

The Barriers to Physical Activity for Individuals with Autism Spectrum Disorders and Strategies  
for Overcoming these Barriers

A Synthesis of the Research Literature

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## **Abstract**

The purpose of this synthesis is to examine the barriers to physical activity (PA) for individuals with Autism Spectrum Disorders (ASD) and strategies for overcoming these barriers. Individuals with ASD face more barriers to PA than their typically developing peers, and therefore, tend to lead less active lifestyles (Must et al., 2015). This can lead to limited motor coordination, health-related issues, and hypokinetic diseases for individuals with ASD (Case & Yun, 2015). The research studies synthesized through this project were analyzed in hopes of uncovering commonly cited barriers to PA for individuals with ASD and strategies for overcoming these barriers. Understanding the unique barriers this population faces and understanding the strategies to overcome these barriers can help physical educators, parents and community instructors increase PA levels in individuals with ASD.

## Chapter 1: Introduction

The Diagnostic and Statistical Manual of Mental Disorders (DSM–5) states that some of the characteristics of Autism Spectrum Disorder (ASD) are “restricted, repetitive patterns of behavior, interests, or activities” (Data & Statistics on Autism Spectrum Disorder, 2019, p. 1). It is this repetitive pattern of interests and activities that enabled Clay Marzo to become one of the best surfers in the world. Clay was formally diagnosed with Asperger’s Syndrome at the age of 18 (5 Top Athletes on the Autism Spectrum, n.d.). His mother claims that he has been obsessed with the water ever since he was a child. Clay articulates that he feels the most at home in the water; it is where he feels at peace (5 Top Athletes on the Autism Spectrum, n.d.). Like many individuals with ASD, Clay struggles with meeting new people, navigating everyday activities and answering basic questions. While fixation can be disruptive for many individuals with ASD, Clay was able to turn his fixation on the water into a thriving surfing career (5 Top Athletes on the Autism Spectrum, n.d.).

Unfortunately, many children with ASD are not able to successfully participate in physical activity. This can lead to limited motor coordination, health-related issues, and hypokinetic diseases (Case & Yun, 2015). According to the CDC, one in 59 children in the US have ASD, and the disorder is about four times more common among boys than among girls. The prevalence of ASD has been steadily increasing. In the year 2000, the incidence of ASD was one in 150 children and has increased every year (Data & Statistics on Autism Spectrum Disorder, 2019). More people than ever are being diagnosed with ASD (Data & Statistics on Autism Spectrum Disorder, 2019). Some of this increase could be due in part to a broader definition of the disorder and better efforts in diagnosing the disorder, but there has been a true increase in the number of people with ASD (Data & Statistics on Autism Spectrum Disorder, 2019).

ASD is a neurodevelopmental disorder in which the individuals affected may have persistent deficits in social interactions and oral communication (DSM-5, 2013). Some of these characteristics of ASD make it difficult for students to attend to instructions in a traditional setting. Children and adolescents with disabilities often participate in less physical activity than their typically developing peers. This is due to a higher number of barriers to physical activity (PA) (Must et al., 2015). However, attitudes and perceptions toward PA do not tend to differ significantly between adolescents with ASD and typically developing adolescents (Stanish et al., 2015).

Research by Obrusnikova & Miccinello on this subject uses the socioecological method to categorize barriers to PA. In this model, barriers are grouped into five categories: intrapersonal, interpersonal, physical, community and institutional (2012). The majority of the researchers in this field have reported that intrapersonal barriers are the most frequently cited among children and adolescents with ASD. All five of these categories come into play, and all five areas need to be addressed, in order to overcome the barriers to PA (Obrusnikova & Miccinello, 2012).

Many children with ASD fall short of the nationally recommended physical activity levels (Menear & Neumeier, 2015). In order to overcome this, there are many strategies that physical educators can use. Social stories are one strategy recommended by Menear and Neumeier (2015). This strategy is helpful because it lets the student with ASD know what to expect before they begin physical education class, and can be done using multiple forms of communication such as a picture exchange communication system (Menear & Neumeier, 2015). If the physical educator uses the same communication system as other members of the multidisciplinary team it can provide consistency for the student by making things more

comforting and predictable (Menear & Neumeier, 2015). Preparing the environment to address the student's sensory challenges and adapting the curriculum and teaching practices are other strategies suggested by Menear & Neumeier (2015).

### **Statement of Problem**

Low levels of physical activity have led to an increased risk of obesity and low levels of motor skill development in children and adolescents with disabilities such as ASD (Menear & Neumeier, 2015). The potential benefits of PA for children with ASD include a decrease in stereotypical and self-stimulatory behavior, improvements in social skills, improvements in physical functioning, and an increase in on-task behavior (Menear & Neumeier, 2015). Understanding the barriers to PA for this specific population will allow more educators, coaches, and parents the ability to come up with strategies to overcome them. This will give more individuals with ASD the opportunity to reap the benefits of regular PA, which will lead to a longer, healthier and happier life for themselves and their families.

### **Purpose of the Review of Literature**

The purpose of this synthesis project is to review the barriers to physical activity for students with ASD and strategies for overcoming these barriers.

### **Research Questions**

1. What are the most commonly cited barriers to PA for children and adolescents with ASD?
2. What are the underlying causes of these barriers?
3. What are the best strategies to use in order to overcome these barriers?

## **Operational Definitions**

1. Physical activity- Bodily movement that requires the use of energy.
2. ASD-Autism Spectrum Disorder- A developmental disability characterized by difficulties with social interactions and repetitive behaviors and thoughts.
3. Adapted Physical Education- A physical education instructional program designed for students with disabilities.

## **Assumptions**

1. The literature review was comprehensive of all the literature on the topic.
2. Children and adolescents with ASD have more and different barriers than their typically developing peers.

## **Delimitations**

1. All articles reviewed in this synthesis were from peer reviewed journals.
2. The literature reviewed was from the last ten years (2009-2019).

## **Limitations**

1. Six of ten studies rely on the parents of the children and adolescents with ASD to provide information.
2. The sample size of the studies may not be large or diverse enough to make generalizations to the entire population.

## Chapter 2: Methods and Procedures

The purpose of this chapter is to review the methods used to examine the barriers to physical activity for students with ASD and strategies for overcoming these barriers. The studies collected for this synthesis were located using the EBSCO database from The College at Brockport's Drake Library. Within the EBSCO database the following databases were searched: SPORTDiscus and Academic Search Complete.

Within these databases a total number of 10 articles met the criteria for inclusion as part of the critical mass within this literature review. In order for an article to meet the criteria for selection in this synthesis it must have been published between 2009-present, this will provide the synthesis with the most up to date and current information available. Other criteria for selection included scholarly and peer reviewed articles that were full-text. Having scholarly and peer reviewed articles provides more validity within the articles and better overall quality. Other articles or sources selected as part of this literature review provided context about the topic, background information and supplemental information to complete the review. All articles and sources are appropriately cited in the reference section of this paper.

In order to gather valuable articles for this synthesis certain keywords and phrases were used when searching the database. The first keywords searched were "barriers or obstacles or challenges", physical activity and autism. When those keywords were used in SPORTDiscus, a total of 30 articles were found. Most of these articles were relevant to the research, but seven were selected as being particularly useful to the study. The same keywords were used in the Academic Search Complete and 66 articles resulted from the search. Of these 66 only three were selected to be particularly useful to the study.

Articles that were selected for use in this synthesis were scholarly and peer reviewed articles that were full-text. Also when selecting articles for use in this synthesis it was important that each article selected had valuable information related to the barriers to physical activity for students with ASD and strategies for overcoming these barriers.

Specific criteria were used in order to be a part of the literature review. All of the articles selected were based on the barriers to physical activity for students with ASD and strategies for overcoming these barriers. Participants in the studies reviewed were students with ASD or parents of students with ASD, physical education teachers and typically developing peers.

For this synthesis a total number of 10 articles were used to compile data on the topic of barriers to physical activity for students with ASD and strategies for overcoming these barriers. Articles came from a variety of journals including *Adapted Physical Activity Quarterly*, *Journal of Physical Activity and Health*, *Research Quarterly for Exercise and Sport*, *Neurology Research International*, *European Journal of Adapted Physical Activity*, *European Physical Education Review*, *Sport, Education and Society*, *Therapeutic Recreation Journal* and *Palaestra; Urbana*.

The critical mass for this synthesis is comprised of 714 participants. Within the 10 articles used for the literature review there were a total of 75 physical education teachers, 195 parents of children with ASD, 250 students with ASD and 194 typically developing students. Data was analyzed using the following methodologies for the studies under review. Interviews were analyzed using constant comparisons to find themes and grouped into the social-ecological categories, t-tests were used to find correlations, t-tests were used for continuous variables, and chi square or Fisher exact tests were used for categorical variables. Using the social-ecological approach, answers were grouped into five categories: intrapersonal, interpersonal, physical, community and institutional. Answers to the questionnaire were grouped by common themes,

regression analysis was used to find correlations between variables, answers were quantified using a formula that could be compared to a norm score, and answers were analyzed using a Likert scale for each question.

### **Chapter 3: Literature Review**

The purpose of this chapter is to present a review of literature in regards to the barriers to PA for students with ASD and strategies for overcoming these barriers. In particular, the following topics will be covered: barriers to PA for students with ASD and strategies for overcoming these barriers. The first part of the review will cover the barriers to PA that are most frequently cited by individuals with ASD or their parents. The second part of the review will focus on the strategies that can be used to overcome these barriers.

Searching for barriers to PA in individuals with ASD yielded the most results. Seven of the articles that were reviewed stated frequently cited barriers to PA for individuals with ASD. Strategies for overcoming these barriers were included in three articles.

#### **Barriers to PA for Individuals with ASD**

Ayvazoglu et al. (2015) used a mixed method research design to investigate the underlying factors affecting PA levels in children with high-functioning autism spectrum disorders (HFASDs). Specifically, the purpose of this study was to investigate the determinants and challenges to PA for families of children with HFASD from a family systems perspective. The researchers gathered data from six families who had a child with ASD where all family members lived in the same home with at least one parent or caregiver. The children with HFASD were ages 4 through 13, with the average age being 7.5 years old. The researchers gathered data in three steps: RT3 monitors were worn by parents and children to get an initial estimate of PA levels; parents were interviewed and answered Q-sort questions and researchers conducted follow-up in-depth interviews based on responses in the first round of interviews. Researchers concluded that the children had low levels of moderate to vigorous physical activity levels. The activity levels varied from 85 minutes to 405 minutes in a seven-day period (Ayvazoglu et al.,

2015). Parents in this study were found to be inactive with a variation of 6 minutes to 53 minutes of moderate to vigorous physical activity in a seven-day period. There was no statistically significant relationship found between PA levels of parents and PA levels of children (Ayvazoglu et al., 2015).

Qualitative data from this study highlighted many barriers to PA for children with ASD. The barriers that are related to the characteristics of the disability include lack of social skills, peer related bullying, fear of injury to the child, and issues with transitions in daily activities (Ayvazoglu et al., 2015). Other barriers that were revealed within the data were a lack of time for PA because the family is taking the child to other therapy services, and a lack of funds due to the cost of many other services the child needs. Another barrier to participating in PA in the community was a lack of understanding about the disability by parents of typically developing children. Parents of children with HFASD felt that they were blamed for their child's behavior (Ayvazoglu et al., 2015). A lack of support and understanding about the disability from PA instructors in the community, or school setting, also emerged from the research as a barrier to PA for children with HFASD (Ayvazoglu et al., 2015).

Similarly, Buchanan & Miedema (2017) conducted a study in which the purpose was to investigate parent perspectives of PA in their adult child with ASD. The framework for this study was social ecology. An individual continuously interacts with their environment and therefore is influenced by their environment. This study aimed to investigate all of the interrelated factors that influence an individual with ASD's PA level. In this study, the researchers conducted face-to-face interviews with nine parents from families who had one child with ASD whose ages ranged from 18-42. The parents consisted of two parent couples and five mothers. The researchers used mostly open-ended questions regarding their child's PA habits. Parents were

told to give their own perspective and not try to answer the way they thought their child would answer. These interviews were then analyzed using constant comparisons to identify patterns and themes (Buchanan & Miedema, 2017).

Four themes emerged from the data: supports and advocacy for PA, engaging in PA independently, benefits of PA, and reasons for disengaging in certain activities (Buchanan & Miedema, 2017). Reasons or barriers to disengaging in certain activities included: poor motor skills which caused a loss of interest in the activity, general lack of interest or loss of interest in activities after doing them for a period of time, no desire to do activities unless a sibling would do them also, and health difficulties such as weight gain and anxiety problems (Buchanan & Miedema, 2017). The researchers also concluded that parents who had a positive attitude toward their child's PA had children who were more active and more independent. Parents who valued PA, and reported fewer barriers to PA, also had children who were more active (Buchanan & Miedema, 2017).

Alternatively, Healy, Msetfi & Gallagher (2013) conducted a study in which the purpose was to investigate the experiences of the child with ASD through their own perspective. They interviewed 12 students with ASD between the ages of 9 and 13. The researchers recruited the students from a week-long summer camp for children with ASD in the southwest Ireland. An information sheet was given to all parents at the camp registration whose child participated in mainstream physical education. 11 boys and one girl were self-selected for this study (Healy, Msetfi & Gallagher, 2013).

Researchers interviewed students with ASD to understand their experiences with mainstream physical education. The researchers used a variety of strategies that have been previously used when working with individuals with ASD. These strategies include: unfinished

statements, incorporating questions into PowerPoint slides, giving the interview in an informal setting, piloting the interview, allowing individuals to draw pictures to express themselves, and visual aids (Healy, Msetfi & Gallagher, 2013). An inductive thematic analysis was conducted to analyze the interview answers. Three themes were identified that described the experiences of the participants. These themes were individual challenges, peer interactions and exclusion (Healy, Msetfi & Gallagher, 2013).

The theme of individual challenges was found to have the sub-themes of physical ability, physical fitness, sensory issues and fear of injury. Physical ability, or lack thereof, emerged as a barrier to physical activity in physical education. Ten of the participants experienced not being able to keep up with the other students and being allowed to sit out because of motor deficits that made it difficult for them to play successfully (Healy, Msetfi & Gallagher, 2013). Three of the participants articulated sensory issues that kept them from participating in physical activity, such as problems with sweating and feeling itchy (Healy, Msetfi & Gallagher, 2013). Four students experienced a fear of injury which kept them from participating successfully.

Another barrier that emerged under the theme of peer interactions was negative social interactions with peers, such as bullying and negative social comparisons (Healy, Msetfi & Gallagher, 2013). The final theme from the data was exclusion. Seven students recalled the experience of being excluded from activities. Two participants recalled being sent out of the activity by their teacher but not being told why. Five participants recalled being excluded because of a lack of ability and four participants asked for permission to sit out and were granted that ability by the teacher (Healy, Msetfi & Gallagher, 2013).

Similarly, a study that explored the perspective of the individuals with ASD was conducted by Lamb, Firbank & Aldous (2016) at a small rural secondary school in eastern

England. The purpose of this study was to uncover the unique perspective of children with ASD in regards to physical education class. The researchers used photo-elicitation as a research tool to convey the emotions of the students with ASD. The participants were ages 12 to 16 years old: there were four males and one female in the sample (Lamb, Firbank & Aldous, 2016). Each participant took photos with an iPad and engaged in a face-to-face interview with their physical education teacher during their usual 50-minute physical education class. The data collection and interviews took two weeks to complete. Each participant was told what to do at the start of their usual physical education class. The participant then had the whole class period to take photos. After they were done taking photos they went into the conference room to explain their photos to their teacher (Lamb, Firbank & Aldous, 2016). One student did not want to talk about his pictures so his pictures were printed and he was able to put emotional pictograms next to each photo to convey his feelings (Lamb, Firbank & Aldous, 2016).

The interviews were analyzed using a manual thematic approach. Four main themes emerged from the data: the physical education changing rooms, the physical education corridor, the physical education office and, more broadly, physical education activities (Lamb, Firbank & Aldous, 2016). A barrier that emerged from the data was negative associations with the changing rooms and hallway leading to the gym. All of the participants took photos of the changing rooms and conveyed that they were areas that provoked negative emotions. One participant conveyed that he felt unhappy and unsafe in the changing rooms, while another participant described the space as noisy making him feel lost (Lamb, Firbank & Aldous, 2016). The hallway before the gym was associated with both positive and negative emotions for the participants. All of these micro-spaces associated with physical education brought about mixed emotions for the participants (Lamb, Firbank & Aldous, 2016).

Another barrier that emerged was the use of team games in physical education. Four out of five participants also claimed to enjoy team sports but when the author explored the subject deeper, it became clear that the participants enjoyed certain aspects of team sports. For example, one of the participants enjoyed shooting the basketball but not the actual team sport of basketball, while another participant enjoyed scoring in football but not the actual team sport of football. Three of the participants conveyed finding enjoyment in individual activities or small group activities more so than in team sports (Lamb, Firbank & Aldous, 2016). One of the participants described himself as feeling worried during team sports and that they were too big and too loud, while another participant described being worried that she would disappoint her teammates (Lamb, Firbank & Aldous, 2016).

In addition, Memari et al. (2015) conducted a study in which the purpose was to examine social and individual factors affecting PA levels in children with ASD. The researchers used a sample of 83 children, 53 boys and 31 girls, ages 6 to 15 years old. These students were recruited from four autism specific schools in Tehran (Memari et al., 2015). The parents of these children answered a modified checklist to report the types and intensity of PA that their child participated in during leisure time over a seven-day period. A composite score was calculated from the parents' answers (Memari et al., 2015). Parents were also asked to specify the most frequent barriers to leisure time PA for their child. They were given a list of barriers including "expense, lack of resources/opportunities, time limitation, motivation, and fear of injury and also an open item as 'other barriers'" (Memari et al., pg. 2, 2015). Parents also recorded a daily log of their child's activities for every hour of the day in a typical 24-hour period. The severity of autism present in each child was also evaluated using the Autism Treatment Evaluation Checklist (ATEC). Background information was also gathered by the authors, such as household structure,

household income and the highest level of education obtained by the parents (Memari et al., 2015).

The researchers' findings based on the composite score from the checklist were that only ten (12%) of the children with ASD in the study were considered to be physically active while 73 (88%) were found to be inactive. Furthermore, t-test analysis showed that boys with ASD were more active than girls with ASD in this study (Memari et al., 2015). Another finding was that children from single-parent households were less active than children from two parent households. The children in this study were also engaged more in solitary play than social play activities. The leading barrier to PA reported by parents was expense (31.7%), followed by a lack of resources and opportunities (30.1%), time (19.5%), motivation (17.1%) and fear of injury (1.2%) (Memari et al., 2015).

Similarly, another study that focused on the barriers to PA for children with ASD was conducted by Must et al. (2015). In this study the researchers' purpose was to investigate the relationship between PA, parent perceived barriers to PA and screen time. The researchers also compared the child/family, social and community barriers to PA between children with ASD and typically developing children (Must et al., 2015). Children ages 3 to 11 were recruited from local schools and community programs as well as through autism support organizations and the Interactive Autism Network Project. Through these networks the researcher's selected 58 typically developing children and 53 children with ASD ages 3 to 11 years old (Must et al., 2015).

Parents completed a survey to report the perceived barriers to PA for their child. Barriers were categorized into three categories: child/family, social and community barriers. The total number of barriers in each category was calculated along with the total number of overall

barriers. (Must et al., 2015). Parents also completed a questionnaire to determine the child's participation in unstructured and organized physical activity. The answers to the questionnaire were used to estimate the total number of activities the child participated in per year and also the total number of hours the child was physically active in a year. Another questionnaire was given to parents to determine how many hours per weekday and weekend day their child was engaged in screen-time activities (Must et al., 2015).

The researchers used t-tests for continuous variables and chi-square or Fisher exact tests for categorical variables. Correlation analyses were also used to examine the relationship between PA participation, screen-time and barriers to PA. The analyses uncovered that 51% of parents of children with ASD reported six or more barriers while no parents of typically developing children reported that many barriers. The top barriers reported by parents of children with ASD in the child/family category were that their child required too much supervision (60%), their child had behavioral problems (53%), and that their child had poor motor skills (42%) (Must et al., 2015). 85% of parents of children with ASD reported two or more barriers in the child/family category.

62% of parents of children with ASD also reported two or more social barriers. The most frequently cited barrier was problems with social skills (77%), followed by lack of skills needed by PA instructors to include their child (59%). For community barriers, 32% of parents of children with ASD reported a lack of opportunities and 22% reported that opportunities were too expensive (Must et al., 2015). The researchers also found a significant correlation between parental attitudes toward PA regarding their child and total PA time as well as screen time. The study showed that parents who reported more barriers to PA had children with lower PA time and higher screen time (Must et al., 2015).

In addition, Obrusnikova & Miccinello (2012) conducted a study that examined the parental perceptions of the factors that influence after-school PA in children with ASD. The questions used to guide the study pertained to parental beliefs about the advantages and disadvantages of their child participating in PA after school, as well as the perceived barriers and facilitators to after-school PA (Obrusnikova & Miccinello, 2012). The researchers used a socioecological model to help them understand the multiple factors affecting after-school PA.

A sample of 103 parents who completed an online questionnaire were used in this study. The parents had to be a legal guardian of a child with ASD and live in Delaware, Pennsylvania, or Maryland. The average age of the children (85 boys and 15 girls) was 12 years old. From this sample, 21 parents expressed an interest in a focus-group interview. These 21 parents took a demographic questionnaire and 11 were selected from this for the study. The average age of the children from this sample was 11 years old and it was comprised of ten boys and one girl (Obrusnikova & Miccinello, 2012).

Data was gathered using an online questionnaire and focus-group interviews. The questionnaire asked open-ended questions about the parents' perception of the advantages and disadvantages of after-school activity, as well as what made it harder or easier for their child to participate in PA after school. The focus-group interviews delved deeper into the questionnaire responses. The questionnaire responses and interview responses were coded by two independent researchers for themes in the data.

The online questionnaire resulted in a report of 225 (69%) advantages to after-school activity and 106 (31%) disadvantages. The average amount of barriers reported by parents was 2.2. The researchers used the socioecological approach to categorize barriers. The most frequently cited barriers were intrapersonal followed by physical, interpersonal, community and

institutional (Obrusnikova & Miccinello, 2012). The most frequently cited intrapersonal barrier to PA was a lack of motivation, or interest, from the child and the child's preference to engage in sedentary activities. Other barriers cited were a lack of time and a lack of independence as well as problems with social, motor and communication skills. Interpersonal barriers that emerged from the data were a lack of time and a lack of energy or patience of parents to engage their child in PA (82%). Parents indicated that children with ASD require too much attention from parents who have full-time jobs or other responsibilities. Parents also struggle to find time to transport their child to organized PA events and they also become frustrated with the lack of success their child has when participating in PA (Obrusnikova & Miccinello, 2012).

A physical barrier that emerged in this study was bad weather conditions or the presence of insects. A community barrier that was reported was a lack of developmentally appropriate or affordable community PA programs. The lack of training of staff in community PA programs to instruct children with ASD was another community barrier reported, along with unsafe neighborhoods (Obrusnikova & Miccinello, 2012). The only institutional barrier reported in this study was that two parents in the questionnaire stated that their child did not receive physical education at school that met their needs (Obrusnikova & Miccinello, 2012).

### **Strategies for overcoming these barriers**

Pan, C.Y., Tsai C.L., & Hseih, K.W. (2011), conducted a study in Taiwan at nine junior high schools. The purpose was to assess environmental and personal factors that might affect PA levels in adolescents with ASD in an inclusive physical education class. The researchers recorded activity levels of students with and without ASD in physical education class. Participants in this study consisted of 19 students with ASD, all males, as well as 76 typically developing students. The mean age of participants was 14 years old (Pan, C.Y., Tsai C.L., &

Hseih, K.W., 2011). The researchers watched a total of 38 physical education classes taught in nine different schools by eleven physical education specialists, seven women and five men. There were also eight non-specialists in physical education who taught a portion of the lessons (Pan, C.Y., Tsai C.L, & Hseih, K.W., 2011). The content of the lessons was categorized into team activities, individual activities and personal fitness activities. 18 of the lessons that were observed were categorized as team activities, 14 were categorized as individual activities and 6 were categorized as personal fitness activities. 57.89% of the lessons were taught outdoors, 15.79% were taught indoors and 26.32% used both spaces (Pan, C.Y., Tsai C.L, & Hseih, K.W., 2011).

Activity levels were recorded using accelerometers that measure vertical acceleration of human motion as well as steps. The participants wore accelerometers for two physical education classes in a one-week period. The accelerometers were taken off at the end of the class and the data were downloaded immediately (Pan, C.Y., Tsai C.L, & Hseih, K.W., 2011). Social interactions were also recorded by the researchers in two categories: social interactions with peers and social interactions with adults. Data was collected in ten-second intervals by the researchers and tallies were counted for analysis. Social initiations by the students with ASD were also recorded in the same method (Pan, C.Y., Tsai C.L, & Hseih, K.W., 2011).

Researchers used the nonparametric Mann-Whitney U-tests and Kruskal-Wallis tests to compare students' PA levels. Spearman Rank order coefficients were used to calculate correlations between social engagement variables and PA in students with ASD (Pan, C.Y., Tsai C.L, & Hseih, K.W., 2011). The results of the study indicated that the content of the lesson had a significant effect on the PA levels of the students. Lessons which had personal fitness activities as the content resulted in higher student PA levels. Students were also more active with female

instructors versus male instructors. When the lesson was outdoors, this resulted in higher activity levels as well (Pan, C.Y., Tsai C.L., & Hseih, K.W., 2011). Social interactions with peers and social initiations with peers were both positively correlated with PA levels, while social interactions and initiations with adults were not correlated with PA levels (Pan, C.Y., Tsai C.L., & Hseih, K.W., 2011).

Alternatively, Lirgg et al., (2017), conducted a study using 75 physical education teachers (19 male, 56 female). The purpose of the study was to explore the challenges faced by these teachers when teaching children with disabilities and also to investigate undergraduate course offerings specific to adapted physical education. A link to a survey was placed in the state AHPERD newsletter and 75 teachers completed this survey. 83% of these teachers received an undergraduate degree in physical education while 12% held an adapted physical education certification (Lirgg et al., 2017). A secondary survey was also sent to universities that had a physical education department in the southern United States. 76 surveys were returned from universities/colleges. The researchers used a survey with a nine-point Likert scale to rank 11 barriers to teaching students with disabilities. The teachers also rated eight disabilities on a nine-point Likert scale on how difficult it was to incorporate students with that disability into their lessons (Lirgg et al., 2017). The survey that was sent to universities/colleges asked how many classes required hands-on teaching experience of students with disabilities before student teaching, as well as an estimation of contact hours that teacher candidates had with students with disabilities. The survey also asked if the university officials felt that their course offerings provided an adequate amount of information and experience working with students with disabilities (Lirgg et al., 2017).

The findings included that teachers felt their main barriers to teaching children with disabilities were large classes and limited adapted equipment. They felt that students with behavioral disabilities, and with ASD, were the most difficult to incorporate into lessons. The researchers also found that teachers did not feel prepared by their undergraduate education to teach students with disabilities; 52% of teachers did not have a field-experience teaching students with disabilities before student teaching. (Lirgg et al., 2017). The survey from the universities showed that 80% of the universities required one undergraduate class that had to do with teaching students with disabilities, while 28% did not require any classes. 52% of universities did not feel that their field experience requirements for undergraduates working with students with disabilities was adequate (Lirgg et al., 2017). The participants felt that to overcome these barriers teachers need to learn strategies for teaching students with ASD and other disabilities during their undergraduate coursework. They also need to be exposed to students with ASD early on in their academic career and develop social interaction skills to include sensitivity training (Lirgg et al., 2017). Hands-on experience with individuals with ASD and other disabilities translates to positive attitudes and intentions of teachers as well (Lirgg et al., 2017).

In addition, Stanish et al. (2015), conducted a study in which the purpose was to assess physical activity enjoyment, beliefs, and barriers in individuals with ASD and to compare these to typically developing individuals to see if they differ. The researchers recruited adolescents with ASD through schools for children with ASD and various community-based organizations for individuals with ASD. Typically developing adolescents were recruited through many of the same outlets. Participants were screened using a phone interview with a guardian followed by a one to two hour visit to the individual's home (Stanish et al., 2015). 35 adolescents with ASD

(29 male and 6 female) and 60 typically developing adolescents (36 male, 24 female) participated in the study.

Researchers used a questionnaire to gather information on factors that might influence the adolescent's participation in PA. The questionnaire was comprised of closed-ended questions and was read out loud to participants. The questionnaire included 33 items. Nine questions targeted PA enjoyment and preferences and three questions were on enjoyment of non-PA activities, such as watching TV. There were a maximum of three response choices: Like it, It's okay, Don't like it (Stanish et al., 2015). Twelve questions targeted perceived barriers to PA, two questions targeted if the participant had a pet and if they were active with that pet, four questions targeted beliefs about PA, and the last three questions were regarding self-efficacy (Stanish et al., 2015).

The researchers used chi-square tests to compare participant characteristics and responses. The results of the study showed that there was a slightly greater preference for doing yard work/chores for adolescents with ASD versus typically developing adolescents. More adolescents with ASD reported that they do not like participating in physical education class in school versus typically developing adolescents and adolescents with ASD were also more likely to dislike team sports (Stanish et al., 2015). Adolescents with ASD were less likely to say that sports and PA were a way to make friends. Both groups believed that sports and exercise was good for them with 59% of adolescents with ASD reporting that they would like to do more sports and exercise (Stanish et al., 2015). More adolescents with ASD reported that they did not do sports or exercise because they were scared to get hurt. 81% of adolescents with ASD reported that they had someone to do sports or exercise with.

Overall, adolescents with ASD report having positive beliefs about PA and enjoy participating in PA. The majority reported that they enjoy going for a walk, participating in physical education class, and doing individual activities (Stanish et al., 2015). More opportunities for individuals with ASD in school and community organizations are a way to increase PA. Ways to facilitate this are to offer a range of activities and supports, eliminate physical, attitudinal and policy barriers, partner with families/disability organizations, train staff and respect individual differences (Stanish et al., 2015). The researchers also concluded that active video gaming may be a creative solution to increasing PA levels in individuals with ASD given their affinity to playing video games and enjoying technology. Another solution given by the researchers was to participate in PA as a family as a way to overcome a fear of injury (Stanish et al., 2015).

### **Summary**

The purpose of this chapter was to review literature in relation to barriers to PA for students with ASD and strategies for overcoming these barriers. The literature that was reviewed gave insight into the many unique barriers that students with ASD face in regards to being physically active. The literature reviewed also gave meaningful insight into strategies that can be used by parents, physical educators and physical activity instructors in order to overcome these barriers. The literature reviewed can have a meaningful impact for the future. If these strategies are utilized, it can lead to healthier, happier and more independent individuals with ASD.

## **Chapter 4: Discussion, Conclusion and Recommendations**

The purpose of this synthesis is to identify the barriers to PA for individuals with ASD and the strategies to overcome these barriers. A critical mass of 10 articles has been analyzed. This chapter will serve as a summary of the answers to the research questions, as well as discuss the conclusions, implications and recommendations for future research on the barriers to PA for individuals with ASD and the strategies to overcome these barriers.

### **Discussion**

Throughout this synthesis project, and across the literature review, it is evident that there are many barriers to PA for individuals with ASD. The literature reviewed revealed that the answer to research question one was that the most commonly cited barriers to PA for individuals with ASD were a lack of interest/motivation from the individual with ASD, a lack of physical, social and communication skills needed to participate successfully, a lack of time or money from the family needed in order to allow the individual with ASD to participate in PA, and a lack of opportunities for PA in the community or school for the individual with ASD. The literature reviewed revealed that the answer to research question two was that the underlying causes of many of these barriers had to do with parent perceptions of PA. Parents who reported having more perceived barriers to PA had children who were less active. Parents who valued PA and reported having fewer barriers to PA had more independent and active children (Buchanan & Miedema, 2017). The literature reviewed revealed that the answer to research question three was that the best strategies to overcome these barriers were to offer a range of activities that the individual is interested in to maintain their engagement, use peer modeling by including students with ASD in class with their typically developing peers, have adapted PE programs in place in order to differentiate tasks so that all students can be successful, structure the environment to

minimize sensory distractions and fear of injury, better prepare teachers/instructors for working with individuals with disabilities, and provide more community programs that are free or low-cost for the families of individuals with ASD.

## **Conclusion**

The barriers to PA fell into three main categories: individual constraints, family constraints and community constraints. Individual constraints had to do with a lack of ability, in some facet, of the individual with ASD that was holding them back from being active. Family constraints had to do with a lack of ability of the family to provide the individual with ASD with chances for being active. Community constraints were a shortcoming of the community or school setting to provide the individual with ASD with opportunities to be active. The strategies for overcoming these barriers should then fall into these same categories in order to address each barrier. This synthesis indicates that strategies do fall into the categories of individual, family and community, but that they are all interrelated. These results build on existing evidence that there is not an easy fix to increasing the activity levels of individuals with ASD. This is because every situation is unique to each individual, their family and the community/setting in which they live and interact. The environment and the individual are continuously interacting to shape one another (Buchanan & Miedema, 2017).

## **Implications**

These conclusions are important because they can help inform future programming and policies in regards to PA opportunities for individuals with ASD. There has to be a collaborative effort between the individual, their family and the community/school if there is going to be an increase on the individual with ASD's activity level. Family-sensitive programming that takes into account and addresses the unique needs and situation of each family is necessary to facilitate

greater PA levels and independence levels in individuals with ASD (Ayvazoglu et al., 2015). The potential benefits of increasing PA levels for individuals with ASD include a decrease in self-stimulatory behavior, an increase in on-task behavior, an increase in positive social interactions and social skills, a positive impact on daily living skills, and therefore, increased independence levels at home and in the community (Ayvazoglu et al., 2015).

### **Recommendations for the future**

The following are recommendations for future research on barriers to PA for individuals with ASD and strategies for overcoming these barriers:

1. Many of the studies included the perspectives of mothers. In order to get a more accurate picture of the family dynamics that affect PA levels in individuals with ASD, further research should be conducted that includes perspectives of siblings and fathers or other members who are part of the nuclear family.
2. None of the studies used in this review included perspectives of community PA instructors. Further research should be conducted by collecting information from community PA personnel in order to fully understand how the environment is affecting PA levels of individuals with ASD.
3. Longitudinal studies should be conducted in order to gain more insight into the lifelong participation habits of individuals with ASD and their family members.
4. Additional research should be conducted using females with ASD because all of the studies included more males than females. Females with ASD have unique and different experiences with PA than males, so these perspectives need to be explored as well in order to gain a better representation of the population as a whole.

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## Appendix

### Synthesis Article Grid

Author	Title	Source	Purpose	Methods & Procedures	Analysis	Findings	Recommendations
Ayvazoglu, N. R., Kozub, F. M., Butera, G., & Murray, M. J. (2015)	Determinants and challenges in physical activity participation in families with children with high functioning autism spectrum disorders from a family systems perspective	<i>Research in Developmental Disabilities</i>	To investigate the underlying factors affecting physical activity (PA) participation of children with high-functioning autism spectrum disorders (HFASDs) and their family members	Mixed method research design. Six families with children with HFASD aged 4 through 13 participated in the study. Data were gathered in three steps including initial estimation of PA using RT3 monitors, parent responses to Q-sort items/interviews, and follow-up in-depth interviews based on initial analysis of transcriptions of parent responses.	The number of minutes that an individual is involved in bouts of MVPA was also recorded for all seven days for each participant. A Pearson product-moment correlation coefficient was computed to assess the relationship between the amount of PA of child with HFASD and PA of the participating parent . For qualitative data, content	(MVPA) in children with HFASD varied between 85 min and 405 min for seven days. Parents of children with HFASD in this study were inactive. Social skills, issues related to bullying, fear of injury to the child, as well as support from family members and lack of understanding of the disability emerged as barriers.	Perspectives of fathers and siblings also need to be investigated to understand family interaction and family functioning more clearly. Also community PA personnel and school educators. Longitudinal studies to gain deeper insights into PA participation.

					analysis used coding to find themes		
Buchanan, A. M., & Miedema, B. (2017)	Parents' perspectives of physical activity in their adult children with autism spectrum disorder: A Social-Ecological approach	<i>Adapted Physical Activity Quarterly</i>	To investigate parent perception of physical activity participation in their adult child with ASD	Social-ecological approach was used to identify themes from interviews with 9 parents of adult children with autism	Interviews were analyzed using constant comparisons to find themes and grouped into the social-ecological categories	Four themes related to parents' perceptions of PA in their adult child with ASD. The themes were supports and advocacy for PA, engaging in PA independently, benefits of PA, and barriers to or reasons for disengaging in certain activities.	The authors concluded that all the parents in the study valued PA which is a big reason why their adult children participated in PA. The parents support for their child to be physically active facilitated their ability to be an independent citizen. Community factors also played a role as to what activities were available.
Healy, S., Msetfi, R., & Gallagher, S. (2013).							
	“Happy and a bit Nervous”: the	<i>British Journal of Learning</i>	The aim of this research is to gain an	Eleven boys and one girl from this group were self-	Transcription of interviews was	The three themes that emerged were;	Adapted PE programs are needed in order to

	experiences of children with autism in physical education	<i>Disabilities</i>	insight into the experiences of students with autism in PE using a qualitative methodology consisting of semi-structured interviews.	selected to participate in an interview to discuss their experiences. The average age of participants was eleven years Interviews were given to students	completed verbatim, and three researchers performed spot checks on a number of transcripts to ensure accuracy. An inductive thematic analysis was conducted. Interviews were coded for themes, these codes were then organized into meaningful groups. Three themes emerged.	individual challenges, peer interactions and exclusion. Individual challenges had the sub-themes of physical ability, physical fitness, sensory issues and fear of injury. Peer interactions had these sub-themes; camaraderie, initiation of friendship, social comparison and bullying.	differentiate tasks so that all students can be successful. Teachers need to try to minimize sensory stimulation for students with ASD. PE environment needs to be structured to minimize fear of injury. Adapted PE can also benefit in reducing the chances of bullying from peers in PE. Additional research is required with females with autistic spectrum disorders to examine how these differences influence their participation in PE.
Lamb, P., Firbank, D., & Aldous, D. (2016).	Capturing the world of physical education through the eyes of	<i>Sport, Education &amp; Society</i>	To share how pupils with ASD experience the field of physical	5 pupils, four males and one female to help understanding of how pupils with ASD view	The interviews were transcribed and manual thematic	Four themes emerged; the physical education changing rooms were	It is evident that rituals associated with changing rooms compound the challenges for the autistic child.

	children with autism spectrum disorders		education by inviting them to share their views of the subject.	physical education. 1 on 1 interviews were conducted. Students were asked to describe the pictures they took.	analysis took place, identifying themes or areas that prompted emotive reactions from each of the participants during the interview process.	seen as negative spaces, the physical education corridor, the physical education office and, more broadly, physical education activities	Placing greater emphasis on supporting pupil needs within the field of physical education should be acknowledged, An informed awareness of these barriers, initiated through more ‘two-way conversations’ should be fostered if we really want to forward change and stimulate the thinking of those involved in the delivery of physical education.
Lirgg, C. D., Gorman, D. R., Merrie, M. D., & Shewmake, C. (2017)	Exploring challenges in teaching physical education to students with disabilities	<i>Palaestra; Urbana</i>	To survey PE teachers to find out what they find to be the biggest barriers to teaching students with disabilities	75 PE teachers were given surveys on barriers using a 9 point likert scale	Answers were analyzed using the likert scale for each question	Large class sizes and limited adapted equipment were the 2 biggest barriers, teachers did not feel prepared by their undergrad education to	Better teacher preparation at the undergrad for teaching students with disabilities

						teach students with disabilities	
Memari, A. H., Panahi, N., Ranjbar, E., Moshayedi, P., Shafiei, M., Kordi, R., ... Ziaee, V. (2015)	Children with autism spectrum disorder and patterns of participation in daily physical and play activities	<i>Neurology Research International</i>	To find patterns of PA in children with ASD and barriers to PA	83 Parents of children with ASD were given questionnaires	Answers were quantified using a formula that could be compared to a norm score	Only 12% of children with ASD were considered to be physically active, leading barriers were expense, lack of resources/opp ortunities, time, motivation and fear of injury	Researchers suggest that there needs to be more community programs that are either free or low cost to give more opportunities to children with ASD to be active and affordable for their families
Must, A., Phillips, S., Curtin, C., & Bandini, L. G. (2015)	Barriers to physical activity in children with autism spectrum disorders: Relationship to physical activity and screen time	<i>Journal of Physical Activity and Health</i>	To investigate the relationship between physical activity, parent perceived barriers to physical activity and screen time among children with ASD	58 typically developing children and 53 children with ASD, ages 3-11. Parents of these children filled out surveys	t tests for continuous variables and chi square or Fisher exact tests for categorical variables	significant positive correlation between age and total barriers reported, parental attitudes toward PA regarding their child did play a significant role in PA and screen time	More programs that have adults who are trained in teaching students with ASD are needed. They state that barriers such as poor motor skills, learning and behavior problems, and poor social skills can be overcome by an instructor who is trained in the field of working with

							children with ASD
Obrusnikov a, I., & Miccinello, D. L. (2012).	Parents perceptions of factors influencing after-school physical activity of children with autism spectrum disorders	<i>Adapted Physical Activity Quarterly</i>	To investigate factors that influence after school physical activity in children with ASD	103 Parents of children with ASD were given a questionnaire about advantages and disadvantages of after school activities	Using the social-ecological approach answers were grouped into five categories; intrapersonal, interpersonal, physical, community and institutional	Researchers found that intrapersonal factors were the number one reason for physical inactivity	Researchers suggest trying to find an activity that the child enjoys and getting them involved in programs or opportunities to do this activity
Pan, C.Y., Tsai C.L, & Hseih, K.W. (2011).	Physical activity correlates for children with autism spectrum disorders in middle school physical education	<i>Research Quarterly for Exercise &amp; Sport</i>	To explore the variables that effect PA levels in children with ASD	Students with (n = 19) and without (n = 76) ASD wore accelerometers in PE class, social interactions observed	Regression analysis was used to find correlations between variables	PA levels varied significantly with content and setting of lessons, social interaction was positively correlated with PA	Continue putting students in class with their typically developing peers helps with peer modeling and positive social interactions increase PA
Stanish, H., Curtin, C., Must, A., Phillips, S., Maslin, M., & Bandini, L. (2015)	Enjoyment, barriers, and beliefs about physical activity in adolescents with and without	<i>Adapted Physical Activity Quarterly</i>	To explore the enjoyment, barriers and beliefs about physical activity in	35 adolescents with ASD and 60 TD adolescents Questionnaire was given to adolescents with ASD and typically developing	Answers to the questionnaire were grouped by common themes	Many adolescents with ASD have similar attitudes and beliefs as their typically developing	Researchers suggest that students with ASD need to be given more opportunities to be physically active because they do value PA

	autism spectrum disorder		adolescents with ASD ages 13-21	adolescents		peers about physical activity	just like their typically developing peers
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