especially those with ASD, are more sedentary in their daily routines than active. Furthermore, a sedentary lifestyle has been shown to predict poor academic success and cognitive functioning among adolescents (Kantomaa et al., 2013, pp. 1917-1918). As explained earlier, PA can help increase a student's ability to focus, process information easier, and stay on task. Therefore, a lack of PA should have contrary effects on students' cognitive and academic capabilities. Students are less capable of focusing attention for sustained periods of time, which can lead to decreased assessment scores in classes and increased unexpected behaviors. If students are unable to process information at a typical rate, they may fall behind in coursework and become disengaged after tirelessly failing to understand the material being taught. While not impossible, the cognitive and academic challenges caused by being physically inactive, become harder to redress as adolescents age. These challenges can escalate causing more significant cognitive and social consequences.

Authors Lindhom et al. (2013) oversaw a study that surveyed 6,720 employees from the city of Helsinki, Finland ranging in ages from 40 to 60 years old. The point of the study was to determine the connection between body weight and leisure-time PA in regards to physical and mental functioning. A survey was distributed between 2000 and 2002 with a follow-up survey in 2007. The survey included questions requesting weight, in order to determine the body mass index (BMI) of each individual, the amount of time being physically active, and mental health related questions. Results were analyzed using various calculations, scales, and processes, and indicated that 48% of the participants were overweight, 11% were physically inactive, 51% were moderately active and 38% were highly active. They further found that PA was associated with better mood and

mental functioning, and more important than weight for mental functioning. Furthermore, overweight and inactive individuals were more likely to have poor mental functioning (Lindhom et al., 2013, pp. 2-7). Although this study focused solely on adult participants, one must ask if they have found similar results through conducting this study on adolescents. In other words, if being physically inactive negatively impacts the physical body and cognitive functioning, what is the likelihood that inactivity impacts mental functioning? An earlier article mentioned in this paper, stated that regular PA improves mental health and moods of adolescents, so it is plausible to assume that a lack of PA would have adverse effects. Good mental health is imperative for daily functioning, relationships and overall feelings of self-worth. Poor mental functioning may lead to moderate to severe stress, anxiety or depression. Though these mental challenges are harmful for any person, adolescents may especially struggle. Students are likely to have less experience managing mental challenges and thus have limited coping mechanisms to utilize. Additionally, managing symptoms of a disability along with mental challenges can often be overwhelming among all the facets within a student's life, which may then manifest into undesired behaviors.

Physical inactivity can also damage students emotionally and socially through their lack of socialization. Researchers Pontifex et al. (2014) explained that engagement in physical activity may be the best time for students to learn social skills (Pontifex et al., 2014, p. 102). However, students with disabilities, such as ASD, are at times, removed from physical education classes and physical activities because of barriers that exist – sensory issues, and low ability level, to name a few. Again, there are fewer opportunities for students to be physically active in organized activities (i.e. sports, clubs) compared to

peers without disabilities. Whether by choice, being removed or having limited opportunities for PA, students miss out on opportunities to socialize with others. Socialization is critical for students learning to appropriately navigate through conversations, understand nonverbal skills or cues, and establish feelings of belonging and connection. Without social practice, students increase their likelihood of isolation. For students with ASD and other disabilities, the issue of isolation may already exist, and a lack of PA only advances that issue. While students may not mind being alone or having limited conversations with peers or other people, socialization is a skill that is necessary for functioning in society. As indicated through the research, a lack of physical activity can negatively influence a person on a holistic basis, even more so for persons with a disability. However, recognizing the consequences of being physically inactive can help spur on the changes necessary for increased PA levels.

Recommendations for Increasing Physical Activity

After reviewing the barriers of PA and the consequences of not being physically active, making significant changes can seem dismal and challenging. For as many difficulties that exist however, there are a wide array of recommendations for how to increase PA levels for students with disabilities. To begin, the Individuals with Disabilities Education Improvement Act of 2004 (IDEA) established norms within schools for students with disabilities. This act required that students receive an appropriate public education free of charge, in the Least Restrictive Environment (LRE) otherwise known as the environment where the student is best supported (Columna, Davis, Lieberman & Lytle, 2010, p. 30). Since this act, students with disabilities have been slowly included in courses at public schools in what is considered mainstream

settings or settings with peers that have no disability. One recommendation is implementing physical education courses that are inclusive for all students. Menear and Neumeier (2015) who cited Pan (2008), explained that structured PE increased PA in students with ASD (as cited in Menear & Neumeier, 2015, p. 45). Authors Zhang and Griffin (2007) who cited Sherrill (2004) stated that in order to have inclusive PE courses, teachers need to have positive attitudes towards students with ASD (more broadly, all disabilities) and be willing to modify the curriculum to meet the needs of every student (as cited in Zhang & Griffin, 2007, p. 33). Modifying curriculum simply refers to altering material being taught so that everyone is able to learn. There are several components to consider when modifying PE curriculum. First, what activities or lesson concepts are appropriate for the age level(s) in the class? Having a blend of students with and without disabilities may mean that not all students are the same age biologically or cognitively. Teachers need to be aware of what and how they teach it so that everyone is able to comprehend and participate. Similarly, we should ask what varying ability levels are found within the class? As previously mentioned, students with disabilities may physically not be able to perform certain tasks or skills compared to their peers without disabilities.

A study by Davis, Hodson, Zhang, Boswell and Decker (2010) detailed the creation of the Motivate, Adapt and Play (MAP) program, a school-based physical activity curriculum for students with disabilities. Their study examined 32 students between the ages of eight and twelve, who were given a sustainable fitness program geared towards improving health. The first step was measuring the BMI of every participant and testing their abilities with a pre-assessment. Based on the results, a

curriculum was developed that could be implemented by teachers. They wanted the activities within the curriculum to be versatile among settings, easy to use, require little training for educators, and required minimal time to implement (Davis, Hodson, Zhang, Boswell & Decker, 2010, pp. 24-25). The entirety of this study centered on the creation of curriculum that aligned with student's abilities. How would this apply practically in a PE class or classroom? Modifying curriculum might look like setting up different activity stations that allow students to select their preference, while also offering a variety of leveled activities. Another example might include altering the amount of exercise or repetition students have to complete based on their ability level (Zhang & Griffin, 2007, p. 34). One more component to examine, is teaching skills in an assortment of settings, when available, for generalization. Students with ASD specifically, often struggle to apply skills taught in one setting, across multiple settings (Zhang & Griffin, 2007, p. 34). Teaching a skill(s) in various settings will not only encourage its use across settings at the time, but familiarize the student through repetition for the use of the skill(s) later in life. A final component relates to students interests in their involvement with PA. An article by Simpson, Gaus, Biggs and Williams (2010) detailed the educational experience of a young man with ASD, in a PE setting. One of his initial recommendations for PE educators, was to provide exercise and activities based on the interests of the learner. From his viewpoint, this would create a more meaningful experience and increase motivation to participate among students with disabilities (Simpson, Gaus, Biggs & Williams, 2010, p. 50). Simply stated, giving students a choice will improve buy-in, as students feel like they have some control over their education. Similarly, an aspect of the MAP program, as explained above, highlights the idea of play. Students need to be able

to have fun. This idea does not have to remain in a PE course, but can be applied to all academic settings across all grade levels. Educators can incorporate more movement, whether it be through structured movement breaks, fused into a particular lesson plan, or as a periodic way of taking a break after ending a unit or celebrating successes. PA should not be solely reserved for environments and times that are common for PA, which makes it a tool for more educators in a variety of settings.

Related to gathering students interests, is the notion of creating interventions that increase the amount of PA. An intervention is an action that is taken to improve a situation. This term is referred to often when working with students with disabilities. Interventions are explored if undesired behaviors exist in a classroom or when trying to get a student to comply. Researchers Todd and Reid (2006) investigated how to increase PA among students with ASD. For their study they used three men with ASD ranging in ages 15 to 20. Each student had a severe disability, with ASD being the primary disability. They were also nonverbal. Subjects participated in a snowshoeing and walking/jogging program. Two days a week the students engaged in an hour long session built into the students daily schedule, although the physical activity of snowshoeing or walking/jogging only last 30 minutes. The program lasted 9 sessions and the interventions included: a self-monitoring board, edible reinforcements, and verbal encouragement. The self-monitoring board was new to all the students, and was used as a means of communicating. After every lap a student completed, they marked a happy face next to their name. The participants were also given a preferred edible reinforcement periodically throughout the exercise. Verbal praise was given throughout the entire session to encourage students. The results of this study indicated that the interventions

increased sustained participation in PA (Todd & Reid, 2006, pp. 168-173). Now an argument could be made that these interventions worked specifically in this setting and may not be replicated in other settings. The goal of the study was to demonstrate how interventions could be introduced in order to increase PA participation for students with ASD. Although these particular interventions might not be used in other academic settings, interventions should be seen and used as a resource in order to improve a specific behavior; in this case, physical activity. As seen in this study, an intervention and reward can be synonymous. Rewards are an excellent way to increase motivation, and are often fairly easy to implement. Rewards might include: verbal praise, candy, stickers, games, or free time, and are important at all grade levels. Special Education teachers and other support staff often have the skills and the knowledge to create interventions. Collaboration among professionals makes creating and implementing interventions easier and altogether better for including students in courses with their peers.

Another recommendation for improving PA levels among students with disabilities is through the use of storytelling and increasing social interactions. Tripp, Rizzo, and Webbert (2007) cited Sapon-Shevin (1999) stating that "[Storytelling] is one of the most effective and powerful ways to transmit useful knowledge in a contextual manner that has meaning to others" (Tripp, Rizzo & Webbert, 2007, p. 36). Students with disabilities, especially those with ASD, learn significantly through the teaching strategies that are storytelling or modeling. These strategies help students visualize concepts and make connections to real-life situations that they would not necessarily comprehend on their own. Similarly, authors Tripp et al. (2007) discussed that storytelling encourages the acknowledgement of diversity among people, and everyone is able to feel a sense of

belonging (Tripp et al., 2007, p. 36). Adding stories and modeling in a physical education setting that relate both to the course and to the student, should allow students to feel connected and increase their interest in the course. Students may hear stories from peers and through guided practice, make connections to their own lives. This idea promotes socialization, regularly a point of concern for students with disabilities. Formerly mentioned as both a barrier and consequence of too little PA, socialization should be considered for all lessons involving physical activity. Authors Zhang and Griffin (2007) reported that because students with Autism lack proper social skills, they need to be explicitly taught the "rules" of social interactions (Zhang & Griffin, 2007, p. 37). In a PE setting, students are able to learn basic social skills such as, taking turns, sharing equipment, joining, stopping and transitioning from one activity to the next, working as a team, learning how to maintain an appropriate attitude when winning or losing, and how to follow rules or instructions. However, providing these basic social skill opportunities is not always enough for students who need the "how" and "why" piece of why certain skills are performed a certain way. If educators are focused on these components when creating lessons and activities, students with ASD and other disabilities are more likely to improve their social skills and the overall amount of time they are physically active. PE teachers may be able to utilize peer support or tutors to help demonstrate specific skills by working students with disabilities. This support not only helps teachers disperse their time amongst students in the class, but again, provides additional opportunities for students to practice social skills. Outside of a PE setting, these strategies and ideas can be used in other environments. For example, educators can be intentional about explaining and modeling appropriate interactions and behaviors for the playground, during a

movement activity in a class, or in a sport or club that involves PA. Additionally, incorporating physical activity into a variety of settings can help increase PA levels. Schwarzfischer, Weber, Gruszfeld, Socha, Luque, Escribano, Xhonneux, Verduci, Mariani, Koletzko and Grote (2017) suggested that educators consider reducing sedentary time and replacing it with light activities (Schwarzfischer, Weber, Gruszfeld, Socha, Luque, Escribano, Xhonneux, Verduci, Mariani, Koletzko and Grote, 2017, p. 7). These activities could easily be implemented allowing students to take a walk, play a game not seated at a desk, or participate in movement breaks before a test or after students have been working hard. Completely unrelated to a school environment, family members can teach students how to interact socially at a fitness facility, in a community organized sport, or at family functions where PA exist, these valuable life skills are necessary to increase both the interest level and the amount of time students spend being physically active.

Some of the difficulties that prevent students with disabilities from participation in PE courses or physical activities stem from unexpected behaviors that may result from sensory issues. An article by Place et al. (2014), clarified that students with ASD specifically, are sensitive to noise levels, changing clothes, unstructured time, and unpredictable routines (Place et al., 2014, p. 209). While it is necessary to teach students how to cope with these sensitivities, educators can also help reduce these sensory issues in various environments. PE teachers can share a schedule at the beginning of the week so students know what to expect. Students may be excused from changing clothes or allowed to arrive to class early in order to change clothes before other students arrive to the locker room. Additionally, for noisy or loud activities, teachers can help minimize

noise levels and allow students with heightened sensitivity to wear headphones or ear plugs. The use of nonverbal signals to cue students is another way to reduce noise. Some unexpected behaviors do not occur from sensory issues, but are momentous enough that educators do not know how to manage students. Several potential solutions include: teaching teachers how to better manage behaviors and provide Adapted PE courses. Special Education teachers and support staff can collaborate with mainstream teachers to work effectively when a student is misbehaving. As previously mentioned, interventions may be utilized to help students change behavior or comply with directions. Similarly, consequences put in place can help refocus students or remind them why a behavior is inappropriate. The goal is to provide educators with the resources and knowledge to teach students with disabilities. However, a more restrictive setting is sometimes necessary. Liu, Breslin and ElGarhy (2017) tested the motor skills of a student with ASD using a variety of instruments. They concluded that appropriate settings and testing instrumentation is important for students (Liu, Breslin & ElGarhy, 2017, p. 250). Although educators can make numerous modifications and accommodations to include students with disabilities, at times, an alternative setting may better meet the students' needs. Adapted PE courses and recess separated from mainstream peers, either indoors or outside, provides value for students with severe disabilities, as they are still able to participate in activities that are geared towards their level of ability. As stated by Healy et al. (2013) "Adapted PE programs are those that have the same objectives as the regular PE program, but in which adjustments are made… to meet the needs and abilities of exceptional children" (Healy et al., 2013, p. 225). When it comes to students, everyone is

unique and each situation and plan should be individualized to maximize growth and learning.

Shifting away from how educators help promote increased PA levels, there are actionable steps that family members, administrators, government personnel and community members can take to be part of the solution. First of all, changing people's negative perceptions regarding those with disabilities is a crucial step towards increasing PA. Askari, Anaby, Bergthorson, Majnemer, Elsabbagh and Zwaigenbaum (2015) explained that negative social attitudes are a barrier for students with ASD participating in settings outside the school (Askari, Anaby, Bergthorson, Majnemer, Elsabbagh and Zwaigenbaum, 2015, p. 112). Askari et al. (2015) cited Anaby et al. (2013), noted that attitudes were the most important environmental factor negatively influencing participation for children with disabilities in physical activities (as cited in Askari et al., 2015, p. 112). Advocating for students with disabilities in professional and personal interactions through open communication, is one example of how to minimize negative perceptions. Additionally, educators can create events, lessons and opportunities that integrate both students with and without disabilities, to help advance positive opinions and tolerance for one another.

Second, support for PA among students with disabilities, needs to come from the top down. In their article, Lagarde and LeBlanc (2010) described the necessity of social and political policies fostering PA during early childhood. They recommended that student participation in physical education courses should be increased throughout the school year. At the high school level, this might require students to take a PE course every year. Similarly, partnerships between schools and community organizations should

work to provide more opportunities for students with disabilities during and after school hours (Lagarde & LeLanc, 2010, p. S10). If limited access to appropriate facilities exists as a barrier, why not open up schools after school for groups to utilize, which provides more opportunities for students with disabilities to be physically active?

The top down mentality also refers to increased funding and resource allocation. More federal and state dollars can be distributed among schools and community organizations for the specific purpose of increasing physical activities for students with disabilities. At the school level, administrators often decide how funds are dispersed. Administrators could be more intentional about paying for more teachers or Para Professionals to help support the initiative of increasing levels of PA. Likewise, setting aside funding to improve facilities and equipment are factors that weigh into the access students have for physical activity. In a community setting, funding to improve facilities and spaces both inside and outside is vital in reducing barriers. Funding dedicated solely to the purchase or building of physical items is not the only use for dispersed money. Financial assistance and resources can be used to help reduce the cost of activities both in schools and at fitness facilities to increase the availability of transportation, provide trainings for family members, and expand opportunities for PA in a variety of settings. Professors Roth, Pyfer and Huettig (2007) discussed in their article that in order for students with disabilities to have an active independent life after high school, the inclusion of community recreation is imperative (Roth, Pyfer & Huettig, 2007, p. 94). In some school districts, students with disabilities have the opportunity to continue their education in a transition program from ages 18 to 21. Transition programs are designed to help students find employment, learn job skills and skills related to independent living.

Focusing resources on the recreational component of transition may better equip students to continue being active beyond their academic years. Reducing the cost of fitness facility memberships or community programs may encourage increased participation, as well as grant access to transportation for individuals that live more independent lifestyles. Roth et al. (2007) asserted from work by Ashton-Shaeffer, Shelton, and Johnson (1995), that "…when the obstacles of transportation and financing were removed, with training, individuals with cognitive disabilities were able to maintain an increased level of community recreation participation" (as cited in Roth et al., 2007, p. 95).

The role of family and other relevant persons contributes considerably to improved PA. Parents, siblings, other family members and professionals are all affected by the lives of students with disabilities both during the academic years and beyond. Collaboratively working with students can aid in effective decision making. Menear and Shapiro (2004) cited Stanton (1995) stating that when families are involved in helping students with disabilities manage their physical activity by providing opportunities for PA in the home, PA levels increase (as cited in Menear & Shapiro, 2004, p. 15). Like other aspects of life, collaborative efforts from all people surrounding these students' lives are a tool for success. Likewise, extended family and close friends who interact regularly with these students can provide an extra layer of support. Other supports include professionals in the community, such as pediatricians, coaches and therapists. An article detailing ideas for increasing participation in physical activities among children with disabilities, authors Murphy et al. (2008) explained that pediatricians can perform evaluations for children with disabilities working together with therapists and coaches to determine the best placement for children when it comes to activities. Furthermore,

collaboratively, these professionals can develop strategies and modify an activity to help minimize the risk of injury (Murphy, Carbone, & the Council on Children With Disabilities, 2008, p. 1060). Families that are able to take preventative measures and initiate conversations before, during and after an activity, are more likely to feel supported, which may increase the rate of success in which a child participates. Authors Roth et al. (2007) recommended in their article, more trainings for parents to inform them about the agencies and programs that exist after students graduate from high school. Additionally, they identified strategies to help increase parental support such as, a monthly newsletter detailing the physical activities available for individuals with disabilities, and a mentorship program. A mentor program would ideally pair an older adult with the individual with disabilities. The pair would work together to participate in recreational activities (Roth et al., 2007, p.100). This model supports not only the individual with disabilities, but also the mentor, as they are given an opportunity to volunteer and make a difference in the life of someone else by sharing their time, skills and knowledge. Overall, families need to be knowledgeable about supports and resources that exist in the community. With the staggering statistics of obesity levels and lack of physical activity among youth with and without disabilities, providing resources and opportunities should become a priority for more communities.

A final recommendation for helping to improve the PA levels among students and individuals with disabilities, is the concept of providing a larger variety of independent and team based opportunities. Pan and Frey (2006) examined physical activity patterns in youth with ASD. Throughout their study, they discovered that one particular community provided countless opportunities for youth involvement. Some examples found in this

community included: adapted swimming and martial arts through the local YMCA, therapeutic horseback riding, adapted baseball, and an adapted physical education program provided at the university level. The community even staffed an inclusion specialist that designed programs for both integrated and separate programs for youth with ASD (Pan & Frey, 2006, p. 604). Offering a variety of opportunities can help improve PA levels as it provides children with more options and potentially more ability leveled activities. Similarly, offering independent and team based activities gives students the choice of whether to engage with others or work out independently, which is often not an option in an academic setting. Unfortunately, some communities may not readily have available a multitude of physical activities for youth with disabilities. Through recommendations discussed in this paper, such as increased funding and awareness of the need for more opportunities, positive changes can occur as the need for increased PA levels remains a societal concern.

CHAPTER III: DISCUSSION AND CONCLUSION

Considering the research reviewed in this paper, many answers to the proposed questions were found. The key research points assert that physical activity is important for all adolescents, both students with and without disabilities. However, the ideal level of physical activity varies from country to country. The data consistently concludes that physical activity provides numerous benefits for the body, mind and emotional state of a person, and unsurprisingly, the majority of students are not participating in the recommended daily levels of physical activity. Students with disabilities engage in physical activity at much lower rates than their peers without disabilities. Explanations related to the low amounts of PA stem from barriers such as: sensory issues, behavioral concerns, and a lack of resources available to accommodate students with disabilities. Many of the same barriers that limit PA for students with disabilities were seen throughout the research, with slight variations to account for unique situations and individual challenges. The consequences of an individual not being physically active were the same in all research examined. Lack of physical activity negatively impacts the physical health, emotional well-being, social relationships, and cognitive development of students with and without disabilities. The section that produced the greatest variability of data related to recommendations for increasing PA levels for students. Several overarching themes were revealed. Schools and community organizations that have access to more resources, were better positioned to accommodate students with disabilities and get them engaged in physical activity. Resources included but were not limited to: increased funding, better equipment and facilities to accommodate special needs, increased trainings for parents and caregivers, more teachers or educational staff,

and new policies that required students to participate in PA during the school day. Although some of the studies were similar, every scenario and participant provided distinctive information, which may account for the varied recommendations authors suggested for removing barriers to increase PA levels.

The most valuable information is found in the sections dedicated to the benefits of PA and the recommendations for increasing PA levels. While it is to no surprise that physical activity is beneficial for the body, reviewing significant data that detailed specific physical, emotional and social benefits strengthened my belief that physical activity is necessary for students, especially those with disabilities. One caveat is that there are educational staff who do not understand the significant value of physical activity. My experience in a school setting for five years, has shown me the benefits of physical education, sports or movement breaks during class. At the same time, I witnessed students removed from PE classes to allow room for a course in a subject deemed more important, such as an extra math or science class. Similarly, I have heard students request removal from PE courses, and refuse to participate in physical activities. In other instances, PA was removed as punishment for unexpected undesirable behaviors related to their disability. These situations caused me to question the benefits or harm in modifying levels of physical activity for special education students. While I understood the importance of requiring students to retake failed or remedial courses, I did not agree that PE should be removed from the schedule. PE courses offer team-building skills, stimulate the mind and the body, and provides necessary mental breaks in a school day. I brainstormed superior ways of dealing with the student's challenges without taking away PA in the event students advocated against physical activity due to sensory issues or PA

was removed as punishment. Informing educational staff and the community and gaining acceptance about the benefits of physical activity is an initial step to implement change in school settings.

In addition to working in an academic setting as both a Para Professional and later a teacher, I have over ten years of coaching experience. It is this coaching experience that fueled my belief that physical activity is a necessity for adolescents. I have seen the positive impact PA has on the body, emotions, and social relationships for a student is powerful. Additionally, I know how challenging it can be to convince reluctant students with and without disabilities, the necessity of consistent PA. Currently, in the hallways during passing time, lunch time or free time in class, students prefer to spend time on electronic devices rather than engage in conversations with peers. Opportunities to participate in physical activity are met with resistance. Fewer students volunteer to participate in non-required activities. Students prefer sedentary lifestyles to ones that are active, yet complain or refuse to complete work if they are required to be stationary for an extended period of time. While I cannot explain definitively the detriment of an adolescent sedentary lifestyle, I observe increased obesity, tiredness, poor attendance, and a lack of motor coordination in a greater number of students. Though this may be caused by multiple factors, I believe these symptoms are a byproduct of inactivity. For myself, I know how tiring and weak my physical body and mind feel after extended periods of stationary time versus activity. Generalized to being sedentary every day, I imagine feeling more tired, and eventually almost resistant to physical activity. This is my observation of students with disabilities, specifically at the secondary level.

The recommendation section provides activities for teachers to implement that improve PA levels for students with disabilities in academic and community settings. I argue that most educational staff and organizations are well aware of the barriers that exist limiting the physical activity of special education students. However, most may not be familiar with resources or solutions to target those barriers. For example, information related to the symptoms and interventions for ASD has become more publicized in recent years and has undergone significant development. Minnesota only recently established that every school district must employ an Autism Intervention Specialist. Educating students with ASD should be increasingly successful as schools become better equipped with specialists in place and have informational resources available regarding the best practices for educating students with ASD. It is the responsibility of schools to utilize this knowledge so educators can create spaces, improve facilities, offer courses, trainings and resources to increase PA levels among students with disabilities. The recommendation section provides encouragement for schools and organizations in similar situations. I was encouraged as I read the creative methods various organizations used to help increase PA levels, and thought about how easy or difficult it would be to incorporate some of the ideas into my current teaching practices. When developing individual educational plans (IEP) and classroom interventions, it is beneficial to begin with research-based interventions.

The limitations of research mimic other studies with lack of diverse participant groups and time limitations. I was most surprised by the limited research focused on students with disabilities, primarily ASD; the lack of variation of ages tested, and how infrequently females were included as subjects in the trials. It was easy to find research

that discussed how PA affects adolescents, but very few that explained how PA impacts students with disabilities. Exploring data for students with ASD produced minimal results and the research I did find, did not observe the participants over an extended period of time. The minimal time period observed may not present an accurate view of how PA impacts students over time. Author Pan (2008) reported that there were no clear patterns of physical activity found among young and old students (Pan, 2008, p. 1299). Pan suggested that the same opportunities provided at both levels might explain the unclear pattern. For example, a form of physical activity tested at the elementary level and secondary level might provide more information to determine if a pattern existed. Additionally, lack of research focused on specific ages may account for the indistinct patterns among young and old students. Lastly, of the participants in the different studies, the majority were male. Among students with ASD, there is roughly a one to five ratio of females to males, which likely contributed to the minimal amount of gender variability within the research. However, I did expect to see more research inclusive of both genders versus predominately males.

Many of the implications for future research stemmed from the limitations discussed in the studies. Authors Healy et al. (2013) detailed that there are gender differences regarding motor skills among students with ASD, therefore more research is required to see how PA impacts males and females differently (Healy et al., 2013, p. 226). Another suggestion for future research is examining PA activities across varied settings. A large number of the studies looked at PA only in an academic setting. If there were opportunities for physical activity at fitness facilities, on sports teams or as part of organizations not related to school, it would have been helpful to see if PA levels were

sustained and if student involvement-increased due to the voluntary nature of the outlets. More research needs to be targeted towards students on the Autism Spectrum. With this disability category increasing in across academic settings, I believe more data and studies conducted for longer periods of time will provide information related to the consequences of inactivity and recommend interventions and activities to successfully improve PA levels. Additionally, research is needed to further explore variables that prevent or compete with the student's ability or decision to be physically active. For example, if sedentary activities, such as video gaming or Lego play compete with PA, which ones are the biggest culprits? On a different note, are there variables competing against PA that do not involve inactivity? Activities such as being in a play, volunteering, and cooking are all activities that involve movement but not necessarily moderate to vigorous physical activity, as recommended by health professionals. Which interventions or strategies appear to work best when trying to increase the engagement levels of PA? Can these interventions or strategies span numerous settings? Answering these questions through further research would provide in-depth insight into the challenges of increasing physical activity among students with disabilities as well as provide resolutions for those challenges.

In conclusion, exploring the topic of the impact of physical activity in students with disabilities produced a myriad of information about the benefits, barriers, consequences and recommendations for improving PA levels. Although additional research is needed to provide a deeper understanding of some sections, there exists a good base of information. Physical activity should be an important part of regular weekly activities for every individual, but is commonly ignored by special disability groups.

With the benefits being holistically advantageous and the consequences potentially severe, adolescents should not be deficient when it comes to PA. Working collaboratively, educational staff, parents, family, friends and community members have the potential to increase physical activity among students with disabilities across multiple environments. There are countless resources and pieces of information that exist to inform teams the best ways to help students become more active. Individuals are needed now who are willing to accept the challenge and move forward to make appropriate changes to improve the health and well-being of adolescents with disabilities.

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