

USING APPLIED BEHAVIORAL ANALYSIS TO INCREASE NEUROTYPICALLY
DEVELOPING CHILDREN'S LEVEL OF PHYSICAL ACTIVITY

by

AHLAM MOHAMMED E FAHEEM

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Doctoral Advisory Committee:

Jessica Korneder, Ph.D., BCBA-D, LBA, Chair
Julia Smith, Ed.D.
Julie Ricks-Doneen, Ph.D.
Michael Kranak, Ph.D., BCBA-D

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*To whomever passed through my life and supported me or taught
me lessons that made me who I am now.*

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Ahlam Mohammed E Faheem

PREFACE

I remember when I was leaving my preschool for the last day to begin elementary school. I was crying and did not want to leave. My mom told me that one day, if I studied hard, I could come back to the preschool and be part of the fun environment as a teacher. Life went by, and here I am reaching the highest level of education in Early Childhood.

ABSTRACT

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Adviser: Jessica Korneder, Ph.D., BCBA-D, LBA, Chair

Physical activity is important to reduce the risk of several diseases and in some cases death. Early childhood theorists stressed the importance of physical activity, lowering its cost, and rewarding physical movements. ABA interventions were an essential part of this paper because of its importance in altering the behavior and keeping the desired change even after the intervention. In general, parents and teachers' motivations and engagement with children were the most effective way to increase physical activity in both ABA and ECE articles. Results of this research found that general knowledge of ABA is low and there is a need to increase ABA awareness and usage in the society before directing toward specific interventions. Finally, the cost of ABA interventions without insurance coverage is astronomical, yet all children have the right to receive behavioral treatments and live in an altered environment that ensure them the best overall development.

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LIST OF ABBREVIATIONS

ABA	Applied Behavioral Analysis
BCBA	Board Certified Behavioral Analyst
CDC	Center for Disease Control and Prevention
WHO	World Health Organization
MVPA	Moderate to Vigorous Physical Activity
ART	Affective-Reflective Theory

CHAPTER ONE

OVERVIEW

Introduction

Physical activity is an important factor in the overall health of individuals. I was born and raised in Saudi Arabia during the 1990s, and at that time, opportunities for physical activities were limited to playing in the street with balls, bikes, or other traditional games. Playing in the street was unsafe, so most families would not allow their children to do so. Also, playing in the street was mostly limited to boys due to cultural and religious restrictions. Moreover, in Saudi Arabian schools, physical activity classes were limited to boys. Given the limited opportunities to engage in physical activity, I suffered from limited physical activity as a child, and I felt the effect of limited physical activity on my mental health, focus, cognitive abilities, and physiological health. I neither had the motivation to move from the couch to go anywhere, nor did not I want to study; I suffered from obesity and depression. These observations suggest that the culture in which a person is reared may influence their worldview and conceptualization of reality (Bronfenbrenner, 2005).

The main cause of death is heart disease for about 702,880 yearly (CDC, 2024). Story stated that moderate intensity exercising for 150 minuets weekly can lower the risk of heart diseases for 14% (2017). Today, awareness of the importance of physical activity has increased, both in Saudi Arabia and worldwide. However, the trend of video gaming and social media among young children and teens continue to push this generation to spend more time sitting on their couches and refusing to leave their homes. In addition,

physical inactivity is now regarded as the fourth most common cause of death worldwide (WHO, 2022). Based on data from 194 countries around the world (WHO, 2022), if individuals and societies do not take immediate action to encourage more physical activity, nearly 500 million people will develop heart disease, obesity, diabetes, or other noncommunicable diseases (NCDs) that are related to inactivity. This problem will affect the US in which will result a cost of US\$ 27 billion (WHO, 2022).

The topic of physical activity is significant, according to the Centers for Disease Control (CDC) and Prevention (2022), which suggests 60 minutes of moderate to vigorous physical activity (MVPA) for children per day, every day. On average, the number of minutes preschool-aged children spend engaging in physical activity is between 8 to 60 min per day (Patel et al., 2019). The WHO defines physical activity as any skeletal muscle-driven motion of the body that involves energy expenditure (WHO, 2022). Zerger et al. (2016, 2017) stated that children who do not get enough physical activity everyday are at risk of several health problems, such as diabetes, obesity, cardiovascular disease, and cancer. Researchers have stated that currently, 12.3% of preschool-aged children are at risk of becoming overweight and 13.9% of all preschoolers are overweight (Ogden et al., 2006). Additionally, Hustyi et al. (2011) argued that these obesogenic health problems become more dangerous when they continue into adulthood. A discovery by Wu et al. (2017) made the connection between childhood and adulthood regarding the health-related issues of lack of physical activity. They stated children and adolescents who engaged in more sedentary behavior had lower health-related quality of life, while those who engaged in more physical exercise had higher health-related quality of life. This relationship suggests that the greater the

frequency of physical activity or the shorter the amount of time spent inactive, the better the health-related quality of life. School health initiatives that encourage kids and teenagers to have active lives may help to raise their quality of life in terms of their health until their adulthood years (Wu et al., 2017). Additionally, Kuhl et al. (2015) have studied the benefits of physical activity for young children, finding that physical activities are beneficial for children's overall health, including their physical abilities, levels of stress and anxiety, and learning abilities.

Background on Physical Activity

The term "physical activity" encompasses all forms of movement, including those performed during leisure time, while using public transportation to get around, and as part of one's job. Physical activity of a moderate intensity as well as vigorous intensity improves health (WHO, n.d.). The intensity of moderate and vigorous exercise may also be prescribed based on heart rate ranges expressed relative to an individual's maximal heart rate or percentage of heart rate reserve, where moderate exercise is defined as 40–59% of aerobic capacity reserve or heart rate reserve and vigorous exercise is defined as 60–84% of these reserves (Warburton et al., 2007).

According to Wortham (2010), early childhood education and young children's curriculum guidance include physical activities as an essential aspect of children's wellbeing. Because the young child uses both his or her fine and gross motor skills in physical activities, the term "motor development" is used to refer to this development. Moreover, because perception and motor skills are interdependent, it is also referred to as perceptual-motor development. When perceptual actions are followed by motor behavior, motor ability changes. Notably, preschool is an important time for physical development.

During the preschool years, the developing locomotor skills that infants and toddlers use become clearer and improve. Both indoors and outdoors, preschoolers typically engage in extensive active play for hours in all settings including home, school, and other situations (Wortham, 2010). Schools have a unique opportunity to assist children in getting the daily prescribed 60 minutes or more of moderate-intensity physical activity (CDC, 2022). This time is usually offered during recess and physical education class.

Physical activities have eight components. According to Wortham (2010), physical development in early years includes: gross motor, fine motor, body awareness, spatial awareness, directional awareness, balance activities, integration activities, and expressive activities. The first two components focus on gross motor and fine motor skills. Gross motor is the locomotor skills (movements that require large motor skills) like walking and jumping, while fine motor skills refer to the fingers and hands which help the fingers grow in strength and flexibility like hammering and cutting. Second are the components that focus on the awareness of the body movements. Body awareness is the ability to differentiate between body parts and comprehend how the body functions and what body parts can do, like pointing. Spatial awareness is the development of perceptual and motor skills that enables children to move around in space like exploring the environment, whereas directional awareness refers to laterality and directionality (e.g., knowing left and right). Balance activities could be as simple as balancing on one foot and integration activities are those which include the ability to track or catch any moving object, like catching a ball. Expressive activities are practicing different types of art like dancing. These physical components are both comprehensive and generally tend to overlap. Children need to have access to rich environments and meaningful

curriculum to help them fully develop their overall physical skills. Importantly, any deficiency in one of the aspects of physical development leads to deficiency in other aspects (Wortham, 2010).

Physical Development Characteristics in Early Childhood

Teachers have a significant impact on children's level of physical activity. According to Moravicik and Nolte (2018), teachers who work with early ages in facilities such as childcare, preschools, and kindergarten classrooms, are responsible for establishing positive feelings and expectations associated with physical activities and exercise. They should also implement limits on sedentary activities and provide opportunities for their students' physical movement. Overall, one of the teacher's roles is to establish a sense of joy and enthusiasm toward the vigorous level of physical activity (Moravicik & Nolte, 2018).

Benefits of Physical Activities

Children's overall development is comprehensive; movement and physical activity are their portal to develop cognitive, social, and emotional development. According to Moravicik and Nolte (2018), children can move around to experience life and entertainment. Additionally, children develop academically through their physical activity. Children as young as infants and toddlers explore their surroundings, go down, up, twist, solve problems, and reach their aims by moving around using their bodies (Moravicik & Nolte, 2018). Older children in preschools and kindergarten use their bodies to show their abilities and talents. Moving around helps children develop their self-esteem and confidence; therefore, they can feel good about themselves, have positive emotions, and build social communications with their peers (Moravicik & Nolte, 2018).

Finally, positive mental health is another benefit of physical activity. When children exercise and move around, they limit their level of stress, anxiety, and depression (Sanders, 2002).

Background of Applied Behavior Analysis

The incorporation of applied behavioral analysis (ABA) is a critical component of this paper and is understood as an intervention used to alter and change behaviors to a desired direction. According to Cooper et al. (2020), ABA is “a science devoted to understanding and improving human behavior” (p. 2). As Cooper et al. (2020) explained, it is a scientific method for identifying environmental factors that consistently have an impact on socially significant behavior and utilizing experimentation to understand the behavior analytic principles responsible for the change in the behavior.

Giving a brief history of ABA, behavior analysis includes three domains philosophy, research, and applied: the philosophy of this method relies on behaviorism, research refers to the experimental analysis of data, and the applied component is research focusing on behaviors that improve people’s lives. The beginning of behaviorism philosophy is connected back to the psychologist John B. Watson and Stimulus-Response Behaviorism (Cooper et al., 2020). The beginning of experimental analysis started with B. F. Skinner (1938) and his book *The Behavior of Organisms*. Applied Behavior Analysis started in the late 1940s and early 1950s. The first study that applied operant behavior on humans was conducted by Fuller (1949), and the beginning of the field of Applied Behavioral Analysis itself is traced back to Ayllon and Michael (1959, as cited in Cooper et al., 2020), with their paper entitled “The Psychiatric Nurse as a Behavioral Engineer,” which discussed how using the principles of behavior helps

improve the behaviors or functioning level of people with disabilities (Cooper et al., 2020).

Applied Behavior Analysis has three important aspects. Accord to Cooper et al. (2020), first, the researcher should choose just one behavior to focus on and alter using a research-based intervention. Second, the study or intervention should specify the individual whom the study is examining or the person that is engaging in the target behavior. Third, the behavior should be measurable (Cooper et al., 2020). Of note, behavior analytic interventions are created for one individual and focuses on one measurable behavior.

Shaping Behavior

Shaping behaviors is a significant aspect of most behavioral interventions. Since my study is examining parents' knowledge and attitude toward increasing their children's physical activity using ABA, shaping behavior is one of the terminologies that needs to be discussed. Shaping behaviors is a behavior analytic intervention to increase or alter behavior. Cooper et al. (2020) stated there are three parts of shaping behaviors. First, caregivers should detect changes in the environment of the learner. Second, educators should "make a discriminated judgment about whether that change is a progressively closer approximation to a terminal behavior of interest" (Cooper et al., 2020, p. 541). Third, the educator "differentially reinforces that closer successive approximation" (Cooper et al., 2020, p. 541). According to Cooper et al., shaping behavior includes "differential reinforcement of successive approximations toward a terminal behavior" (2020, p. 541). Differential reinforcement is "presenting an unconditioned or conditioned reinforcer only to those emitted members of a response class that share a specific

dimension” (Cooper et al., 2020, p. 541). According to the definition of shaping behavior, the main focus of this technique is to change and maintain the new desired behavior. Even if not explicitly mentioned, shaping was generally an intervention strategy used within most the ABA articles reviewed.

Behavioral Skills Training (BST)

Applied Behavior Analysis (ABA) uses behavioral skill training as an intervention to help people learn novel skills. It is a systematic approach with a set of procedures to guarantee that the desired ability is mastered and applied in a variety of settings. Four essential elements are usually included in BST. First instruction, the trainer breaks down the goal skill into smaller, more doable steps and gives clear, simple instructions. Second modeling, the instructor performs the target skill, giving the desired behavior a visual depiction. Third role-playing, this method helps trainers apply what they've learned by having them practice the desired ability in a hypothetical setting. Forth feedback, the trainer gives the student quick feedback on how they performed, highlighting their errors and offering reinforcement for right answers (Sturmey & Maffei-Almodovar, 2024).

Theoretical Framework

In this section, four main theories that guide this research study will be explained. The first two theories are exercise related: the Affective–Reflective Theory of Physical Inactivity and Exercise and the Theory of Energetic Cost Minimization. The third theory connects this work to early childhood foundations via Bronfenbrenner's Development Ecology Model. Finally, the fourth theory connects to the foundation of behavioral change via the Law of Effect.

Affective–Reflective Theory (ART) of Physical Inactivity and Exercise

Brand and Ekkekakis introduced this theory in their 2017 article entitled “Affective–Reflective Theory of physical inactivity and exercise: Foundations and preliminary evidence.” In scenarios where people either stay in a state of physical inactivity or take action (exercise), ART seeks to explain and forecast behavior. This dual-process paradigm suggests that automatic associations and an automatic affective valuation of exercise are triggered by stimuli related to exercise (type-1 process). If self-control resources are present, the reflective appraisal (type-2 process) can proceed after the automatic affective valuation. While reflective evaluation can lead to action plans, automatic affective evaluation is associated with a drive to act. The person is constantly guided toward or away from changing behavior by these two processes interacting (Brand & Ekkekakis, 2018). The intension of my study is for parents to know the types of motivation their children require to stay active and state their acceptance and attitude toward ABA interventions using these motivational states to increase their children’s physical activity.

Theory of Energetic Cost

This theory is built upon the theory of Affective–Reflective Theory (ART), which stated that due to the high energy required to stay active, the body prefers to stay in the state of inactivity (comfort zone). Cheval and Tipura et al. (2018) in their study entitled “Behavioral and Neural Evidence of the Rewarding Value of Exercise Behaviors: A Systematic Review” reviewed studies that tested reflexive responses brought on by signals connected to various forms of physical activities and how much energy do these

types of exercise costs. This theory suggests that lowering the energetic cost of the different types of physical activities is rewarding. Also, Cheval and Radel et al. (2018) suggested that when people try to engage in physical activity is more effective than when they try to avoid sedentary activity and these actions are tied to the cortisol hormone in the body with connection with these actions. This theory is another great resource for this study since lowering the energetic cost of physical activity could be one of the interventions that ABA can use to increase children's level of physical activity.

Bronfenbrenner's Development Ecology Model

Bronfenbrenner's theory is known for helping us understand the effect of the surrounding environment on the children. According to Bronfenbrenner (1979), there are five interrelated systems that affect children's overall development. Healthy child development depends on the connection, communication, and relationship of these five systems (Bronfenbrenner, 2005). In this section, I will list and explain each system. Then, I will discuss the contribution of the model and its systems to increasing the level of children's physical activity.

The first environmental element that Bronfenbrenner (1979) discussed in his book *The Ecology of Human Development* is the microsystem, which is an order of roles, interactions, and activities that a developing individual experiences in a specific environment that has certain material and physical properties. The first system is the elements that directly affect a child in their immediate environment, such as parents, siblings, teachers, and schoolmates. Second, the relationships between two or more environments in which a developing person actively interacts are referred to as mesosystems. Examples of these relationships include those between a child's home,

school, and neighborhood peer group, and an adult's family, job, and social life. Third, an exosystem is one or more contexts in which the developing person is not an active participant but where events take place that influence or are influenced by events occurring in the setting in which the developing person is present. Some examples of the exosystem are parent's workplace and the family's neighborhood. Fourth, the term "macrosystem" describes consistencies at the subcultural or cultural level as well as any underlying ideologies or belief systems. The fifth system is the "chronosystem", which influences children by changing their behavior and/or choices since it is based on significant life events and shifts in the environment over time. Both positive and negative events can happen. Positivity, puberty, school success, a birth, or a shift in perspective on gender view. The negative could be the death of a loved one, the start of a chronic illness, or a tragic occurrence like a war. These consistencies can take the shape and substance of lower-order systems (micro-, meso-, and exo-) that exist or could exist, which affect the child directly or indirectly (Bronfenbrenner, 1979).

This paper focuses on parents' perspective on physical activity. According to Bronfenbrenner's theory, parents are the core of the direct environment that affect children's overall development and growth, or in other words, the first system (microsystem). Additionally, insurance policies for using ABA to increase physical activities and their acceptations for interventions are affected by a broader system—the exosystem. Nevertheless, different cultures and countries have different perspectives toward physical activities and exercise. For example, as I mentioned in the introduction, I did not have a chance to be physically active when I was a child due to cultural and religious restrictions. These restrictions are part of the larger macrosystem. The

connection between this study and Bronfenbrenner's ecological theory is in that parents' attitudes and beliefs toward physical activity affect children directly as parents are considered part of the microsystem.

Law of Effect Theory

The Law of Effect was established by Edward Thorndike, an American psychologist. This theory is one of the core behavioral theories, and is the main behavioral theory upon which this study was built. Thorndike (1911) in his book *Animal Intelligence: Experimental Studies* explains The Law of Effect. Essentially, when two or more reactions are made to the same situation, the reactions that are accompanied or closely followed by the animal's satisfaction will, other things being equal, be more firmly connected with the situation, making them more likely to recur. The reactions that are accompanied or closely followed by the animal's discomfort will, on the other hand, have their connections with that situation weakened, making them less likely to occur when the situation recurs. The stronger or weaker the link, the more satisfied or uncomfortable the situation is.

The Law of Exercise is all other variables being equal, every response to a circumstance will have a stronger connection to it based on how frequently it has been linked to it, as well as on the average strength and duration of those connections. This theory is used to shape behaviors or create a learning experience. Acquiring a new desired skill, according to this theory, happens when the organ accomplishes the desired skill and get rewarded for that accomplishment or punished for failure (Thorndike, 1911). my dissertation study collected data about parents' acceptance of using this theory to

shape their children's behavior. The desired behavior is a higher physical activity level which will get rewarded, and the sedentary behavior is not rewarded.

Statement of Problem

Lack of physical activity has harmful effects on children and studies have addressed the effects of inactivity on children. Researchers have stated that lack of physical activity or sedentary lifestyle for children can lead to several health problems like obesity, type 2 diabetes, cardiovascular diseases, and poor mental health (Kuhl et al., 2015). Additionally, a study by Poitras et al. (2019) highlighted other effects of the lack of physical activities like bone health and muscular strength. With all these health-related issues either connected to or caused by the lack of physical activity, lack of physical activity is considered a serious problem that needs intervention.

The lack of physical activity is related to additional problems. Puhl and Luedicke (2013) stated that children who are overweight suffer from low self-esteem and have an increased risk of eating disorders and depression. The authors stressed the need for comprehensive approaches to address both the physical and psychological aspects of obesity to support the overall health of overweight children. ABA interventions are applied, research based, and customized approaches that have been proven to be effective in improving the behaviors of individuals by adjusting the environment to guide behaviors to the desired direction. Increasing physical activities is an area where ABA interventions have focused on improving individuals' behaviors related to physical activity and healthy eating habits. Even so, as of November 19, 2021, just 0.11% of trained behavior analysts stated that their main area of professional focus is health, sport, and fitness (Behavior Analyst Certification Board, 2023).

However, ABA interventions require a high cost of consultation and BCBA interventions planning services. ABA interventions are covered by insurance to provide services for children with autism spectrum disorder but are not available for neurotypically developing children through insurance reimbursement. This study used a survey to ask parents about their knowledge and willingness to receive interventions and training from a (BCBA), pay for the service (with no insurance coverage), and implement the intervention.

Purpose

The purpose of this research was to examine parent knowledge and attitudes toward behavioral interventions to increase neurotypically developing children's physical activity.

Research Questions

1. What do parents of neurotypically developing children expect from a BCBA as it pertains to increasing physical activity for their children?
2. To what extent are parents willing to be trained in ABA principles to help increase their child's level of activity?
3. What are parents' current level of knowledge and beliefs on the effectiveness of ABA interventions to help increase physical activity?

Significance

This study provides the field of ABA with two benefits. First, future researchers who are interested in ABA interventions for increasing physical activity will have a background of parents' acceptance and needs for specific areas of interventions and research regarding ABA interventions for children's physical activity. Second, BCBAs

may have more opportunities to work with neurotypically developing children to increase their level of physical activity according to the need and willingness of parents for these interventions.

CHAPTER TWO

LITERATURE REVIEW

The following literature review will include peer-reviewed empirical articles from both the *Journal of Early Childhood Education* and the *Journal of Applied Behavioral Analysis*. The review is organized by section, appearing in the following order: first, parents' attitude toward exercise; second, the importance of parents' collaboration; third, structured exercise and exercise equipment; fourth, the effect of social encouragement; and fifth, the effect of reinforcement systems.

Parents' Attitude Toward Exercise

The focus of this paper is to collect data about parents' attitude and acceptance to use ABA to increase children's physical activities. Some studies in the field of early childhood education have proven the connection between a positive attitude of parents toward physical activities and the higher level of physical activity of children. Hu et al. (2021) found that parents' attitude toward physical activity predicted their four- and five-year old children's physical performance, specifically their ability to jump two feet. Another study Larson et al. (2013) stressed the importance of caregivers' verbal praises, engagement, play, and activity with children. These actions from parents proved to increase children's level of physical activity. In a follow up study, Larson et al. (2014), found that caregivers' interaction and play with preschoolers increased children's physical activity levels comparing with three other environmental conditions. The conditioned that compared with the interactive play conditions were giving the child

some attention and verbal praises, leaving the child La, and escaping or pretending to be busy whenever a child is active.

The Importance of Parents' Collaboration

My dissertation study surveyed parents to know about their needs and beliefs toward collaborations with behavior analysts. In this section I will review previous articles related to parents' collaboration with care givers in different organizations, like behavior analysts and teachers. Keengwe and Onchwari (2022) stated that parents' perceptions of their relationships with teachers were influenced by factors such as their level of education, household income, child's age, the center's location, and the availability of distance learning. Providing parents with the needed tips in their homes could be a useful tactic for encouraging good parent-teacher connections during difficult times.

Parents effect on children's behaviors is a common topic under review in fields related to children. In connection with my dissertation research, I reviewed articles from ABA journals about parents' attitudes toward children's behaviors. A systematic review of articles by Stocco and Thompson (2015) stated that parent-children interactions occur naturally in the daily routine, and it has a back-and-forth effect, which means the child's behavior effects parents' behaviors and vice versa. A study by Stocco and Thompson (2015) has also found that most parents' behaviors are escape and avoidance-maintained behaviors, which are staying away from their children's challenging behaviors, like crying. The antecedents or the cause of challenging behaviors that parents escape or avoid are giving a demand, denying access to an item or leisure time, or the child seeking attention. To connect Stocco and Thompson with my dissertation, asking children to stop

their play time or video games to do physical activity can be a cause for challenging behavior among children. This outcome is especially true if the physical activity that parents pick is not the child's favorite. Additionally, if the child has not discovered their favorite physical activity yet, it is more aversive to engage in physical activity. In most cases, playing video games is more rewarding for children than physical activity and requires less effort.

Communication is an essential component in the relationship between educators and parents. Almendingen et al. (2021), stated that parents stressed the importance of active skills-based training to receive an effective and practical communication. Parents in the article mentioned that when teachers were respectful and responsive, open to solve problems, share details about the child's behaviors, and start consistency and connection between different settings, it is more practical and effective for the parent-teacher communication. The article also stated that active communication makes it easier for parents to discuss their concerns.

Communication is a key aspect of collaboration between parents and caregivers in childcare settings like ABA services or schools. ABA terminology is generally unclear for people who are not in the field. An important ethic code in ABA is communication between behavior analysts and parents should use parents' friendly terminology (Behavior Analyst Certification Board, 2020). An article by Cheatham et al. (2011) stressed the importance of keeping an open and on-going line of communication between parents and teachers. Also, they suggested always asking parents about their expectations and prior knowledge regarding their children's overall development. Additionally, the authors stressed the importance of pausing between topics and asking if parents (for

whom English is not their first language) have any questions (Cheatham et al., 2011). Thus, parents need clear language from the behavioral analysts to be able to apply behavioral interventions and follow directions in settings other than the ABA setting.

In sum, most early childhood and behavioral articles related to the role of parents in the overall progress of the child stressed the importance of two ways communication between caregivers and parents for the best results of the child.

Structured Exercise and Exercise Equipment

Exercise and physical activity have several forms, and structured physical activity is one of the forms that is known to be effective for sustaining a higher level of physical activity. Several studies in the field of early childhood education have stressed the importance of teacher guidance in increasing children's physical activities. A study by Carroll et al. (2021), which was conducted in a head start school in the US, demonstrated that an indoor preschool physical activity intervention led and guided by teachers was a workable strategy that could significantly raise kids' moderate to vigorous physical activity (MVPA) levels. Additionally, teacher-guided activities were also proven to be effective when included in the curriculum. Similarly, in a study by Donnelly et al. (2009), higher levels of physical activity, a lower body mass index, and better academic performance were all seen in an intervention group who had physical activity as part of their curriculum.

Structured exercise activities are mostly guided by caregivers, which include parents and teachers. One study by Mavilidi et al. (2021) stressed the importance of more teacher training and professional development to change children's daily routines and increase their physical activities. The researchers found longer-term professional growth

may result in significant alterations to children's daily schedules that include greater possibilities for participation in physical activity.

Additionally, when talking about young children and activity, many people tend to consider the amount of space needed for their physical movements. Adding indoor space for children to move around was one of the tools researchers examined to discover its effect on increasing children's physical activity. A study by Segura-Martínez et al. (2020) found that after one week of the implementation of the physical activity space inside the classroom both boys and girls had higher physical activity level. Interestingly, after six weeks of intervention, boys were more active than girls.

There many factors related to curriculum and school structures that contributes to increasing the level of physical activity in children. An Australian study by Macdonald et al. (2020) used a questionnaire to collect data from teachers and schools about these factors. The questionnaire divided the contribution factors to barriers and solutions. The main barriers for schools were limited time, school ethos and policies, and lack of space, training, resources, and equipment. The barriers for teachers were staff attitude, knowledge, and beliefs. The study suggested that having more administration support, funding, training and resources, physical activities within the schedule, and political support might contribute into the increase of physical activities for young children.

The Effect of Social Encouragement

Social encouragement is one of the most motivating tools that personal trainers and exercise coaches use with trainees. For young children, caregivers 'encouragement and motivational praises had one of the highest effects on children's physical activity performance compared to leaving the child alone, giving the child verbal encouragement,

or ignoring their behavior. This study took a place in a preschool on two four-years-old children (Larson et al., 2013). Another study by Zerger et al. (2016) stressed the importance of social interaction. They compared the affect of giving attention and interactive play on seven preschool children ages between five and four years old. They found that interactive play and social attention increased children's level of physical activity to the highest level.

The Effect of Reinforcement System

In addition, a reinforcement system is understood as "providing a preferable consequence to increase children's likelihood to repeat the targeted behavior in similar situations in the future" (Cooper et al., 2020, p. 253). One of the main causes of sedentary activity is that children spend a significant amount of their day watching their phones or playing video games (Alanko, 2023). A study by Shayne et al. (2012) examined the effect of using physically active video games, or "exergaming," on the level of children's physical activity. Exergaming is a form of video games that require the child to represent physical movements to earn points, pass a level, or win the game, which can be likened to reinforcements used in ABA interventions. Exergaming proved its effectiveness in increasing children's level of physical activity and more opportunities for physical activities. Fifth grade students who were inactive during physical education (PE) classes showed more activity levels and engagement while exergaming.

In ABA, there are two types of reinforcement delivery: contingent and non-contingent. Contingent means the reinforcement is delivered whenever a behavior occurs, whereas non-contingent means the reinforcement is delivered according to a timed schedule, regardless of whether the behavior occurs (Cooper et al., 2020). Contingent

reinforcement proved its effectiveness in increasing physical activity level in children. A token economy when contingent on MVPA can be used as an effective way to increase and maintain children's physical activity at a level that would be considered higher than the typical environment (Patel et al., 2019).

Behavioral Skills Training

Behavioral skills training (BST) is the commonly used parent training program in ABA. One of the articles used BST to guide participants set specific, measurable, attainable, relevant, time-bound (SMART) goals using BST. Researchers collected baseline data and post-intervention data. The results showed noticeably improved skills in the SMART goal setting of the participants after using BST (Beaulieu et al., 2024).

In addition, a systematic review of 20 studies on training caregivers of children ages zero to 21 using BST was one of the studies to support this research. Positive results were found in every study that was reviewed, indicating that BST can be used to train professionals, including teachers, how to apply a range of interventions effectively. It was discovered that seven publications had primary outcomes with high enough quality/rigor scores to permit confident interpretation of the results (Slane & Lieberman-Betz, 2021).

ABA is a well-known practice among parents of children with Autism. However, the intention of my dissertation is to use ABA with neurotypically developing children. Policies of physical activity and ABA will be discussed in the next section.

Laws, Policies, Standards from Governing Agencies and Organizations

Every day in the classroom, from kindergarten through grade 12, all children should take part in engaging physical education (PE) programs. A model physical

education program should offer all students the chance to learn while also providing instruction and assessments that align with the curriculum (State of Michigan, n.d.a). In recent years, the focus of physical education has shifted from competitive sports to cooperative learning and physical fitness, allowing each student to receive a customized education depending on where they are and where they would like to be (State of Michigan, n.d.a). The K-12 physical Education Standards in Michigan states that it is challenging to meet each child at their level and needs, especially given the student population of many schools. Using technology such as heart rate monitors helps support the maintenance of adequate physical activity levels for each child (State of Michigan, n.d.a).

Physical Activity Standards in Michigan

The Standards of Michigan specify what all students are expected to know and be able to do. They highlight what is most important, but they do not include everything that can or should be taught in PE classes. The Standards' goal is to define the foundations, not to provide an exhaustive list or a set of guidelines that restrict what can be taught outside of what is mentioned in the document. Determining the complete spectrum of services appropriate for PE and for children with special needs is likewise outside the purview of the Standards (State of Michigan, n.d.a). This omission allows space for the student to grow and teachers to be creative and productive with their students' skills. Moreover, the Standards establish grade-specific requirements, but they do not specify the intervention techniques or resources required to support students who perform significantly below or above grade-level expectations. The wide range of skills, needs, learning rates, and achievement levels of students in any particular PE classroom cannot

be adequately reflected by any set of grade-specific criteria. Lastly, and most importantly, the mind-body link is a fundamental idea in everything taught in PE and significantly contributes to a well-rounded education, even if it is not officially included in the Standards. An improvement in fitness levels is linked to greater academic success, according to growing evidence (Donnelly et al., 2009). Students must be taught this idea as part of an excellent PE curriculum (State of Michigan, n.d.a).

Assessment

To fully comprehend a student's learning and progress toward goals in PE, a range of assessments based on the activity are required. Suitable evaluations for PE include several types of assessment. First, formative evaluations are ongoing throughout PE classes and may include knowledge checks, heart rate monitors, checklists, rubrics, and exit slips. Second, summative assessments are used to assess a student's level of achievement and are given at the conclusion of a unit or instructional sequence. Third, personal fitness goals and diaries, skill assessments, written assignments, and demonstrations of skills in front of classmates are a few examples of methods used to establish lesson comprehension. Finally, student self-assessments for the Fitness Gram, peer assessments, and performance-based evaluations are additional types of evaluation used for physical assessment in Michigan schools (State of Michigan, n.d.a).

Insurance Policies for ABA Interventions

Unfortunately, until recently, ABA services have not been understood as necessary for children outside of those who are diagnosed with Autism Spectrum Disorder (ASD). Therefore, medical insurances do not cover ABA services for children or adults who do not have an ASD diagnosis. According to the State of Michigan (n.d.),

Medicaid insurance covers ABA services for children younger than 21 years who have an ASD diagnosis. Children with other special needs and illnesses, as well as those who are neurotypically developing do not have the opportunity for insurance coverage. On the other hand, people can pay to receive in clinic or at home service for their children; however, the cost of ABA services are expensive without the insurance coverage. Without insurance, the cost of ABA therapy can range from \$4,800 to more than \$20,000 per month, \$1,200 to \$4,800, per week, and \$240 to \$600 per day (Zauderer, 2022). ABA treatments for children with other disabilities and neurotypically developing children need to be reviewed and possibly made mandatory. For the case of this paper, neurotypical children who are lack physical activity or living a sedentary lifestyle are in need of ABA coverage for increasing physical activity. The literature review stressed the effectiveness of ABA interventions in increasing children's level of physical activities and research on using ABA to shape behavior continues to grow.

CHAPTER THREE

METHODS

Research Questions

1. What do parents of neurotypical developing children expect from a BCBA as it pertains to increasing physical activity for their children?
2. To what extent are parents willing to be trained in ABA principles to help increase their child's level of activity?
3. What are parents' current level of knowledge and beliefs on the effectiveness of ABA interventions to help increase physical activity?

Overall Design

My study was quantitative and used a cross-sectional design to examine parents' acceptance of implementing ABA interventions at home in the United States. For my quantitative study used an online questionnaire. According to Setia (2016), cross-sectional work is an example of an observational study design. In a cross-sectional study, the researcher simultaneously assesses the participants' exposures and outcomes. For population-based surveys, and to determine the prevalence of illnesses in clinic-based samples, cross-sectional designs are applied. These examinations are typically affordable and relatively quick to perform. They can be carried out either as a planning step for a cohort study or as a baseline for one. Researchers learn about the prevalence of outcomes or exposures from these kinds of designs, and we can utilize this knowledge to plan the cohort research. For the case of my study, I collected data about parents' opinions of a health intervention (i.e., ABA). Collecting opinions before creating and implementing

interventions can help professionals direct their efforts to the needs of parents and society.

The cross-sectional design is a great fit for my research for several reasons. These reasons include but are not limited to efficiency, cost effectiveness, the ability to gather baseline data, and the ability to provide a snapshot of the population. The following section, adapted from Wang and Cheng (2020) expounds upon these and additional reasons.

- **Efficiency:** compared to longitudinal research, cross-sectional studies may be completed over a shorter time horizon, which makes them perfect for projects like dissertation with tight deadlines.
- **Cost-effectiveness:** compared to longitudinal designs, they usually need fewer resources in terms of time, money, and labor, which might be helpful for graduate students with restricted funding like me.
- **Population snapshot:** cross-sectional designs enable researchers to gather data on several factors at once by giving a snapshot of the population at a particular moment in time. This approach can be useful for determining the frequency of specific events in a population or investigating correlations between variables.
- **Exploratory research:** to produce hypotheses or spot trends that can be investigated more in subsequent studies, cross-sectional studies are frequently utilized for exploratory research.

- **Comparative analysis:** to find differences or similarities between groups within a population, such as groups exposed to various interventions or groups with different demographics, researchers can utilize cross-sectional designs.
 - **Feasibility:** a cross-sectional design could be more practical than other designs, especially if longitudinal data collection is impractical or unethical, depending on the study topic and the resources at hand.
 - **Baseline data:** for tracking population changes over time or assessing the efficacy of interventions, cross-sectional studies can offer useful baseline data.
- In general, the research question, objectives, available resources, and practical considerations will determine whether a cross-sectional design is appropriate for a dissertation (Wang & Cheng, 2020).

Sample

The sample for my research was parents of neurotypical developing children aged from one to 13 years old. I aimed to collect data from 150 participants. After conducting the survey the number of participants, I received from Prolific was N=201 participants. According to Bullen (2022), the number of participants in research should be 10% of the population in statistically challenged population. However, if the populations are a large number, the maximum number of the participants should not be more than one thousand. For the case of my study, the number of children who need an ABA intervention to increase their level of physical activity is unknown. Yet, the number of children who lack physical activities, which is an indicator for the need of physical activity, is 14.7 million children ages from 2-19 years old (WHO, 2024).

In my survey parents were from the United States and the demographic characteristics of the parents was taken into consideration. Parents who participated in the survey were 78 male, 101 female, 4 non-binary/ third gender, 1 other, and 17 answers were missing. The ages of participants varied with 55 participants aged 18 to 25, 52 participants aged 26 to 35, 36 participants aged 36 to 45, 30 participants aged 46 to 55, 10 participants aged 56 to 65, one aged 66 to 75, and the rest of the data were missing. The educational level of parents also varied with 72 had four-year degree, 39 had some college, 24 had masters, 20 graduated high school, 15 had a two-year degree, six had a professional degree, 5 had a doctorate degree, and the rest was missing as well. Finally, I asked a demographic question about the house-hold income. Parents who earn \$50,000-\$100,000 yearly were the most participants with 63 participants, \$25,000-\$50,000 yearly were 44 participants, \$100,000-\$200,000 yearly were 39 participants, less than \$25,000 yearly were 20 participants, more than \$200,000 yearly were 11 participants, four preferred not to say, and the rest were missing. The abovementioned demographic characteristics were the ones I focused on when conducting the *t-tests* for my survey.

Data Instrument

Data for this study was collected through a questionnaire. According to Kline (2016), questionnaires can be a valuable method for collecting data on a wide range of variables, including attitudes, beliefs, behaviors, and personality traits, some of which are the focus of my research. When designing a questionnaire, it is essential to define the constructs being measured clearly and to ensure that the items are relevant and meaningful to the participants. Response options can be structured in various ways, including multiple-choice, Likert scales, and open-ended questions (Ponto, 2015). In my

dissertation study, the questions were mostly multiple choice. Notably, the choice of response options can affect the validity and reliability of the survey, which will be discussed later in this paper. The wording of questions and response options could also impact the quality of the data collected. Questionnaires related to health and exercise in the field were used to ensure unambiguous language appropriate for the target population, so I used a simple language in the questions that is understandable by people with different educational levels. For example, the question of the knowledge of ABA was “Have you ever heard of Applied Behavioral Analysis ABA?”.

To assess the reliability of a questionnaire, it is necessary for the researcher to examine the internal consistency of the items and to test for test-retest reliability. For my research, two members of the research committee and one PhD colleague reviewed the questionnaire before dissemination. To assess the validity of a questionnaire, it was essential to explore both content validity (i.e., whether the items are measuring the intended construct) and construct validity (i.e., whether the questionnaire is measuring the intended construct in the way it was intended). Construct validity can be assessed using various techniques, including factor analysis, convergent validity, and discriminant validity. This was measured also by letting a colleague who does not know about ABA answer the questions, and the answers were reviewed to make sure they were valid. Once a questionnaire has been developed, it is crucial to pilot-test it with a small sample of participants to identify and address any issues before administering it to a larger selection (Hassan et al., 2006). The small sample was a group of PhD students who were enrolled in a research class. Overall, Kline (2016) emphasized the importance of careful planning and testing when using questionnaires as a data collection method and provides practical

guidance for developing and validating questionnaires in various research contexts (See appendix A).

Data Collection Procedure

Data were collected through an e-questionnaire. The e-questionnaire was created through a technology startup called Prolific. Prolific is building the world's largest collection of high-quality, human-derived data as well as the best platform for accessing it. With a new study released every two minutes, Prolific is used by more than 35,000 AI developers, researchers, and top corporations to collect rich data from trustworthy and involved participants (Prolific, 2024).

Prolific is a platform where I uploaded my survey and asked for a specific sample to fill out my survey as participants. I paid about 600\$ out of pocket to the website, and I aimed for 15 minutes approximate time for each participant to complete the survey. Each participant would earn 12\$ an hour through PayPal for participating in the survey, which was the suggested amount from the website. Collecting data took approximately two hours and I got 200 responses to my survey, which was 50 more participants than the aimed number.

Survey Questions

I designed my survey after reading similar surveys related to health, exercise, and parents' opinions. The choices of questions were serving the research questions I intended to answer. I will list the research questions and the related survey questions that meant to answer these questions.

First research question was what do parents of typically neurotypically developing children expect from a BCBA as it pertains to increasing physical activity for their children? The survey questions were as followed:

28. For each resource listed below, please indicate how willing you would be to access that resource to learn more about ABA, from 0=not at all to 10= very willing:

- a. Books
- b. Articles
- c. Workshops
- d. Training hours
- e. Meetings

29. For this same list of resources, please indicate your interest in using it to learn more about ABA, from 0=Not at all to 10 = Very interested

- a. Books
- b. Articles
- c. Workshops
- d. Training hours
- e. Meetings

30. If provided with a plan how comfortable would you be implementing it by your own?

- a. Extremely uncomfortable
- b. Not comfortable at all
- c. Somewhat uncomfortable
- d. Don't know
- e. Slightly comfortable
- f. Very comfortable
- g. Extremely comfortable

31. If provided with a plan and the needed resources such as training, workshops, and regular meetings with a Board Certified Behavior Analyst would you be comfortable implementing it on your own?

- a. Extremely uncomfortable
- b. Not comfortable at all
- c. Somewhat uncomfortable
- d. Don't know
- e. Slightly comfortable
- f. Very comfortable
- g. Extremely comfortable

The second question was to what extent are parents willing to be trained in ABA principles to help increase their child's level of physical activity? The survey questions were as followed:

30. If provided with a plan how comfortable would you be implementing it by your own?

- a. Extremely uncomfortable
- b. Not comfortable at all
- c. Somewhat uncomfortable
- d. Don't know
- e. Slightly comfortable
- f. Very comfortable
- g. Extremely comfortable

31. If provided with a plan and the needed resources such as training, workshops, and regular meetings with a Board Certified Behavior Analyst would you be comfortable implementing it on your own?

- a. Extremely uncomfortable
- b. Not comfortable at all
- c. Somewhat uncomfortable
- d. Don't know
- e. Slightly comfortable
- f. Very comfortable
- g. Extremely comfortable

The third research question was what are parents' current level of knowledge and beliefs on the effectiveness of ABA interventions to help increase physical activity? The survey questions were as followed:

26. Have you heard about Applied Behavioral Analysis (ABA)?

- a. No
- b. Yes

27. How would you rank your knowledge of each area, with 0 = none at all to 10=a great deal

- a. ABA
- b. Child development
- c. Healthy Eating
- d. Exercise
- e. Shaping children behavior
- f. Helping child to do things differently

Data Compilation and Analyses

The Statistical Package for the Social Sciences, or SPSS software, 29.0.2.0 was used to analyze data. As the name implies, SPSS is a statistical software package for data analysis in social science research. It provides researchers with a comprehensive set of tools for data management, descriptive statistics, inferential statistics, and data visualization. SPSS is particularly useful for analyzing large datasets, as it can handle both simple and complex statistical analyses. It also offers a user-friendly interface that allows researchers to easily input data, select variables, and run statistical tests. According to IBM Corporation (2021), the current owner of SPSS, the software has been used in a wide range of research fields, including psychology, sociology, economics, and education, and has become a standard tool in many academic and research settings.

Testing the rigor of the research design includes several aspects. According to Streiner et al. (2015), the following aspects are connected to the research:

1. **Internal Consistency:** This approach involves assessing the consistency of responses across different items within the same questionnaire.
2. **Content Validity:** This involves making sure that the questionnaire or survey measures what it is intended to measure. This can be done by having experts in the field review the questionnaire to ensure that it covers all relevant topics and items.
3. **Construct Validity:** This involves assessing the extent to which the questionnaire measures the intended construct. This can be done using techniques such as factor analysis, which examines the underlying structure of the questionnaire to ensure that it is measuring the intended construct.

It is important to use multiple methods to assess reliability and validity, and to continually refine and improve the questionnaire based on feedback from respondents and experts in the field (Streiner et al., 2015). In the case of this study, the chosen research design that align with the research questions, the details and the process of creating the questionnaire, the use of “Prolific” as reliable data collection website, the use of SPSS 29.0.2.0 to analyze the data, and repeating a question in the research (which is asking the same question two times in different ways and spots in the survey) were all ways to ensure rigor in this quantitative study.

CHAPTER FOUR

RESULTS

This chapter summarizes the results of 200 caregivers. The survey was intended to collect data from 150 participants, but I received 200 participants through prolific. Participants provided answers for questions related to their needs and willingness regarding the provision of ABA services for their neurotypically developing children to increase their level of physical activity. Their answers provide better understanding for the need of parents regarding using ABA to increase their children's level of physical activity. The survey methods used to collect data can be found in Chapter Three.

Quantitative Results

The survey of this research was built upon answering three questions: (1) What do parents of neurotypically developing children expect from a BCBA as it pertains to increasing physical activity for their children? (2) To what extent are parents willing to be trained in ABA principles to help increase their child's level of activity? (3) What are parents' current level of knowledge and beliefs on the effectiveness of ABA interventions to help increase physical activity?

To discuss the results, I will highlight each question, list the questions in the survey related to the answer, and review the results related to these questions. Initially, SPSS 29.0.2.0 was used to run descriptive analyses for the responses of each question to get a table of the minimum, maximum, mean, and standard deviation of the total responses. The mean of the responses was used to answer each research question.

Knowledge of ABA

Initially in the survey, a question about parents' knowledge of ABA was asked. The survey question asked parents if they have heard about ABA and the choices were "Yes, No." Interestingly, 50% of the participants had not heard of ABA, 27% of the participants did not answer the question, and just 23% of the participants had heard of ABA.

Beliefs on the Importance of Exercise

This research is primarily concerned with parents' opinions on the importance of using ABA to increase children's physical activity, so three questions in the survey focused on rating parents' opinions in the need of exercise and daily physical activities. The first question regarded the importance of exercise. The survey asked parents if they thought physical activity was important for overall health. Parents who participated in the survey mostly thought physical activity was very important for the overall health (55.20%). Next were parents who believed that physical activity was somewhat important, with 14.40% of the participants in this category. The slightly important category comprised 3% and 1.5% of participants indicated they did not know how important physical activity was for overall health.

Next was a question about parents' beliefs on the importance of physical activity for their children. The highest percentage of the participants (31.40%) stated that it was very important for them to engage their children in exercise activities, whereas 16.90% of participants felt it was moderately important and 13.40% of parents believed it was extremely important. The lowest two percentages of the participants felt it was either slightly important or not important at all, with 9% and 3%, respectively.

Finally, the survey asked parents about the number of minutes or hours needed for children's daily physical activity. Slightly over one third of parents (33.80%) selected 30 to 60 minutes of daily physical activity. Just under a quarter (23.90%) of the respondents indicated they expected the need of their children to be two to three hours daily. Some parents preferred a higher level of physical activity for their children, with 10.40% indicating three to five hours daily was needed, and 3.5% of the parents preferred for their children to be active more than five hours per day. Lastly, parents who thought 20 minutes of daily physical activity was enough for their children included 2.5% of the participants.

Expectations from a BCBA

The first question was **“What do parents of neurotypical developing children expect from a BCBA as it pertains to increasing physical activity for their children?”** To answer this question, participants were asked about their willingness and interest related to the expected resources from a BCBA. The first question was “for each resource listed below, please indicate how willing you would be to access that resource to learn more about ABA?” Each of the following listed resources had a scale from 0 to 10, where participants rated their willingness for each resource. Resources included books, articles, workshops, training hours, and meetings. The results showed that parents were most willing to read articles and books to learn more about behavioral interventions with a mean of ($\bar{X} = 6.40$) for articles and ($\bar{X} = 5.53$) for books. Parents' lowest willingness option was having a meeting with the BCBA and training hours with a mean of ($\bar{X} = 3.62$) for meetings and ($\bar{X} = 3.99$) for training hours.

In addition, the survey asked parents about their interests in using any of the previously mentioned resources to know about their children's ABA interventions. The answers regarding their interests were similar to their willingness. For these participants, articles and books were the most interesting ways to learn about ABA, with a mean of ($\bar{X}$ = 5.97) for articles and ($\bar{X}$ = 5.22) for books. Finally, meetings had a mean of ($\bar{X}$ = 3.53) and training hours ($\bar{X}$ = 3.77).

The second research question was **“To what extent are parents willing to be trained in ABA principles to help increase their child's level of activity?”** The first survey question that aimed to collect data about parents' comfort level to be involved in the intervention was “If provided with a plan and the needed resources such as training, workshops, and regular meetings with a Board-Certified Behavior Analyst would you be comfortable implementing it on your own?” The answers were rated on a scale from 1 to 10, with 10 being very comfortable and 1 being not comfortable at all. The highest answer was 8 and the lowest answer was 2 with a mean of ($\bar{X}$ = 4.66) for 151 participants. The mean of the answer indicates that less than half of the participants were comfortable being trained in ABA to increase their children's physical activity level.

Another question asked parents about what actions they were willing to take to collaborate with a BCBA to implement an in-home intervention. According to the survey, parents were mostly willing to engage in physical activity themselves and have a stable routine and schedule to help increase their children's level of physical activity. The mean for parents who were willing to engage in physical activity themselves was ($\bar{X}$ = 7.41) and their willingness to have a stable routine was ($\bar{X}$ = 7.36). Parents' willingness to observe their child throughout the day to get a better sense of their physical activity had a

mean of ($\bar{X} = 7.02$). Also, parents were open to including a daily schedule that had a focus on increased physical activity for their children, with a mean of ($\bar{X} = 6.71$). In addition to this, parents were willing to include a reward system for their children's physical activity, with a mean of ($\bar{X} = 6.68$). Parents' lowest level of willingness was for developing and implementing a physical fitness intervention plan for their child at home with a (BCBA) ($\bar{X} = 5.39$).

The last research question was **“What are parents’ current level of knowledge and beliefs on the effectiveness of ABA interventions to help increase physical activity?”**

This question was answered with the following survey questions: “How would you rank your knowledge of ABA?”, “How would you rank your knowledge of shaping children's behavior?”, and “To what extent do you rate the effectiveness of applied behavioral interventions for neurotypically developing children to change their behavior?”

For the first question, parents’ knowledge of ABA was low. The highest rate provided for parents was 10, and the mean of parents’ knowledge was ($\bar{X} = 2.1$). However, parents’ knowledge of shaping behavior was higher, with a mean of ($\bar{X} = 5.5$), which is in the middle of the rate from 10 to 0. Finally, parents who believed the effectiveness of ABA for their neurotypically developing children had a middle mean of ($\bar{X} = 5.7$).

T-test Measurements

After answering the research questions, I run a *t-test* related to the acceptance and willingness of using ABA related to several demographic factors. The demographic factors were parents' gender, age, educational level, and annual household income. The *t-test* compares two variables with one factor. For the case of this research, I compared the highest two response choices with the targeted factor. For example, I compared the level of ABA acceptance for neurotypically developing children between males and females since the frequency of responding males is 78 and females is 101 out of 200 responses (some of the participants chose other choices). Males and females were the highest number of participants. This example will be applied to the rest of the demographical factors. Surprisingly, there were no significant differences found between any of the demographic characteristics I tested. The following table summarize the results of the targeted *t-tests* and its results.

Table 1

T-tests comparison

Variable	P-value	Significance
Knowledge of ABA	.131	No significance
Male and Female	.438	No significance
Age	.859	No significance
Household Income	.707	No significance
Educational Level	.382	No significance

CHAPTER FIVE

DISCUSSION AND CONCLUSION

The purpose of the research was to examine parent knowledge and attitudes toward behavioral interventions to increase children's physical activity, and the research questions were:

1. What do parents of neurotypically developing children expect from a BCBA as it pertains to increasing physical activity for their children?
2. To what extent are parents willing to be trained in ABA principles to help increase their child's level of activity and decreasing weight?
3. What are parents' current level of knowledge and beliefs on the effectiveness of ABA interventions to help increase physical activity?

Significance of the Research

The significance of this research was that the field of ABA can better know the needs of parents to increase children's physical activity levels. According to the survey and the results that did not show significance, parents need to learn more about ABA. To prove the need for more knowledge about ABA, the mean result of parents' knowledge of ABA was lower than all the analyzed means in the survey. Additionally, parents had a higher mean of knowing about shaping behaviors, which is one of the detailed concepts under ABA.

The second significance of the research was this that it is helpful for future researchers to collaborate with parents and start creating interventions to increase physical activities by using participants answers to the needed resources, materials, and

support from behavioral analysts. The survey questions of this research asked parents about their expectations and needs from the field specialists. According to the analysis, parents preferred to read articles about ABA mostly. The results of this research connected the two points of the significance of research. First, parents needed to know more about ABA, and the best way they would prefer to learn about ABA more is by reading more articles.

However, these days with the fast pace of life and the time spent on screens, in general, and social media in specific, children's level of physical activity has become limited (Alanko, 2023). Not to mention that there are still parents who value physical activity time for them and their children according to this study. According to the results of this research, parents with different educational levels had a similar knowledge of ABA, which in general was low given the chosen scale of measurement. Therefore, the job of ABA researchers is to increase parents' general knowledge of ABA and help disseminate this information among different groups socially, economically, educationally, and maturely. Overall, the need is to reach parents through different organizations and platforms. Logically, parents will not start reading articles unless they are guided to specific articles that matches their needs and level of knowledge, which needs to be guided by a behavioral health professional.

Theoretical Background

The theoretical background is an essential part of all research to connect the results of the research to existing knowledge. The results of this research are tied strongly to Bronfenbrenner's Development Ecology Model, the Theory of Energetic Cost, and the Law of Attraction. First, parents' highest mean on the scale of willingness to collaborate

with a behavioral interventionist was for their willingness to change their schedule or daily routine to establish a physical activity habit and be active themselves. This finding aligns with the effect of the “microsystem” in Bronfenbrenner’s theory, which include the child’s immediate surroundings. Parents’ willingness to engage in exercise and to change their schedule to increase physical activity would be an effective contribution to increase physical activity among children (Bronfenbrenner, 2005).

Additionally, this sample of parents believed in the effectiveness and importance of exercise for the overall health in general and their children’s health in specific. Parents also stated that they believed that their children needed more than an hour of daily exercise activity, which matches the suggested amount of exercise needed for children from the Centers for Disease Control and Prevention (CDC, 2022). This finding again aligns with the concept of the microsystem, which is the first environmental surrounding around the child and has the strongest effect on a child (Bronfenbrenner, 2005). If parents increase their daily level of physical activity, and they are the first environmental effect on their children, they will be the best influence for their children to engage in daily physical activity.

Second, parents’ belief in the importance of observing their child throughout the day to collect data about their daily habits guided by a behavioral specialist is an indicator of their knowledge on the need of making exercise part of their daily routine and lower the energetic cost of it. The theory of the energetic cost states that due to the high energy required to stay active, the body prefers to stay in the state of inactivity (i.e., the comfort zone) (Cheval, Radel et al., 2018). Parents’ willingness to observe their child through the day and change their daily routine were some of the highest means on the

willingness scale. According to the theory of energetic cost, lowering the energetic cost of the different types of physical activities is rewarding. The theory also suggests that when people try adding physical activity to their daily routine can adjust faster than when they try to remove or avoid sedentary activity and these actions are tied to the cortisol hormone in the body (Cheval, Radel, et al., 2018).

In addition, parents' willingness to change their daily routine and incorporate a reward system to increase physical activity in their children is strongly tied to the ART theory by Brand and Ekkekakis (2018). Brand and Ekkekakis stressed the two types of motivation associated with physical activity. They stated that when activity is associated with painful experiences, it leads to inactivity. When exercise is associated with environmental motivation and self-control, it leads to higher physical activity. Collaboration with a behavior specialist to change daily habits and routines of the children to increase their physical activity will focus on making physical activities reinforcing and fit within their individual schedules. The focus on the reinforcement aspect comes from two principles of ABA. First, ABA prioritizes reinforcement schedules to change behaviors, and second, ABA interventions are research-based. When it comes to creating a physical activity plan, specialists must build their intervention based on research, which is in this case built upon the energetic cost theory or other similar exercise theories (Cooper et al., 2020).

Parents' Knowledge of ABA

In the behavior analytic field, changing behavior reinforcing successive approximations to the target behavior is referred to as "shaping behavior," and it is one of the terms I asked participants to rank their knowledge on. However, since only 23% of

the participants stated that they had heard of ABA, their higher ranking of their knowledge of shaping behavior could be built upon thinking that shaping behavior is an isolated term from ABA. However, their higher ranking of shaping behavior might be built upon their knowledge and experiences of using different methods generated from varied childrearing approaches to change children's behaviors. Yet again, their willingness to change their habits, daily schedule, and observing their child throughout the day aligns with the three rules of shaping behavior, as defined within the context of ABA. The three rules are detecting a change in the environment, observing if the change is closer or further from current behavior, and providing reinforcement for the steps toward the desired behavior (Cooper et al., 2020). Nevertheless, a study by Larson et al. (2014) stated that caregivers' interaction and play with preschoolers increased children's physical activity levels comparing with three other environmental conditions. This finding suggests that even though participants knowledge of the field of ABA was not high, their intuition as parents guided them to highly rate and accept the ABA guidelines of changing behaviors.

Parents' Beliefs on the Importance of Exercise

Exercising is one of basic needs of human body. According to the World Health Organization (WHO) physical inactivity is now regarded as the fourth most common cause of death worldwide. If individuals and societies do not take immediate action to encourage more physical activity, nearly 500 million people will develop heart disease, obesity, diabetes, or other noncommunicable diseases (NCDs) that are caused by inactivity. This will result in a cost of 27 billion US\$ annually. These data were from 194 countries around the world (WHO, 2022). Parents in this research believed on the

importance of exercise for the overall health for people from different ages and stages with the highest percentage for “very important” and “somewhat important” and a total of 69.6% for their belief on the importance of exercise for overall health. Additionally, the results of this research indicated that parents believe the importance of exercise for their children. Parents ranked exercise as very important, moderately important, extremely important, with a total of 61.7% believing in the importance of exercise for their children. Parents perspective of exercise activities is an indicator of their children’s level of physical activity. Interestingly, a 2021 study by Hu et al. found that parents’ attitude toward physical activity predicted their four- and five-year old children’s physical performance.

Talking about the level of physical activity guides the reader to think about how much physical activity is needed for a child. Therefore, this study included a question about how much time parents believed was needed for children to be physically active every day. In survey responses, parents had the highest rating for 30-60 minutes which align with the previous research. The CDC (2022) suggests 60 minutes of moderate to vigorous physical activity (MVPA) for children per day, every day. In sum, parents who participated in this survey had positive attitude toward physical activity and exercise and the needed daily amount of exercise they suggested aligns perfectly with the suggested amount by the CDC.

Parents’ Expectations of a Behavioral Intervention

The first question of the research was what the expectations of parents from a behavioral analyst regarding increasing physical activity for their neurotypically developing children. Two questions were asked in the survey to test this factor. One is

about their willingness to collaborate with a behavior analyst and the other is about their interest and what are the ways they prefer to receive the support, all of which had sub choices rated from one to ten. Parents' answers were similar in both the interests and willingness. They mostly wanted to read articles and books about ABA. Parents rated training hours, meetings, and workshops the lowest. The expectation was to have a higher rating for meetings and training since articles about parents' collaboration stated parents' need for communication. Almendingen et al. (2021) stated that parents wanted more skill-based training and open communication to be able to fully support their child development.

Demographic Questions and Acceptance of ABA

The *t-tests* conducted in this study are about the relationship between each demographical question and ABA acceptance. The first test examined the relationship between educational level and household income. The expectation was parents with a higher educational or household income level will accept and know more about ABA than other participants. However, there was no significant difference in any of the educational or household levels of parents in this study. These findings differ from those concluded in a study by Keengwe and Onchwari (2022), who found parents' perceptions of their relationships with teachers were influenced by factors such as their level of education and household income (Keengwe & Onchwari, 2022). In sum, none of the demographic factors in relation to the acceptance of ABA in this research had significant results. Not having significant results would be discussed in the limitation section.

Directions for Future Research

The topic of using ABA in contexts other than among children with Autism is less studied, and in the case of this research, just 0.11% of the of trained behavior analysts stated that their main area of professional focus is health, sport, and fitness (Behavior Analyst Certification Board, 2023). The results of this research proved that more than half of the participants had not heard of ABA. When running a *t-test* to know if people who heard of ABA had higher acceptance of ABA, no significant results were found. First, replicating the study on the same participants before and after learning about ABA would help the field of ABA better understand the importance of spreading the knowledge of ABA to parents from different educational settings in the society. Second, future work may consider using the same survey in educational settings with an established ABA background and employing a rating scale to investigate their knowledge of ABA; those who have no knowledge can be prompted to exit the survey. Contrarily, running a study within the ABA society with people who are highly familiar with ABA could help garner insight on future directions and the needs and expectations of parents from the behavior analysis with specific focus on increasing physical activity.

In addition, educators and behavioral analysts are responsible for increasing ABA knowledge among parents and educational communities. The following list is a suggested plan for increasing parents' knowledge of ABA:

- Behavior analysts should start posting on social media parenting tricks and tips constructed from ABA principles and ABA articles and then reference the needed articles.

- Behavior analysts communicate and collaborate more with schools to send posters and flyers about ABA. Some of them can be behavioral tips and tricks related to their children educational progress and improvements, such as daily schedules and the use of reinforcement at home to increase desired behaviors. Other information about ABA and the services behavior analysts provide can be written in parent-friendly terminology.
- Behavior analysts can also do the same among parents in extracurricular settings, like children's sporting events, parks, daycare facilities during parents' educational meetings.
- The abovementioned suggestions can be facilitated through ABA organizations with the collaboration of individuals who work in the field to increase overall knowledge of ABA usage among individuals who do not fall on the autism spectrum disorder.

My ABA Transformation

I stated in the introduction my experience with limited physical activity as a child. For me I started noticing my weight gain and limited activity since I was 10. I tried every possible solution with the help of my mom earlier and independently later. I stick with a program then I lose interest after a while. I kept going back and forth between programs and ways to be active and lose weight, yet I kept failing and quitting. Working in the ABA field changed my mentality toward my personal behaviors in general, and my limited activity in specific. There are several ABA concepts that I always kept in mind before starting with intervention. I started to think about it as behavior and breaks it down to discover the environmental effect to it. Since not being active is a complex behavior

that could be affected by the eating habits, lifestyle, hobbies, and even social life, I wanted to know what was mostly affecting my activity level. The idea of breaking down a behavior is generated from component analysis in ABA. Component analysis is an experimental strategy used to determine the active substances in a treatment package, the relative contributions of various components, and/or the need and sufficiency of making changes in any of the components (Cooper et al., 2020). I paid a close attention to all behaviors related to inactivity and started to make small changes and accept the small improvements. Like when we look at a child graph and see small changes in their behavior, we feel proud of it. Also, I kept in consideration one of the ABA concepts which is Relapse, which is the return of a difficult behavior that has been suppressed after treatment circumstances have changed (Kimball et al., 2023). Relapse in my intervention means that my level of activity might decrease according to life events like traveling or having a life events. With keeping all these ideas in consideration, it was time to start the intervention. I started with the most important component of my behavior, which is not being active, and decided to find a time to go to the gym that is hard for it to be changed with a change of my daily schedule. That time was 5:00 in the morning. The biggest operational motivation for me were a guaranteed me time in the morning before everyone is awake and eating my favorite desert with the coffee. The reinforcer during and after the workout was the feeling of the endorphins running through my body and the focus and energy I get all day from the dopamine released after the exercise. Being always active is a journey and I'm really satisfied with where I'm now due to regular exercising physically and mentally, I'm still trying to understand my body, behaviors, and working on self-improvement using a behavioral analyst mindset.

Limitations

Even though this research had a strong theoretical background and well-designed research survey, there were some limitations. First, the survey was not circulated through different social media platforms or parents of children in varied educational settings. The survey was conducted through Prolific and only Prolific, and the majority of the participants had not heard of ABA. If the survey was conducted in schools that used ABA as their behavioral method or educational settings that have an ABA clinic (e.g., the Lowery Center at Oakland University), the results might differ. Second, most participants had not heard about ABA. Asking parents if they would accept the details of the ABA interventions when they did not have basic knowledge of ABA and what is for could result in biased feelings about it and may have resulted in no significant results. Even after running a *t-test* for the acceptance of ABA between people who had heard of ABA and people who had not, no significant results were shown, which indicates that their knowledge of ABA was not enough to be significant.

Conclusion

My inspiration for conducting this study was sparked by my limited access to physical activity as a child, which caused me depression and affected my educational performance. Today, the CDC suggests children participate in a minimum 60 minutes of moderate to vigorous physical activity (MVPA) per day, every day (CDC, 2022). The World Health Organization (2022) defines physical activity as any skeletal muscle-driven motion of the body that involves energy expenditure. Several studies mentioned the high risk of limited physical activities on children, which cause several health problems, such as diabetes, obesity, cardiovascular disease, and cancer (Ogden et al., 2006). Other health

problems are related to children's overall health, including their physical abilities, levels of stress and anxiety, and learning abilities (Kuhl et al., 2015).

Physical activities varied in their intensity. The intensity of the physical activities can be measured by the heart rate ranges expressed relative to an individual's maximal heart rate. According to Wortham (2010), early childhood education and young children's curriculum guidance include physical activities as an essential aspect of children's wellbeing. Physical activities for children include both fine, motor skills and any movements for either one. Teachers have a great role in the physical development of their students (Moravicik & Nolte, 2018).

In addition, this study focused on parents' opinions on using ABA with their neurotypically developing children. Applied Behavioral Analysis (ABA) is "a science devoted to understanding and improving human behavior" (Cooper et al., 2020, p. 2). This field was established in the early 1900s by Skinner. ABA is built upon seven dimensions which are generality, effective, technological, applied, conceptually systematic, analytic, and behavioral (Cooper et al., 2020).

This study was built upon the framework of four theories: Affective–Reflective Theory of Physical Inactivity and Exercise, the Theory of Energetic Cost, Bronfenbrenner's Development Ecology Model, and the Law of Effect Theory.

The major problem addressed by this work circled around the fact that many children suffer from a lack of physical activity. Puhl and Luedicke (2013) stated that overweight children often suffered from low self-esteem, coupled with an increased risk of eating disorders and depression. Increasing physical activities is an area where ABA interventions have focused on improving individuals' behaviors related to physical

activity and healthy eating habits (Behavior Analyst Certification Board, 2023). The purpose of this research was to examine parent knowledge and attitudes toward behavioral interventions to increase children's physical activity.

The three research questions focused on the needs, expectations, and willingness of parents to collaborate with a behavioral interventionist. These questions are significant to support future research in the field and practical for the current practices.

Previous research related to this study stated that parents' attitude toward exercise can predict children's level of activity. Parents' preferred ways of communication and collaboration with schools was also part of the literature review. Then lastly the effect of structured exercise activities, social encouragement, and reinforcement system was also part of the review. Nevertheless, politically, schools in Michigan have an individualized curriculum for physical activities; yet, ABA services are covered by insurance for children with Autism only.

This study was quantitative and conformed to a cross-sectional design. A survey was conducted through the Qualtrics platform, and collected 200 parents' answers from the United States. The data were analyzed using the Statistical Package for the Social Sciences, or SPSS software 29.0.2.0. In addition, the expectations of the research are for parents with higher education or income to accept ABA more than other population.

The results showed that a low population of parents knew about ABA. However, they believed that exercise is important for them and their children. Parents preferred to read books and articles to know more about ABA. However, parents were willing to change their daily routine and participate in physical activity themselves to help increase

their children's physical activity. Parents also believed that ABA and shaping behavior are somewhat important for their children.

In sum, the connection of the current research with the existing research was done through five topics: theoretical background, parents' knowledge of ABA, parents' beliefs of the importance of exercise, the expectation of parents from a behavior analyst, demographic questions, and acceptance of ABA. In this research, tips for raising the knowledge and awareness of ABA, suggestions for future research, and limitation of the current research were stated.

Finally, ABA is an individualized behavioral intervention that can support parents of neurotypically developing children during their parenting journey in many ways, and parents deserve to know more about and have available resources. Then they can make their decisions built on their knowledge of ABA.

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APPENDIX A

Table 2
Activity Level Codes

Level	Activity	Operational Definition
1	Stationary or motionless	Stationary or motionless with no major limb movements or major joint movement (e.g., sleeping, standing, riding passively in a wagon)
2	Stationary with limb or trunk movements	Stationary with easy movements of limbs or trunk without translocation (e.g., standing up, holding a moderately heavy object, hanging off bars)
3	Slow, easy movements	Translocation at a slow and easy pace (e.g., walking with translocation of both feet, slow and easy cycling, swinging without assistance and without leg kicks)
4	Moderate movements	Translocation at a moderate pace (e.g., walking uphill, two repetitions of skipping or jumping, climbing on monkey bars, hanging from bar with legs swinging)
5	Fast movements	Translocation at a fast or very fast pace (e.g., running).

Note: Adapted from McIver et al. (2009)

APPENDIX B

Demographic Questions for the Parent

1. Are you willing to participate in this survey?
 - a. Yes
 - b. No
2. What is gender?
 - a. Male
 - b. Female
 - c. Non-binary/third gender
 - d. Prefer not to answer.
 - e. Prefer not to say
3. What was your age in your last birthday?
 - a. 18-25
 - b. 26-35
 - c. 36-45
 - d. 46-55
 - e. 56-65
 - f. 66- 75
 - g. 76+
 - h. Prefers not to say
4. What is you approximate annual house holding??
 - a. \$25,000 - \$50,000
 - b. \$50,000 - \$100,000
 - c. \$100,000 - \$200,000
 - d. More than \$200,000
 - e. Prefer not to say
5. What is the highest degree or level of school you have completed?
 - a. Less than school degree
 - b. High school
 - c. Some college
 - d. 2-year degree
 - e. 4-year degree
 - f. Master's degree
 - g. Professional degree.
 - h. Doctorate degree.
 - i. Other.

Questions About the Child

The following questions are about your child. If you have more than one child, please select a child who is between 1 to 8 years old to answer these questions. If you have more than one child in this age range, you may choose to fill this survey out for each child.

8. What is your relationship to the child?
- a. Mother (biological/adopted)
 - b. Father (biological/adopted)
 - c. Step-Mother
 - d. Step-father
 - e. Grandparent
 - f. Uncle/Aunt
 - g. Older sibling
 - h. Non-relative custodial guardian
 - i. Other

9. How old is the child??
(Short Answer Space)

10. What is the child's gender?
- a. Male
 - b. Female
 - c. Other

11. What is your child weight in pounds?
(Short Answer Space)

12. What is the child's height in inches?
(Short Answer Space)

Questions About Physical Activities

12. On a typical weekday (Mon – Fri) about how much time do you spend with your child?
- a. Less than an hour
 - b. 1-4 hours
 - c. 5-8 hours
 - d. More than 8 hours

13. On a typical weekend day (Saturday, Sunday), about how much time do you spend with your child?

- a. Less than an hour
- b. 1-4 hours
- c. 5-8 hours
- d. More than 8 hours

14. Which of these terms would you say apply to your child? Please select as many as fit? (Pick all that applies)

Happy
Curious
Thoughtful
Helpful
Obedient
Worried
Confused
Sad
Lonely
Angry
Active
Smart
Kind
Friendly
Talkative
Sleepy
Aggressive
Quiet
Shy
Sneaky

15. Does your child have any physical limitations or impairments?

- a. No
- b. Yes, please describe
(Short Answer Space)

16. How would you rate your child's general health?

- a. Needs constant care
- b. Gets sick frequently
- c. Gets normal childhood illness
- d. Fairly healthy
- e. Very healthy

17. How important is it to you for your child to exercise or participate in sports activities?

- a. Not at all important
- b. Slightly important
- c. Moderately important

- d. Very important
- e. Extremely important

18. For each item listed below, please estimate how often your child does each activity, from 0=Never to 10=Every day

Does your child do any of these exercises on a regular basis?

- Ride a bicycle
- Jog
- Swim
- Walk for Exercise
- Use obstacle courses
- Use jungle gym
- Other (Short Answer Space)

19. Has your child participated in any of these sports during the past 12 months? Please check as many as apply.

- Basketball
- Bowling
- Football
- Golf
- Gymnastic
- Handball
- Soccer
- Softball
- Baseball
- Swimming
- Tennis
- Track and field
- Volleyball
- Wrestling
- Other (Short Answer Space)

20. Would you say that your child is physically more active, less active, or about as active as other children their age?

- a. More
- b. Less
- c. Same

21. Below is a list of possible resources used to learn more about children's physical activity. Please indicate how useful you would consider each of these to be for you, from 0=Not at all to 10=Very much

- The Internet (Random website)
- The center for disease control and prevention (CDC)
- Books
- Workshops
- Physical education classes

Other (Short Answer Space)

22. How many hours of daily physical activity do you think your child needs?

- a. Less than 20
- b. 30-59 minutes
- c. 2-3 hours
- d. 3-5 hours
- e. More than 5

23. How many actual hours of daily physical activity is your child doing currently?

(Physical activities for children are walking or running, playing tag, swimming, tumbling, dancing, throwing and catching, and any other unstructured physical activities).

- a. Less than 20
- b. 30-59 minutes
- c. 2-3 hours
- d. 3-5 hours
- e. More than 5

24. How often does your child exercise or participate in sports activities each week?

(Sports for kids include basketball, baseball, football, soccer, volleyball, gymnastics, and any other structured group or individual physical activity).

- a. Not at all
- b. Less than 1 time/month
- c. 2-3 times/month
- d. 1 time/week
- e. 2 times/week
- f. 3-4 times/week
- g. 5-6 times/week
- h. Every day

25. How much control do you think you have over your child's future health?

- a. None at all
- b. Very little
- c. Some
- d. A great deal

26. Have you heard about Applied Behavioral Analysis (ABA)?

- a. No
- b. Yes

27. How would you rank your knowledge of each area, with 0 = none at all to 10=a great deal

- a. ABA

- b. Child development
- c. Healthy Eating
- d. Exercise
- e. Shaping children behavior
- f. Helping child to do things differently

28. For each resource listed below, please indicate how willing you would be to access that resource to learn more about ABA, from 0=not at all to 10= very willing:

- a. Books
- b. Articles
- c. Workshops
- d. Training hours
- e. Meetings

29. For this same list of resources, please indicate your interest in using it to learn more about ABA, from 0=Not at all to 10 = Very interested

- a. Books
- b. Articles
- c. Workshops
- d. Training hours
- e. Meetings

30. If provided with a plan how comfortable would you be implementing it by your own?

- a. Extremely uncomfortable
- b. Not comfortable at all
- c. Somewhat uncomfortable
- d. Don't know
- e. Slightly comfortable
- f. Very comfortable
- g. Extremely comfortable

31. If provided with a plan and the needed resources such as training, workshops, and regular meetings with a Board Certified Behavior Analyst would you be comfortable implementing it on your own?

- a. Extremely uncomfortable
- b. Not comfortable at all
- c. Somewhat uncomfortable
- d. Don't know
- e. Slightly comfortable
- f. Very comfortable
- g. Extremely comfortable

32. To what extent do you rate the following items, from 0= Definitely not to 10 = Definitely would

- a. applied behavioral interventions are helpful for typically developing children to change their behavior?
- b. you being willing to develop and implement a physical fitness intervention plan for your child in home with a Board-Certified Behavior Analyst (BCBA)?
- c. you being open to including a reward for physical activity?
- d. you being open to including a daily schedule that had a focus on increased physical activity?
- e. your willingness to observe your child throughout the day to get a better sense of their physical activity?
- f. your willingness to engage in physical activity yourself as a parent, if it was part of the intervention plan?
- g. your willingness to have a stable routine and schedule for physical activity for your child?

33. How much do you believe in the importance of physical activity for overall health?

- a. Extremely important
- b. Not very important
- c. Don't know
- e. Slightly important
- f. Somewhat important
- g. Very important

34. If yes, list some of your beliefs about its benefits.
(Short Answer Space)

APPENDIX C

INSTITUTIONAL REVIEW BOARD APPROVAL LETTER



Date: September 26, 2022

Study #: IRB-FY2022-65

Study Title: Evaluation of parents perspective on physical activity

Submission Type: Initial

IRB Decision: Exempt

Research Team:
Ahlam Faheem
Jessica Korneder

Based on applicable federal regulations, the above referenced study has been determined to be Exempt, with the following categories:
Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Notes for Researcher(s):

This submission includes the following approved documents:

- Recruitment document (English and Arabic)
- Date-Stamped English Information Sheet V 9/26/2022
- Date-Stamped Arabic Information Sheet V 9/26/2022
- Physical Activity Questionnaire

Letter and Consent Document:

This letter along with the IRB approved (date-stamped) consent document can be found in Cayuse in the [Submission Details](#) page under [Letters](#) and [Attachments](#), respectively. Please make sure to use the most recent IRB approved version of the consent form in consenting participants.

Permission from Research Site(s):

Please note the following:

- This IRB exemption determination letter means that this research has met one or more of the federal criteria for exemption per 45 CFR 46.104- Exempt Research.
- Before the research is initiated, permission to conduct research at a given site must be obtained from all research locations listed in the IRB submission. You must keep copies of all such permission letters for your files.
- It is the responsibility of each researcher to follow all applicable policies and procedures of any outside institution where the research will be conducted.

Modifications:

Any changes to this exempt project must be reviewed by the IRB prior to initiation by submitting a MODIFICATION request. Do not collect data while the changes are being reviewed. Data collected during this time cannot be used in research.

Record Retention:

Exempt projects will be retained by the IRB office for three years after the last action on the project.

You are approved to start the research. Please retain a copy of this notification for your records.

If you have any questions, please contact the IRB office.

Thank you.

The Oakland University IRB