

Benefits of Physical Activity for Adults with Intellectual Disabilities

A Synthesis of the Research Literature

---

A Synthesis Project

Presented to the

Department of Kinesiology, Sport Studies, and Physical Education

The College at Brockport

State University of New York

---

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Education

(Physical Education)

---

by

Joshua David Reed

August 7, 2020

THE COLLEGE AT BROCKPORT  
STATE UNIVERSITY OF NEW YORK  
BROCKPORT, NEW YORK

Department of Kinesiology, Sport Studies, and Physical Education

Title of Synthesis Project: Benefits of Physical Activity for Adults with Intellectual  
Disabilities: A Synthesis of the Research Literature.

Read and Approved by: Melanie Perreault  
Melanie Perreault, Ph.D.

Date: 8/15/2020

Accepted by the Department of Kinesiology, Sport Studies, and Physical Education, The  
College at Brockport, State University of New York, in partial fulfillment of the  
requirements for the degree Master of Science in Education (Physical Education).

*Cathy Houston-Wilson*

8/17/2020

Dr. Cathy Houston-Wilson  
Chairperson, Department of Kinesiology, Sport Studies, and Physical Education

**Abstract**

The purpose of this synthesis was to examine the existing body of literature on benefits of physical activity for adults with intellectual disabilities. Research has indicated many benefits that could be gained through physical activity and three main themes emerged which were physical, social and emotional health. With the help of caretakers and legal guardians who aid in day to day living for adults with ID, the overall quality of life could be increased through engagement in physical activity. Areas such as daily living, overall negative health prevention and overall well-being were seen as the most prevalent factors that could be improved through the use of physical activity. Future research should be focused on three main points which are quantitative physical test scores, perceptions of caretakers and legal guardians in aiding with the physical activity process and the benefits of long-term engagement in physical activity for adults with intellectual disabilities.

*Keywords:* [adult, benefit, intellectual disability, physical activity]

## **Table of Contents**

Chapter 1 Introduction.....	5
Rationale.....	6
Purpose Statement.....	7
Assumptions.....	7
Delimitations.....	7
Limitations.....	8
Operational Definitions.....	8
Chapter 2 Methods.....	9
Search Process.....	9
Inclusion/Exclusion Criteria.....	9
Data Analysis.....	10
Chapter 3 Results.....	10
Physical Benefits.....	12
Social Benefits.....	17
Emotional Benefits.....	18
Summary.....	20
Chapter 4 Discussion.....	21
Daily Living.....	21
Prevention.....	23
Well-Being.....	25
Limitations.....	26
Future Research.....	27
Conclusion.....	27
References.....	28
Appendix A – Article Grid.....	32
Appendix B – Thematic Coding Table.....	44

## Chapter 1

## Introduction

Physical activity (PA) refers to being active in a moderate manner long enough to acquire benefits. The national guidelines for physical activity is 30 minutes of moderate-intensity aerobic activity five days/week and muscle-strengthening activities two days/week (Centers for Disease Control and Prevention, 2020). When consistent with these guidelines PA can be declared a preventive health measure (Lynnes et al., 2009). Engaging in regular PA can prevent persons from a number of chronic diseases such as coronary heart disease, hypertension, type 2 diabetes, obesity, osteoporosis and colon cancer (Lynnes et al., 2009). It is so important to stay consistent with healthy levels of PA as one moves across their lifespan. Unfortunately, only 53% of typically developing adults aged 18 and over meet the recommended guidelines for aerobic activity (National Center for Health Statistics, 2017). This means that just over one out of every two adults without disabilities are staying active in a healthy manner. Adults with disabilities display a far lower rate of physical activity with only 12% of the population meeting the recommended guidelines (Physiopedia, 2020). The percentages seem low for both groups of adults so far, but a specific adult population who have a disability known as intellectual disability (ID) display even worse numbers. In one study comparing adults with and without ID and their moderate to vigorous PA levels, only 6% of the population with ID met the recommended PA guidelines (Dixon-Iberra et al., 2013).

A person who is diagnosed with ID is someone with significantly reduced ability to understand new or complex information and to learn and apply new skills (World Health Organization, 2015). This specific population has a sub average level of intelligence that may range from mild to moderate or be classified as severe. The

degree of severity revolves around how much help a person needs to complete daily living tasks. A person who has mild ID may be able to live independently with little outside help from a caretaker or friends and family. Someone who has moderate ID may need to be placed in a group home if the parent or guardian is unable to assist with the daily living tasks. Lastly, someone who has severe ID potentially needs around the clock care since things such as eating and drinking may not be able to be accomplished alone.

### **Rationale**

Already at a disadvantage, persons with ID have a higher chance of leading sedentary lives (Dixon-Iberra et al., 2013). Obesity is one of the most prevalent diseases and is becoming increasingly worse over time (McDaniel et al., 2014). Low PA and or sedentary behavior can lead to the increase in weight of individuals over time. With this, comes many adverse health conditions such as coronary heart disease, type 2 diabetes, shortened life expectancy, high blood pressure, high cholesterol and breathing problems (Vincenzo et al., 2016). There is no question that adults with ID should increase their levels of exercise, but why should they? PA can not only be used as a way to deter the onset of obesity, but improve on the overall quality of life for adults with ID in areas of physical and psychological well-being (St. John et al., 2020).

With the help of caretakers and legal guardians, adults with ID could reap the benefits of PA in numerous domains. Increased self-perceived benefits in areas of social and emotional health as well as increased physical test scores can be seen through engagement in PA (St. John et al., 2020). Some adults with ID may need a significant amount of physical assistance when completing daily living tasks such as ambulation,

transferring, dressing and bathing. By participating in increased levels of PA, adults with ID could see a shift towards physical independence.

It is estimated that up to half the adults with ID are chronically lonely (Gilmore & Cuskelly, 2014). In addition to feelings of loneliness adults with ID are at a higher risk of developing depressive symptoms (Vogt et al., 2012). Feelings of loneliness and depression could dissipate as a byproduct of being active simply by being around others and participating in a physically active community event or program. Through the use of PA, studies may show multiple benefits to be gained for adults with ID.

### **Purpose Statement**

The purpose of this synthesis is to explore the benefits physical activity has to offer a specific group of individuals; those with intellectual disabilities. Adults who have ID exhibit far more sedentary behaviors than their typically developing peers. Through the use of physical activity adults with ID may see improvements in various aspects of life.

### **Assumptions:**

- An underlying assumption is that enough literature exists currently to answer the research question.
- Another assumption is the research used in this synthesis has been conducted with adequate rigor yielding valid and reliable results.

### **Delimitations:**

- One delimitation pertaining to this synthesis project were the focus of physical activity for adults (18 years or older) with ID.
- A second delimitation is the use of research pertaining to only physical activity.

**Limitations:**

- A limitation to this synthesis is the concentration on the adult population (18yrs and up) as opposed to all ages.
- A second limitation is the intervention lengths that the studies involved in this synthesis conducted.
- A third limitation is the measurements used for research. A lack of quantitative physical test scores were seen when searching for articles to be used in the critical mass of research.
- A fourth limitation is the overall amount of studies pertaining to benefits of PA for adults with ID.

**Research Questions:**

What are the benefits of physical activity for adults with intellectual disabilities?

**Operational Definitions:**

1. Adult: a person 18 years or older having attained full size and strength (Hacker, 2011).
2. Benefit: an advantage or profit gained from something (Hacker, 2011).
3. Intellectual Disability: significantly reduced ability to understand new or complex information and to learn and apply new skills (World Health Organization, 2015).
4. Physical Activity: any bodily movement produced by skeletal muscles that require energy expenditure (World Health Organization, 2015).

**Chapter 2****Methods**



## **Search Process**

The beginning of the research process proved to be difficult due to a limitation of database searches. Instead of focusing on databases related to kinesiology, sports and physical education it was important to open up the search. Through the use of the Brockport Online Library I was able to refine my searches to include all databases available within EBSCO. This was very important since keyword searches went from just over 900 results to 7,000 results. Reference lists within articles aided in finding other important research as well as asking for assistance from The College at Brockport library staff.

Within the search there were many keywords used to narrow in on the topic at hand. The combination of keywords used simultaneously to find results were “adults,” “intellectual disability,” “benefits,” “physical activity,” and “exercise”. By using the search terms, 7,706 peer reviewed articles appeared.

## **Inclusion/Exclusion Criteria**

After having found many articles it came time to decide what could be included. The inclusion criteria for articles found started with the type of research article. Any research article that was to be included needed to be within peer-reviewed journals. The research articles could be both quantitative and qualitative studies. The studies needed to have an adult population (18 years of age or older) of persons who have intellectual disabilities. Each study needed to directly relate physical activity with some sort of benefit for the specific population of adults. There was no cutoff date by which the articles needed to be published simply due to the specificity of the topic and limited

research. A total of 200 articles were screened and a total of 10 articles were used for the results section of this synthesis (see Figure 1).

### **Data Analysis**

Once the articles were selected that fit the inclusion criteria an article grid was assembled (see Appendix A). The article grid describes specific aspects of each study such as the purpose, methodology, analysis and the results. The grid allows for easy access to the research and what it accomplished. The use of a thematic coding table was used to organize each research article into its respective category (see Appendix B). The data and findings were separated into three themes (physical, social and emotional) and were discussed in the results section of this synthesis.

## **Chapter 3**

### **Results**

This section will outline the results from the research included in the critical mass of literature for the benefits of physical activity for adults with ID. A total of 10 research articles regarding the benefits of physical activity for adults with ID were used in this section. The importance of physical activity in benefitting the lives of older persons with ID were broken down into three themes; physical, social and emotional benefits. The physical theme was then broken down into subthemes. The subthemes for the physical benefits of PA were weight, cardiovascular/muscular fitness and maintenance.

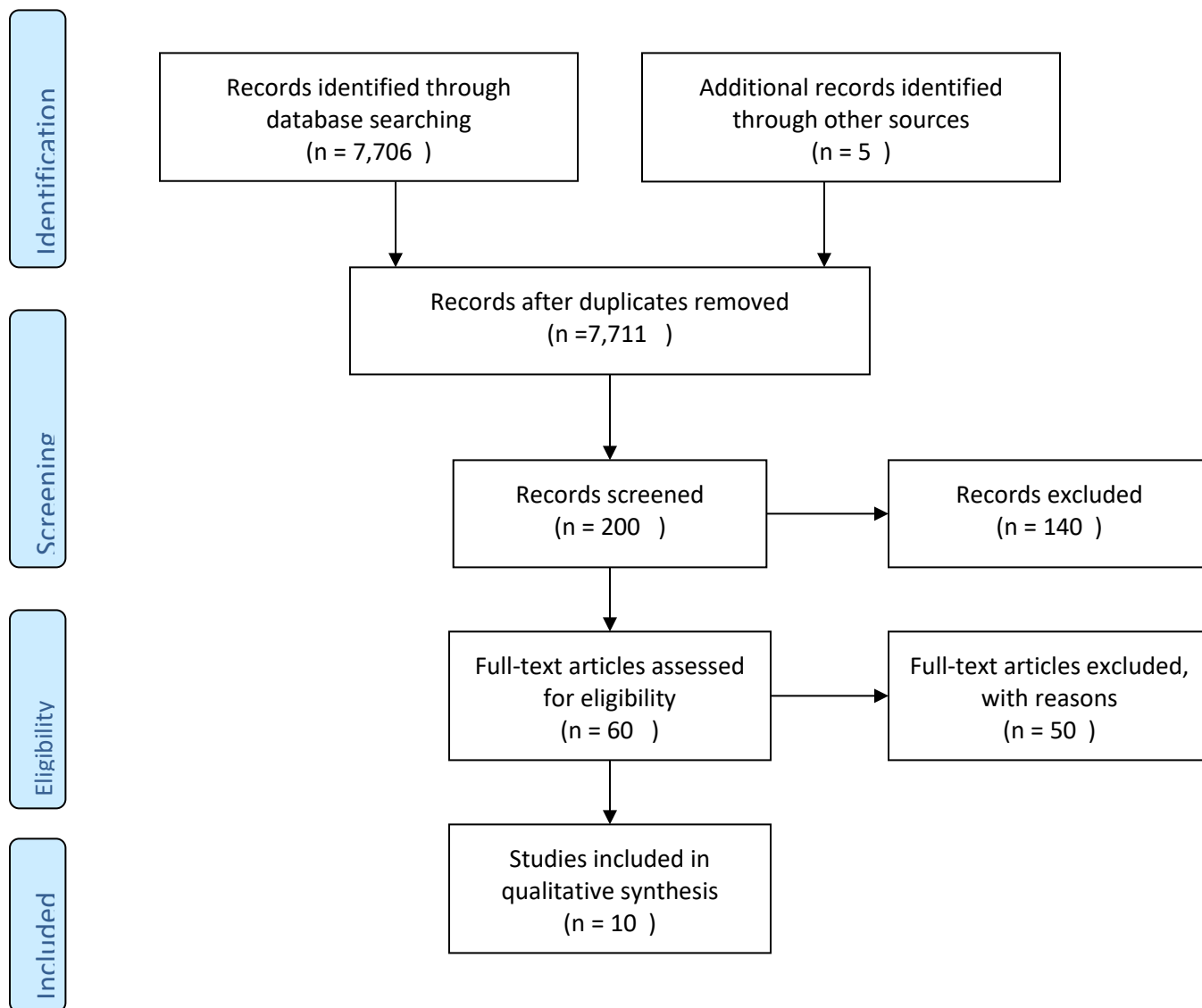


Figure 1. Flow Diagram: Illustrates process for obtaining articles in critical mass.

## **Physical Benefits**

**Weight.** Adults with ID face many unique challenges as they move throughout their lifespan. One challenge is an increased rate of a sedentary lifestyle as stated prior (Dixon-Iberra et al., 2013). Persons who remain sedentary may see increases in weight as the behavior continues. Three studies used in this synthesis with a partial aim to decrease weight amongst adults with ID by using physical activity saw positive trends.

A study done by Jo et al. (2018) recruited 20 adults with ID to take part in a physical exercise program in order to see the effects on numerous aspects of physical health. Within the population there were 10 adults in the exercise group (EG). The intervention for the EG consisted of bi weekly exercise bouts of 90 minutes each and lasted 12 weeks. Exercises revolved around aerobic and band activities. Jo et al. (2018) concluded that at the end of the 12 weeks the EG lost an average weight of .5 pounds and 1.8 pounds of body fat.

Another form of aerobic exercise was used by Martinez-Aldao et al. (2019) in their study with a similar goal in mind. The study aimed to assess the impact on body composition through the use of dance. A total of 23 adults both male and female with classifications of ID ranging from mild to severe were used in the program. The physical activity intervention used two non-consecutive days each week for 60 minutes each and lasted a total of 10 weeks. A mix of Latin pop songs along with Zumba and music helped to engage the participants (Martinez-Aldao et al., 2018). The study concluded dance could be effective in helping adults with ID lose weight since participants lost on average a total of 3 pounds (Martinez-Aldao et al., 2018). An exercise intervention led by an educated individual is not the only way adults with ID can effectively lose weight.

Within the technological era, it is important to use every resource to attain results. Silva et al. (2017) took full opportunity of advancing times with proposing a study to improve physical health using a Wii-based exercise program. The Wii is an interactive gaming system that allows for movements done by an individual using a specific controller to be recorded on screen in real time. Silva et al. (2017) recruited 27 adults with Down syndrome, which is a form of intellectual disability, to take place in the study. The group completed a two month Wii-based exercise program using three 1 hour sessions each week of the intervention period. Weights were recorded pre- and post-intervention and on average the participants lost 3 pounds (Silva et al., 2017). It is important to note a decrease in weight within all three studies as mentioned above. Fortunately, the loss of weight is not the only bi-product of participating in physical activity for adults with ID. Many more physical benefits are to be gained through the continued engagement in exercise.

**Cardiovascular endurance and muscular strength.** Improved cardiovascular endurance and muscular strength may help adults with ID conquer some of their unique challenges. Increasing both domains could mean the difference of being able to accomplish more daily living tasks that some adults find challenging. The study by Silva et al. (2017) had multiple results benefitting more than just decreasing weight. The use of the interactive gaming system and more specifically the Wii Fit Balance Board as well as a Wii Sports game helped in areas of strength and endurance. Increased scores from pre- to post-intervention in the Eurofit Test Battery such as the shuttle run, standing broad jump, 30 second sit ups, bent arm hang and 6 minute walk tests were observed (Silva et al., 2017).

Martinez-Aldao et al. (2019) found similar results in their study using dance and used some of the same tests to see benefits of physical activity. In conclusion of the study, significant increases in the standing long jump and 6 minute walking test were observed. On average participants recorded an increase of 16.5 centimeters on the standing broad jump (Martinez-Aldao et al., 2019). The participants were also able to increase an average of 27 meters on the 6 minute walking test (Martinez-Aldao et al., 2019).

Lastly, aerobic exercises and band resistance training proved successful in benefitting physical fitness for adults with ID as explained in the study done by Jo et al. (2018). In addition to the loss of weight, the 12 week program elevated the exercise group scores in muscular endurance. Muscular endurance was measured by the 30 second sit up test where participants did as many sit ups as possible for the allotted time. The increase in scores went from an average of 16.7 sit ups to 20.4 (Jo et al., 2018). It is very important for adults with ID to increase their physical fitness levels in order to gain the best quality of life possible. Improvements in fitness along with the correct maintenance over time may help this specific population become more self-sufficient.

**Maintenance.** Physical maintenance on the body can help with a multitude of things such as prevention of accidents, reduced muscle stiffness and soreness, flexibility and longevity. Some persons may use exercise for short term gains, but there is an extremely high value in the long term benefits of consistently engaging in physical activity. Crockett et al. (2015) performed a study promoting exercise to decrease the number of falls adults with ID may encounter. A total of 27 participants ranging in ages 28-81 with 9 having mild ID and 18 having moderate ID were included in the study. The

exercise program lasted a total of 12 weeks and included anywhere from 6-9 daily exercises to be performed from the following categories; warm up exercises, general/strengthening exercises and balance exercises. In addition to the daily exercises, 2-3 times per week participants chose an aerobic exercise to complete. Balance and gait tests were administered pre- and post-intervention and the participants saw increased scores in both areas (Crockett et al., 2015). To measure balance and gait the Tinetti test was issued. The measuring of falls was recorded by the caretaker of each individual with ID 4-6 weeks prior to the study taking place and up to 4 weeks after the study took place. A significant decrease in the number of falls pre-intervention compared to post-intervention was observed as an average of 2.2 (Crockett et al., 2015). Along with injury prevention, PA has been proven successful in other avenues of body maintenance. Whether it is reducing muscle soreness and stiffness or increasing flexibility PA has helped the specific population of adults with ID.

Muscle soreness and the ability to be more mobile could make a difference in adults with ID and their capabilities to overcome their unique challenges. A walking program was developed by Mitchell et al. (2016) in hopes of finding out the perceived benefits from an adult population with ID. Participants in the study were a total of 102 adults and 19 of those persons were asked interview questions. Some participants reported that walking relieved symptoms of health conditions such as arthritis, leaving them less sore and stiff after the exercise period (Mitchell et al., 2016). The interviewees also reported benefits regarding being less tired throughout their day and not feeling so out of breath (Mitchell et al., 2016). One interviewee said “when I come back (after a

walk) I am wide awake... since going out to places I have got used to walking a lot more and I am not so out of breath” (Mitchell et al., 2006, p. 114).

In addition to these benefits, becoming more flexible may help persons to move easier throughout their day. Two studies previously highlighted in this section by Jo et al. (2018) and Silva et al. (2017) reported increases in flexibility through the use of PA. In the Wii based intervention Silva et al. (2017) found an increase of 2 inches gained on the sit and reach test. In the same thought, Jo et al. (2018) reported an increase of 3.5 inches by participants in the same test. The use of PA has aided in moving easier and the prevention of falls which may help adults with ID gain an edge on their unique challenges.

Physical maintenance of the body has also been linked to a lower mortality rate by which the specific population could continue pursue their goals in life. A study conducted by Oppewal and Hilgenkamp (2018) sought to see just what kind of predictive value physical fitness had on the survival rate of older adults with ID. The study which started in 2010 involved a total of 900 adults. Baseline data was taken in July of 2010 to assess overall physical fitness. The categories tested included manual dexterity, auditive reaction time, visual reaction time, balance, comfortable gait speed, fast gait speed, grip strength and cardiorespiratory fitness (Oppewal & Hilgenkamp, 2018). In March of 2015, five years after baseline physical fitness data was taken, the researchers recorded the number of all cause deaths suffered in the adults with ID using the help of the partnering group home agencies. All categories except auditive reaction time stood out as being significant predictors for survival in the population tested (Oppewal & Hilgenkamp, 2018). A total of 19.1% of the participants died over the course of the 5 year follow up



period and 75.3% survived, with 5.6% having left the group home agencies (Oppewal & Hilgenkamp, 2018). Participants with higher recorded physical fitness levels saw a greater predictive chance of survival (Oppewal & Hilgenkamp, 2018).

Overall physical maintenance of the body and keeping up with a healthy level of physical fitness accounted for feeling better throughout the day, prevention of future falls, relieved symptoms of muscle soreness and stiffness and increased longevity in adults with ID. Benefits from PA are seen not only in the physical realm, but the social aspect of health as well. Emotions are tough to measure quantitatively so most studies were conducted in the form of qualitative research.

### **Social Benefits**

Socially, adults with ID may find it difficult to engage with other persons. For adults with ID physical activity can be a gateway into forming new bonds and taking part in healthy social interactions. A study done by Lante et al. (2011) aimed to see what benefits PA could have on well-being in adults with ID. Participants in the study included one male (21 years old) and one female (22 years old). The intervention lasted two years and consisted of biweekly sessions of sport engagement in netball and cricket. The adults with ID played with and against a group of student instructors. An interview was conducted at the end of the program noted that the most positive aspects of the program for participants were receiving social praise and being able to have the social contact with others (Lante et al., 2011). The caretakers were also interviewed which also solidified positive social interaction amongst the adults with ID and the staff of the program (Lante et al., 2011). One caretaker stated “they enjoy meeting new students [instructors]. They will talk about the students even after they have gone” (Lante et al, p. 203). Participants

in the walking program in Mitchell et al. (2016) also saw social benefits to physical activity. One participant during the interview process pertaining to the walking program stated “Just being more active and more social... because when I am out I have to interact with people, so it has helped me with that... it forces me to talk to other people when I wouldn’t have talked to them before” (Mitchell et al., 2016, p. 114).

Also tailored towards finding the effects of exercise on emotional health Vogt et al. (2012) conducted a study that found similar results in the social domain. A total of 12 adult males with ID were asked a series of questions pertaining to their well-being, but not limited to social acceptance before and after exercise (Vogt et al., 2012). The exercise intervention was a five minute walk on a treadmill. When asked a question related to their self-perceived level of social acceptance, results indicated (0= not at all; 5= totally) an increased average score from pre- to post-exercise of 1.5-2.3 (Vogt et al., 2012).

Although not a large growth margin it is important to take into account only five minutes of exercise were used one time. Engaging in PA even for short bouts has proven to have benefits related to social health for adults with ID. With PA, adults can feel more engaged and provides opportunities into social interactions. Another side of health that may be of high concern for this specific population is emotional health.

### **Emotional Benefits**

Self-efficacy can be defined as the beliefs persons hold about their capabilities in areas such as well-being (Excellence In School Counseling, 2020). In order to overcome their unique challenges, adults with ID may need support in self-efficacy. The support can come from engagement in PA which has many emotional benefits. The study done by Vogt et al. (2012) saw emotional benefits as well as social benefits which were

previously described. The participants were asked questions both before and after their five minute walk in areas of perceived positive mood, motivational state and self-confidence. All areas saw significant improvements after the exercise was conducted (Vogt et al., 20120).

Overall increase in well-being was seen by Carmelli et al. (2008) through the use of PA. A total of 31 adult participants with ID ranging in ages of 47-67 years old were recruited for the study. The PA intervention used large body movements, flexibility, dynamic balance and general strength training exercises (Carmelli et al., 2008). Within the 10 months intervention, participants engaged in 3 exercise days/week lasting 40 minutes each. A questionnaire assessing overall well-being was given out three times throughout the study: once pre-intervention, once 5 months after training and once post-intervention. The scores from the test raised significantly from pre- to post intervention concluding an increase in overall well-being from the PA program (Carmelli et al., 2008).

Confidence as part of self-efficacy is important for good emotional health. A study described earlier by Mitchell et al. (2016) saw positive trends in confidence. The walking program allowed for one participant to increase confidence which helped him socially engage as well (Mitchell et al., 2016). The participant stated “my confidence wasn’t so good. Since then it has grown massively” (Mitchell et al, 2016, (p. 114). Similar findings reported by Lante et al. (2011) were viewed through the eyes of a caretaker. In response to the effects of being part of physical activity in a group setting the caretaker stated “They are more confident... they are more willing to talk to other people... rather than hanging back behind the staff” (Lante et al, 2011, p. 203).

Confidence and overall well-being are important for good emotional health, but some adults with ID may find those ideas harder to grasp due to depressive symptoms.

Adults with ID have often been reported as having depressive symptoms (Carraro & Gobbi, 2014). Physical activity can be used as a pathway to help improve a person's mental state. The study consisted of 27 adults with ID who had a mean age of 40. Prior to PA intervention the adults filled out the Zung Self-Rating Depression Scale which measures the frequency of depressive symptoms and includes 20 items (Carraro & Gobbi, 2014). The adults exercised biweekly using individual, paired and group methods. The exercises designated by the researchers were sport related activities, group cooperative situations and adapted games. After 12 weeks of PA sessions the participants took the same rating scale test which a higher score meant higher prevalence of depressive symptoms. Pre-intervention the participants scored an average of 32.36 and post-intervention the scores dropped significantly to 23.71 (Carraro & Gobbi, 2014). PA has proven to benefit adults with ID increase their emotional health in areas such as motivation, positive mood, overall well-being, confidence and by reducing depressive symptoms.

### **Summary**

The information presented from the critical mass of literature in this chapter outlines benefits in multiple factors of life. It is evident that PA can not only help adults with ID become more physically fit, but reduce weight as well as aid in the maintenance of the body which can allow this population to move easier throughout their day. Social and emotional health in the specific population have also seen positive effects when PA is used as a means to intervention. Improved social engagement, motivation, confidence and

overall well-being will help adults with ID conquer their unique challenges. The results presented could be used by a specific group of persons who work with adults who have ID in order to significantly improve their overall quality of life. The next section will discuss how the results could be used by caretakers and legal guardians of adults who have ID.

## **Chapter 4**

### **Discussion**

This synthesis sought to find out what benefits PA can have for adults with ID. After analyzing the data, three main themes arose (physical, social and emotional benefits). Physical activity can help benefit adults who have ID in areas such as daily living, prevention and well-being. With unique challenges to overcome, adults who have ID can use PA as a way to diminish the difficulties they may face. Those who work closely with or help persons who have ID with daily living such as caretakers and legal guardians may use the information presented to create a more positive life for who they look after. The results indicated why engagement in PA should be highly sought after in the adult population with ID.

#### **Daily Living**

Being more physically fit can help a person in many facets of life. Things such as daily living activities may become easier to complete when physically able. Someone with ID faces challenges related to major life functions (Jansma, 1999). The level of ID a person has is related to how much help is needed in major life functions and can range from mild to moderate or severe and profound. Part of the major life functions are

activities of daily living which include bathing, ambulation, toileting, transferring, eating and dressing (Tender Loving Care Senior Residence, 2020).

Through engagement in PA a person with ID can increase their muscular strength and cardiovascular endurance (Jo et al., 2018; Martinez-Aldao et al., 2019; Silva et al., 2017). Increased test scores in the two areas of physical fitness can translate to other areas of life. If an adult with ID lacks the endurance or strength needed to complete tasks such as bathing, ambulation, transferring and dressing, caretakers and legal guardians will need to intervene to ensure the activity is completed. An adult with ID may still require prompting to complete the tasks, but if they become more physically fit, those tasks will become physically easier. Transferring out of bed or into the shower may be daunting for those who cannot muster up the strength to do so. Engagement in regular physical activity may help adults with ID conquer once extremely hard to complete tasks on their own which could lead to an increased level of independence. In the same thought, other physical benefits of PA may also help adults with ID complete activities of daily life. PA has proven to increase flexibility and energy as well as decrease stiffness in adults with ID (Jo et al., 2018; Mitchell et al., 2016; Silva et al., 2017). A person who is unable to bend over or lacks energy will more than likely have difficulty with bathing, ambulation, transferring and dressing. Caretakers and legal guardians may find it beneficial to increase PA in the persons they care for to help create more independence in the activities of daily living. PA can also be used as a means to prevent major health implications for the adult population who have ID.

## **Prevention**

Prevention of serious health effects can make an immense difference in the quality of life for adults with ID. Obesity is one of the most prevalent diseases and is becoming increasingly worse over time (McDaniel et al., 2014). Low PA and sedentary behavior can lead to an increase in weight of individuals over time. As stated in the introduction section, obesity can lead to serious health conditions such as coronary heart disease, type 2 diabetes, shortened life expectancy, high blood pressure, high cholesterol and breathing problems (Vincenzo et al., 2016). Persons with ID have higher chances of leading sedentary lives (Dixon-Iberra et al., 2013). In the study done by Dixon-Iberra et al. (2013) comparing adults with and without ID and their moderate to vigorous levels of PA, only 6% of the population with ID met the recommended PA guidelines. It is evident that adults with ID face difficulties in the area of weight management and exercise.

Engagement in PA has resulted in a decrease in weight in adults with ID (Jo et al., 2018; Martinez-Aldao et al., 2019; Silva et al., 2017). However it is important to note that PA alone may have minimal results. Out of the three studies, the highest amount of weight that was lost by participants resulted in three pounds. In order to see a substantial loss of weight, a multicomponent weight management intervention is needed. When including personalized dietary guidelines to follow along with engagement in PA, participants have been recorded losing up to 5% of their total weight (Doherty et al., 2017). Caretakers as well as legal guardians should keep in mind that a paired diet and exercise program will overall be more beneficial in order to see a weight reduction in the persons they care for as opposed to simply PA. A healthy weight will help negate the

onset of serious health conditions in adults with ID. Also, in regards to staying healthy, the prevention of falls can help individuals with ID stray away from injury.

Falls can be extremely dangerous for the elderly population. According to the Centers for Disease Control and Prevention (2019) for adults 65 and older, falls are the leading cause of injury and injury related death. For caretakers and legal guardians taking care of an adult with ID, a fall can be extremely worrisome as serious injury may occur. PA intervention related to general strengthening and balancing exercises has proven to decrease the number of falls in adults with ID (Crockett et al., 2015). Engaging in PA for adults with ID can help caretakers and legal guardians feel more comfortable in relation to falls that might occur in those they are looking after. Another positive PA can have for adults with ID is increasing their longevity.

Research suggests that overall physical fitness can be a predictor in the survival rate amongst adults with ID (Oppewal & Hilgenkamp, 2018). This is vital information for those caring for adults with ID as they will help to increase the quality of life for the adults and this can be done through PA. The study conducted saw an increased survival rate after a five year period in the adults who exhibited higher levels of physical fitness. Preventive measures for obesity, falls and survival rate can be accomplished when the use of PA is integrated into the lives of adults with ID. PA can also help adults with ID in areas of positive social engagement, confidence and overall well-being.

### **Well-Being**

Adults with ID face unique challenges in personal well-being. Things such as having low self-motivation/confidence and having feelings of being left out are apparent in this population (Abbott & Mcconkey, 2006). Even though minimal research has been



done on the well-being of adults with ID, the research that exists suggests that interventions are necessary to help improve these self-perceived conditions. Through the use of PA an increased sense of positive mood, motivational state, self-confidence, and overall well-being has been proven to take place (Carmelli et al., 2008; Lante et al., 2011; Mitchell et al., 2016; Vogt et al., 2012). If caretakers and legal guardians notice the person they care for lack feelings related to positive well-being it is crucial to start a regular schedule of PA. Having more motivation and increased confidence could make a difference in things adults with ID regularly take part in. Tasks that seem difficult may become easier when adults with ID feel emotionally confident. Participating in PA can also help adults who struggle with loneliness and boost the amount of positive social interactions they might see.

It has been estimated that up to half the adults with ID are chronically lonely (Gilmore & Cuskelly, 2014). The same study concluded these feelings can be attributed to negative social attitudes and low expectations as well as reduced opportunities and limited experiences of social integration. Participating in a community sports program led one participant to increase his self-confidence and become more willing to talk to others which resulted in a positive social experience (Lante et al., 2011). Another program focused on walking allowed for another individual to gain social skills simply by being with others in the community (Mitchell et al., 2016). Lastly, Vogt et al., (2012) concluded that after a period of exercise participants felt more socially acceptable. PA and participating in community based sport or exercise programs should be highly sought after for caretakers and legal guardians in order to reduce feelings of negative social experiences and loneliness in the adults with ID they take care of. Engaging in positive

social interactions and increasing overall well-being will help to improve the quality of life for individuals with ID.

### **Limitations**

Limitations pertaining to the research within the specific topic of the benefits of PA for adults with ID can be related to the population of interest, intervention length, measurements and limited studies. This synthesis focused on a specific population as well as age group. The focus on adults (18 years and older) as opposed to all ages such as adolescents and young teens limited the amount of research that was able to be used in defining the benefits of PA. There was a high variance as far as the length of interventions used for each study. The least amount of time spent on intervention was 12 weeks and the most time spent on intervention was 2 years. If the studies included in this synthesis used similar lengths of intervention, the results would be more consistent. Another limitation was the types of measurements used within the studies. A lack of physical test scores were seen while screening articles to be used within the synthesis. More quantitative measurement studies pertaining to improving physical fitness should be conducted to further explain the benefits of PA on the physical realm. Lastly, this topic in general has a lack of research that has previously been conducted. With a lack of research, questions remain as far as the reliability of studies. With more studies done and more of the same types of studies done, an increased level of reliability will show from the results of the research.

### **Future Research**

Research moving forward should focus on a few items which include quantitative research, caretakers and legal guardian's perceptions of helping adults with ID engage in

PA as well as benefits of continued engagement in PA. More research as far as what specific measurements can be increased through the use of PA for adults with ID should be conducted. There was a lack of research involving increased test scores related to overall physical fitness. To find out more so what methods of PA work best for adults with ID additional concrete evidence is needed. It is also important for future research to point out what is feasible for caretakers and legal guardians to engage in when helping the persons they care for become more physically active. Lastly, more research pertaining to adults with ID who have continued to engage in PA after the intervention period ends is needed to help build the case as to why PA is so important for this specific population.

### **Conclusion**

Research has demonstrated adults with ID can improve their overall quality of life through engaging in PA. When facing unique challenges, adults with ID can use PA as a means to increase their physical fitness, keep up to date with the prevention of serious health conditions, aid in the independence in daily living tasks and improve overall feelings of well-being. Caretakers and legal guardians should continue to advocate for and aid in the engagement of PA for adults with ID to diminish difficulties that may be seen in daily life. Future results of research will only solidify the importance PA can play in the lives of adults with ID.

## References

- Abbott, S., & Mcconkey, R. (2006). The barriers to social inclusion as perceived by people with intellectual disabilities. *Journal of Intellectual Disabilities, 10*(3), 275-287.
- \*Carmeli, E., Orbach, I., Zinger-Vankin, T., Morad, M., & Merrick, J. (2008). Physical training and well-being in older adults with mild intellectual disability: A residential care study. *Journal of Applied Research in Intellectual Disabilities, 21*, 457-456.
- \*Carraro, A., & Gobbi, E. (2014). Exercise intervention to reduce depressive symptoms in adults with intellectual disabilities. *Perceptual & Motor Skills, 119*(1), 1-5.
- Centers for Disease Control and Prevention. (2019). *Keep on Your Feet*. Retrieved July 13, 2020, from [cdc.gov/injury/features/older-adult-falls/index.html](https://www.cdc.gov/injury/features/older-adult-falls/index.html)
- Centers for Disease Control and Prevention. (2020). *Physical Activity*. Retrieved July 23, 2020, from [cdc.gov/physicalactivity/basics/adults/index.htm](https://www.cdc.gov/physicalactivity/basics/adults/index.htm)
- \*Crocket, J., Finlayson, J., Skelton, D., & Miller, G. (2015) Promoting exercise as part of a physiotherapy-led falls pathway service for adults with intellectual disabilities: A service evaluation. *Journal of Applied Research in Intellectual Disabilities, 28*, 257-264.
- Dixon-Ibarra, A., Lee, M., & Dugala, A. (2013). Physical activity and sedentary behavior in older adults with intellectual disabilities: a comparative study. *Adapted Physical Activity Quarterly, 30*(1), 1-19.
- Doherty, A., Jones, S., Chauhan, U., & Gibson, J. (2017). An integrative review of multicomponent weight management interventions for adults with intellectual

- disabilities. *Journal of Applied Research in Intellectual Disabilities*, doi:  
10.1111/jar.12367
- Excellence In School Counseling. (2020). *Motivation Overview*. Retrieved July 2, 2020,  
from <https://excellenceinschoolcounseling.com/develop-a-cba/define-studentexcellence-overview/motivation-overview-3/self-efficacy/>
- Gilmore, Linda., & Cuskelly, M. (2014). Vulnerability to loneliness in people with  
intellectual disability: An explanatory model. *Policy and Practice in Intellectual  
Disabilities*, 11(3), 192-199.
- Hacker. (2011). *Merriam-Webster*. Retrieved July 7, 2020, from  
<https://www.merriam-webster.com/dictionary/hacker>
- Jansma, P. (1999). *Psychomotor domain training and serious disabilities (5<sup>th</sup> Ed.)*.  
University Press Of America.
- \*Jo, G., Rossow-Kimball, B., & Lee, Y. (2018) Effects of 12-week combined exercise  
program on self-efficacy, physical activity level, and health related physical  
fitness of adults with intellectual disability. *Journal of Exercise Rehabilitation*,  
14(1), 175-182.
- \*Lante, K., Walkley, J., Gamble, M., & Vassos, M. (2011) An initial evaluation of a  
long-term, sustainable, integrated community-based physical activity program for  
adults with intellectual disability. *Journal of Intellectual & Developmental  
Disability*, 36(3), 197-206.
- Lynnes, M., Nichols, D., & Temple, V. (2009) Fostering independence in health-  
promoting exercise. *Journal of Intellectual Disabilities* 13(2), 143-159. doi:  
10.1177/1744629509340815

- \*Martinez-Aldao, D., Martinez-Lemos, I., Bouzas-Rico, S., & Ayan-Perez, C. (2019) Feasibility of a dance and exercise with music program on adults with intellectual disability. *Journal of Intellectual Disability Research*, 63(6), 519-527.
- McDaniel, T., Melton, B. F., & Langdon, J. (2014). Promoting physical activity through student life and academics. *Health Education Journal*, 73(2), 237-244.
- \*Mitchell, F., Stalker, K., Matthews, L., Mutrie, N., Melling, C., McConnachie, A., Murray, H., & Melville, C. (2016) A qualitative exploration of participants' experiences of taking part in walking program: Perceived benefits, barriers, choices and use of intervention resources. *Journal of Applied Research In Intellectual Disabilities*, doi: 10.1111/jar.1236
- National Center for Health Statistics. (2017). *Exercise or Physical Activity*. Retrieved August 5, 2020, from [cdc.gov/nchs/fastats/exercise.htm](https://www.cdc.gov/nchs/fastats/exercise.htm)
- \*Oppewal, A., & Hilgenkamp, T. (2018) Physical fitness is predictive for 5-year survival in older adults with intellectual disabilities. *Journal of Applied Research In Intellectual Disabilities*, doi: 10.1111/jar.12589
- Physiopedia. (2020). *Physical Activity in Individuals with Disabilities*. Retrieved August 5, 2020, from [physiopedia.com/physical\\_activity\\_in\\_individuals\\_with\\_disabilities](https://www.physiopedia.com/physical_activity_in_individuals_with_disabilities)
- \*Silva, V., Campos, C., Sa, A., Cavadas, M., Pinto, J., Simoes, P., Machado, S., Murillo-Rodriguez, E., & Barbosa-Rocha, N. (2017) Wii-based exercise program to improve physical fitness, motor proficiency and functional mobility in adults with Down syndrome. *Journal of Intellectual Disability Research*, 61(8), 755-765.
- St. John, Laura., Borschneck, G., & Cairney, J. (2020). A systematic review and meta-

- analysis examining the effect of exercise on individuals with intellectual disability. *American Journal On Intellectual And Developmental Disabilities*, 125(4), 274-286.
- Tending Loving Care Senior Residence. (2020). *ADLs*. Retrieved July 13, 2020, from [tllcsr.com/assisted-living-facility-alf/activities-of-daily-living-adls/](https://tllcsr.com/assisted-living-facility-alf/activities-of-daily-living-adls/)
- Vincenzo, B., Mingozi, N., & Passalia, A. (2016). Lifetime sedentary is a major cause of chronic diseases. *Ovidius University Annals, Series Physical Education & Sport/Science, Movement & Health*, 16301-305.
- \*Vogt, T., Schneider, S., Abeln, V., Anneken, V., & Struder, H. (2012) Exercise, mood and cognitive cognitive performance in intellectual disability- A neurophysiological approach. *Behavioural Brain Research*, 226, 473-480.
- World Health Organization. (2015). *Health Topics*. Retrieved June 9, 2020, from <http://www.euro.who.int/en/health-topics/noncommunicable-diseases/mental-health/news/news/2010/15/childrens-right-to-family-life/definition-intellectual-disability>

## Appendix A

## Synthesis Article Grid

Author	Title	Source	Purpose	Methods & Procedures	Analysis	Findings	Recommendations	Type of Intervention	Length of Intervention
Carmeli, E., Orbach, I., Zinger-Vankin, T., Morad, M., & Merrick, J. (2008) *Emotional	Physical training and well-being in older adults with mild intellectual disability: A residential care study	Journal	The aim of this study was to investigate the effect of physical training on general well-being and self-image in older persons who have ID.	The total number of participants were 62 adults with ID ranging in ages from 47-67 years old. The training program lasted for 10 consecutive months and exercises were performed 3 days a week for 40-45	A statistical package (SPSS, 7.2 Windows 2000) was used to analyze data. A one-way analysis of variance (ANOVA) was used to determine the	Increased self-perception of well-being Increased social acceptance Increased self-perception (physical appearance) Increase in energy Increase perceived physical mobility	Exercise intervention can improve the well-being of adults with ID. The exercise program can also improve the overall quality of life and make participants feel good.	Gross motor movements, flexibility, dynamic balance and strength training	10 months 3 days/week 40-45 minute sessions



				minutes each.	effect of physical training.				
Carra ro, A., & Gobb i, E. (2014 )  *Emo tional	Exercis e interve ntion to reduce depress ive sympto ms in adults with intellec tual disabili ties	Jo ur na l	To see wheth er or not exerci se can be a positi ve count erbalan ce to depre ssive sympt oms in adults with ID.	Partic ipants were 27 adults with mild to moder ate ID who attend ed a center for perso ns with ID.	The SDS (Self ratin g depr essio n scale ) mea sure s the freq uenc y of depr essio n item s.	There was a signifi cant differ ence in the self report ed depre ssion scores for the exerci se group.	Physica l activity should be used more so in combati ng depress ive mental health sympto ms.	Individua l/ Paired/ Group sports, cooperati ve games and adapted games	3 month s  2 days/ week 1 hour sessio ns
Croc ket, J., Finla yson, J., Skelt on, D., & Mille r, G. (2015 )  *Phy sical	Promot ing exerci se as part of a physiot herapy- led falls pathway service for adults with intellec tual disabili ties	Jo ur na l	The purpo se of this study was to descri be the benefi ts of using a streng th and balan ce exerci se	Partic ipants includ ed 27 adults rangin g from 28-81 years old. A 12 week streng th and balan ce exerci se	Pair ed sam ple t- tests were cond ucted on pre- and post- inter venti on num ber of	Signifi cant impro vemen t in balanc e and gait and reducti on in numbe r of falls. Pre- exerci se interve ntion	Strengt h and balance exercise progra ms paired with other approac hes could signific antly help adults with ID sustain less	General/s trengthen ing, balance and aerobic exercises	3 month s  Gener al/stre ngth and balanc e exerci ses Daily  Aerob ic exerci ses

	ties: A service evaluation		program to deter falls in adults with ID.	program was used as the intervention type within the study.	falls and Timetti score measure s for the intervention sample.	the mean number of falls were 3.2. Post exercise intervention the mean number of falls were 1.0.	injuries due to falls.		2-3 days/week
Jo, G., Rossow-Kimball, B., & Lee, Y. (2018)	Effects of 12-week combined exercise program on self-efficacy, physical activity level, and health related physical fitness of adults with intellectual	Journal	The study aimed to examine the effects of a physical activity program on health related physical fitness, self-efficacy and PA levels	A total of 20 adults with ID were recruited for the study. 10 adults were assigned to the control group and the other 10 assigned to	Physical scores for the following variables were recorded : weight, body mass, skeletal muscle mass, body fat	Exercise group saw: Increase in strength, flexibility, sit ups and step test results . Increased self-reported ratings of physical ability, confid	The implementation of an exercise based intervention will improve the overall quality of life in adults with ID related to physical and emotional benefits .	Gymnastics, aerobic and band exercises	3 months 2 days/week 90 minute sessions

	disability		in adults with ID.	the exercise group. Health related physical fitness was measured using a 3 min step test, body composition was measured by a Bioelectric impedance analysis (BIA), muscular endurance was measured via sit up test, a self-efficacy	mass, strength, flexibility, sit up and step test and crosses analyzed with pre and post as well as control/exercise group. Levels of self-efficacy determined by answering questions using a rating	ence and overall self-efficacy. Decrease in weight and body fat mass.			
--	------------	--	--------------------	---	--	---	--	--	--

				cy scale was used and accelerometers were also used in the study to collect data.	scale were cross analyzed from exercise group and control group.				
Lante, K., Walkley, J., Gamble, M., & Vassos, M. (2011) * Motivation Not sure yettttt	An initial evaluation of a long-term, sustainable, integrated community-based physical activity program for adults with intellectual disability	Journal	To gain understanding on how a long-term physical activity program can provide benefits to adults with ID.	Accelerometers were used for collecting data related to exercise. Interviews were conducted during the program to understand the psychosocial outcomes	Data related to exercise was summarized and then an analysis of variance was used to determine differences for years 08'-09'.	Across time, a decrease in the amount of light activity was found and an increase in the moderate to vigorous activity was also found. Long-term sustainable and low cost	Physical activity should be taken more seriously by all persons no matter place of origin, in order to deter the onset of major health concerns.	Netball, cricket and soccer	13.5 months 1 day/week 60-90 minute sessions

				gained.	The matic analysis was used to analyze the data from inter views.	PA programs can minimize barriers to physical activity.			
Martinez-Aldao, D., Martinez-Lemos, I., Bouzas-Rico, S., & Ayan-Perez, C. (2019)	Feasibility of a dance and exercise with music programme on adults with intellectual disability	Journal	The main goal of the study was to provide information regarding the effect of a dance specific exercise program (on adults with ID) focused on	The participants included 30 adults from an urban area of northwestern Spain who all had ID. The dance program lasted a total of 10 weeks and the exerci	The data was recorded as means with standard deviations. The results were then analyzed to show differences between pre-	Increase in cardiovascular fitness (walking test) Increase in muscular fitness (standing long jump) Decrease in weight (BMI)	A dance program could be used to combat health risks in overweight or obese populations of adults with ID as well as be used to increase muscular and cardiovascular fitness.	Dance	2.5 months 2 days/week 60 minute sessions

			aspects such as body composition as well as cardiovascular and muscular fitness.	se was conducted biweekly for one hour at a time.	test measures and post-test measures. Three items were measured with in this study: BMI, 6-min walk test and standing long jump (along with age, height and weight).				
Mitchell, F.,	A qualitative	Journal	This study aimed	A total of 102	An inductive	Perceived Physical	Physical activity	Walking	3 months

<p>Stalker, K., Matthews, L., Mutrie, N., Mellinger, C., McConachie, A., Murray, H., &amp; Melville, C. (2016)</p> <p>*Emotional</p>	<p>exploration of participants' experiences of taking part in a walking programme: Perceived benefits, barriers, choices and use of intervention resources</p>	<p>anal</p>	<p>to provide insight into adults with ID's experiences of participating in and self-monitoring their physical activity behavior within the first community based walking program.</p>	<p>adults with ID took place in the 12 week walking program. Of the 102 adults, 19 were selected and approved to be interviewed by the researchers.</p>	<p>thematic approach was used to decipher the qualitative results presented with in the interviews given.</p>	<p>al benefits: loss of weight, reduced muscle stiffness and soreness and more fit. Perceived psychological benefits: increased confidence, self-efficacy, easier social engagement, more positive outlook, improved self-esteem and feeling relaxed.</p>	<p>such as walking can lead to many benefits in adults with ID. A walking program could lead this specific group to become more independent.</p>		<p>Daily Participants choice for allotted time on task</p>
--	--	-------------	--	---	---	---	--	--	--

						The use of self-monitored PA with the help of a pedometer helped to increase interest and participation.			
Oppewal, A., & Hilgenkamp, T. (2018)	Physical fitness is predictive for 5-year survival in older adults with intellectual disabilities	Journal	This study sought to investigate the predictive value of physical fitness for survival in older adults with ID.	A total of 900 older adults with ID had their fitness levels examined at baseline. The next portion of the study occurred 5 years later	Cox proportional hazards models were used to determine the association between the physical fitness test results	Higher survival rate of persons showing an increased score in areas such as manual dexterity, visual reaction time, balance, comfortable	To increase the longevity of adults with ID it is imperative that they exhibit higher levels of physical fitness.	Physical Fitness test (done once)	5 years to determine survival rate



				during the collection of all-cause mortality rates within the study group.	ts of each participant and their survival rate.	gait speed, fast gait speed, grip strength and cardiorespiratory fitness.			
Silva, V., Campos, C., Sa, A., Cavadas, M., Pinto, J., Simoes, P., Machado, S., Murillo-Rodriguez, E., & Barbosa-Rocha, N. (2017)	Wii-based exercise program to improve physical fitness, motor proficiency and functional mobility in adults with Down syndrome	Journal	This study aims to analyze the effects of a Wii-based exercise program on physical fitness, functional mobility and motor proficiency of adults with Down Syndrome.	A total of 27 adults with DS between the ages of 18 and 60 years old took part in this study. The intervention took place over a 2 month period and encompassed 22 total sessions	Independent sample t-tests were used to verify differences between the two groups at baseline. A 2x2 mixed factor analysis of variance	Increase in aerobic endurance Increase in explosive leg power Increase in flexibility Increase of speed of limb movement Increase in trunk strength Increase in functional mobility	Within the technological era, advancements in engaging platforms for exercise can be used to improve physical fitness, functional mobility and motor proficiency in adults with DS.	Balance, isometric strength, aerobic, sports and dancing related exercises	2 months 3 days/week 60 minute sessions

				ns, each being 1 hour 3 times a week.	nance was used to test for differences between the control group and exercise group at baseline as well as post-test.				
Vogt, T., Schneider, S., Abeln, V., Anneken, V., & Struder, H. (2012) *Emotional	Exercise, mood and cognitive performance in intellectual disability- A neurological approach	Journal	The study aimed to localize EEG activity changes related to mood and cognition in adults	Participants were 12 males with ID. A 32-channel portable EEG-system was used for data	To measure data one-way repeated measures of variance (ANOVA) was used	Increase in positive mood. Increase in self-confidence. Increase in social acceptance. Increase in motiva	PA can be used as an intervention for adults with ID who have difficulty with their overall positive emotional state.	Walking/jogging on treadmill	1 exercise session lasting 30 minutes

			with ID following a 30 minute moderate PA intervention .	collection during the exercise intervention .	for EEG data. Mood assessments were conducted using Wilcoxon paired sample test.	tional state.			
--	--	--	--	---	--	---------------	--	--	--

## Appendix B

Thematic Coding Table

Article	Physical			Social	Emotional
	Weight	Cardiovascular/ Muscular	Maintenance		
Carmeli, E., Orbach, I., Zinger-Vankin, T., Morad, M., & Merrick, J. (2008)					X
Carraro, A., & Gobbi, E. (2014)					X
Crocket, J., Finlayson, J., Skelton, D., & Miller, G. (2015)			X		
Jo, G., Rossow- Kimball, B., & Lee, Y. (2018)	X	X	X		
Lante, K., Walkley, J., Gamble, M., & Vassos, M. (2011)				X	X
Martinez- Aldao, D., Martinez- Lemos, I., Bouzas-Rico, S., & Ayan- Perez, C. (2019)	X	X			

Mitchell, F., Stalker, K., Matthews, L., Mutrie, N., Melling, C., McConnachie, A., Murray, H., & Melville, C. (2016)			X	X	X
Oppewal, A., & Hilgenkamp, T. (2018)			X		
Silva, V., Campos, C., Sa, A., Cavadas, M., Pinto, J., Simoës, P., Machado, S., Murillo- Rodriguez, E., & Barbosa- Rocha, N. (2017)	X	X	X		
Vogt, T., Schneider, S., Abeln, V., Anneken, V., & Struder, H. (2012)			X	X	X