

Behavioral problems and solutions for children with intellectual disabilities in  
physical activity settings - A review of the literature

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## **Abstract**

The purpose of this synthesis was to review common behavior issues in children with intellectual disability, explore barriers and facilitators of participation in physical activity, and to find intervention strategies so children can participate successfully in physical activity. Of eighteen articles that were reviewed, thirteen articles were used to answer the research questions: one) what are the physical activity levels and motor skills of children with intellectual disabilities? two) what are the most common behavioral issues in children with intellectual disabilities? three) what are the facilitators and barriers to physical activity for children with intellectual disabilities? and four) what are the most effective strategies for managing behavioral issues in physical activity settings for children with intellectual disabilities? Results indicated that children with intellectual disabilities have significantly lower physical activity levels, and face many barriers that can prevent them from participating in physical activity. The barriers for students with intellectual disabilities to physical activities are lack of supervision, sedentary activities, social impairments, physical impairments, and a scarcity of community programs or resources. The strategies that help children with intellectual disabilities participate in physical activity are behavior interventions, family involvement and encouragement, choice of activities, participation in early intervention programs, playground interventions, after school programs.

## **Chapter 1**

### **Introduction**

The American Association on Intellectual and Developmental Disabilities defines intellectual disability as “having significant limitations in intellectual functioning (problem solving, reasoning and learning) and in adaptive behavior” (2010). The prevalence of children with an intellectual disability is on the rise according to the U.S. Centers for Disease Control and Prevention (CDC). In the years 2014 to 2016, the CDC found that “the prevalence of intellectual disabilities among children ages three to seventeen years old has increased from 5.76 percent to 6.99 percent” (Zablotsky, Black, & Blumberg, 2017). More and more children are being identified and diagnosed as having an intellectual disability. The CDC also reported that the prevalence of intellectual disability is higher among boys than in girls (Zablotsky et al., 2017). The criteria as defined in Individuals with Disabilities Education Act (IDEA) “the individual must have significant limitations in intellectual functioning, the individual must have limitations in adaptive behavior regarding conceptual skills, social skills and practical skills and the third criterion is that the disability needed to be present before the age of eighteen”. People with ID show differ from others in their cognitive abilities. Individuals with ID tend to have difficulty in generalizing tasks, short attention span, and difficulty understanding abstract concepts (Fegan, 2016). Children with ID also show deficits in motor learning as well and demonstrate challenging behavior (Fegan, 2016). Challenging behavior can be categorized as aggression, stereotypy, self-injurious, or disruptive behaviors (Fegan, 2016).

Many children with Down Syndrome, a form of intellectual disability are three times more likely be overweight than their typically developing peers (Rimmer, Yamaki, Lowry, Wang, & Vogel, 2010). If children with ID are overweight and out of shape, they are likely to develop hypokinetic diseases (Rimmer et al., 2010). This problem affects their overall functioning and ability to live an enjoyable, healthy life. Physical activity and exercise can help reduce the risk of hypokinetic diseases and obesity (Rimmer et al., 2010). If children learn to be physically active from a young age, then this can reduce their risk of being overweight and unhealthy, and this is true for children with intellectual disabilities as well. This makes it necessary for children with ID to participate in fitness programs along with their typically developing peers. Due to the unique needs of children with intellectual disabilities, physical activities need to take into account their unique learning, behavioral and physical needs. It is important for all programming to be inclusive for learners with unique needs. Physical education programs that do not consider the unique needs of children with disabilities exclude them from participating in physical activity. Children with disabilities cannot afford to lose out on opportunities that provide physical activity. Physical activity programs need to consider a variety of classroom and behavior management strategies, differentiated instructions and equipment modifications necessary in an effort to be as inclusive as possible.

In regard to physical activity, the problem presented by the presence of intellectual disability in children is that they are not receiving the recommended amount of physical activity. This is due mainly to the fact that much time must be spent on correcting or managing challenging behaviors before the child can even begin to participate in the physical (or any type of) activity (Rimmer et al., 2010).

**Purpose-**

The purpose of this synthesis is to review common behavior issues in children with intellectual disability, explore barriers and facilitators of participation in physical activity, and to find intervention strategies or solutions to those strategies so children can participate successfully in physical activity.

**Operational Definitions-**

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

**Challenging Behavior** - aggression, stereotypy, self-injurious, or disruptive behaviors (Fegan, 2016).

**Facilitators** - someone who helps to bring about an outcome (such as learning, productivity, or communication) by providing indirect or unobtrusive assistance, guidance, or supervision (Merriman-Webster Dictionary n.d., <https://en.oxforddictionaries.com/definition/facilitators>).

**Intellectual Disability (ID)** - disability characterized by significant limitations both in intellectual functioning (reasoning, learning, problem solving) and in adaptive behavior, which covers a range of everyday social and practical skills (IDEA, n.d. ).

**Physical Activity** - bodily movement produced by skeletal muscles that requires energy expenditure (World Health Organization n.d.,

<https://www.who.int/dietphysicalactivity/pa/en/>)

**Assumptions-**

- 1) It was assumed that all studies were valid and reliable.
- 2) It was assumed that participants answered all questions truthfully.

**Limitations-**

- 1) There are only a limited number of studies available in order to prove reliability.
- 2) Small sample sizes make the results unique to that particular group of people, and that those results may not be truly representative of the larger population.

**Delimitations-**

- 1) Articles were peer reviewed and published in an academic journal.
- 2) Only articles written from the year 2008 to the present are included in this synthesis.
- 3) Articles had to focus on behavioral issues in children with ID and strategies for working with them.

**Research Questions-**

- 1) What are the physical activity levels and motor skills of children with intellectual disabilities?
- 2) What are the most common behavioral issues in children with intellectual disabilities?
- 3) What are the facilitators and barriers to physical activity for children with intellectual disabilities?

4) What are the most effective strategies for managing behavioral issues in physical activity settings for children with intellectual disabilities?

## **Chapter 2**

### **Methods**

A careful search and selection process was used in determining what research should be included in this synthesis. The purpose of this chapter is to describe the methods and procedures used for synthesizing the information obtained from research studies. Empirical research studies were used to provide information on physical activity levels of children with intellectual disabilities (ID), common behavioral issues connected to ID, and facilitators and barriers. This chapter will address how the data were collected and how the data were analyzed.

#### **Data Collection**

Peer reviewed articles were located using computer databases through The College at Brockport library system. The databases that were used for selecting the articles were Education Source, SPORTDiscus and Physical Education Index. Keyword phrases were selected based on the topic of intellectual disability. Articles had to be peer reviewed and contain one of the following keywords: intellectual disability, challenging behavior, physical activity, facilitators, barriers, strategies, solutions, and down syndrome.

The first search was performed using the Education Source database. The keywords entered were challenging behavior, child, and intellectual disability. This search yielded 252 results, from which twelve articles were chosen for the critical mass. The next search used the keywords barriers, physical activity, and children intellectual

disability. This search yielded ten results from which two articles were chosen for the critical mass based on the research questions.

The next search used the keywords facilitators, physical activity, and children intellectual disability. This search yielded seven results from which two articles were chosen for the critical mass. The next search was performed using the Physical Education Index Database, and used the keywords exercise, behavior, children, and intellectual disability. This search yielded 20 results from which four articles were chosen for the critical mass based on the relevance of the research questions.

The next database used was SportsDiscus. The keywords used in the first search were physical activity levels, children, and intellectual disability. This search yielded 29 results from which three articles were chosen for the critical mass. The next search used the keywords facilitators for physical activity children with intellectual disability. No results were found from this search.

Out of 318 articles that came up for all of the searches combined 23 articles were considered for the synthesis and saved in the computer program Zotero. Out of the 23 articles considered, only 13 were actually selected for the critical mass. The research was exhausted after the searches performed because the same articles kept coming up. The articles selected for the critical mass met the guidelines for the synthesis. The articles matched the focus of the synthesis and answered a specific research questions. They were also published after 2008 and were peer reviewed.

## **Data Analysis**

Data were analyzed by using an article grid. This grid helped organize the information obtained from the peer reviewed articles. The article grid did a fine job at categorizing the information. The categories were author, title, source, purpose, methods and procedures, analysis, findings, discussion, recommendations, commonalities and differences.

The articles used for the critical mass used several different data analysis methods. Four used quantitative methods, six used qualitative methods, and three used a mixture of quantitative and qualitative methods.

A total 1,683 participants were studied over the course of the thirteen articles chosen for this synthesis. The breakdown of the participants is as follows. 1,584 were children and/or adolescents with some form of intellectual disability. 39 were parents and/or guardians of children and/or adolescents with some form of intellectual disability. The remaining 60 participants did not have any form of intellectual disability. This final group often acted as a control group in the studies. Participants were distributed worldwide, with several studies taking place in the United States, several in the United Kingdom, one in the Netherlands, one in South Korea, one in Australia, and one in Hong Kong. This demonstrates that this is a worldwide issue, not one solely confined to the United States.

Thirteen studies will serve as the basis for forming a collective conclusion of the results. Articles chosen were from the following academic journals: Journal of Early Intervention, Journal of Applied Research in Intellectual Disabilities, Adapted Physical Activity Quarterly, Journal of Intellectual Disability Research, Journal of Mental Health Research in Intellectual Disabilities, Intellectual and Developmental Disabilities, Journal

of Exercise Rehabilitation, Journal of Autism and Developmental Disorders, Journal of Policy and Practice in Intellectual Disabilities, and Journal of Physical Activity and Health.

## **Chapter 3**

### **Review of Literature**

The purpose of this chapter is to review all of the literature that was used to form the basis of this synthesis. Initially there were 23 articles chosen from the searches of the database. Thirteen articles were ultimately chosen from these 23, as these thirteen met the criteria established. Four different themes were identified for reporting the results. These themes are: (one) direct physical activity, (two) indirect physical activity, (three) facilitators to physical activity and (four) barriers to physical activity.

#### **Direct Physical Activity**

In this section, direct physical activities will be defined as activities that are part of a formal curriculum or program. The two main categories these could fall into are physical education and sports teams. The goal of these direct, structured activities must be that the participants will be engaging in moderate-to-vigorous physical activity. There was only one article reviewed that supports this category. This article uses a mixture of qualitative and quantitative research.

Robertson, Emerson, Baines, and Hatton (2018) presented a study which was based on a secondary analysis of the data collected by waves one to seven of Next Steps, an annual panel study which followed a cohort from their early adolescence through adulthood. The study began following the children in 2004 when they were aged 13-14 years. The sample size at wave one was 15,770 children, and they were followed up yearly until 2010 when they were aged 19-20 years. The sample size contained children with intellectual disabilities and children without intellectual disabilities.

In the first four waves, data were collected by face-to-face interviews with the child and her or his parents. The remaining three waves conducted the interviews by the child's method of choosing. At waves one, two, and four, they were asked how often they do the direct physical activity of team sports, and responded on a scale of one to six, most days to never, respectively. At waves six and seven, they were asked how often they do any type of physical exercise, with the responses being the same. The study by Robertson, et al. showed a mixture of qualitative and quantitative methods in the gathering of their data and analysis. Questions were asked of the participants to gather information on their experiences and habits in physical activity for qualitative data. Quantitative data were obtained from information from the NPD.

### **Indirect Physical Activity**

In this section, indirect physical activities will be defined as activities that are not a part any formal curriculum or program. Typical examples of indirect physical activities are those that occur during recess, free play, outdoor time, etc. There is typically no overall or common goal to these kinds of physical activities. There were a total of two articles reviewed that support this category. Both articles in this category used quantitative research.

In the United Kingdom, Downs, Fairclough, Knowles, and Boddy performed a study in which 32 participants with intellectual disability had their physical activity monitored for seven days by using accelerometers (2016). It was found that participant's physical activity levels were significantly low. Participants demonstrated random and short bursts of physical activity. As the intensity and duration of the physical activity increased, the number of continuous sessions of physical activity decreased. Physical

activity levels were not impacted by sex, ID group, age, or day of the week. The data were gathered quantitatively through the accelerometers.

Another quantitative study that addresses indirect physical activities is a 2012 study by Esposito, MacDonald, Hornyak and Ulrich, in which participants were recruited from Down Syndrome support groups in the state of Michigan. 104 participants (47 female, 57 male) aged eight to sixteen years were recruited. Participants had no physical disability or medical condition that would prevent their participation in physical activity.

The Actical accelerometer was used to measure physical activity over a period of seven days. The data were able to be time-stamped and gave information on the length and intensity of the physical activity. The accelerometer was worn above the right hip using an elastic waistband. The monitor needed to be worn for a minimum of ten hours each day and for at least four of the seven days of the monitoring period, as suggested by previously established literature as guidelines for recording reliable and valid data from an accelerometer. Sedentary activity was given counts less than 25, light physical activity 25-375, moderate physical activity 376-1,625, and vigorous physical activity greater than 1,626. Data analysis was performed using the SPSS version 17.0. The participants were split into four age groups approximating grades three, five, seven and nine. Patterns of physical activity and relationships among percentage of body fat, BMI, physical activity level, and age were also explored.

Generally, physical activity showed a marked decrease as the children's age increased. Aggregating moderate and vigorous PA found that the ninth grade group was significantly less active than the fifth grade group. The seventh grade group was significantly more sedentary than the fifth grade group. Weak relationships were found

between physical activity and BMI, and physical activity and body fat. A small but significant relationship was found between body fat and BMI and aging. The children in this sample were not meeting the minimum guidelines of a daily 60 minutes of physical activity.

### **Facilitators to Physical Activity**

In this section, facilitators to physical activity will be defined as a thing or a person that can make access to physical activity available or easier. Seven articles were reviewed that demonstrated facilitators to physical activity, and thus support this category. Five articles in this category used qualitative research and two used a combination of quantitative and qualitative research.

Choi and Cheung (2016) described the effects of an eight week structured physical activity program on psychosocial behaviors of children with intellectual disabilities. A somewhat experimental approach was taken by the researchers, creating a training group (TG) and a control ground (CG) for comparison. A time-series design was able to be used because of the three point data collection method. 30 children in second grade with mild ID were recruited for the study from a special school based in Hong Kong, with 18 students making up the TG, 12 making up the CG during the following year. Participants were limited to being from only one school and grade, so not to confound the results due to developmental differences. The students were all seven or eight years old, 22 males and eight females. In addition to ID, 60% also had ASD.

A physical activity-intervention program with two components was implemented in order to influence the psychosocial behaviors of the children, the two components

being the particular activities in the program and the delivery approach to implement the program. The therapeutic recreation accountability model (TRAM) was chosen because it is one of the few that is concerned with the process of planning, implementing, and evaluating an intervention. The TRAM included the four components of comprehensive and specific program design, activity analysis, protocol development, and the intervention program. Twelve physical activities were chosen for this study after two pilot studies involving mainstream and ID students. The intervention program consisted of 24 sessions, with three activities conducted during each session, with these three activities remaining the same for two weeks before changing. Each session was one hour long and structured to contain a warm up, the intervention activities, and a cool down.

Quantitative data were gathered from the sessions through systemic observation and teacher ratings. A four point scale was assigned values of one, two, three, or four to each of the psychosocial behaviors and the observers' perceptions of the children never, rarely, sometimes, or always exhibiting them. The observers were a special education expert and the researcher. Analysis of covariance (ANCOVA) was used to test for the children's differences in pre- and post-program psychosocial behavior ratings. A one way repeated measure of analysis of variance (ANOVA) was conducted for comparing the psychosocial behavior at the beginning, middle and end of the study. The psychosocial behavior was analyzed with several different procedures, including correlation coefficients of the psychosocial behavior gain scores between training and classroom contexts for the TG, ANCOVA results between the TG and CG's posttest mean scores, and results of the ANOVA comparisons of the three point measurement.

Only 16 of the 18 students in the TG were kept for analysis, due to two students unable to attend 80% of the program. A medium positive correlation was found between the gain scores of emotional self-control, which suggested that gains in training coincided with those in the classroom. A small, negative correlation was found in the social interaction variable. The results of the ANCOVA indicated a significant difference between the TG and CG in emotional self-control mean scores, the posttest mean score was higher for the TG. The results of the ANOVA indicated a significant difference in the mean scores of emotional self-control in the three testing periods. Similar results were found for social interaction in the training context. This demonstrates that a higher level of emotional self-control is a facilitator to physical activity.

In Italy, Alesi and Pepi (2017) performed a study whose purpose was to explore the beliefs of parents of children with Down Syndrome, in regards to facilitators, barriers, and benefits of physical activity. The study's participants were 13 families with children with Down Syndrome, with interviews with seven mothers and six fathers. The children were four girls and nine boys aged seven to 27, all with moderate intellectual disability. The families were recruited through gyms and non-profit organizations that offered support and resources for people and families with DS. The three criteria participants had to meet were that they had to be the parent of a child with DS, speak Italian, and the child must be between the ages of six and 30.

The researchers created a semi-structured interview split into three parts. The first part contained open ended questions aimed at collecting qualitative data on the children's personal and medical history, the second part contained open questions meant to explore the child's participation in PA (sport activities, who initiated the activities, emotional

reactions), the third part analyzed the parents' beliefs on what facilitates or obstacles the children's participation in PA. Each interview lasted no more than 25 minutes and were all conducted by the same researcher.

The researchers chose a thematic content analysis approach because of its flexibility to identify, report and analyze themes and patterns from qualitative data. From this it was divided into six phases: 1. the interviews were transcribed and then read many times by a team of two other researchers; 2. the transcripts were then clustered into patterns which highlighted common themes based on quotes which identified meaningful themes; 3. the frequency of the meaningful quotes was counted to identify the most important themes; 4. themes were checked against each other and given names; 5. a thematic map was made to show the themes into two different figures; 6. quotes that were found to be significant were used to create a report.

Only one of the children did not have any participation in physical activity. Otherwise, it was found that the children participated in different types of physical activity, the most common being swimming, followed by football, basketball, tennis, dance, and martial arts. The frequency of the children's participation was once for seven, twice for four, and daily for one. Parents reported emotional reactions of enjoyment, boredom, and resignation. The three main themes of facilitation that were found were support from the family, availability of APA instructors and gyms, and the quality of the activity as a challenging opportunity.

Back in the United States, a 2016 study by Stanish, Curtin, Must, Phillips, Maslin and Bandini compared physical activity enjoyment and personal characteristics of children with intellectual disabilities to their typically developing peers. For the study,

both adolescents with intellectual disability and typically developing adolescents were recruited. Sources used to recruit were schools for ID, community organizations, disability agencies, etc. The participants were screened by a phone interview with a parent, followed by a one to two hour study visit. The participants were given a questionnaire to gather information directly from them on factors that influence their participation in physical activity. There were 33 items on the form, with nine targeting PA enjoyment and preferences. After administration of the questionnaire, interviews were conducted with each of the participants by a trained research assistant.

The characteristics of the participants were summarized through means, medians, and percentages and were then compared by t tests and  $\chi^2$ . The Pearson  $\chi^2$  or Fisher exact test were used to determine the statistical significance in the response percentages between the groups. When differences between the ID and the TD groups were statistically significant at  $P < .10$ , the results were then stratified by sex. All analyses were performed using the SAS version 9.2 and IBM SPSS version 20 software. 38 adolescents with ID and 60 TD adolescents ultimately completed the study.

The enjoyment of participating in physical education classes and team sports did not differ between the TD and ID adolescents. The majority of both groups participated in sports, and reported it as "a lot of fun." (Stanish, et al, p. 105) There was also very little difference in how the two groups felt about non-physical activity, such as video games or watching TV. This demonstrates that actual, personal enjoyment of physical activities, physical education classes, and team sports is a facilitator to the overall enjoyment of those activities.

A qualitative 2013 study by An and Hodge examined the parental involvement experiences in physical education and the perspectives of students with developmental disabilities and their parents. A sample of eight parents of children with developmental disabilities participated in the study. Three were mothers of children with DS, one mother of a child with a developmental delay, and two mothers and one couple with children with ASD. All families were of middle-class suburban status. Children in elementary school attended physical education twice a week and those in middle school five days a week. All of the children received adapted physical education services once a week except for one child.

The main source of data collection for the study was semi-structured, face-to-face interviews and transcribed verbatim. Questions asked of the parents were to find out how they felt about their child's participation in PE, their own involvement in it. Three interviews were conducted with each of the eight parents over the course of three weeks. The first interview was about the experiences of their own involvement, the second about their relationships with the general physical education teachers, and finally the significance of artifacts like videos and IEP documents in the final interview. The interviewer also kept a journal of her own interpretations of each interview.

In order to examine the structure, essence, and meaning of the parents' experiences, the researchers used thematic analysis. Through reading the transcripts of the interviews and the journals, the data were coded by structuring descriptions, organizing into primary themes and subthemes. The three themes that the researchers found were parents wanting to be an advocate for their child, understanding the big picture, and collaborative partnerships undeveloped in GPE. Advocating subthemes were

that of assuring their child's learning and success, and working as a team. Big picture subthemes were that of unending communication, having a supporting role in the school, and networking with others. Undeveloped collaborative partnerships subthemes included limited interest in GPE program and gathering information from others. Overall, it was gleaned from this study that parental involvement in classes and school is a facilitator to success in physical activity.

A study that showed a mixture of qualitative and quantitative research was Patel, Wolter-Warmerdam, Leifer and Hickey's 2018 study of behavioral characteristics of individuals with Down Syndrome. The purpose of this study was to examine the behavior problems that individuals with Down Syndrome experience. This was done by identifying behavioral problems that are observed by parents but not measured by standards, and examining how much these behaviors are impacted by language, gender, and age.

Data were collected on a total of 274 children with Down Syndrome. Criteria included having a diagnosis of DS, receiving care at the Sie Clinic in Colorado, and being aged two to twenty-two years. The Down Syndrome Behavior Clinical Form was developed in 2012 to address patient behavioral changes, and was used to gather data for this study. The form was administered to the parents of all of the children a week before their clinical appointment, and participation was voluntary. The form identified and evaluated 16 behavioral challenges. Examples were included so that parents could easily identify the behaviors. Parents then indicated the frequency of the behavior and their concern of each behavior.

The demographic and clinical characteristics of the data set had descriptive statistics performed on them. To determine any significant associations between gender,

age and speech, cumulative odds ordinal logistic regressions were performed. In addition, T-test and chi-square tests for association were performed between parents of children with DS who completed the form and non respondents, expressive language impairment status and gender, age, household, and health.

Results indicated that 93.8% of the participants showed at least one challenging behavior identified on the form at least weekly or daily. Noncompliance was the most frequently occurring, at 77%, followed by running and wandering at 75% and sitting and refusing to move at 71%. Of the participants who displayed the behaviors daily or weekly, self-stimulatory behaviors were the most often at 85%, followed by noncompliance at 77% and talking to self at 75%. The study suggests that parents may be more apt to take notice of difficult behavior in their own children than caregivers at facilities, and that this accounts for the significant difference between the results of this study with previous estimations of 18-43% of children with DS having behavioral challenges. The understanding and recognizing of such behavior can be considered to be a facilitator, since it is a first step towards being able to manage problematic behaviors so that children with DS have a better chance at being successful in physical activities.

Barr and Shields (2011) aimed to identify the facilitators and barriers to participation in physical activity for children with Down Syndrome. To realize this, a qualitative study was undertaken in which 18 in-depth interviews with the parents of children with Down Syndrome were conducted. The purpose of these interviews was to find what made participation in physical activity difficult for their children. Participants were recruited through a non-profit membership-based organization that is an advocate for those with Down Syndrome and their families. The sample size grew over the course

of the study as more participants signed up, eventually totaling 20 parents of 18 children (ten girls and six boys) between the ages of two to seventeen years, with the mean being nine years. A broad range of physical activities were reported, including, swimming, dance, tennis, karate, gymnastics, etc. The interviews lasted 20-50 minutes and were conducted by one researcher, with four of the interviews taking place over the phone. Both parents were interviewed together when available. An interview schedule was created in order to guide the conversation and ensure similarities between all interviews. All questions were open ended so that participants could share their own unique experiences.

Confidentiality was maintained by replacing real names with pseudonyms. Otherwise, all interviews were transcribed verbatim. In order to make sure that the themes were pulled from the data, thematic analysis was used. Transcripts were read in depth by the two researchers several times. The initial round of coding was divided into as many categories as possible, and then grouped into appropriate themes. NVivo software was used for coding and recording. Transcripts were sent back to the respective interviewees for them to check that their views were represented correctly.

There were four main facilitation themes identified: positive role of the family, opportunities for social interaction with peers, accessible structured programs with proper adaptations, and children who were physically skilled and determined to succeed.

The final article explored the theme of facilitators to participation in physical activity was a 2015 study from Adamo, Wu, Wolery, Hemmeter, Ledford, and Barton in which video modeling, prompting, and behavior-specific praise to increase moderate-to-vigorous physical activity for young children with down syndrome. The sample for the

study were three preschoolers with Down Syndrome. In addition, two preschoolers without any disabilities participated by providing video models before the beginning of the study. All of the children attended an inclusive university-affiliated early childhood program. All of the training, baseline, and intervention sessions occurred on the playground. The intervention happened during one of the two 30-minute daily outdoor periods. The implementers for the study were two graduate students, who used a camcorder to record examples of the target activities. From this they were able to edit together videos with voice-over instructions. They also made seven videos of use during the intervention, which depicted activities such as going up the stairs, down the slide, up a step ladder, kicking a ball, running up a hill, etc.

An application was programmed into an iPad for the participant to begin the intervention at the iPad. The implementer started the application and the participant chose an activity from two pictures on the screen. When selected, the video of that activity would play, followed by a prompt from the iPad for the child to go do the activity. After doing the activity, the child indicated whether they performed it by selecting a happy or sad face on the screen. Pressing the happy face played a reinforcement video. Pressing the sad face would repeat the sequence that just happened.

An A-B-A-B withdrawal design was used for the study to demonstrate a functional relationship between the child's MVPA and the treatment package. In the baseline portion of the study, data collectors measured the participants MVPA during normal playground activities. The iPad was used for the training portion of the study. For the intervention, videos were used just like in the iPad training section. In order to obtain

interobserver agreement (IOA), a point-by-point formula was used. A second observer then collected procedural fidelity data.

The first child showed low levels of MVPA without any increasing trends during the baseline conditions. A small initial change followed by a consistently increasing trend in prompted and total MVPA occurred during the intervention. The second child showed similar trends. The third child had higher and more variable levels of MVPA during the baseline than the other two, and also increased during the intervention. The study shows that the adoption of technology-oriented strategies, such as the one demonstrated by the study, can be an effective strategy for managing behavioral issues by getting children with intellectual disabilities more involved in physical activity.

### **Barriers to Physical Activity**

In this section, barriers to physical activity will be defined as obstacles, situations, or circumstances that prevent people from connecting where they should, communication, or progress. In a broader sense, they are just the opposite of facilitators to physical activity. Examples of barriers to physical activity include a lack of supervision, sedentary activities, social impairments, physical impairments, and a scarcity of community programs or resources. Six articles that were reviewed demonstrated barriers to physical activity, and thus support this category. Three articles in this category used qualitative research and three used quantitative research.

A quantitative study conducted in the United Kingdom by Oliver, Petty, Ruddick, and Bacarese-Hamilton (2011) explored the association between repetitive, self-injurious and aggressive behavior in children with severe intellectual disability. For the study, a

sample of 943 children was selected out of 1,096 from 17 special schools for children with ID. The children ranged in age from four to 19 years. 35% of the students were completely or partially immobile without the help of aids, 48% completely or partially incontinent, 18.8% with a visual impairment, and 10.9% with a hearing impairment. These were determined by the administration of the Self-Help and Behavior rating scale. This scale was divided into a self-help skills and general abilities section, and a behavior and emotional difficulties section. A three-point scale was used to score, with one indicating a severe incapacity, two indicating a mild incapacity, and a three indicating none.

From the data, two scales were derived: Social and Physical Incapacity Scale (SPI) and the Speech, Self-Help and Literacy Scale (SSL). The scales were completed by the students' teachers for each child in their class. A five-point scale was used to score an additional five items (aggression, destructive behavior, hyperactivity, repetitive and ritualistic behavior, and self-injurious behavior). This scale ranged from one indicating "never" to five indicating "very often". These five items were also rated on a scale of management difficulty (one for "not difficult" through five for "seriously difficult"). The adapted behavior variable was split by the median in order to create two groups, one representing a "more severe deficit" and one representing a "less severe deficit". The sample was also split into three age categories so that the younger children did not make up the majority of the "more severe" group.

In regards to speech, students scoring a one were sorted into a "no speech" group, while those scoring a two or three were sorted into a "speech" group. The challenging

behavior data were split into categories of "never" (one score), "moderate" (two to three score) and "highly frequent" (four to five score).

In regards to challenging behavior being present, 153 students (17%) showed self-injurious behavior, 356 (39.5%) aggressive behavior, and 267 (29.6%) destructive behavior. Odds ratios for each potential risk marker. Differences as age increases were investigated by calculating odds ratios for the entire sample, the 4-11 years age range and the 11-19 years age range.

In all of the groups, a severe deficit in adaptive behavior was associated with self-injury. Severe aggression was found in the total sample, while destructive behavior was found in the older group, and severe destructive behavior present in all groups. The absence of speech was found to be strongly associated with the presence of self-injury. These types of behaviors can be barriers to participation in physical activity. The time spent in attempting to manage and correct these behaviors is less time that the individuals can have participating in physical activity.

In the Netherlands, Poppes, Van der Putten and Vlaskamp (2014) studied how since some people with profound intellectual and multiple disabilities (PIMD), who are at a higher risk of developing challenging behavior. Using quantitative research, this study explored how challenging behaviors are addressed in daily practice at residential facilities. For the study, six residential facilities in the Netherlands provided an existing database which contained data on the prevalence, frequency, and severity of challenging behavior of 181 adults and children with PIMD. The Dutch version of the Behavior Problem Inventory (BPI) was used to identify 3 types challenging behavior: self-injurious, stereotypical, and destructive or aggressive. The scale consists of 52 items and

are scored on a frequency scale of zero to four (never to hourly) and a perceived severity scale of one to three (slight to severe). From there, the researchers selected a sample of the 25% "most severe" cases. Thirty participants were ultimately selected, ten women and 20 men aged 2-65. 392 behaviors were scored in total, and scored as 106 self-injurious, 219 stereotypical, and 67 aggressive. It was shown that self-injurious behavior happened on a weekly and daily basis too.

After selecting participants with the most serious and frequent behaviors, their facilities were contacted and their IPs (support plans) were obtained and analyzed. Challenging behavior should be described within the IPs. The IPs were analyzed for challenging behaviors and compared to the results of the BPI. IPs were analyzed to see if the behaviors were described in the IP, along with whether or not goals of reducing the behavior were included as well. The study demonstrated that all of the participants exhibited challenging behaviors on a daily basis, with nearly half of the behaviors not being noted on the IPs. Frequency, setting, and consequences of the behaviors were not mentioned on the IPs. If mentioned at all, it was in very vague terms. This lack of thorough documentation of challenging behaviors is a barrier to participation in physical activity for these individuals, and every other individual whose behavior is documented in an IP. If the behaviors are not being documented, it is likely that they are not being recognized and thus having some attempt to correct them. The fact that this behavior is not being corrected prevents the individuals from participating in physical activity to the degree they should be fully capable of.

In South Korea, a study using quantitative research by Lee and Jeoung (2016) aimed to discover whether there is a relationship between motor skills and behavior

problems of students with intellectual disabilities. The participants in the study were 117 students with ID (38 female, 79 male). All attended special education schools in South Korea.

The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOTMP-2) standards test was used for the basis of this test. It was categorized into the four composite motor domains of fine motor control and integration, manual coordination, body coordination and balance, and strength and agility. Each participant was rated by three researchers on the BOTMP-2 and their average scores were calculated.

Using the Korean version of the Child Behavior Checklist (K-CBCL), the children were surveyed to evaluate their problematic behaviors. Using the problematic behavior syndrome scale part of the checklist, which consists of 8 subscales to measure withdrawal, somatic complaint, anxiety and depression, social immaturity, thought problems, attention problems, rule breaking, and aggression. Each of the 119 items on the scale are rated on a scale of zero points (none), one point (infrequent or mild), two points (frequent or severe). The range of possible scores is 0-234. The score was then converted into a standardized T score. A T score greater than 63 is considered to be in the clinical range. The IBM SPSS was used to analyze the data. To examine the relationship between cognitive function and motor skills, a bivariate correlation analysis was performed. On the motor skill subdomains that showed significant correlation a line regression was performed to analyze the effects of the subdomains on cognitive function. The level of significance was set at  $P < 0.05$ .

The researchers found that aggressive behavior was found to be associated with the BOTMP-2's fine motor subdomain. Social problems were correlated with balance,

speed and agility, bilateral correlation, strength and upper limb coordination. The participants' anxiety and depression score is predicted to have an increase of 0.16 for every one point increase in the motor skill manual dexterity subdomains. The social problem score was found to decrease by -0.28 as speed and agility scores increase by one. The attention problem score is predicted to decrease by -0.22 as the participants' bilateral coordination score increases. As the fine motor score increases by one, the aggressive behavior score is predicted to decrease by 0.21. The findings suggest that low levels of certain skills causes a barrier to full participation in physical education for individuals.

The study on physical activity enjoyment and perceived barriers by Stanish, et al (2016) found that in regards to barriers about participation in PA, significantly more of those with ID did not think exercise and sports were boring (78%) compared with their TD counterparts (63%). However, they were less likely to think that they were good at sports and exercise compared to their TD counterparts. All TD adolescents reported that they do not think it is hard to learn sports and exercise, compared to 59% of the ID group. This lack of confidence is a barrier to the individuals' full enjoyment of, and therefore participation in, physical activity.

Alesi and Pepi's (2015) study on parental beliefs on physical activity engagement in children with Down Syndrome also found barriers to participation in physical activity in addition to the aforementioned facilitators. The three main barrier themes that were identified by the study were lack of APA instructors and gyms, characteristics of DS, and parents' own worries.

Finally, Barr and Shields' 2011 qualitative study on barriers and facilitators to participation in physical activity for children with Down Syndrome found four main

themes that were barriers to participation in physical activity. These themes were typical Down Syndrome characteristics, competition with other family responsibilities, diminished physical and behavioral skills, and a lack of programs that are accessible.

### **Summary of Results**

Taken as a whole, the results of the studies examined in the four themes of direct and indirect physical activity, and facilitators and barriers to physical activity, paint a clear picture of the problem presented by the presence of intellectual disability in children in regards to physical activity. Overall, the presence of a form of intellectual disability is a predictor in the child having a reduced amount of physical activity in their life.

## **Chapter 4**

### **Discussion**

This chapter of the paper will synthesize what the critical mass articles concluded regarding physical activity for children and adolescents with intellectual disability, and the facilitators and barriers they face. For the critical mass, a total of thirteen articles were examined. The participants in these studies were not only children and adolescents with intellectual disability themselves, but also their parents and/or guardians, and some of their typically developing peers. This chapter is divided up by the research questions that were created. The research questions were one) what are the physical activity levels and motor skills of children with intellectual disabilities? two) what are the most common behavioral issues in children with intellectual disabilities? three) what are the facilitators and barriers to physical activity for children with intellectual disabilities? and four) What are the most effective strategies for managing behavioral issues in physical activity settings for children with intellectual disabilities? Based on the findings in the results section children with intellectually disabilities demonstrated significantly lower physical activity levels than their typically developing peers, and experienced several barriers that prevented them from participating in physical activity. Others findings described facilitators that allowed children with intellectual disabilities to participate in physical activity.

#### **1. What are the Physical Activity Levels of Children with ID?**

Robertson, et al. (2018) concluded that "Sport/exercise participation rates were consistently lower for adolescents and young people with mild to moderate intellectual

disability than for their peers without intellectual disability" (p. 250). Boys with or without ID, aged 14-15, who spent more time with friends and were not bullied or threatened with violence were more likely to frequently participate in sport and exercise activities. The likelihood was twice as much, however, for girls with ID than their TD peers.

Strengths of this study were its large population-based sample, the various measures of household and socioeconomic disadvantage, and "the use of multiple imputation methods to take account of item nonresponse on sociodemographic variables." (p 252) A severe limitation of this study was that the actual measurement of individuals' participation in physical activity was based solely on the response to a single question whose wording changed over the course of the study, depending on which wave was being asked.

"It is clear that adolescents and young adults with mild to moderate intellectual disability participated in less sport/exercise than peers without intellectual disability, with the difference being particularly marked for sports and for women" (p. 252). The authors acknowledge that, unfortunately, there is very little evidence regarding how to improve the participation rates in physical activity among those youth with intellectual disabilities.

The study found that common barriers to physical activity for individuals with intellectual disability are cost, a lack of support, a lack of awareness of the available options, and transportation. The authors note a study that suggested that the geographical centralization of certain sports programs for those with intellectual disability restricted participation due to increased travel times and expenses. Safety reasons may prevent

individuals from participating in activities, such as walking or biking to school or other locations.

The participants in the study by Downs, et al. (2016) did not meet the minimum recommended amount of health-enhancing physical activity as set forth by the Chief Medical Officer of the United Kingdom. The data obtained by the accelerometers showed that most of the participants' engagement in physical activity was in short (less than 15 seconds) bouts, with the frequency of the bouts decreasing as the duration of bouts increased. This is in line with previous findings noted by the authors. Another previous study noted by the authors that corroborated their findings was that of an age-related decline in participation in physical activity for those with ID.

Like in Downs, et al.'s study, Esposito, et al. (2012) found that children in the United States - specifically those with DS - do not meet the surgeon general's recommendation of having 60 or more minutes of moderate to vigorous physical activity each day. This is cause for concern, since this population is already at an elevated risk of being overweight. The findings that the 14-15 year age group was more sedentary than the younger groups is in line with previous studies that show that the same holds true for their typically developing peers in the same age groups. Likely reasons for this decrease in physical activity are that the "informal bouts of activity when children play" decrease as they age. These intermittent bouts become replaced with more structured activities and increased responsibilities. "The significant drop in moderate and vigorous physical activity as children age is an area of concern" (p. 113).

The researchers indicate that previous studies have shown physical fitness in the DS population has shown improved health and increased performance in daily tasks.

Their recommendation is that health professionals continue to "improve or increase physical activity to keep these individuals independent and productive" (p. 113).

Approximately 45.5% of the participants were overweight or obese for their age or gender, which is supportive of previous studies and literature which estimates the percentage of those with DS or other intellectual disability that have obesity between 28% and 59%.

## **2. What are the Most Common Behavioral Issues of Children with ID?**

The 2012 study by Oliver, et al. found that the prevalence of self-injurious, aggressive, and destructive behaviors was comparable to the rates reported in previous studies. The researchers identified a "key finding...in the identification of the presence of high frequent repetitive or ritualistic behavior as a robust risk marker for self-injurious, aggressive, destructive, and multiple behaviors" (p. 915).

Poppes, et al. (2014) discussed how in the Netherlands, all with profound intellectual and multiple disabilities (PIMD) have only one IP (a support plan), and their IP theoretically should contain extensive documentation of their challenging behavior. It was found, however, that this is not the case, and the IPs do not necessarily reflect the severity of the problems nor document all that they should. The types of challenging behavior covered in this study should be considered a problem and is a barrier to the improvement of the individual's quality of life, and it is expected that interventions or strategies to deal with these behaviors would be addressed as well.

Lee and Jeoung (2016), in their study of the relationship between motor skills and behavior problems of students with intellectual disabilities, found that in the subdomains of problematic behavior there were "social problems were associated with the motor skill

developmental subdomains of bilateral coordination, balance, speed and agility, upper limb coordination, and strength" (p. 601). This demonstrates that social problems can be improved through improved coordination and overall motor development, but is still considered a barrier.

Patel, et al.'s (2018) study acknowledged that while previous studies suggested a range of 18-43% of children with DS having behavioral challenges that are barriers to participation in physical activity, their study shows a significantly higher rate of 93.8%. The authors note that due to the nature of the study involving a questionnaire, families may have been more critical in their assessment of their children's behavior, as they were examining these behaviors in greater detail than usual. It may also be that only families who were experiencing challenging behavior with their children submitted their questionnaires, while those who felt that they were not experiencing challenging behavior with their children did not submit their questionnaires, thus skewing the results. What was found to be consistent with previous studies is that noncompliance was the most frequently occurring of the behavior problems experience in children with DS. This was followed by the behaviors of wandering and running away from adults and sitting and refusing to move.

Choi and Cheung (2016), whose study examined an after-school program for individuals with intellectual disability in Hong Kong noted that, unfortunately, such programs are few and far between in Hong Kong, and this absence of such programs can be considered a barrier to participation in physical activity for individuals with ID.

Stanish et al. (2016) found that the majority of adolescents with intellectual disabilities surveyed said that they want to do more physical activity than they are

currently participating in. This indicates that they may be facing barriers to physical activity that they are unaware of. Most of them did not indicate any restrictions from the barriers that were queried by the interview. Barriers identified by previous studies that they authors note include a lack of accessible programs and locations for participation in physical activity. Other barriers noted by the authors were a lack of friends to engage in PA with, lack of exercise knowledge, and a lack of or inadequate facilities. The interviewed adolescents did not report these barriers, leading the authors to suggest that these particular adolescents may have families that have been able to let them overcome them.

The study found that the adolescents with ID had a preference for physical activities which are performed with two or more people over their typically developing counterparts, suggesting that group oriented or social physical activities may be more beneficial in getting adolescents with ID engaged in physical activity. The adolescents with ID also reported physical activities as being difficult to learn, while the TD adolescents did not. This was perceived as a barrier.

### **3. What are the Facilitators and Barriers?**

A specific goal of Barr and Shields' (2011) study was to identify facilitators to participation in physical activity, the researchers believe that their study found more facilitators than previous studies. They also acknowledge that presence of more-recently implemented programs that promote integration and provide resources may have influenced their findings, as such programs have only become prevalent after the previous studies. The study showed that "children with Down syndrome were more likely

to engage in physical activity when their parents and families provided ongoing encouragement and were actively involved themselves or when there was social interaction as part of the activity" (p. 1029). The authors note that this is corroborated by findings in previous studies. The attributes of the child's condition (Down Syndrome) have the unusual dichotomy of being both a barrier and a facilitator in participation in physical activity. The presence of good communication and physical skills are facilitators. To counter the observed trend of participation in physical activity decreasing with age, it is suggested that children who have participated in early intervention programs (such as one-on-one therapy for promoting motor skill development) are less likely to have a decrease in physical activity as they age than those who did not participate.

In Alesi and Pepi's (2017) exploration of the beliefs of parents of children with Down Syndrome, the reporting from the parents indicated that about half of their children regularly participated in physical activity, and the other half participated at low and irregular intensities. The researchers corroborate this with previous research that indicates that most individuals with DS spend most of their time engaging in physical activity of a low intensity. They note the popularity of swimming and aquatic programs and their "wide range of physical benefits such as improvement in agility, cardiorespiratory fitness and behavioral patterns as well as motivation correlates such as self-esteem and physical self-image" (p 78). The parents interviewed as part of this study agreed with these benefits and the success of their children with swim programs. The researchers found that family can be a barrier to participation in physical activity for children with Down Syndrome. Ways in which the family can act as a barrier to participation in physical

activity include "worries regarding medical and psychological conditions linked to the specific disability" (p. 78). This influences the family to become overprotective of the child and "creates prejudices on reduced physical and behavioral skills...by decreasing...the participation to PA activity" (p. 78).

The study by Barr and Shields (2011) also found that while there is a facilitator in the parental understanding of the significance and importance of participation in physical activity, the children in the study were still quite inactive because this facilitator did not outweigh the barriers of negative attitudes and a lack of available programs.

The results of the study indicated that the parents found that family is an important facilitator to their children's participation in physical activity. The family provides encouragement and influence in choice of activities, since the individual with DS is limited in their freedom to choose due to their disabilities. The family is also important in providing emotional support and motivational support. Importantly, the parents interviewed acknowledged both the physical and psychological benefits of participation in physical activity. The concern over obesity was particularly important, according to both the researchers and previous studies. The family can act as a facilitator in preventing obesity by controlling and monitoring the child's food intake and modeling acceptable diet and physical activity behaviors.

Adamo, et al. (2015) determined that playground interventions have the effect of increasing moderate-to-vigorous physical activity by adding the novel intervention of video modeling. Previous playground interventions included the addition of new playground equipment, direct instruction, and novel playground markings, among others. The authors suggest that "the feasibility of mobile video technologies increases the

likelihood of teachers using this relatively simple practice, and the relative strength in visual learning for children with Down syndrome may make this intervention more effective than others" (p. 281). The positive outcomes of these interventions can be interpreted as facilitators to physical activity.

Choi and Cheung determined that the after-school program which was examined in their study could "benefit the psychosocial development of children with ID" (Choi and Cheung, 2016, p. 11). That would make well-structured and goal-oriented after-school programs, such as this one, a facilitator to participation in physical activity for individuals with ID.

Stanish et al. (2016) suggest that despite the barriers noted by their study, family encouragement can act as a facilitator to participation in physical activity, and can even be strong enough to overcome those barriers. The authors suggest the idea that "promoting the social aspects of physical activity may be particularly appealing for adolescents with ID, and encouraging them to try physically demanding and/or challenging activities may further promote proficiency and self-confidence" (p. 108).

Another significant finding of the study by Oliver, et al. was that variables which predicted the presence of a certain behavior differed from variables that predicted the actual severity of the behavior. Aggressive and destructive behaviors were predicted by the absence of speech in an individual. This can be considered a barrier, as when the individual does not speak, a dialogue addressing the aggressive and/or destructive behaviors is virtually impossible, thus taking away from time that could be spent on physical activity or any number of otherwise productive tasks.

Finally, An and Hodge (2013) conclude that "parents are the most crucial agents in the lives of their children in that they help shape the immediate environment where the child interacts" (p. 161). They found that the parents in the study were involved in the children's school environment and acted as advocates as well, which the authors believe contributed to the children's learning and development. A key aspect of their involvement in their children's education was direct and indirect communication and participation. This allows the authors to emphasize the "importance of people...in the educational process" (p. 161).

## **Chapter 5**

### **Conclusion and Future Research**

The final section of this synthesis will be for a final discussion on the critical mass articles, with special consideration given to what future research can be performed to more deeply examine the physical activity levels in children and adolescents with intellectual disability, their facilitators and barriers to physical activity, and strategies for management of their behavior.

#### **Conclusion**

The thirteen critical mass articles used in this synthesis showed that with regard to physical activity, the problem presented by the presence of intellectual disability in children is that they do not receive the recommended amount of physical activity. This is due mainly to the fact that much time must be spent on correcting or managing these behaviors before the child can even begin to participate in the physical (or any type of) activity. Some of the barriers that were found in the critical mass were self-injurious, aggressive, and destructive behaviors, lack of friends to engage in PA with, lack of exercise knowledge, and a lack of or inadequate facilities and programming for children with intellectual disabilities. Facilitators for children with intellectual disabilities were parental and family support by provided ongoing encouragement and were actively involved in their children's physical activity, playground interventions and the use of technology and additional after school programming.

#### **Future Research**

Research on the levels of physical activity in children and adolescents with intellectual disability, their facilitators and barriers to physical activity, and the management of their behavior must continue if we are to better understand these issues and improve physical activity opportunities for this population.

The qualitative studies included in this synthesis presented an excellent approach to discovering the actual opinions and feelings of those who have intellectual disability or those who are affected by it (parents, caregivers, etc.) in regards to physical activity, particularly its social impact. These types of studies can provide insight into how things really are for those with intellectual disability more so than quantitative studies. A severe limitation to these kinds of studies is that their very nature is time and resource consuming, given the interviews and questionnaires that are the best way to gather this type of data.

Another area which would be well investigated by a qualitative study would be that of how disruptive behaviors are managed in the classroom. Teachers and other classroom personnel can provide real-life anecdotes and experiences regarding how to manage the disruptive behavior of students with intellectual disability and the effects that this behavior has on the overall classroom experience. Patel, et al. (2018) suggest that "endorsed items and open-ended responses about behavior problems indicate the need for developing a more detailed, formal measure to assess the full scope of common behavioral concerns for children and young adults with Down syndrome" (p. 238).

In regards to their study on parental involvement in physical education for students with developmental disabilities, An and Hodge (2013) acknowledge that their study cannot speak for families of all socioeconomic backgrounds, and that future studies

should consider families from diverse backgrounds, cultures, and perspectives (CITE). Robertson, et al. (2018) also noted that future studies similar to theirs should consider the "association of a wider range of variables (eg, ethnicity, disability) to participation in sport/exercise" (p. 252).

The decline in participation in physical activity as those with intellectual disability progress through adolescence is particularly concerning and worth investigating further. Studies like the one by Adamo, et al, (2015) in which an experiment was set up with baseline, training, and intervention portions, albeit with young children, would work well for investigating why there is this decline in physical activity through adolescence. A study like this could also potential ways to reverse this trend of a decline in physical activity. The researchers also suggest that "future studies might examine the ecological validity of similar video-plus-prompting procedures. Additional studies using peer assistance should be considered, because the addition of peer modeling or prompting may decrease the need for ongoing adult prompts" (p. 281). They suggest that this type of intervention should be performed on children with a variety of disabilities, not just on those with Down Syndrome, as their study focused on.

Participation in physical activity is something that has been shown to have a positive effect on an individual's quality of life, regardless of whether or not they have an intellectual disability. However, it is much more important for individuals with a form of intellectual disability to participate in physical activity, as they have a tendency towards more sedentary activities as they age. Parents, guardians, and caregivers of children and adolescents with intellectual disability can be advocates for their children in their championing and promoting the importance of physical activity. Additional research

should be conducted in how parents are already doing so, and additional ways that they can champion and promote the importance of physical activity for their children.

## References

- Adamo, E. K., Wu, J., Wolery, M., Hemmeter, M., Ledford, J. R., & Barton, E. E. (2015). Using video modeling, prompting, and behavior-specific praise to increase moderate-to-vigorous physical activity for young children with Down syndrome. *Journal of Early Intervention, 34*(4), 270-285.  
doi:10.1177/1053815115620211
- Alesi, M., & Pepi, A. (2015, September 7). Physical activity engagement in young people with Down syndrome: investigating parental beliefs. *Journal of Applied Research in Intellectual Disabilities, 30*, 71-83. doi:10.1111/jar.12220
- An, J., & Hodge, S. R. (2013). Exploring the meaning of parental involvement in physical education for students with developmental disabilities. *Adapted Physical Activity Quarterly, 29*, 147-163. Retrieved from <https://brockport.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=86172858&site=ehost-live>
- Barr, M., & Shields, N. (2011, November). Identifying the barrier and facilitators to participation in physical activity for children with Down syndrome. *Journal of Intellectual Disability Research, 55*(11), 1020-1033. doi:10.1111/j.1365-2788.2011.01425.x
- Barriers. (n.d.). *Oxford Dictionaries*. Retrieved from <https://en.oxforddictionaries.com/definition/barrier>
- Challenging Behavior. (2016). Fegan.

- Choi, P., & Cheung, S. (2018). Behavioral characteristics of individuals with down syndrome. *Journal of Mental Health Research in Intellectual Disabilities, 11*(3), 221-246. doi:10.1123/APAQ.2014-0213
- Downs, S. J., Fairclough, S. J., Knowles, Z. R., & Boddy, L. M. (2016). Physical activity patterns in youth with intellectual disabilities. *Adapted Physical Activity Quarterly, 33*, 374-390. doi:10.1123/APAQ.2015-0053
- Esposito, P. E., MacDonald, M., Hornyak, J. E., & Ulrich, D. A. (2012). Physical activity patterns of youth with Down syndrome. *Intellectual and Developmental Disabilities, 50*(2), 109-119. doi:10.1352/1934-9556-50.2.109
- Facilitators. (n.d.). *Merriam-Webster Dictionary*. Retrieved from <https://www.merriam-webster.com/dictionary/facilitator>
- Fegan, P. L. (2016). *Adapted physical education and sport*. Champaign, IL: Human Kinetics.
- Intellectual Disability. (n.d.). *Individuals with Disabilities Education*. Retrieved from <https://sites.ed.gov/idea/>.
- Lee, Y., & Jeoung, B. (2016). The relationship between the behavior problems and motor skills of students with intellectual disabilities. *Journal of Exercise Rehabilitation, 12*(6), 598-603. doi/10.12965/jer.1632854.427
- Oliver, C., Petty, J., Ruddick, L., & Bacarese-Hamilton, M. (2012). The association between repetitive, self-injurious and aggressive behavior in children with severe

intellectual disability [Electronic version]. *Journal of Autism and Developmental Disorders*, 42, 910-919. doi:10.1007/s10803-011-1320-z

Patel, L., Wolter-Warmerdam, K., Leifer, N., & Hickey, F. (2018). Behavioral characteristics of individuals with down syndrome. *Journal of Mental Health Research in Intellectual Disabilities*, 11(3), 221-246.  
doi:10.1080/19315864.2018.1481473

Physical Activity. (n.d.). *World Health Organization*. Retrieved from

<https://www.who.int/dietphysicalactivity/pa/en/>

Poppes, P., Van der Putten, A.A.J., & Vlaskamp, C. (2014, June). Addressing challenging behavior in people with profound intellectual and multiple disabilities: analyzing the effects of daily practice. *Journal of Policy and Practice in Intellectual Disabilities*, 11(2), 128-136.

Rimmer, H. J., Yamaki, K., Lowry, M. B., Wang, E., Vogel, C. L. (2010). Obesity and obesity-related secondary conditions in adolescents with intellectual/developmental disabilities. *Journal of Intellectual Disability Research*, 54(9), 787-794. doi-org.brockport.idm.oclc.org/10.1111/j.1365-2788.2010.01305.x

Robertson, J., Emerson, E., Baines, S., & Hatton, C. (2018). Self-reported participation in sport/exercise among adolescents and young adults with and without mild to moderate intellectual disability. *Journal of Physical Activity and Health*, 15, 247-254. doi:10.1123/jpah.2017-0035

Stanish, H. I., Curtin, C., Must, A., Phillips, S., Maslin, M., & Bandini, L. G. (2016). Physical activity enjoyment, perceived barriers, and beliefs among adolescents with and without intellectual disabilities. *Journal of Physical Activity and Health*, *13*, 102-110. doi:10.1123/jpah.2014-0548

## Appendix

### Data Analysis Article Grid

Author	Title	Source	Purpose	Methods & Procedures	Analysis	Findings	Discussion/ Recommendations
Downs, Fairclough, Knowles, & Boddy, 2016	Physical Activity Patterns in Youth With Intellectual Disabilities	Adapted Physical Activity Quarterly	Evaluate regular physical activity patterns of children with intellectual disability.	The sample size consisted of 70 participants. Ages ranged from 5-15 years old. Their PA was monitored for seven days by using accelerometers. 32 participants were in the final analysis.	Physical Activity was monitored by using accelerometers. 32 participants were included in the final analysis.	<p>Physical activity levels were low in the group studied.</p> <p>Participants demonstrated random and short bursts of physical activity.</p> <p>As the intensity and duration of the physical activity increased the number of continuous sessions of physical activity decreased.</p> <p>Physical activity levels were not impacted by sex, ID group, age, and day of the week.</p>	The results of this study showed that the participants did not meet the minimum recommended amount of health-enhancing physical activity as set forth by the Chief Medical Officer of the United Kingdom. The data obtained by the accelerometers showed that most of the participants' engagement in physical activity was in short (less than 15 seconds) bouts, with the frequency of the bouts decreasing as the duration of bouts increased. This is in line with previous findings noted by the authors. Another previous study noted by the authors that corroborated their findings was that of an age-related decline in participation in physical activity for those with ID.
Esposito, MacDonald, Hornyak, & Ulrich, 2012	Physical Activity Patterns in Youth With Down Syndrome	Intellectual and Developmental Disabilities	To explore the levels of physical activity children with Down Syndrome participate in.	Participants were recruited from Down Syndrome support groups in the state of Michigan. 104 participants (47 female, 57 male) aged 8-16 years were recruited. Participants had no physical disability or medical condition that would prevent their participation in physical activity. The Actical accelerometer was used to measure physical activity over a period of 7 days. The data were able to be time-stamped and gave information on the length and intensity of the physical	The analysis was performed using the SPSS version 17.0. The participants were split into four age groups approximating grades 3, 5, 7 and 9). Patterns of physical activity and relationships among percentage of body fat, BMI, PA level, and age were also explored.	<p>Generally, physical activity showed a marked decrease as the children's age increased.</p> <p>Aggregating moderate and vigorous PA found that the 9th grade group was significantly less active than the 5th grade group. The 7th grade group was significantly more sedentary than the 5th grade group.</p> <p>Weak relationships were found between physical activity and BMI, and physical activity and body fat.</p> <p>A small but significant relationship was found between body fat and BMI and aging. The children</p>	This study found that children with DS do not meet the surgeon general's recommendation of having 60 or more minutes of moderate to vigorous physical activity each day. This is cause for concern, since this population is already at an elevated risk of being overweight. The findings that the 14-15 year age group was more sedentary than the younger groups is in line with previous studies that show that the same holds true for their typically developing peers in the same age groups. Likely reasons for this decrease in physical activity are that the "informal bouts of activity when

				<p>activity. The accelerometer was worn above the right hip using an elastic waistband. The monitor needed to be worn for a minimum of 10 hours each day and for at least 4 of the 7 days of the monitoring period, as suggested by previously established literature as guidelines for recording reliable and valid data from an accelerometer. Sedentary activity was given counts less than 25, light physical activity 25-375, moderate physical activity 376-1625, and vigorous physical activity greater than 1626.</p>		<p>in this sample were not meeting the minimum guidelines of a daily 60 minutes of physical activity.</p>	<p>children play" decrease as they age. This intermittent bouts become replaced with more structured activities and increased responsibilities. "The significant drop in moderate and vigorous physical activity as children age is an area of concern." (p 113) The researchers indicate that previous studies have shown physical fitness in the DS population has shown improved health and increased performance in daily tasks. Their recommendation is that health professionals continue to "improve or increase physical activity to keep these individuals independent and productive." (p 113) 45.5% of the participants were overweight or obese for their age or gender, which is supportive of previous studies and literature which estimates the percentage of those with DS or other ID that have obesity between 28% and 59%.</p>
<p>Robertson, Emerson, Baines, &amp; Hatton, 2018</p>	<p>Self-Reported Participation in Sport/Exercise Among Adolescents and Young Adults With and Without Mild to Moderate Intellectual Disability</p>	<p>Journal of Physical Activity and Health</p>	<p>Explores the participation patterns of children and adolescents in physical activity with and without mild to moderate intellectual disabilities.</p>	<p>The study is based on a secondary analysis of the data collected by waves 1-7 of Next Steps, an annual panel study which followed a cohort from their early adolescence through adulthood. The study began following the children in 2004 when they were aged 13-14 years. The sample size at wave 1 was 15,770 children, and they were followed up yearly until 2010 when they were aged 19-20 years. Based on information from the national pupil database (NPD), 97% were found to have special educational needs (SEN).</p>	<p>Simple bivariate comparisons were made between the participants with and without ID in regards to their frequency of participation in sport and exercise in the first stage of analysis. In the final stage, the strength of the association between ID and frequency in the participation of sport or exercise while controlling between-group differences. All analysis was done using the IBM SPSS 22 software.</p>	<p>Frequency of participation in sport and exercise was higher among those without ID, at all waves. Females with ID were more disadvantaged compared to males with ID. At wave 2, males with ID had a higher likelihood of participation in sport if they were not being bullied. At wave 7, males with ID were more likely to participate if they had participated at wave 2 and were brought up in a single parent household. As the researchers expected, the participants with ID were much more likely to have been brought up in lower SEP families and neighborhoods, be bullied and have</p>	<p>"Sport/exercise participation rates were consistently lower for adolescents and young people with mild to moderate intellectual disability than for their peers without intellectual disability" (p 250). Boys with or without ID, aged 14-15, who spent more time with friends and were not bullied or threatened with violence were more likely to frequently participate in sport and exercise activities. The likelihood was twice as much, however, for girls with ID than their TD peers. Strengths of this study were its large population-based sample, the various measures of household and socioeconomic disadvantage, and "the</p>

				<p>In the first 4 waves, data were collected by face-to-face interviews with the child and her or his parents. The remaining 3 waves conducted the interviews by the child's method of choosing. At waves 1, 2, and 4, they were asked how often they do sports, and responded on a scale of 1 to 6, most days to never, respectively. At waves 6 and 7, they were asked how often they do any type of physical exercise, with the responses being the same.</p>		<p>fewer friends, than their mainstream peers.</p>	<p>use of multiple imputation methods to take account of item nonresponse on sociodemographic variables." (p 252)  A severe limitation of this stud was that the actual measurement of individuals' participation in physical activity was based solely on the response to a single question whose wording changed over the course of the study, depending on which wave was being asked. "It is clear that adolescents and young adults with mild to moderate intellectual disability participated in less sport/exercise than peers without intellectual disability, with the difference being particularly marked for sports and for women." (p 252)  The authors acknowledge that, unfortunately, there is very little evidence on how to improve the participation rates in physical activity among those youths with intellectual disabilities. The study found that common barriers to physical activity for individuals with intellectual disability are cost, a lack of support, a lack of awareness of the available options, and transportation. The authors note a study that suggested that the geographical centralization of certain sports programs for those with intellectual disability restricted participation due to increased travel times and expenses. Safety reasons may prevent individuals from participating in activities, such as walking or biking to school or other locations.</p>
Lee & Jeoung, 2016	The relationship between the behavior problems and	Journal of Exercise Rehabilitation	The study's purpose was to discover if there is a relationship between motor	The participants in the study were 117 students with ID (38 female, 79 male). All attended special	The IBM SPSS was used to analyze the data. To examine the relationship between cognitive	Aggressive behavior was found to be associated with the BOTMP-2's fine motor subdomain.	In the subdomains of problematic behavior that the researchers identified, they found that "social problems

	motor skills of students with intellectual disability		skills and behavior problems of students with intellectual disabilities.	education schools in South Korea. The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOTMP-2) standards test was used for the basis of this test. It was categorized into the four composite motor domains of fine motor control and integration, manual coordination, body coordination and balance, and strength and agility. Each participant was rated by three researchers on the BOTMP-2 and their average scores were calculated. Using the Korean version of the Child Behavior Checklist (K-CBCL), the children were surveyed to evaluate their problematic behaviors. Using the problematic behavior syndrome scale part of the checklist, which consists of 8 subscales to measure withdrawal, somatic complaint, anxiety and depression, social immaturity, thought problems, attention problems, rule breaking, and aggression. Each of the 119 items on the scale are rated on a scale of 0 points (none), 1 point (infrequent or mild), 2 points (frequent or severe). The range of possible scores is 0-234. The score can then be converted into a standardized T score. A T score greater than 63 is considered to be in the clinical range.	function and motor skills, a bivariate correlation analysis was performed. On the motor skill subdomains that showed significant correlation a line regression was performed to analyze the effects of the subdomains on cognitive function. The level of significance was set at $P < 0.05$ .	Social problems were correlated with balance, speed and agility, bilateral correlation, strength and upper limb coordination. The participants' anxiety and depression score is predicted to have an increase of 0.16 for every 1 point increase in the motor skill manual dexterity subdomains. The social problem score was found to decrease by -0.28 as speed and agility scores increase by 1. The attention problem score is predicted to decrease by -0.22 as the participants' bilateral coordination score increases. As the fine motor score increases by 1, the aggressive behavior score is predicted to decrease by 0.21.	were associated with the motor skill developmental subdomains of bilateral coordination, balance, speed and agility, upper limb coordination, and strength." (p601) This proves that social problems can be improved through improved coordination and overall motor development. Fine motor skill development is necessary for the improvement of aggressive behavior in individuals with ID. Manual dexterity was found to be correlated with the anxiety/depression subdomain. Overall, the researchers conclude that there is a relationship between brain functions that cause problematic behaviors and brain areas that control motor function.
Patel, Wolter-Warmerdam, Leifer, & Hickey, 2018	Behavioral Characteristics of Individuals	Journal of Mental Health Research in	The purpose of this study is to examine the behavior	Data were collected on a total of 274 children with Down Syndrome. Criteria	The demographic and clinical characteristics of the data set had	93.8% of the participants showed at least one challenging behavior	While previous studies suggest a range of 18-43% of children with DS having behavioral

	with Down Syndrome	Intellectual Disabilities	problems that individuals with Down Syndrome experience. This is to be done by identifying behavioral problems that are observed by parents but not measured by standards, and examining how much these behaviors are impacted by language, gender, and age.	included having a diagnosis of DS, receiving care at the Sie clinic in Colorado, and being 2-22 years old. 2.6% of the sample has translocation DS and 1.1% had mosaicism DS. The Down Syndrome Behavior Clinical Form was developed in 2012 to address patient behavioral changes, and was used to gather data for this study. The form was administered to the parents of all of the children a week before their clinical appointment, and participation was voluntary. The form identified and evaluated 16 behavioral challenges. Examples were included so that parents could easily identify the behaviors. Parents then indicated the frequency of the behavior and their concern of each behavior.	descriptive statistics performed on them. To determine any significant associations between gender, age and speech, cumulative odds ordinal logistic regressions were performed. In addition, T-test and chi-square tests for association were performed between parents of children with DS who completed the form and non respondents, expressive language impairment status and gender, age, household, and health.	identified on the form at least weekly or daily. Noncompliance was the most frequently occurring, at 77%, followed by running and wandering at 75% and sitting and refusing to move at 71%. Of the participants who displayed the behaviors daily or weekly, self-stimulatory behaviors were the most often at 85%, followed by noncompliance at 77% and talking to self at 75%.	challenges, this study shows a significantly higher rate of 93.8%. The authors note that due to the nature of the study involving a questionnaire, families may have been more critical in their assessment of their children's behavior, as they were examining these behaviors in greater detail than usual. It may also be that only families who were experiencing challenging behavior with their children submitted their questionnaires, while those who felt that they were not experiencing challenging behavior with their children did not submit their questionnaires, thus skewing the results. What was found to be consistent with previous studies is that noncompliance was the most frequently occurring of the behavior problems experience in children with DS. This was followed by the behaviors of wandering and running away from adults and sitting and refusing to move.
Oliver, Petty, Ruddick, Bacarese-Hamilton, 2012	The Association Between Repetitive, Self-Injurious and Aggressive Behavior in Children With Severe Intellectual Disability	Journal of Autism and Developmental Disorders	To explore the association between repetitive, self-injurious and aggressive behavior in children with severe intellectual disability.	A sample of 943 children were selected out of 1,096 from 17 special schools for children with ID. The children ranged in age from 4yrs 0mos to 18yrs 11mos (M = 10.88, SD = 3.87). 35% of the students were completely or partially immobile without the help of aids, 48% completely or partially incontinent, 18.8% with a visual impairment, and 10.9% with a hearing impairment. These were determined by the administration of the Self-Help and Behavior rating	The adapted behavior variable was split by the median in order to create two groups, one representing a "more severe deficit" and one representing a "less severe deficit". The sample was also split into three age categories so that the younger children did not make up the majority of the "more severe" group. In regards to speech, students scoring a 1 were sorted into a "no speech" group, while those scoring a 2 or 3 were sorted into a "speech" group. The challenging	In regards to challenging behavior being present, 153 students (17%) showed self-injurious behavior, 356 (39.5%) aggressive behavior, and 267 (29.6%) destructive behavior. Odds ratios for each potential risk marker. Differences as age increases were investigated by calculating odds ratios for the entire sample, the 4yrs-10yrs 11mos range and the 11yrs-18yrs 11mos range. In all of the groups, a severe deficit in adaptive behavior was associated with self-injury. Severe aggression was found in the total sample, while destructive	This study found that the prevalence of self-injurious, aggressive, and destructive behaviors was comparable to the rates reported in previous studies. These behaviors were also significantly associated with the diagnosis of autism. The researchers identified a "key finding...in the identification of the presence of high frequency repetitive or ritualistic behavior as a robust risk marker for self-injurious, aggressive, destructive, and multiple behaviors." (p 915) Another significant finding of the study was that variables which predicted the presence of a certain behavior differed from variables

				<p>scale. This scale was divided into a self-help skills and general abilities section, and a behavior and emotional difficulties section. A three-point scale was used to score, with 1 indicating a severe incapacity, 2 indicating a mild incapacity, and a 3 indicating none. From the data, two scales are derived: Social and Physical Incapacity Scale (SPI) and the Speech, Self-Help and Literacy Scale (SSL). The scales were completed by the students' teachers for each child in their class. A five-point scale was used to score an additional five items (aggression, destructive behavior, hyperactivity, repetitive and ritualistic behavior, and self-injurious behavior). This scale ranged from 1 indicating "never" to 5 indicating "very often". These five items were also rated on a scale of management difficulty (1 for "not difficult" through 5 for "seriously difficult").</p>	<p>behavior data were split into categories of "never" (1 score), "moderate" (2-3 score) and "highly frequent" (4-5 score).</p>	<p>behavior was found in the older group, and severe destructive behavior present in all groups. The absence of speech was found to be strongly associated with the presence of self-injury.</p>	<p>that predicted the actual severity of the behavior. Aggressive and destructive behaviors were predicted by the absence of speech in an individual. This can be considered a barrier, as when the individual does not speak, a dialogue addressing the aggressive and/or destructive behaviors in virtually impossible, thus taking away from time that could be spent on physical activity or any number of otherwise productive tasks.</p>
<p>Poppes, Van der Putten, &amp; Valaskamp, 2014</p>	<p>Addressing Challenging Behavior in People With Profound Intellectual and Multiple Disabilities: Analyzing the Effects of Daily Practice</p>	<p>Journal of Policy and Practice of Intellectual Disabilities</p>	<p>Since some people with profound intellectual and multiple disabilities (PIMD) are at a higher risk of developing challenging behavior, this study explores how these behaviors are addressed in daily practice at residential facilities.</p>	<p>Six residential facilities in the Netherlands provided an existing database which contained data on the prevalence, frequency, and severity of challenging behavior of 181 adults and children with PIMD. The Dutch version of the Behavior Problem Inventory (BPI) was used to identify 3 types challenging behavior: self-injurious, stereotypical, and</p>	<p>The IPs were analyzed for challenging behaviors and compared to the results of the BPI. IPs were analyzed to see if the behaviors were described in the IP, along with whether or not goals of reducing the behavior were included as well.</p>	<p>The study demonstrated that all of the participants exhibited challenging behaviors on a daily basis, nearly half of the behaviors were not noted on the IPs. Frequency, setting, and consequences of the behaviors were not mentioned on the IPs. If mentioned at all, it is in very vague terms.</p>	<p>A serious limitation of the study was that the sample was not random, but rather selected from those who already were known to exhibit serious challenging behaviors.</p> <p>In the Netherlands, all with PIMD have only one IP, and their IP theoretically should contain extensive documentation of their challenging behavior. It was found, however, that this is not the case, and the IPs do not necessarily reflect the severity of the problems</p>

				<p>destructive or aggressive. The scale consists of 52 items and are scored on a frequency scale of 0 to 4 (never to hourly) and a perceived severity scale of 1 to 3 (slight to severe). From there, the researchers selected a sample of the 25% "most severe" cases. 30 participants were ultimately selected, 10 women and 20 men aged 2-65. 392 behaviors were scored in total, and scored as 106 self-injurious, 219 stereotypical, and 67 aggressive. It was shown that self-injurious behavior happened on a weekly and daily basis too. After selecting participants with the most serious and frequent behaviors, their facilities were contacted and their IPs (support plans) were obtained and analyzed. Challenging behavior should be described within the IPs.</p>			<p>nor document all that they should. The types of challenging behavior covered in this study should be considered a problem with a huge impact on the individual's quality of life, and it is expected that interventions or strategies to deal with these behaviors would be addressed as well.</p>
Alesi & Pepi, 2017	Physical Activity Engagement in Young People with Down Syndrome: Investigating Parental Beliefs	Journal of Applied Research in Intellectual Disabilities	The purpose of this study was to explore the beliefs of parents of children with Down Syndrome, in regards to facilitators, barriers, and benefits of physical activity.	The study's participants were 13 families with children with Down Syndrome, with interviews with 7 mothers and 6 fathers. Parents ranged in age from 37 to 69, with the average being 51.85, the children were 4 girls and 9 boys aged 7 to 27, all with moderate intellectual disability. The families were recruited through gyms and non-profit organizations that offered support and resources for people and families with Down Syndrome. The three criteria participants had to meet were that they	The researchers chose a thematic content analysis approach because of its flexibility to identify, report and analyze themes and patterns from qualitative data. From this it was divided into 6 phases: 1, the interviews were transcribed and then read many times by a team of two other researchers; 2, the transcripts were then clustered into patterns which highlighted common themes based on quotes which identified meaningful themes; 3, the frequency of the meaningful quotes was counted	Only one of the children did not have any participation in PA. Otherwise, it was found that the children participated in different types of PA, the most common being swimming, followed by football, basketball, tennis, dance, and martial arts. The frequency of the children's participation was once for 7, twice for 4, and daily for 1. Parents reported emotional reactions of enjoyment, boredom, and resignation.  The three main themes of facilitation that were found were support from the	The reporting from the parents that about half of their children regularly participated in physical activity, and the other half participated at low and irregular intensities. The researchers corroborate this with previous research that indicates that most individuals with DS spend most of their time engaging in physical activity of a low intensity. They note the popularity of swimming and aquatic programs and their "wide range of physical benefits such as improvement in agility, cardiorespiratory fitness and behavioral patterns as well as motivation correlates such as self-esteem and physical self-image." (p 78). The

			<p>had to be the parent of a child with DS, speak Italian, and the child must be between the ages of 6 and 30.</p> <p>The researchers created a semi-structured interview split into three parts. The first part contained open ended questions aimed at collecting data on the children's personal and medical history, the second part contained open questions meant to explore the child's participation in PA (sport activities, who initiated the activities, emotional reactions), the third part analyzed the parents' beliefs on what facilitates or obstacles the children's participation in PA. Each interview lasted no more than 25 minutes and were all conducted by the same researcher.</p>	<p>to identify the most important themes; 4, themes were checked against each other and given names; 5, a thematic map was made to show the themes into two different figures; 6, quotes that were found to be significant were used to create a report.</p>	<p>family, availability of APA instructors and gyms, and the quality of the activity as a challenging opportunity.</p> <p>The three main barrier themes that were identified were lack of APA instructors and gyms, characteristics of DS, and parents' own worries.</p>	<p>parents interviewed as part of this study agreed with these benefits and the success of their children with swim programs.</p> <p>The results of the study indicated that the parents found that family is both an important facilitator and barrier to their children's participation in physical activity. The family provides encouragement and influence in choice of activities, since the individual with DS is limited in their freedom to choose due to their disabilities. The family is also important in providing emotional support and motivational support. Ways in which the family can act as a barrier to participation in physical activity include "worries regarding medical and psychological conditions linked to the specific disability." (p 78) This influences the family to become overprotective of the child and "creates prejudices on reduced physical and behavioral skills...by decreasing...the participation to PA activity." (p 78)</p> <p>The researchers identified the most significant barrier to participation in physical activity to be the combination of the lack of APA expert coaches and educators and a lack of awareness in how to be inclusive of individuals with DS in physical activity. Environmental factors reinforce this through the absence of accessible services and facilities. The researchers do concede, however, that this may be reflective of the particular area in which the study took place. Importantly, the parents interviewed acknowledged both the physical and</p>
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							psychological benefits of participation in physical activity. The concern over obesity was particularly important, according to both the researchers and previous studies. The family can act as a facilitator in preventing obesity by controlling and monitoring the child's food intake and modeling acceptable diet and physical activity behaviors. Parents who fail to do this can then be considered a barrier to the child's health and participation in physical activity.
Barr & Shields, 2011	Identifying the barriers and facilitators to participation in physical activity for children with Down syndrome	Journal of Intellectual Disability Research	Identifying the barriers and facilitators to participation in physical activity for children with Down syndrome	18 in-depth interviews with the parents of children with Down Syndrome were conducted over the course of the study. The purpose of these interviews was to find what made participation in physical activity difficult for their children. Participants were recruited through a non-profit membership-based organization that is an advocate for those with Down Syndrome and their families. The sample size grew over the course of the study as more participants signed up, eventually totaling 20 parents of 18 children (10 girls and 6 boys) between the ages of 2-17 years, with the mean being 9.9 years. A broad range of physical activities were reported, including, swimming, dance, tennis, karate, gymnastics, etc. The interviews lasted 20-50 minutes and were conducted by one researcher, with four of the interviews taking	Confidentiality was maintained by replacing real names with pseudonyms. Otherwise, all interviews were transcribed verbatim. In order to make sure that the themes were pulled from the data, thematic analysis was used. Transcripts were read in depth by the two researchers several times. The initial round of coding was divided into as many categories as possible, and then grouped into appropriate themes. NVivo software was used for coding and recording. Transcripts were sent back to the respective interviewees for them to check that their views were represented correctly.	There were four main facilitation themes identified: positive role of the family, opportunities for social interaction with peers, accessible structured programs with proper adaptations, and children who were physically skilled and determined to succeed. There were four main barrier themes found as well: typical Down Syndrome characteristics, competition with other family responsibilities, diminished physical and behavioral skills, and a lack of programs that are accessible.	The study showed that "children with Down syndrome were more likely to engage in physical activity when their parents and families provided ongoing encouragement and were actively involved themselves or when there was social interaction as part of the activity." (p 1029) The authors note that this is corroborated by findings in previous studies. The attributes of the child's condition (Down Syndrome) have the unusual dichotomy of being both a barrier and a facilitator in participation in physical activity. Obesity, congenital heart disease, and diminished cognitive ability are barriers, while the presence of good communication and physical skills are facilitators. Another potential barrier noted by the researchers was that of "parental over-protectiveness or concerns that activity might exacerbate these conditions." (p 1030) To counter the observed trend of participation in physical activity decreasing with age, it is suggested that children who have participated in early intervention programs (such as one-on-one

				<p>place over the phone. Both parents were interviewed together when available. An interview schedule was created in order to guide the conversation and ensure similarities between all interviews. All questions were open ended so that participants could share their own unique experiences.</p>			<p>therapy for promoting motor skill development) are less likely to have a decrease in physical activity as they age than those who did not participate. Since a specific goal for the study was to identify facilitators to participation in physical activity, the researchers believe that their study found more facilitators than previous studies. They also acknowledge that presence of more-recently implemented programs that promote integration and provide resources may have influenced their findings, as such programs have only become prevalent after the previous studies. Similar to children with other intellectual and physical disabilities, this study found that children with DS had difficulties in participation in physical activity due to "a lack of social, cognitive and physical skills." (p 1030) The main difference between the barriers for those with DS and those with other disabilities was that the former's more significant barriers were cognitive function and communication skills, and that the latter's included a lack of physical access, assistive devices and other equipment. This study also found that while there is a facilitator of parents understanding the significance and importance of participation in physical activity, the children in the study were still quite inactive because this facilitator did not outweigh the barriers of negative attitudes and a lack of available programs.</p>
Stanish, Curtin, Must, Phillips, Maslin, & Bandini, 2016	Physical Activity Enjoyment, Perceived Barriers, and	Journal of Physical Activity and Health	The study compared physical activity enjoyment and	For the study, both ID and TD adolescents were recruited. Sources used to recruit were	The characteristics of the participants were summarized through means, medians, and	38 ID adolescents and 60 TD adolescents ultimately completed the study. The	The researchers found it significant that the majority of the adolescents with ID that they surveyed said that

Beliefs Among Adolescents With and Without Intellectual Disabilities		personal characteristics of children with intellectual disabilities to their typically developing peers.	schools for ID, community organizations, disability agencies, etc. The participants were screened by a phone interview with a parent, followed by a 1 to 2 hour study visit. The Kaufman Brief Intelligence Test (KBIT) was administered to those with ID, to make sure that they scored a 75 or lower. The participants were given a questionnaire to gather information directly from them on factors that influence their participation in PA. There were 33 items on the form, with 9 targeting PA enjoyment and preferences. After administration of the questionnaire, interviews were conducted with each of the participants by a trained research assistant.	percentages and were then compared by t tests and $\chi^2$ tests. The Pearson $\chi^2$ or Fisher exact test were used to determine the statistical significance in the response percentages between the groups. When differences between the ID and the TD groups were statistically significant at $P < 10$ , the results were then stratified by sex. All analyses were performed using the SAS version 9.2 and IBM SPSS version 20 software.	enjoyment of participating in PE and team sports did not differ between the TD and ID adolescents. The majority of both groups participated in sports, and reported it as "a lot of fun." There was also very little difference in how the two groups felt about non-PA, such as video games or watching TV. In regards to barriers about participation in PA, significantly more of those with ID did not think exercise and sports were boring (78%) compared with their TD counterparts (63%). However, they were less likely to think that they were good at sports and exercise compared to their TD counterparts. All TD adolescents reported that they do not think it is hard to learn sports and exercise, compared to 59% of the ID group.	they want to do more physical activity than they are currently participating in. This indicates that they may be facing barriers to physical activity that they are unaware of. Most of them did not indicate any restrictions from the barriers that were queried by the interview. Barriers identified by previous studies that they authors note include a lack of accessible programs and locations for participation in physical activity. Nearly all of the adolescents interviewed revealed that they felt good about their abilities in physical activities, which "suggests that a lack of self-confidence in this realm may not be a barrier that needs for be addressed." (p 108) Other barriers noted by the authors were a lack of friends to engage in PA with, lack of exercise knowledge, and a lack of or inadequate facilities. The interviewed adolescents did not report these barriers, leading the authors to suggest that these particular adolescents may have families that have been able to let them overcome them. Thus, family encouragement can act as a facilitator to participation in physical activity. The study found that the adolescents with ID had a preference for physical activities which are performed with two or more people over the TD adolescents, suggesting that group oriented or social physical activities may be more beneficial in getting adolescents with ID engaged in physical activity. The adolescents with ID also reported physical activities as being difficult to learn, while the TD adolescents did
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							not. This was perceived as a barrier. The authors suggest the idea that "promoting the social aspects of physical activity may be particularly appealing for adolescents with ID, and encouraging them to try physically demanding and/or challenging activities may further promote proficiency and self-confidence." (p. 108)
An & Hodge, 2013	Exploring the Meaning of Parental Involvement in Physical Education for Students With Developmental Disabilities	Adapted Physical Activity Quarterly	Examine parental involvement experiences in physical education and perspectives of parents and students with developmental disabilities.	A sample of 8 Caucasian parents of children with developmental disabilities participated in the study. 3 were mothers of children with DS, 1 mother of a child with a developmental delay, and 2 mothers and 1 couple with children with ASD. All families were of middle-class suburban status. Children in elementary school attended PE twice a week and those in middle school 5 days a week. All of the children received APE services once a week except for one child. The main source of data collection for the study was semi-structured, face-to-face interviews and transcribed verbatim. Questions asked of the parents were to find out how they felt about their child's participation in PE, their own involvement in it. Three interviews were conducted with each of the 8 parents over the course of 3 weeks. The first interview was about the experiences of their own involvement, the second about their relationships with the GPE	To examine the structure, essence, and meaning of the parents' experiences, the researchers used thematic analysis. Through reading the transcripts of the interviews and the journals, the data were coded by structuring descriptions, organizing into primary themes and subthemes.	The three themes that the researchers found were parents wanting to be an advocate for their child, understanding the big picture, and collaborative partnerships undeveloped in GPE. Advocating subthemes were that of assuring their child's learning and success, and working as a team. Big picture subthemes were that of unending communication, having a supporting role in the school, and networking with others. Undeveloped collaborative partnerships subthemes included limited interest in GPE program and gathering information from others.	The authors of this study conclude that "parents are the most crucial agents in the lives of their children in that they help shape the immediate environment where the child interacts." (p 161) They found that the parents in the study were involved in the children's school environment and acted as advocates as well, which the authors believe contributed to the children's learning and development. A key aspect of their involvement in their children's education was direct and indirect communication and participation. This allows the authors to emphasize the "importance of people...in the educational process." (p 161)

				teachers, and finally the significance of artifacts like videos and IEP documents in the final interview. The interviewer also kept a journal of her own interpretations of each interview.			
Adamo, Wu, Wolery, Hemmeter, Ledford, & Barton, 2015	Using Video Modeling, Prompting and Behavior-Specific Praise to Increase Moderate-to-Vigorous Physical Activity for Young Children With Down Syndrome	Journal of Early intervention	Examine if video modeling, prompting, and behavior specific praise can increase physical activity among levels in children with down syndrome.	<p>The sample for the study were three preschoolers with Down Syndrome. In addition, two preschoolers without any disabilities participated by providing video models before the beginning of the study. All of the children attended an inclusive university-affiliated early childhood program. All of the training, baseline, and intervention sessions occurred on the playground. The intervention happened during one of the two 30-minute daily outdoor periods. The implementers for the study were two graduate students, who used a camcorder to record examples of the target activities. From this they were able to edit together videos with voice-over instructions. They also made 7 videos of use during the intervention, which depicted activities such as going up the stairs, down the slide, up a step ladder, kicking a ball, running up a hill, etc.</p> <p>An application was programmed into an iPad for the participant to begin the intervention at the iPad. The implementer started the application and the participant chose an activity from two pictures on the screen. When</p>	An A-B-A-B withdrawal design was used for the study to demonstrate a functional relationship between the child's MVPA and the treatment package. In the baseline portion of the study, data collectors measured the participants MVPA during normal playground activities. The iPad was used for the training portion of the study. For the intervention, videos were used just like in the iPad training section. In order to obtain interobserver agreement (IOA), a point-by-point formula was used. A second observer then collected procedural fidelity data.	<p>The first child showed low levels of MVPA without any increasing trends during the baseline conditions. A small initial change followed by a consistently increasing trend in prompted and total MVPA occurred during the intervention. The second child showed similar trends. The third child had higher and more variable levels of MVPA during the baseline than the other two, and also increased during the intervention.</p>	<p>For all three of the participants in this study, their participation in moderate-to-vigorous physical activity increased when intervention was introduced, and then decreased when the intervention was removed. One of the goals of video modeling is to reduce the need for in vivo prompting. However, all three participants continued to need prompts over the course of the study, although the number of prompts they needed did decrease over time. This study expanded on previous studies that showed that playground interventions have the effect of increasing moderate-to-vigorous physical activity by adding the novel intervention of video modeling. Previous playground interventions included the addition of new playground equipment, direct instruction, and novel playground markings, among others. The authors suggest that "the feasibility of mobile video technologies increases the likelihood of teachers using this relatively simple practice, and the relative strength in visual learning for children with Down syndrome may make this intervention more effective than others." (p 281)</p>

				selected, the video of that activity would play, followed by a prompt from the iPad for the child to go do the activity. After doing the activity, the child indicated whether they performed it by selecting a happy or sad face on the screen. Pressing the happy face played a reinforcement video. Pressing the sad face would repeat the sequence that just happened.			
Choi & Cheung, 2016	Effects of an 8-Week Structured Physical Activity Program on Psychosocial Behaviors of Children With Intellectual Disabilities	Adapted Physical Activity Quarterly	The purpose of this study was to investigate what effect an 8-week structured physical activity program would have on certain psychosocial behaviors in children with intellectual disability.	<p>A somewhat experimental approach was taken by the researchers, creating a training group (TG) and a control group (CG) for comparison. A time-series design was able to be used because of the 3-point data collection method.</p> <p>30 children in grade 2 with mild ID were chosen recruited for the study from a special school based in Hong Kong. 18 students made up the TG, 12 made up the CG during the following year. Participants were limited to being from only one school and grade, so not to confound the results due to developmental differences. The students were all 7 or 8 years old, 22 males and 8 females. In addition to IS, 60% also had ASD.</p> <p>A PA-intervention program with two components was implemented in order to influence the psychosocial behaviors of the children, the two components being the particular activities in the</p>	<p>Analysis of covariance (ANCOVA) was used to test for the children's differences in pre- and post-program psychosocial behavior ratings. Effect sizes were calculated and determined to be .01 for small effect, .06 for moderate, and .14 for large.</p> <p>A one way repeated measure of analysis of variance (ANOVA) was conducted for comparing the psychosocial behavior at the beginning, middle and end of the study. The psychosocial behavior was analyzed with several different procedures, including correlation coefficients of the psychosocial behavior gain scores between training and classroom contexts for the TG, ANCOVA results between the TG and CG's posttest mean scores, and results of the ANOVA comparisons of the 3-point measurement.</p>	<p>Only 16 of the 18 students in the TG were kept for analysis, due to 2 students unable to attend 80% of the program. A medium positive correlation was found between the gain scores of emotional self-control, which suggested that gains in training coincided with those in the classroom. A small, negative correlation was found in the social interaction variable. The results of the ANCOVA indicated a significant difference between the TG and CG in emotional self-control mean scores, the posttest mean score was higher for the TG. The results of the ANOVA indicated a significant difference in the mean scores of emotional self-control in the three testing periods. Similar results were found for social interaction in the training context.</p>	<p>This study found that the participants in the TG showed gradual improvement in their emotional self-control after participating in the physical activity program, both in the training context and in the classroom context. The significant ANCOVA result suggested that if the training did not occur, then there may not have been such an obvious improvement in the self-control of emotional behavior. Social interaction did not improve over the course of the study for both the TG and CG. The researchers suggest that because this was observed in both the TG and the CG, then perhaps 8 weeks was not a sufficient enough length of time to witness a change in social-interaction behaviors. This is especially true, as the majority (57%) of the participants also had a diagnosis of ASD. Individuals with ASD have been proven to have delays and/or deficits in and developing social-interaction. The researchers cite an earlier study in which a basketball program offered by the Special Olympics was successful in decreasing maladaptive behaviors in individuals with ID.</p>

				<p>program and the delivery approach to implement the program. The therapeutic recreation accountability model (TRAM) was chosen as it is one of the few that is concerned with the process of planning, implementing, and evaluating an intervention. The TRAM included the four components of comprehensive and specific program design, activity analysis, protocol development, and the intervention program.</p> <p>Learning outcomes that were chosen for the program included the skills of emotional self-control and social interaction. Specific cues and prompts were created for the achievement of these learning outcomes.</p> <p>12 physical activities were chosen for this study after two pilot studies involving mainstream and ID students. The intervention program consisted of 24 sessions, with 3 activities conducted during each session, with these 3 activities remaining the same for 2 weeks before changing. Each session was 1 hour long and structured to contain a warm up, the intervention activities, and a cool down.</p> <p>Quantitative data were gathered from the sessions through systemic observation and teacher ratings. A 4-point scale was assigned values of 1, 2, 3, 4 to each of the psychosocial behaviors and the</p>			<p>The researchers found that the after-school program which was examined could "benefit the psychosocial development of children with ID." (p11) That would make well-structured and goal-oriented after-school programs, such as this one, a facilitator to participation in physical activity for individuals with ID. They also note, unfortunately, that such programs are few and far between in Hong Kong, and this absence of such programs can be considered a barrier to participation in physical activity for individuals with ID.</p>
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				observers' perceptions of the children never, rarely, sometimes, or always exhibiting them. The observers were a special education expert and the researcher.			
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