Assessing the Needs of Physical Activity in a Pediatric Weight Management Clinic

By

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ABSTRACT

Objective: This study determined the type of physical activity support patients wanted while receiving treatment at the Pediatric Healthy Weight Research and Treatment Center. **Methods:** A sample of 27 parents/patients were interviewed using a Physical Activity Needs Assessment questionnaire to determine current physical activity behaviors, attitudes, and knowledge, along with assessing the wants and needs for future physical activity interventions. The questionnaire was competed by children between the ages of 12-17 years, but for children between 5-11 years of age their parents completed the questionnaire. **Results:** The average age of the participants was 11.4 ± 2.75 years. The majority of participants that attended the clinic were male and the largest racial/ethnic group was Black, Non-Hispanic, followed by White, Non-Hispanic. The average BMI percent of the 95th percentile was 149.00 ± 32.58; meaning the majority of patients seen at the clinic were class 3 obesity. Nearly half of the sampled children attending this weight management clinic participated in aerobic physical activity for 60 minutes 5-7 days a week (44%) and only 33% of parents/patients were knowledgeable of current youth physical activity recommendations. In terms of the needs assessment, participants had a positive view of physical

activity and noted benefits related to health, enjoyment, and social aspects. Patients' preference on receiving information about physical activity was as follows: face-to-face group meetings, face-to-face individual meetings, and videoconferencing. Lastly, the patients' top interests of topics to learn about included fitness components such as aerobic physical activity, muscle building physical activity, bone building and calories being burned during physical activity. **Discussion:** These findings can be useful to design future physical activity interventions targeting obese youth obtaining medical treatment. Based on the study findings, future studies should design an intervention that is face-to-face discussing physical activity recommendations, fitness components, and activities that can be done at home with friends or family.

Assessing the Needs of Physical Activity in a Pediatric Weight Management Clinic

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Chapter I: Introduction

Childhood obesity has been identified as a risk factor for developing multiple health conditions, such as type 2 diabetes, sleep apnea, anxiety, depression, and cardiovascular disease (Shaikh et al., 2011). Childhood obesity has increased dramatically over the last five decades, where currently, 20% of adolescents aged 12 to 19 years old are considered obese and nearly 20% of children ages 6 to 11 years old are considered obese (Ogden et al., 2016). Between 1976-1980, only 5.0% of adolescents and 6.5% of children were classified as obese (Kumar & Kelly, 2017). Certain youth populations are more likely to have obesity than others. For example, non-Hispanic African American and Hispanic youth have higher rates of being overweight and obese compared to other races (Skinner et al., 2018). In 2019-2020, 23.8% of non-Hispanic black youth ages 10 to 17 had obesity and 21.4% of Hispanic youth ages 10 to 17 had obesity (Johnson, 2021). Due to the increase of obesity, a new classification system has been developed to define obesity better: class I obesity, class II obesity, class III obesity (Skinner et al., 2018). A BMI ≥ the 95th but <120 percent of the 95th percentile is defined as class I obesity, BMI values between ≥120 to 139 percent of the 95th percentile is defined as class II obesity, and BMI values ≥140 percent of the 95th percentile is defined as class III obesity (Skinner et al., 2018). Not only has there been an increase in childhood obesity, but physical inactivity levels among youth are high. Physical inactivity is defined as not accumulating the recommended amount of regular physical activity (Faigenbaum et al., 2019). The 2018 *Physical Activity Guidelines for Americans* recommends that children and adolescents ages 6 through 17 engage in 60 minutes or more of moderate-to-vigorous physical activity (MVPA) daily. However, according to the 2016 United States report card on physical activity for children and youth, the overall physical activity score

was graded a D- with less than half of children and youth meeting physical activity recommendations (Katzmarzyk et al., 2016). Further, the overall grade of a D- was given to sedentary behavior, meaning youth spend much of their time in sedentary activities (Katzmarzyk et al., 2016).

Children and adolescents are not as active as recommended, and physical inactivity has been identified as a modifiable risk factor for preventing and controlling chronic diseases like obesity (Faigenbaum et al., n.d.). Given the positive effects of physical activity, interventions focusing on physical activity can improve the overall health of children and adolescents. Interventions designed for adolescents have utilized single behavior and multi-component approaches to reduce obesity (Boon & Clydesdale, 2005). The most common single-component interventions have focused on increasing physical activity, decreasing sedentary behavior, or altering food intake, while multi-component interventions target nutrition, physical activity, and inactivity (Boon & Clydesdale, 2005). In addition to being multi-component or single component, intervention have also varied in terms of whether offered in-person or remotely.

Face-to-face interventions, while helpful, may present barriers for youth who live in rural areas. Related to medical care, a child who lives in a rural region has barriers such as increased travel time to receive treatments or lack of access to resources (Shaikh et al., 2011). Different approaches have been used to combat this barrier, such as telehealth in adults and youth (Shaikh et al., 2011). Telehealth uses electronic information and telecommunication technologies to support long-distance clinical health care, patient and health care professional education, and public health (Shaikh et al., 2011). There have been requests for healthcare providers who treat pediatric obesity to offer opportunities to deliver methods that overcome travel time, expense,

and geographic isolation (Shaikh et al., 2011). Due to these demands, there has been an increase in telehealth interventions.

Telehealth has shown to be a feasible method to deliver healthcare to treat adolescent with obesity (Chai et al., 2019). Yet, the research is scarce, and the results have been inconclusive on the effectiveness of these interventions on physical activity and obesity outcomes. For example, Currie et al., (2018) reported that participants who participated in a telehealth intervention did not improve in physical activity or obesity outcomes, but Larsen et al., (2018) found a decrease in physical activity after the intervention. On the other hand, Nourse et al., (2015) reported improvements in waist-hip ratio, VO2pulse, and functional movement after a telehealth intervention.

In summary, while physical activity provides numerous health benefits, many adolescents are not engaging in adequate amounts of physical activity. Further, obesity levels among adolescents have been rising. While physical activity interventions have been completed in the past, among adolescents living in rural environments, face-to-face interventions may produce barriers that are unique to those living in a rural area. Telehealth may be an alternative means to deliver physical activity interventions to adolescents living in a rural area. Unfortunately, the few interventions that have been conducted in obese adolescents have produced mixed results regarding their effectiveness for increasing physical activity and weight management. Thus, the purpose of this study is to determine if a physical activity telehealth intervention will increase the amount of MVPA among youth 13-17 years of age who are receiving obesity treatment. It is hypothesized that a telehealth intervention will increase the amount of time spent in MVPA for 13- to 17-year-old adolescence receiving obesity treatment. A secondary purpose is to determine if a telehealth physical activity intervention will impact 13-17-year-old adolescents' body mass

index (BMI) z-score and BMI percentile who are receiving treatment for obesity. It is also hypothesized that there will be a decrease in the adolescent's BMI z-scores and BMI percentile as a result of the intervention.

In terms of study significance, results may shed insight on the efficacy of a telehealth intervention for treating obesity by improving the amount of time spent in MVPA and positively affect weight management in obese adolescents. In addition, with travel barriers to face-to-face intervention, using a telehealth physical activity intervention can offer adolescents guidance on how to improve their physical activity levels and receive individualized attention. Furthermore, this study will add additional research regarding the feasibility and effectiveness of telehealth intervention in obese adolescents.

The current literature review and method sections (Chapters 2 and 3, respectively) was proposed for the “Effectiveness of telehealth intervention in obese adolescents” study. Two participants (1 intervention, 1 control) agreed to participate in the telehealth intervention, but both dropped out of the study after the 1st week. Due to a lack of involvement and response recruiting for the study, recruitment was stopped and a new study was designed to get better understanding of what parents and patients wanted regarding physical activity support at the Pediatric Healthy Weight and Treatment Center. Assessing the physical activity needs of patients allows for research and medical staff to be aware of patient needs and wants. Currently the standard care at the Pediatric Healthy Weight and Treatment Center involves discussion of physical activity with a physician assessing their current behaviors. The new study offers medical staff an awareness of physical activity topics of interest that can be addressed in these discussions and be used to develop future physical activity interventions for pediatric weight management clinics. Thus, the purpose of the new study was to determine the type of physical

activity support patients wanted while receiving treatment at the Pediatric Healthy Weight Research and Treatment Center. The methods for this new study are found in the results section (Chapter 4).

Delimitations:

1. Participants will live in Eastern North Carolina.
2. Participants will be between the ages of 13-17 years-old
3. All participants will be classified as at BMI of at least 95th percentile for obesity.

Limitations:

1. All participants will be recruited from East Carolina University's Pediatric Healthy Weight Research and Treatment Center
2. Participants must have internet access and accessibility to a phone, laptop, or webcam device for weekly web meetings.

Definitions:

1. Telehealth: is the use of electronic information and telecommunication technologies to support long-distance clinical health care, patient and health care professional education, and public health (Shaikh et al., 2011).
2. Body Mass Index (BMI) Z-Score: Also called BMI standard scores are measures of relative weight adjusted for a child's age and sex. BMI z-score is calculated relative to an external reference. BMI z-scores corresponds to growth chart percentiles and can be converted into their equivalent BMI-for-age percentiles by comparison to a normal distribution (Must & Anderson, 2006).

3. Obesity: is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex (*Defining Childhood Obesity | Overweight & Obesity | CDC*, 2019).
4. Physical Activity: World health defines physical activity as any bodily movement produced by skeletal muscles that require energy expenditure (World Health Organization, n.d.)
5. Moderate-intensity physical activity: an activity with a MET level between 4.0-5.9 (Butte et al., 2018)
6. Vigorous-intensity physical activity: any physical activity with a MET level ≥ 6 (Butte et al., 2018).
7. Moderate-to-vigorous physical activity: a physical activity with a MET level greater or equal to 4.0 (Butte et al., 2018).
8. Sedentary Behaviors- Any waking behavior characterized by an energy expenditure of 1.5 METs or less (Faigenbaum et al., n.d.)

Chapter II: Review of Literature

This literature review will discuss obesity and physical activity within the adolescent population. It will also cover interventions that have been used to increase adolescents' physical activity and reduce obesity and introduce telehealth interventions. The main sections of this literature review include: obesity, physical activity, obesity interventions for adolescents, and physical activity interventions in health care.

Obesity

Overweight and obesity currently affect nearly 13.7 million children and adolescents in the United States (Hales, 2017). Among youth ages 2-19 years old, 17.0% of youth were considered obese between 2011-2014 with 38.7% of adolescents between 12- to 15-year of age classified as overweight and obese (Skinner et al., 2018; Ogden et al., 2018). 6.5% of children and 5.0% of adolescents were classified as obese between 1976-1980 (Kumar & Kelly, 2017). 2009 and 2010, 18.0% of children and 18.4% of adolescents were classified as obese, and by 2012, 5.9% of children had severe obesity (Kumar & Kelly, 2017). Over the last 5 decades obesity has steadily increased in all populations.

As a result of the high prevalence of obesity, a new classification system has been introduced to pediatric populations. According to this new system, a BMI ≥ the 95th but <120 percent of the 95th percentile is defined as class I obesity, BMI values between ≥120 to 139 percent of the 95th percentile is defined as class II obesity, and BMI values ≥140 percent of the 95th percentile is defined as class III obesity (Skinner et al., 2018). This corresponds to a BMI for class I obesity equaling between 30.0-34.9 kg/m^2, class II obesity BMI equaling 35.0-39.9 kg/m^2 and class III obesity ≥40 kg/m^2. Within the study, 4.5% of adolescents ages 16-to 19-years-old

meet the criteria of class III obesity (Skinner et al., 2018). In addition, class 2 and class 3 obesity is increasing significantly in all ages. In 2015 11.9% and 4.8% of youth ages 3 to 19 years of age were classified has class 2 and class 3 obese respectively (Skinner et al., 2015). Not only is obesity increasing overall in the pediatric population, but there are racial/ethnic differences that exist as well. The highest prevalence of obesity by ethnic group are non-Hispanic black youth with 23.8% meeting obese criteria, 21.4% of Hispanic youth meeting obese criteria, and 12.1% of non-Hispanic White youth meeting the criteria of obese (Johnson, 2021).

The high prevalence of childhood obesity is concerning because it has been identified as a risk factor for developing multiple health conditions, such as type 2 diabetes, dyslipidemia, prehypertension, nonalcoholic fatty liver disease, early atherosclerosis, cardiovascular disease, sleep apnea, anxiety, depression, orthopedic issue, and premature mortality in adulthood (Styne et al., 2017). Furthermore, the development of health issues during childhood reduces their quality of life and sets the stage for further health complications during adulthood (Pratt et al., 2018). Finally, pediatric obesity is costly. It is estimated that if all US children and adolescents with obesity become obese in adulthood, the individuals' average cost could be >$92,000, and the societal costs during their lifetimes might be >$1.1 trillion (Styne et al., 2017).

Compared to other diseases, patients who are obese are often perceived as being responsible for their illness, and studies have shown that healthcare professionals have exhibited implicit bias against patients with obesity (Pratt et al., 2018). Obesity is a multifactorial disease resulting from genes, hormones, physical, social, and lifestyle factors, like physical activity and nutrition (Ranucci et al., 2017). Nearly 1 in 4 children and adolescent, that are overweight or obese, report binge eating (Pratt et al., 2018). There is also evidence that there is a decline in

moderate to vigorous physical activity (MVPA), and an increase in sedentary behavior coincides with a rise in childhood obesity (Mitchell et al., 2017). Approximately 1 in 4 adolescents who are obese have a primary caregiver who has undergone metabolic and bariatric surgery (Pratt et al., 2018). A thorough medical and family history is necessary for assessing obese youth because obesity and associated comorbidities can have familial tendencies (Styne et al., 2017). The complexity of etiology behind the development of obesity and the associated adverse health and economic consequences underscores the importance of treating and preventing obesity development in the pediatric population.

Socioeconomic Status & Obesity. Socioeconomic status (SES) includes income, educational attainment, occupational prestige, and subjective perception of social status and social class (*Children, Youth, Families and Socioeconomic Status*, n.d.). SES is a consistent and reliable predictor of outcomes across the individual life span, including physical and psychological health (*Children, Youth, Families and Socioeconomic Status*, n.d.; Tandon et al., 2012). In the United States, 39% of African-American and 33% of Latino children and adolescents live in lower SES neighborhoods, which is more than double the 14% rate for non-Latino, White and Asian children and adolescents (*Ethnic and Racial Minorities & Socioeconomic Status*, n.d.).

There is a significant inverse relationship between childhood obesity prevalence and SES (Skinner et al., 2018; Ogden & Flegal, 2010). For example, among boys, 21.1% were obese if they lived in households where the head of the family has less than a high school degree, whereas only 11.8% of boys were obese if they lived in homes where the head of household has at least a college degree (Ogden & Flegal, 2010). A similar finding was reported for girls, where 20.4% were obese if the household was headed by someone with less than a high school degree,

and only 8.3% were obese if the household head had at least a college degree (Ogden & Flegal, 2010). These findings indicate that specific populations, monitories, and low SES, have a higher risk for childhood obesity than other populations.

In summary, adolescent obesity and overweightness affects 38.7% of the population between the ages of 12- to 15-year of age. Suppose all US children and adolescents with obesity become obese in adulthood. In that case, the societal costs during their lifetimes can be nearly $1.1 trillion, and pediatric obesity is a risk factor for developing multiple health conditions, such as cardiovascular disease and type 2 diabetes. Obesity is a multifactorial disease due to genes, hormones, physical, social, and lifestyle factors such as poor nutrition, decreased physical activity and increased screen time.

Physical Activity

Physical activity is essential for health and well-being; however, reports indicate that children and adolescents are not as active as recommended (*Physical Activity Guidelines for Americans, 2nd Edition,* 2018.; Faigenbaum et al., n.d.). Physical activity is beneficial at all stages during the formative years, and active play is vital in physical, mental, and social aspects of growth and development, helping to set a pattern of participation in physical activity across a person's lifespan (Hills et al., 2011). The 2018 Federal *Physical Activity Guidelines for Americans* recommend that children and adolescents ages 6 through 17 complete 60 minutes or more of moderate-to-vigorous physical activity (MVPA) daily (*Physical Activity Guidelines for Americans, 2nd Edition,* 2018.). However, youth between the ages of 12 to 15 and 16 to 19 only record an average of 26 and 33 minutes of MVPA per day, respectively (*VitalSource Bookshelf: Essentials of Youth Fitness,* 2020). Physical fitness and aerobic fitness decline as youth transition from childhood and middle school to adolescence and high school (Basch, 2011). Further, racial

differences exist, where approximately 20% more White high school students meet the physical activity recommendations than either Black or Hispanic high school students (Basch, 2011).

Physical inactivity is a modifiable risk factor for preventing and controlling chronic diseases, such as obesity (Faigenbaum et al., n.d.). Obese children can experience a reduced health-related quality of life and physical function, which in turn discourages participation in physical activity (Eisenmann et al., 2015). Regular physical activity can positively affect fat mass and lean body mass, blood pressure, blood lipids, metabolic health, and carotid intima-media thickness in obese children (*VitalSource Bookshelf: Essentials of Youth Fitness*, n.d.; Eisenmann et al., 2015). In addition, more time being physically active can affect BMI and waist circumference values (Mitchell et al., 2017). For example, among those who were in the 90th percentile for MVPA recommendation, each additional hour of MVPA a day was associated with a .35 lower BMI z-score ($p < .001$) and a .36 ($p < .001$) lower waist circumference z-score (Mitchell et al., 2017). Thus, physical activity is essential for the normal growth and development of youth and plays a vital role in reducing health risks such as obesity (Hills et al., 2011).

SES & Physical Activity. Many healthcare professionals, including physicians recognize that environmental factors, such as playground accessibility, are related to children's overall wellness. For example, a study performed in Canada determined that youth who lived in a higher-SES neighborhood had significantly more physical activity resources than those who lived in lower-SES communities (Ravensbergen et al., 2016). For example, high-SES youth had access to 35 physical activity resources. In contrast, the low-SES youth had access to 23 physical activity resources (Ravensbergen et al., 2016). A possible explanation for the lack of physical activity in youth outside of school is that nearly half live in neighborhoods without parks or

playgrounds, community centers, walking paths, or sidewalks (*2014 State Indicator Report on Physical Activity*, 2014). SES discrepancies also exist in how physical activity resources are used (Ravensbergen et al., 2016). For example, among the low-SES group, the most common usage of physical activity resources were community centers where they have access to free physical activity activities (Ravensbergen et al., 2016). On the other hand, high-SES youth participate in organized sports and are more likely to spend higher amounts of money on sports such as swimming, skating, dancing, soccer, rock climbing, and used sports facilities to play organized sports (Ravensbergen et al., 2016). Overall, during childhood and adolescence, physical activity is complex, multifactorial, and SES can impact physical activity levels in youth (Drenowatz et al., 2010).

Obesity Interventions for Adolescents

Inequities in a physical and social environment can explain racial, ethnic, and SES disparities in childhood obesity (Rossen, 2014). The American Academy of Pediatrics and the US Department of Agriculture recommend a decreased consumption of fast foods, added table sugars, high-fructose corn syrup, high fat and high sodium foods, as well as processed foods (Styne et al., 2017). Yet, low-income and minority communities often have reduced access to supermarkets or physical activity resources but excessive exposure to convenience stores, fast food outlets, and other hazards like crime, which impact outside physical activity participation (Rossen, 2014). A recent analysis that used the National Longitudinal Survey of Youth reported that approximately 44-78% of racial and ethnic differences in BMI were explained by household sociodemographic and economic characteristics and variables related to area-level SES, neighborhood food availability, and physical activity resources (Rossen, 2014). Given that behavioral factors like nutrition and physical activity are a primary cause of obesity in the

pediatric population, access to these factors is more challenging for children and adolescents living in a low-SES environment, thus conducting interventions that target not only these factors but also adolescents who are low-SES is essential. Therefore, a variety of interventions that target adolescents who are obese have been conducted.

Some intervention studies have been designed to target a single behavior or intervention activity. The three most popular single-component interventions have focused on increasing physical activity, decreasing sedentary behavior, and altering food intake (Boon & Clydesdale, 2005). Physical activity intervention can achieve desirable changes, such as increasing time spent in moderate to vigorous physical activity (Boon & Clydesdale, 2005). Interventions decreasing sedentary behaviors, like television viewing, improve positive behaviors and body composition (Boon & Clydesdale, 2005). While modifications to physical activity and sedentary behaviors have been conducted, interventions that focus on changing eating habits have been most popular (Boon & Clydesdale, 2005). Many studies have used a combination approaches to reduce obesity; for example, an intervention may include physical activity, lifestyle education, and nutritional components with the hope to alter both sides of the energy balance equation by reducing the number of calories consumed and increasing the energy used each day (Boon & Clydesdale, 2005). Multi-component interventions have been conducted more often than single behavior interventions (Boon & Clydesdale, 2005). Research has indicated that while it is easier to target one behavior during an intervention, multi-component interventions had better results related to outcomes in obese youth such as weight loss.

Interventions among youth who are obese have taken place in various settings such as schools, after-school programs, summer camps, and healthcare setting. School-based interventions are popular because youth spend most of their waking hours in school or school-

related activities, making these interventions ideal locations (Boon & Clydesdale, 2005). Some examples of school-based interventions targeting obesity are the Child and Adolescent Trial for Cardiovascular Health, Pathways, Planet Health, and The Active Program Promoting Lifestyle Education, and MATCH (Boon & Clydesdale, 2005; Lazorick et al., 2015). These studies have shown that interventions can be incorporated into the school environment and produce changes in behaviors that influence weight gain (Boon & Clydesdale, 2005; Lazorick et al., 2015).

Other researchers have targeted areas outside of the school environment like after-school programs or summer camps such as Camp Golden Treasures and Take Off 4-Health. Camp Golden Treasures was a weight loss camp that was held for six week to support campers to lose weight, raise self-esteem and to learn tools necessary to lead a healthy lifestyle (Pratt et al., 2009). Take off 4-Health was an immersive weight management summer camp that focused on developing autonomous problem-solving and behavioral choice skills to promote adherence to healthier behaviors and improve weight status once campers have returned to their families and community environment (Carraway et al., 2014). The results from after-school and camp-based interventions indicated that they could yield successful improvements in weight status in high-risk adolescents (Carraway et al., 2014).

Obesity interventions in youth have also been conducted within health care. Typically two types of interventions are completed within health care, intensive clinical treatment programs and interventions focusing on better diagnoses and treatment of youth who are overweight and obese (Boon & Clydesdale, 2005). Due to the etiology of obesity development in childhood, most clinical-based interventions have included physical activity, modified diet, behavior changes counseling led by trained medical professionals, and compared outcomes of several types of studies to understand better which methods are most effective (Boon &

Clydesdale, 2005). The United States Service Task Force found that comprehensive, intensive behavioral intervention with 26 or more contact hours over a period of 2 to 12 month can result in weight loss and 52 or more contact hours demonstrated great weight loss and improvement in cardiovascular and metabolic risk factors (US Preventive Services Task Force, 2017). While interventions for treating obesity during childhood have been examined through multiple different types of interventions, pediatric obesity still is an issue in the United States. Therefore, more studies and interventions are necessary to combat childhood obesity.

Physical Activity Interventions in Health Care

Many factors influence the role of improving physical activity and support physical activity participation in youth. These factors include state and local governments and non-governmental agencies to create and enhance access to safe places for physical activity, enhancing physical education and physical activity in schools and childcare settings (*2014 State Indicator Report on Physical Activity*, 2014). In addition, health care professionals can also play a role in providing support for physical activity in their patients.

Designing an exercise intervention should be developmentally appropriate and consistent with individuals' needs, goals, and abilities to gain competence and confidence in their physical skills while being enjoyable (Faigenbaum et al., 2018). Unfortunately, this can be challenging as health care providers do not feel adequately trained to recommend the types of exercise for their patients, and there is a lack of clinical training to health care providers about pediatric exercise (Ashish et al., 2015). Even though this could be a barrier, past interventions such as FitKids360, Freiburg Intervention Trails for Obese Children, and Raising Awareness of Physical Activity have produced positive outcomes with pediatric obesity and physically inactive youth (Tucker et al., 2014; Korsten-Reck et al., 2005; Ridgers et al., 2017; Koorts et al., 2020).

The FitKids360 intervention was a multi-component, family-based, low-cost healthy lifestyle program that targeted 599 youth ages 5- to-16-years old who were overweight and obese (Tucker et al., 2014). FitKids360's goal was to provide an evidence-based approach to the treatment of pediatric overweight and obesity by (a) improving patients' physical activity, screen time, and dietary behaviors, and (b) improving family obesogenic risk score (Tucker et al., 2014). The intervention take place over a course of six weeks and involved two-hour weekly sessions consisting of physical activity and nutrition education, behavioral counseling for the patient, and social support (Tucker et al., 2014). Physical activity was performed intermittently throughout the session for 30-60 minutes, and between weekly sessions, patients logged habitual physical activity, screen time, and dietary behaviors (Tucker et al., 2014). The results indicated that a one-point increase in the family nutrition and physical activity total score was associated with .12 kg/m^2 lower BMI ($p<.001$), a .51 percentile point lower percent of 95^{th} BMI percentile ($p<.001$), a .17% point lower body fat percent ($p<.001$), and a .001 reduction in the waist to height ratio ($p=.039$) (Tucker et al., 2017). Based on the results of the FitKids360, it is apparent that it can be a valuable program for initiating positive health behavior changes, and patients that completed the program made meaningful improvements to their physical activity and sedentary behaviors.

Freiburg Intervention Trails for Obese Children was an interdisciplinary outpatient treatment program for obese children ages 9-12 years with parental involvement (Korsten-Reck et al., 2005). This intervention program lasted eight months and involved 496 youth who participated in regular physical exercise and comprehensive dietary and behavioral education (Korsten-Reck et al., 2005). Each child's long-term goals were established based on recommended guidelines, and lifestyle changes were discussed and goals were set (Korsten-Reck

et al., 2005). The intervention resulted in 78.0% of the children having lower BMI z-scores than their initial results (Korsten-Reck et al., 2005). This is a primary example of a face-to-face intervention to increase obese youth's physical activity level and decrease their BMI score.

The Raising Awareness of Physical Activity is another physical activity intervention that combined wearable activity trackers with online digital behavior change resources for inactive adolescents attending school in socioeconomically disadvantaged areas (Ridgers et al., 2017). This intervention's methodology examined the short and long-term impact of a wearable activity tracker combined with behavior change resources on adolescents' daily MVPA (Ridgers et al., 2017). A study that used this intervention involved 136 adolescents and found that 74% reported increasing their daily physical activity (Koorts et al., 2020). The three physical activity interventions, FitKids360, Freiburg Intervention Trails for Obese Children, Raising Awareness of Physical Activity, show how a well design exercise interventions that are age-appropriate and consider individual needs, goals, and abilities can positively affect adolescents who are obese.

Telehealth

Telehealth uses electronic information and telecommunication technologies to support long-distance clinical health care, patient and health care professional education, and public health (Shaikh et al., 2011). Telehealth supports health care delivery in various ways, including inpatient and outpatient care, medical emergency response, educating physicians and patients, conducting medical research, and more generally augmenting the communication between families and the medical professionals who care for their children (Bala et al., 2019). Telehealth is associated with more seamless use of health services and support decision-making, making health institutions more efficient, skilled, and flexible to meet patients' and professionals' needs (Sousa et al., 2020). In addition, this method of providing care for families who live in a rural

area can reduce the time and cost associated with traveling for medical treatment and the need for childcare for other children living in the family (Cueto & Sanders, 2020).

Interventions among adults who used telehealth have raised the participants' awareness of health topics through easy-to-understand information about their health status, making an informed decision on their health (Sousa et al., 2020). Examples of technology that are used for telehealth include videoconferencing, streaming media, and wireless communications (Bala et al., 2019). Compared to adult populations, telehealth interventions have not been as widely used among the pediatric population. Below are examples of telehealth interventions focused on physical activity in the pediatric population as part of their disease management.

One example of a telehealth intervention that was conducted in children is Steps to Active Kids with Diabetes (STAK-D). This was an online intervention for youth ages 9-11 years diagnosed with Type 1 Diabetes (Quirk et al., 2018). Children were randomized to an intervention or usual medical care control group for 6-months. The intervention included a combination of educational, behavioral, and cognitive-behavioral strategies to promote children’s self-efficacy for physical activity and participation in daily physical activity (Quirk et al., 2018). In addition, participants were encouraged to use the website for the physical activity intervention and provided a supplementary leaflet signposting them to local events, services, and facilities (Quirk et al., 2018).

Another web-based intervention for youth is the *Ninas Saludables* and was adapted from the *Paso Hacia la Saluda*, an adult intervention (Larsen et al., 2018). The intervention's primary aim was to assess the feasibility and acceptability of using *Ninas Saludables* in adolescent Latina girls aged 12-19 years while examining changes in MVPA (Larsen et al., 2018). The first part of the intervention focused on one-on-one motivational interviewing to set specific physical activity

goals and perform guided problem-solving (Larsen et al., 2018). The intervention also included a pedometer that was worn daily, and the girls were encouraged to track their steps and minutes of activity in a log calendar on the website (Larsen et al., 2018). In addition, the girls had access to the *Ninas Saludables* website for 12-weeks and included links to exercise videos such as Zumba and hip-hop dance (Larsen et al., 2018). The girls also had internet-delivered activity manuals that were matched to each participant's level of motivational readiness, computer-expert system tailored reports, activity tip sheets, and a guide of local activity resources (Larsen et al., 2018).

Another type of telehealth intervention that has been used in the pediatric population involved telephones. Currie et al. (2018) studied the effectiveness of a seven-week-long intervention in 69 obese adolescents receiving medical treatment for obesity. The intervention included weekly newsletters and telephone calls that discussed increasing physical activity, reducing physical activity barriers, goal setting, and physical activity benefits (Currie et al., 2018). In addition, motivational interviewing was used to discuss these topics, and discussions included open-ended questions and reflective listening (Currie et al., 2018). This technique was used to assist the adolescents in developing realistic goals, action plans, and strategies to overcome barriers by encouraging them to identify the behavior they wanted to change and promote change by discussing the benefits and obstacles to making the change (Currie et al., 2018).

Finally, videoconferencing is another telehealth intervention option. For example, Nourse et al. (2015) used videoconferencing platforms such as Skype Communication, Microsoft Corporation, or Luxembourg to deliver an exercise intervention in 17 overweight and obese youth (14.3± 2.1 years). Participants were given a weighted medicine ball, jump rope, and resistance tubing with door attachments to use at home (Nourse et al., 2015). The intervention

was 36 sessions over 11 weeks, and the exercise sessions were scheduled three times per week, lasted 60 minutes, and consisted of aerobic and resistance training in circuit form (Nourse et al., 2015).

Telehealth interventions to improve young people's health behaviors towards the adolescent population are growing (Sousa et al., 2020); however, these interventions' effectiveness has yielded mixed results (Sousa et al., 2020). For example, in the STAK-D intervention, children in the intervention group declined MVPA by 17.4 min, and the control group decreased MVPA by 14.2 min when measured using an accelerometer. In contrast, the girls who participated in *Nina Saludable* increased their weekly MVPA from 24.7 ± 26.1 min/week to 79.4 ± 46.8 min/week, measured using the 7-day physical activity recall (Larsen et al., 2018). They also measured MVPA with an accelerometer, and they found MVPA decreased from 24.8 min/week to 10.4 min/week; however, this decrease could have been affected the adolescents participating in activities that were not measured by accelerometers like swimming and cycling, or they forgot to wear the accelerometer (Larsen et al., 2018). Furthermore, in the study by Currie et al. (2018), the telephone intervention did not produce statistically significant improvements in physical activity levels or BMI z-score. Finally, Nourse et al. (2015) reported a considerable improvement in waist-hip ratio, total cholesterol, non-high-destiny lipoprotein cholesterol, percent of predicated VO2pulse, and functional movement screening total score baseline and post-intervention visit. Due to the mixed results regarding the effectiveness of telehealth interventions for producing changes in physical activity and health outcomes, more research is needed.

Another benefit of telehealth interventions is promoting adherence to a structured physical activity program in adolescents. The primary outcome measurements in STAK-D

included recruitment rate, adherence rate, retention rate, data completion rate, and adverse events (Quirk et al., 2018). After three months, the retention rate from baseline was 10/13 (77%): 5/5 in the control group and 5/8 in the intervention group (Quirk et al., 2018). Children and parents who participated in the STAK-D intervention also perceived it as fun, enjoyed increased physical activity, and motivated them to adhere (Quirk et al., 2018). The results from the *Nina Saludable* indicated that 90% of the girls returned for the 12-week assessment, and 72% of the girls indicated they were satisfied/very satisfied with the program (Larsen et al., 2018). While the telephone-based intervention did not produce statistically significant improvements in any of the outcome variables, participation in the intervention was high where 59% of the participants completed the 7-week intervention, and only 20% dropped out in the first two weeks of the intervention (Currie et al., 2018). In addition, the attendance rate for the Nourse et al. (2015) study was very high, where 93 ± 11% attended scheduled exercise sessions and 99 ± 4% attended scheduled nutrition check-in. These studies demonstrate that telehealth interventions are feasible in overweight and obese adolescents and promote high adherence to a structured exercise program.

Overall, telehealth interventions can support health care activities for adolescents, and telehealth interventions towards the adolescent population are growing to improve young people's health behaviors. Videoconferencing, streaming media, and wireless communications have been feasible for the adolescent population; however, there are mixed results for the effectiveness. Given the limited research using telehealth as part of interventions in adolescents, additional studies are warranted to examine the effectiveness of this method to promote physical activity and aid in weight management.

Summary

The increase in adolescent obesity is concerning because it is identified as a risk factor for developing multiple health conditions, such as type 2 diabetes, sleep apnea, anxiety, depression, cardiovascular disease, and many others. Along with increased obesity, there has been a decrease in physical activity in adolescents, and physical inactivity is a modifiable risk factor to prevent chronic disease development and premature mortality. Given the rise in obesity prevalence among adolescents and the fact that inactivity is a cause for obesity development, finding ways to increase physical activity levels is vital in this population. Past interventions have examined single-component and multi-component interventions as a way to reduce adolescent obesity. Recently telehealth has been proven a feasible method to deliver healthcare to treat pediatric obesity; however, the effectiveness of using telehealth as a method for obesity treatment has not been determined. Also, there is a paucity of research regarding telehealth physical activity intervention among obese adolescents. Offering a virtual based intervention allows researchers to see home environment and adolescents accessibility to physical activity resources. Therefore, the purpose of this study is to evaluate the effectiveness of using a physical activity telehealth intervention to increase moderate to vigorous physical activity levels in obese adolescents ages 14-17 years old who are receiving treatment for obesity.

Chapter III: Methods

Participants

The goal was to recruit 24 adolescents aged 13-to 17-years who were receiving treatment for obesity at the Brody School of Medicine Pediatric Healthy Weight Research Treatment Center in Greenville, NC. A pre-requisite of this medical clinic is that the patients have a BMI ≥ 95th percentile and are referred from a primary care physician for obesity treatment. The adolescent patients invited to participate in the study completed their initial clinic visit and were seeing physicians for their first follow-up medical care appointment. An earlier study that used the same medical clinic focused on patients at their initial clinic visit and reported that only 45% had post-intervention data (Currie et al., 2018). The follow-up visit is being used to reduce drop-out and loss of follow up rates potentially. Along with nearly half of patients returning to their first follow up, the initial visit to the doctor is extensive including: meeting with the physician, lab work being done, meeting with the nutrition, etc. Participants were recruited from the first follow-up visit to standardize the exposure to medical care across everyone. The ages 14-17 years were chosen because independence and responsibility of physical activity behavior are higher than those of in a younger age group. The participants and parents were required to speak and write in English. Eligible participants were required to have internet access and accessibility to a phone, laptop, or webcam device for weekly web-meetings. Exclusion criteria include any adolescent that was pregnant, taking any medication that can influence the metabolism or had a musculoskeletal disease that impairs physical activity. If there were multiple adolescents in a family who were eligible to participate, only one adolescent was able to take part in the study.

Based on clinic data, the patients were mainly minorities, low SES, and live in rural or small cities.

Study Design

A randomized controlled trial served as the study design. The physical activity intervention lasted for 11 weeks and was planned to be delivered virtually to each individual participant. The 11-week time frame was chosen so the last week of the intervention did not occur during the same week as post-intervention data collection during a regular clinic visit; clinic visits occur every 6 weeks. At baseline and post-intervention, height, weight, and BMI percentile were planned to be assessed and physical activity were planned to be assessed using the PAQ-C and PAQ-A questionnaires. The adolescents were randomly assigned to either the physical activity intervention or control group. Those in the intervention group received standard care plus one-on-one weekly web meetings for 11 weeks. In contrast, those in the control group received standard care for 11 weeks and contacted weekly to determine their engagement of physical activity. For both the intervention and control group, the subsequent appointment after starting the study (week 6), adolescents attended their routine clinic visit and an updated BMI, height and weight were planned to be obtained and recorded. At post-testing (week 12), the patients had their routine clinic visit, and height, weight, BMI planned to be assessed and complete of the physical activity questionnaire PAQ-A or PAQ-C again. Following the post-testing, those in the control group would have received the intervention materials and been given the option to have the one-on-one web meetings.

Randomization Process. Adolescents were randomized into either an intervention or standard care control group at a 1:1 ratio (intervention-control). The randomized process was generated using a computer program by an individual who is not associated with the study.

Randomization was performed with a gender block because past research indicates that males are more active than females. An independent individual prepared a sealed envelope, and the group placement was revealed to the adolescents after all baseline data had been collected. The physical activity intervention group consisted of 12 participants who received standard care plus the weekly one-on-one web meetings for 11 weeks. The control group consisted of 12 participants who received standard care and contacted weekly for an update in physical activity that they engaged in.

Standard Care at Pediatric Healthy Weight Research and Treatment Center

At the Pediatric Healthy Weight Research and Treatment Center, each client was given standard care during their treatment. The medical team consists of a physician, nutritionist, medical student, and a graduate student majoring in family medical therapy. The follow-up appointments last approximately 15 minutes. In clinic follow-up appointments with the physician occur every 6 weeks. Follow-up visits with the nutritionist are scheduled every approximately 6 weeks these visits are delivered using telehealth. Overall, the patient is in contact with the clinic every 3 weeks. Part of the standard care with the physician is to discuss physical activity with each patient. The goal is to encourage the patients to decrease screen time and increase physical activity participation.

Control Group. The control group received the standard care provided at the clinic by the medical team at the scheduled office visit, which included some discussion of physical activity. During the 11 weeks of the study those in those in the control group were contacted by the study staff weekly to report their physical activity engagement. Weekly check-in with the control group was done to standardize the number of contacts between the control and

intervention participants. Those in the control group were contacted using Microsoft Teams video conferencing platform.

Physical Activity Intervention

Those adolescents assigned to the intervention group received the standard care plus a physical activity intervention delivered through telehealth. Adolescent and their guardian chose the day to have their video meeting. An invite was sent to the email or phone that the participant indicated would be an appropriate method to contact them. The intervention lasted 11 weeks, and participants in the intervention group had individual weekly web-meeting using the Microsoft Teams video conferencing platform. During this meeting, participants reported on the past week's goals, failures and successes, set goals for the next week, review the weekly behavior modification content and complete of short physical activity session. The topics that were discussed in the newsletters and weekly meetings included behavioral strategies for physical activity change, resources for physical activity programs near the participants' home, suggestions on physical activity that can be done near or at home with limited supplies, and the energy expenditure chart for specific activities (Table 1). The physical activity sessions corresponded with that week's topic. Participants were given all weekly activities and newsletters at their first visit. The weekly meeting last approximately 30 minutes.

Table 1

Weekly Topics of Discussion

Week Number	Conversation Topic
Week 1	What is physical activity? physical activity Opportunities
Week 2	Goal Setting
Week 3	Calories In vs. Calories Out; Energy Expenditure Chart
Week 4	Determining Intensity: RPE, Talk Test, Heart Rate
Week 5	Technology and Physical Activity
Week 6	Exercise Videos and Social Media examples
Week 7	Lifestyle Physical Activity
Week 8	Swapping Sedentary Behaviors for Physical Activity

Week 9	Physical Activity Barriers
Week 10	Social Support
Week 11	Preventing Setbacks

Intervention Theory. For this intervention the theory of Self-Determination and Motivational Interviewing was used. Self-determination theory can be described as a set of psychological mechanisms relating to the self, founded on principles generally relating to the self, based on a series of guides generally proved valid in experimental investigations (Ryan & Deci, 2000). The general principles of self-determination theory are:

1. Humans are growth-oriented and naturally inclined to develop, internalize, and integrate emotional elements to build a unified sense of the self (Ryan & Deci, 2000).
2. Three innate psychological needs determine the ongoing psychological growth of human beings towards integrity and well-being:
    a. A need for autonomy
    b. A need for competence
    c. A need for relatedness to others (Ryan & Deci, 2000).
3. Motivations that determine human behavior vary on a qualitative scale from lack of motivation through extrinsic motivation to intrinsic motivation. In addition, an internalization process of external self-regulation can change the nature of motivation into internalized habits and generate a feeling of autonomous self-regulation and value (Ryan & Deci, 2000).

The concepts of autonomy, competence and relatedness were incorporated into the intervention through the weekly newsletters and highlighted during the one-on-one weekly meetings. Also, during the weekly meetings motivational interviewing techniques were utilized.

Motivational interviewing has been applied to an array of clinical studies including, but not limited to weight loss, eating disorders, diabetes, pediatrics, and behavior changes (Miller and Moyers, 2017; Currie et al., 2017). Motivational interview is designed to evoke and strengthen the client's motivation for change and is a complementary method that can be used with various treatment procedures (Miller and Moyers, 2017). Using motivational interviewing techniques along with self-determination theory encourages the adolescents to increase their MVPA.

Motivational Interviewing. Motivational interviewing techniques were used to ask adolescents open-ended questions during their video meeting and having the adolescent reflect on their answers and the weekly topic. Motivational interviewing is also used by the physicians and nutritionist as part of their treatment at the Pediatric Healthy Weight Research and Treatment Center as well. This counseling style is participant focused and goal-oriented compared with non-direct counseling. As part of the motivational interviewing process the adolescent identified physical activity behaviors they wanted to change for the week and determined other aspects of behavior changed during the intervention instead of the researchers identifying them for the adolescent. If needed the researcher assisted the adolescents with developing ideas, but ultimately the adolescent made the final decision.

Measurements. At the baseline visit, demographics such as race, sex, age, date of birth, clinical visit date, height, weight, and insurance status were obtained from the participant's medical records. Insurance status was used to determine the participant's SES.

Anthropometrics. Baseline and post-intervention height and weight were obtained from the participant’s medical records when meeting with their physicians for clinic visits. From this information, BMI percent of the 95^{th} percentile, percent of the 95^{th} percentile, and BMI z-scores were calculated using a pediatric z-score calculator

(https://zscore.research.chop.edu/calcbmi.php). This tool allows for the calculation of BMI between the ages of 2 and 20 years old and the exact BMI percentile and z-score, based on normative data from the Center for Disease Control (CDC) growth charts. BMI percentiles were be used to place participants in the following categories:

- class I obesity: BMI ≥95th percentile but <120% of the 95th percentile
- class II obesity: BMI values between ≥120% to 139% of the 95th percentile
- class III obesity: BMI values ≥140% of the 95th percentile (Skinner et al., 2018)

Physical Activity. Physical activity was be measured at baseline and post-intervention during the participant's clinic visits through questionnaires. The questionnaires used to determine physical activity is the Physical Activity Questionnaire for Adolescents (PAQ-A). The PAQ-A is a 7-day recall instruments consisting of nine structured questions to determine the number of times the youth have participated in moderate to vigorous physical activity. The PAQ-A, a modified version of the PAQ-C, was developed to measure adolescents' general level of physical activity (Kowalski et al., 1997). The PAQ-C and PAQ-A have been supported as valid and reliable measures of general physical activity levels from childhood to adolescence. In a study performed by Kowalski et al. (1997), it was determined that PAQ-C was valid and supported by moderate relationships with activity rating (r=0.63), week summation of 24-hr moderate to vigorous activity recall (r=0.53), and teacher's rating of physical activity (r=0.45). When results from the PAQ-A were correlated with other measures of physical activity levels in high school students statistically significant moderate relationships were observed (activity rating, r=0.73; Leisure Time Exercise Questionnaire r=0.57; and Physical Activity Recall r=0.59) (Kowalski et al. 1997). PAQ-A and PAQ-C are cost and time-efficient, easy to administer to large-scale populations and display normal distribution properties (Kowalski et al., 1997). Reliability, as

measured by internal consistency of the two questionnaires, has been reported as Cronbach alphas of .88 for the PAQ-A (Janz et al., 2008). These values suggest good internal consistence for this questionnaire.

Scoring for the PAQ-A was going to follow the standard guideline. The first question includes a checklist of 22 common leisure and sport physical activities and 2 "other" fill in options (Donen, 2004). Question 1 is scored as the mean of all activities using a 1-5 scale (Donen, 2004). Questions 2-9 also use a scoring scale of 1-5 and are organized using segmented time-of-day or day-of-the-week (Donen, 2004). Question 10 can be used to identify participants who had unusual activity during the previous week, such as being ill, but it is not calculated as part of the summary activity score (Donen, 2004). Once a value of 1-5 for each of the 9 questions have been determined, taking the mean of all 9 items values were used to create a final activity summary score (Donen, 2004). A score of 1 indicates low physical activity and a score of 5 indicates high physical activity (Donen, 2004).

Intervention Evaluation

There are many ways the intervention was going to be evaluated. The first proposed method was to evaluate if the intervention was delivered as intended. To evaluate delivery of the intervention, 30% of virtual meetings were going to be recorded randomly and an individual outside of the study will observe to determine if motivational interviewing is occurring, and the weekly content being delivered accurately. Second, treatment enactment was planned to be measured. Treatment enactment determines if the adolescent is engaging in exercise outside of the weekly meeting time. This information would have come from notes take by the research staff during the weekly meetings. Each week the participants will set a goal that will be recorded by the research staff and weekly they will report if they have met their weekly PA goals or not.

When evaluating the goal reported, the researcher will review if the adolescent has met their goal and if they did not then determine what physical activity did they complete (if any) that week. Items determined would include type, frequency, and duration. From this information the energy expenditure will be calculated using the Youth Compendium MET_y (Butte et al., 2018). This information will allow us to determine if the participants are engaging in more physical activity throughout the intervention and if their exercise related energy expenditure is changing over the course of the intervention. Third, treatment receipt, which focuses on if the adolescent understands the material covered each week, was going to be assessed by asking questions about the material at the end of the weekly meeting. The recordings sessions will be used to quantify this aspect of intervention evaluation. Finally, at the end of the intervention, during their clinic visit, the adolescents would have completed a short exit survey to quantify the quality of the intervention.

Statistical Analysis

This statistical analysis section describes what was planned to be completed for the intervention study. Descriptive statistics, mean, standard deviation, and percentages will be calculated at baseline for participants' age, race, SES, height, weight, BMI z-score, BMI percentile, and physical activity score. A 2 X 2 (group X time) repeated measures ANOVA will be used to determine the impact the intervention had on BMI z-scores and percentile. A 2 X 2 (group X time) repeated measures ANOVA will be used to evaluate the effect the intervention had on physical activity levels. All analysis will be conducted unadjusted and also adjusted for the length of time between baseline and post-testing. Effect sizes will also be calculated to examine the magnitude of the changes that are occurring. Effect size (Cohen’s d) will be

interpreted as >0.8 for a large effect size, 0.5 for a medium effect size, and <0.2 for a small effect size (Cohen, 1988). Statistical significance will be set at alpha < .05.

Chapter IV: Results

Telehealth Intervention Recruitment

Recruitment for the intervention occurred between November 2021 through the beginning of February 2022. Ten adolescents were scheduled for clinic visits with the physician during this time. Four of these ten potential participants did not attend their appointments, four declined to participate after talking to researched staff, and two agreed to participate. Of the two participants (1 intervention, 1 control) both dropped out of the study after the 1st week. The study staff was able to complete the first week's activities, but then neither participant responded to repeated attempts of contact made by the study staff. Among the parents and adolescents who declined to participate in the study, the reasons included: not being interested in virtual participation and wanting a physical exercise class. Due to a lack of involvement and response, it was decided not to continue recruiting for the intervention study. Instead, it was decided that a better understanding of what parents and patients wanted regarding physical activity support at the Pediatric Healthy Weight and Treatment Center was needed. Thus, the new study's purpose was to determine the type of physical activity support patients wanted while receiving treatment at the Pediatric Healthy Weight and Treatment Center.

Recruitment for Physical Activity Needs Assessment

The goal was to recruit 100 parents/patients between the ages of 5 and 17 for the study. Patients were recruited from any follow-up visit at the Pediatric Healthy Weight and Treatment Center. The university’s institutional review board approved this study.

Physical Activity Needs Assessment

Parents/patients were asked 36 questions from the Physical Activity Needs Assessment questionnaire. A needs assessment for physical activity in the health care setting has not been published, so to develop this needs assessment previous research focusing on school and community needs assessments were reviewed to aid in the development of the needs assessment questionnaire used in this study (Kristjansson et al., 2015; Gates et al., 2016). The questions for this needs assessment focused on current physical activity behavior, knowledge of youth physical activity recommendations, attitudes towards physical activity, and desired information wanted. To develop the Physical Activity Needs Assessment questionnaire when possible the questions came from previous studies. Questions focusing on current physical activity habits were acquired from the Youth Risk Behavioral Survey. Additional questions were added to determine the amount of time spent in muscle and bone strengthening exercises. Questions focusing on the knowledge of youth's physical activity recommendation were taken from (Kristjansson et al., 2015). Physical activity attitude questions were modeled from the Sport Commitment and Enjoyment Questionaire-2 (Scanlan et al., 2016). For the questions focusing on what physical activity content was desired, past physical activity interventions with a behavioral focused were reviewed and items were selected based off these intervention studies (Currie et al., 2017; DuBose & Dlugonski, 2018; Koorts et al., 2020; Nourse et al., 2015). The questions were asked in an interview-administration method and occurred during the patient's normal physician's visit. For children 5-11 years of age, the research staff interview administered the questionnaire to the parents because many of the questions the children in this age group

were not able to answer. The parents responded based on what they thought their child wanted and thought. For adolescents 12-17 years of age, parents were present while the research staff interview administered the questionnaire to the adolescent. The questionnaire took an average of 10 minutes to complete.

Other Measures

Along with the questionnaire, demographics, including patients' age, race, sex, and insurance status, was collected from their medical records. Body composition such as height, weight, BMI, BMI percentile, percent of the 95th percentile, and BMI z-score was also collected from their medical records.

Statistical Analysis

Key variables for data analysis included responses to the physical activity needs assessment questionnaire, demographic, anthropometrics, and visit number variables. Means, standard deviations, and frequencies were calculated for the entire sample and for the younger group (5-11 years) and the older group (12-17 years). Further, t-tests were run to determine if differences between the younger and older groups were present for anthropometric variables. Statistical analysis was set at $p<.05$.

Physical Activity Needs Assessment Results

Participants

Recruitment for this study occurred between April through June 2022 and 89 patients between the ages of 5-17 years old had appointments scheduled at the clinic during this time frame. Fifty-seven participants (64%) attended their scheduled visit to the clinic. Of those who attended, 27 (47%) were not eligible to participate. Twelve of the participants that were not eligible due to being non-English speaking, 9 due to time restrictions in the clinic, 4 the

physician deemed not appropriate for the study, and 2 were due to other reasons. For all those who were not eligible, the physician did not mention the study to patients and the research staff did not talk these patients. A total of 30 children and adolescents were given the opportunity to participate, three decline to learn more about the study when the physician initially approached them. A total of 27 children and adolescents participated in the study.

Participants' demographics are shown in Table 2. The average age of the participants was 11.4 ± 2.75 years and on average their 3rd visit to the clinic (younger visit: 3.31 ±1.74, older visit: 3.30 ± 2.25 visit). The majority of participants were male (56%) and the largest racial/ethnic group was Black, Non-Hispanic (48%), followed by White, Non-Hispanic (26%). When examining demographic differences between younger (5-11 years) and older (12-17 years) children, the younger group had more females (64%), and the older group had more males (69%) participate in the study. The average age for the younger group was 8.73 ± 1.85 years and 13.3 ± 1.30 years was the average age for those in the older group. In the younger and older groups, the Black Non-Hispanic race/ethnicity (64 % and 38%, respectively) was most prominent. Most of the participants had Medicare insurance (78%), and this insurance type was similar in both groups.

Table 2

Frequency Characteristics of Participants by Age Group

Variable	Ages 5-11 (n=11) %	Ages 12-17 (n=16) %	All (n=27) %
Gender			
Male	36	69	56
Female	64	31	44
Race			
White, Non-Hispanic	18	31	26
White, Hispanic	0	6	4
Black, Non-Hispanic	64	38	48
Other, Non-Hispanic	0	6	4
Other, Hispanic	18	13	15

Mixed, Non-Hispanic	0	6	4
Insurance			
Private	0	13	7
State	1	19	15
Medicare	91	69	78

Table 3 shows the participants anthropometric information. As expected, the participants were considered obese with the average BMI in the 99th percentile, but when examining the BMI percent based on the 95th percentile the average was 149%, which is classified as Class III Obesity (Skinner et al., 2018). T-test results indicated that the younger group had lower overall BMI (p=.01) compared to the older group. When examining the average BMI percent of the 95th percentile the values were similar between the two groups with the younger BMI percent of the 95th averaged 158.0 ± 40.69 and older group averaged 142.69 ± 25.18. When evaluating BMI Z-score, the scores were similar between the two groups with a BMI Z-score for the younger group was 2.62 ± 0.40 and the older group BMI z-score was 2.48 ± 0.32.

Table 3

Participants Anthropometric Values by Age Group

Variable	**Ages 5-11 (n=11) Mean ± SD**	**Ages 12-17 (n=16) Mean ± SD**	**All (n=27) Mean ± SD**
Height (cm)	147.05 ± 13.14	167.3 ± 9.84	159.0 ± 14.99
Weight (kg)	77.5 ± 31.64	105.6 ± 22.48	94.1 ± 29.57
BMI (kg/m^2)	34.7 ± 9.93	38.1 ± 6.83*	36.7 ± 8.23
BMI Percentile	99.23 ±1.06	99.1 ± 0.97	99.1 ± .99
BMI Percent of the 95th	158.0 ± 40.69	142.69 ± 25.18	149.00 ± 32.58
BMI Z-Score	2.62 ± 0.40	2.48 ± 0.32	2.53 ± 0.35

* p<.05 ages 5-11 compared to ages 12-17; BMI= Body Mass Index

Current physical activity behaviors and knowledge are presented in Table 4. Overall, the percentage of participants participating in physical education class at school was high. Even among those in the older group reported that most were participating in physical education class.

As expected, majority of the older group did not participate in recess at school while all the younger group did participate in recess. Only 14% of the participants were currently participating in 60 minutes of aerobic activity daily. Interestingly, the prevalence of engaging in 60 min of aerobic activity daily 5-6 days per week was lower between the younger group compared to the older groups (18% and 31%, respectively). When determining the participants or parents (for the younger age group) knowledge of youth physical activity recommendations, overall, only 33% knew that the daily physical activity recommendations was 60 minutes. Further, parents 18% responded "I do not know" to this question and the children in the older group 6% responded "I do not now."

Table 4

Physical Activity Results from Physical Activity Needs Assessment by Age Group

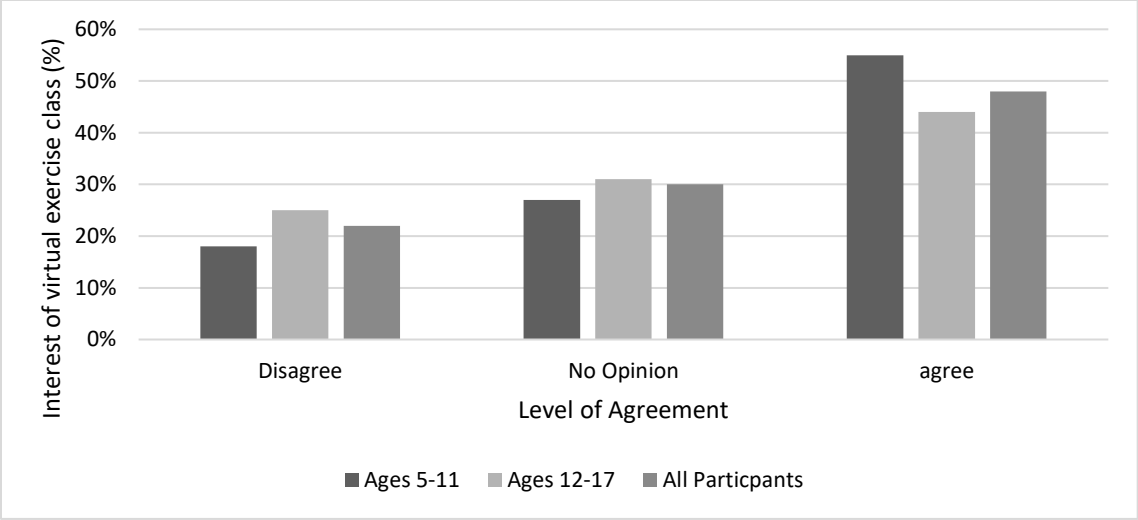
	Ages 5-11 n=11	**Ages 12-17 n=16**	**All n=27**
Physical Activity Behavior & Knowledge	**%**	**%**	**%**
Participating in physical education class at school			
Yes	100	94	96
No	0	6	4
How many days per week			
1 day/week	55	31	41
2-3 days/week	36	44	41
4 days/week	9	0	4
5 days/ week	0	25	15
Participating in recess at school			
Yes	100	31	59
No	0	69	41
How many days per week			
1 day/week	0	40	13
2-3 days/week	9	20	13
4 days/week	0	0	0
5 days/ week	91	40	75
Knowledge of daily recommended amount of PA			
30 minutes	36	19	26
45 minutes	9	25	19
60 minutes	36	31	33
90 minutes	0	19	11
I do not know	18	6	11

On average participate in 60 minutes of aerobic PA			
0-1 day/week	18	38	30
2-4 days/week	36	19	26
5-6 days/week	18	31	26
7 days/week	18	12	14

Figure 1 shows the results from participants' amount of interest in participating in a virtual exercise class. Thirty percent of all participants had no opinion when asked about their interest level in a virtual exercise class; however, 48% of participants chose either "agree or agree a lot" for their interest level, and 22% "disagree or disagree a lot." The level of interest in participating in a virtual exercise class was similar between the two age groups with 55% of the younger group stated they agree and 64% stated they agree in older group.

Figure 1

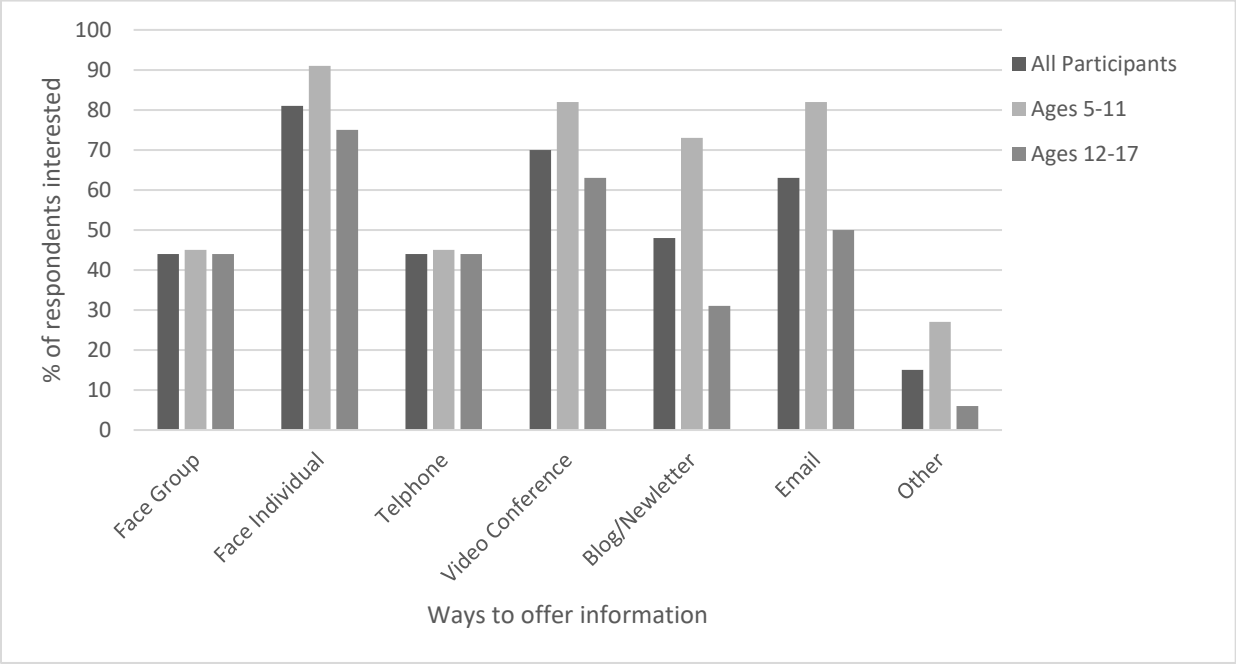
Interest level in participating in a virtual exercise class by age group



The preferences for the different methods of receiving information on how to increase physical activity participation is shown in Figure 2. The method with the highest prevalence was to receive the information via an individual face-to-face meeting, the next highest interest was

video conferencing, followed by email, blog/ newsletter, face-to-face group meeting and telephone call, and then other methods such as, social media/text messages.

Figure 2.
Interest how information can be offered by age group



Because participants were able to choose multiple options of how they would like to receive the information, they also provided a rank order their preference, with 1 being the most preferred method and 7 the least preferred method. Table 5 shows participants ranking of the different methods. For the total sample, the rank order was face-to-face group meetings (42%), face-to-face individual meeting (41%), other (25%), email (24%), video conference (21%), telephone (17%), and finally blog/newsletter (8%). When comparing the two groups to determine if there were differences in their rank order, the parents of the younger children ranked their most preferred method to be face-to-face group meeting (60%) followed by other (33%), face-to-face individual (30%), email (22%), telephone (20%), video conference (11%), blogs/newsletter (0%). On the other hand, the older group ranked their most preferred method as individual face-

to-face meetings (50%), followed by video conference (30%), face-to-face group meetings (29%), email (25%), blog/newsletter (20%), telephone (14%), and other (0%).

Table 5
Rank Order of How to Receive Physical Activity Information by Age Group

	Ages 5-11 n=11 Ranking	**Ages 12-17 n=16 Ranking**	**All n=27 Ranking**
Face-to-face group meetings with others like my child lead by a physical activity professional	1	3	1
Face-to-face individual meetings lead by a physical activity professional	2	1	2
An individual telephone calls lead by a physical activity professional	5	6	6
An individual video conferences (on zoom or similar platform) lead by a physical activity professional	6	2	5
By a blog or newsletter	7	5	7
By email	4	4	4
Other	3	7	3

Rank order 1= most preferred method to 7= least preferred method

The parent's and children's attitude toward physical activity was also quired (Table 6). The importance of physical activity for weight management emerged as the main attitude they had. Participants had a positive attitude regarding the overall importance of physical activity and when asked "if given the opportunity to participate in more physical activity" majority (89%) stated they agreed that they would participate. When comparing the two groups, there was no difference between attitudes from the younger group compared to the older group.

Table 6
Attitudes Towards Physical Activity by Age Group

	Ages 5-11 (n=11) % Agree	Ages 12-17 (n=16) % Agree	All (n=27) % Agree
Physical activity is important to help me manage my weight.	100	94	96
My weight limits me from being as active as I want.	27	38	33
Being physically active is important to me.	55	88	74
I enjoy being physically active.	91	81	85
If given the opportunity I would like to participate in more physical activity.	81	88	85

Table 7 shows the participants' interest in topics they wanted to learn about. Overall, participants wanted to learn about how to make physical activity a habit, benefits of physical activity, and how it fits in with weight management. For more specific topics, participants wanted to learn more about aerobic physical activities, muscle and bone building physical activity, and how many calories are burned with different physical activities compared to sport related activity, activities that are not-sport related, and virtual exercise classes. When comparing the fitness components, the highest preference was tied between learning about how many calories are burned during physical activity and aerobic activity at 82%, followed by bone building physical activity (78%), and then muscle building physical activity (74%) for all participants. While these four topic ideas were the main ones for both the younger and older age group, the order of preference was a little different. For the younger age groups the order was: calories burned during physical activity, bone building physical activity, aerobic physical activity, and muscle building physical activity. In the older group the order was: aerobic physical

activity, muscle building physical activity, bone building physical activity, and calories burned during physical activity.

When participants were asked how they wanted to learn about becoming more physical active, 78% of participants were interested in learning about physical activities that can be done at home and 89% of participants wanted to learn about physical activities that can be done alone (Table 7). This was the most popular among both groups. The next most popular choices were learning about physical activity resources, such as parks, after-school programs, recreational programs that are close to participants and physical activities that can be done with family or friends. Between both groups there were no differences as both groups where highly interested in these topics.

Table 7
Participants Topics Interested to Learn More About

	Ages 5-11 (n=11) % Agree	**Ages 12-17 (n=16) % Agree**	**All (n=27) % Agree**
learn how to make physical activity a habit.	82	75	78
learn about physical activity resources (parks, after-school programs, rec programs) near me.	72	56	63
have access to online physical activity resources (such as exercise videos).	63	63	63
learn about how many calories are burned with different physical activities.	91	75	82
learn about physical activities that are sport related (basketball, tennis, volleyball, etc.).	82	69	74

learn about physical activities that are not sport related.	64	69	67
learn about physical activities that can be done at home.	100	63	78
learn about physical activities that I can do by myself.	82	87	89
learn about physical activities that I can do with my family or friends.	91	94	93
learn about aerobic physical activity.	72	88	82
learn about muscle building physical activities.	64	88	74
learn about bone building physical activities.	72	88	78
learn how physical activity fits in with weight management.	100	81	89
learn about the benefits of being active.	82	81	82
learn how to participate in a virtual exercise class for adolescents.	55	44	48

Two open ended questions were asked to better understand what the participants liked and did not like about being physically active. From their responses, themes were identified for each question. Themes for why participants like being active included health benefits specifically weight loss and improved mood, being active is fun and provides them opportunities to do other things, and finally the participants mentioned the social aspect of being active as something that they liked. Specifically, they mentioned that they liked doing activities with a parent, siblings, or friends. Two major themes emerged for why participants did not like

engaging in physical activity. The first theme was the negative physiological responses to activity. These physiological responses included items such as being tired afterwards or easily became out of breath, sweating, and post-exercise muscle soreness. Another theme dealt with boredom, where they stated that doing the same activities over and over gets boring/repetitive and highly structured activities were not enjoyable. Finally finding an activity that the child stayed interested in was challenging. Interestingly, the themes for why participants like and do not like to be active were similar between the two age groups.

Chapter V: Discussion

Physical activity is essential for health and well-being for children and adolescents, but few are meeting current recommended levels in the United states (*Physical Activity Guidelines for Americans, 2nd Edition*, 2018). Thus, the purpose of this study was to determine the type of physical activity support patients wanted while receiving treatment at the Pediatric Healthy Weight and Treatment Center. The results indicated that about a third of the participants were meeting physical activity recommendations and few parents and patients were aware of youth physical activity recommendations. One key finding from this study was that patients enjoyed being physically active and if given the opportunity majority stated they would participate in more. Other key findings were that participants' topics of interest to learn more about included fitness components: aerobic physical activity, muscle building physical activity, bone building physical activity and calories burned with each activity. Lastly, patients wanted to receive more information about these physical activity topics via face-to-face meetings.

A low percentage of children attending this weight management clinic participated in aerobic physical activity daily for a minimum of an hour compared to the national average (14%). This percentage is low and is below the national average of 24% of children 6 to 17 years of ages participating in 60 minutes of physical activity every day (*Physical Activity Guidelines for Americans, 2nd Edition*, 2018). In the sample 44% reported doing 60 minutes of aerobic physical activity 5-7 days per week and of that, 58% reported engaging in aerobic physical activity 5 days per week and 33% engage in aerobic physical activity 7 days per week. A possible reason for the higher percentage of aerobic physical activity in 5 compared to 7 days a week could be due to the participants obtaining most of their physical activity during school. However, time spent in physical activity outside of school was not measures so it is unknown

where the participants were engaging in physical activity. While school-based physical activity interventions are popular given youth spend majority of their waking hours in school (Boon & Clydesdale, 2005; Lazorick et al., 2015) this also indicates that physical activity interventions that occur outside school are also necessary. A few physical activity interventions have occurred outside of school in obese youth and have produced increases in physical activity levels (Carraway et al., 2014).

Past research has reported that between 9-23% of parents are knowledgeable of children's physical activity recommendations in the United States (DeBastiani et al 2014; Hyde et al., 2019). The finding in the current study regarding knowledge of youth physical activity recommendations is higher than previously reported. One reason for this difference could be due to the participants of the current study attending a medical clinic for the child's obesity and the physicians discuss physical activity with patients at each visit. Further, the current study's results reflect the knowledge of not only parents but older children as well. It is possible that the children have learned about the physical activity recommendations at school during physical education class or in another setting. In contrast, the past research was completed using national samples of adults (DeBastiani et al 2014; Hyde et al., 2019).

Regarding the participants' attitude towards physical activity, overall participants had a positive attitude toward being physical active. Participants reported they enjoyed being physically active, that being physical active was important to manage their weight, and being physical active was important to them. Participants' positive perception towards physical activity included themes such as health benefits, being active is fun and providing them opportunities to do other things, and finally being social, this is consistent with findings from Deforche et al., (2006) who found that most youth perceived benefits from physical activity because of social

contact, feeling better, and improving overall health. The participants in the current study indicate having barriers such as boredom and not enjoying the physiological effects of engaging in physical activity. This is in consistent to what others have found in overweight and obese adolescents (Deforche et al., 2006).

A novel finding was learning what physical activity topics parents of obese children and obese youth would like to learn more about. The primary topics they wanted to know more about included learning about how many calories are burned during physical activity and fitness components such as aerobic, and muscle and bone building physical activities. Participants of this study also wanted to receive information about physical activity in face-to-face group followed by face-to-face individual meeting. The desire for individual and group face-to-face meeting is in agreement with a recommendation provided by Kist et al. (2016). This group of researchers examined physical activity practices in pediatric weight management clinics to develop recommendations for best practices. It is also possible that the participants wanted to receive information in a face-to-face format as the data in the current study was collected after two years of the COVID pandemic and they could have been tired of doing a variety of activities virtually. Further, Kist et al., (2016) recommended that in addition to fitness and physical activity assessments there should be an educational segment on physical activity guidelines and topics including fitness components. These recommendations fall in line with what the participants indicated that they wanted.

Using the information from this study will be help design future interventions. It would be useful to not only assess physical activity levels, but also determine where that activity was occurring (during school, outside of school, or both), the type activity and the level of intensity the activity was being performed. While the patients at clinic had positive views toward physical

activity, this may not representative for all obese youth, thus assessing attitudes and barriers about physical activity before designing an intervention would be important. Because the top three preference to receive information about physical activity were face-to-face group and individual meetings and videoconferencing, one of these methods would be good to use. When designing an intervention discussing physical activity recommendations, fitness components, and activities that can be done at home with friends or family are most ideal for this population.

This study has several strengths. The participation rate was very high, where 90% of those who were approached participated in the study. Further, this study obtained information from children from a variety of ages, mainly Blacks and those with low socioeconomic status. This study also allowed insight into the children and adolescents who are receiving treatment for obesity. Therefore, this study was able to target a group that can greatly benefit from physical activity and is often under studied. Another strength from this study was the questionnaire was not time intensive with it taking an average of 10 minutes and was able to be completed at patients scheduled visit.

There are several important limitations to this study. The first limitation was that participants and their parent had to able to read and speak English. Of the youth (and their parents) who attended the medical clinic, 21% needed an interpreter and as a result could not participate in the study. Further, 36% of the clinic patients did not attend their clinic visit and thus could not be recruited. By not including these individuals the findings may not be generalizable to the entire population attending this medical clinic, especially since nearly a quarter of the population attending the clinic are non-English speaking individuals and a third did not attend their scheduled visit. Further, the results from this study may not be generalizable to other pediatric weight management clinics across the United States as their population

demographics might be different. A final limitation was relying on parents' responses for the younger group as some parents were not aware of their child's physical activity levels at school. While this could result in measurement error for the child's participation of physical activity, completing physical activity surveys by parental proxy is a common method used in children under 12 years.

In conclusion, completing a physical activity needs assessment allowed us to determine the type of physical activity support patients wanted while receiving treatment at a pediatric weight management clinic. From the study results, parents and patients want additional support to increase the children's physical activity level as they view it as an important part of weight management. Offering an intervention that is face-to-face and discusses different type of physical activity components would be best. Further, offering a physical activity class would be beneficial for this group. Designing an intervention that is consistent with individual wants, needs, goals, and abilities could improve physical activity levels and aid in meting weight management goals.

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APPENDIX A: Institutional Review Board Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
rede.ecu.edu/umcirb/

Notification of Initial Approval: Expedited

From: Biomedical IRB
To: Kiara Robins
CC: Katrina DuBose
Date: 4/1/2022
Re: UMCIRB 22-000538
Assessing the Needs of Physical Activity in a Pediatric Obesity Clinic

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) occurred on 3/31/2022. The research study is eligible for review under expedited category # 5,7. The Chairperson (or designee) deemed this study no more than minimal risk.

As the Principal Investigator you are explicitly responsible for the conduct of all aspects of this study and must adhere to all reporting requirements for the study. Your responsibilities include but are not limited to:

1. Ensuring changes to the approved research (including the UMCIRB approved consent document) are initiated only after UMCIRB review and approval except when necessary to eliminate an apparent immediate hazard to the participant. All changes (e.g. a change in procedure, number of participants, personnel, study locations, new recruitment materials, study instruments, etc.) must be prospectively reviewed and approved by the UMCIRB before they are implemented;

2. Where informed consent has not been waived by the UMCIRB, ensuring that only valid versions of the UMCIRB approved, date-stamped informed consent document(s) are used for obtaining informed consent (consent documents with the IRB approval date stamp are found under the Documents tab in the ePIRATE study workspace);

3. Promptly reporting to the UMCIRB all unanticipated problems involving risks to participants and others;

4. Submission of a final report application to the UMICRB prior to the expected end date provided in the IRB application in order to document human research activity has ended and to provide a timepoint in which to base document retention; and

5. Submission of an amendment to extend the expected end date if the study is not expected to be completed by that date. The amendment should be submitted 30 days prior to the UMCIRB approved expected end date or as soon as the Investigator is aware that the study will not be completed by that date.

The approval includes the following items:

Name	Description
Child Assent	Consent Forms
Medical Records	Data Collection Sheet
Needs Assessment for 12 and older	Surveys and Questionnaires
Needs Assessment for under 11 years old	Surveys and Questionnaires
Parental Permission 5-17 yrs	Consent Forms
Physician Recruitment Script	Recruitment Documents/Scripts
research protocol	Study Protocol or Grant Application
Step by step for recruiting	Recruitment Documents/Scripts
Thesis	Study Protocol or Grant Application
verbal asssent 7-11 yrs	Consent Forms

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: Consent & Assent Documents

Parental Permission to Allow Your Child to Take Part in Research

Information to consider before allowing your child to take part in research that has no more than minimal risk.

Title of Research Study: Assessing the needs of Physical Activity in a Pediatric Obesity Clinic

Principal Investigator: Kiara Robins

Institution, Department or Division: East Carolina University, Kinesiology Department

Address: Minges Coliseum, 200 Ficklen Drive, Greenville, NC 27858

Telephone #: 914-263-7069

Faculty Investigator: Dr. Katrina DuBose

Telephone #:252-328-1599

Participant Full Name: _____Date of Birth: _____

Please PRINT clearly

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research. If you choose for your child to take part in this research, a copy of this document will be included in your child's medical record.

Why is my child being invited to take part in this research?

The purpose of this research is to find out your child's current physical habits, their attitudes and barriers for physical activity, and what type of physical activity support patients at the clinic need to help increase their physical activity levels. Your child is being invited to take part in this research because he/she is getting medical care at the Pediatric Healthy Weight Research and Treatment Center and he/she is between 5-17 years old. The decision for your child to take part in this research will also depend upon whether your child wants to participate. By doing this research, we hope to learn how to better support the clinic patients' physical activity needs.

If you and your child agree for him/her to volunteer for this research, your child will be one of about 100 people to do so.

Are there reasons my child should not take part in this research?

The risk for participating in this study is very low.

What other choices do I have if my child does not take part in this research?

Your child can choose not to participate. They will continue to receive treatment normally at the clinic.

Where is the research going to take place and how long will it last?

The research will take place at the Pediatric Healthy Weight Research and Treatment Clinic (PHWRTC) at today's visit. The total amount of time will take 20 minutes.

What will my child be asked to do?

Your child will be asked to do the following:

- For children between the ages of 12-17, I will ask your child a series of 36 questions about physical activity (current levels, attitudes toward physical activity, barriers for being active, and what type of additional support would be helpful).
- For children between the ages of 5-11, I will ask you a series of 36 questions about your child's physical activity (current levels, attitudes toward physical activity, barriers for being active, and what type of additional support would be helpful).
- Afterwards, a member of the study staff will review your child's medical records to get: age, sex, race, insurance status, number of visits to the clinic, heigh, weight, BMI, BMI z-score, and BMI percentile.

What might I experience if I take part in the research?

By participating in this study, you will assist us in determining what kind of additional physical activity support can be provided for you child and other patients at the this clinic.

Will my child be paid for taking part in this research?

We will not pay you or your child for the time you volunteer while being in this study.

Will it cost me anything for my child to take part in this research?

It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?

ECU and the people and organizations listed below may know that your child took part in this research and may see information about your child that is normally kept private. With your permission, these people may use your child's private information to do this research:

- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your child's welfare during this research and may need to see research records that identify your child.
- People designated by ECU Brody School of Medicine Pediatric Healthy Weight Research Treatment Center
- If your child is a patient at ECU, a copy of this form will be placed in your child's medical records.

How will you keep the information you collect about my child secure? How long will you keep it?

Only the investigators and personnel associated with this study will have access to the data obtained. No identifying information will be released. An ID will be assigned to your child and only the primary investigator and key research personnel will have access to the code and your child's name. Data will be secured in a locked filing cabinet in the faculty investigator's laboratory (Activity Promotion Lab, Minges 101). Electronic data will be stored on a password protected drive maintained by the faculty investigator and East Carolina University. These measures will protect the identity of your child. The data will be kept for 6 years. Any data that is presented in papers or at conferences will be done so as group data with no identification of individual participants.

What if my child decides he/she doesn't want to continue in this research?

Your child can stop at any time after it has already started. There will be no consequences if he/she stops and he/she will not be criticized. Your child will not lose any benefits that he/she would normally

receive. Your child's medical care will continue as normal even if he/she chooses to stop participating in the research study.

Who should I contact if I have questions?

The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 914-263-7069 days, between Monday-Friday between 8:00am-5:00p.m. or Dr. Katrina DuBose (Monday-Friday between 8:00 – 5:00 pm).

If you have questions about your child's rights as someone taking part in research, you may call the University and Medical Center Institutional Review Board (UMCIRB) at phone number 252-744-2914 (days, 8:00 am-5:00 pm) If you would like to report a complaint or concern about this research study, you may call the Director of Human Research Protections, at 252-744-2914.

Is there anything else I should know?

Identifiers might be removed from the identifiable private information or identifiable biospecimens and, after such removal, the information or biospecimens could be used for future research studies or distributed to another investigator for future research studies without additional informed consent from you. However, there still may be a chance that someone could figure out the information is about your child.

HIPPA Documentation

The purpose of the information to be gathered for this research study is to better understand the type of physical activity support patients at the clinic need to increase their physical activity levels. When taking part in research, protected health information (PHI) is collected, used, and shared with others who are involved in the research. Federal laws require that researchers and health care providers protect your PHI. Also, federal laws require that we get your permission to use collected PHI for the research. This permission is called authorization.

The individuals who will use or disclose your child's identifiable health information for research purposes include the principal investigator and other members of the research team. Individuals who will receive your child's identifiable health information for research purposes include the principal investigator, other members of the research team, institutional officials in connection with duties for monitoring research, and UMCIRB to provide continuing review of the research project. The type of

information accessed for this research study includes your child's medical records and other records generated during this study. The information will be used and disclosed in such a way as to protect your child's identity as much as possible; however, confidentiality cannot be absolutely guaranteed. Someone receiving information collected under this Authorization could potentially re-disclose it, and therefore it would no longer be protected under the HIPAA privacy rules (federal rules that govern the use and disclosure of your child's health information). There is not an expiration date for this Authorization.

You and your child may not participate in this study if you do not sign this Authorization form. You may revoke (withdraw) this Authorization by submitting a request in writing to Dr. Katrina DuBose (dubosek@ecu.edu). However, the research team will be able to use any and all of the information collected prior to your request to withdraw your Authorization. You will not be able to see your child's PHI in his/her medical record related to this study until the study is complete. If it is necessary for your child's care, his/her PHI will be provided to you or your physician.

To authorize the use and disclosure of your child's health information for this study in the way that has been described in this form, please sign below and date when you signed this form. A signed copy of this Authorization will be given to you for your records.

If you have questions about the sharing of PHI related to this research study, call Kiara Robins at 914-263-7069 or Katrina DuBose at 252-328-1599. If you have questions about your and your child's rights as someone taking part in research, you may call the ECU University and Medical Center Institutional Review Board (UMCIRB) at phone number 252-744-2914 (days). If you would like to report a complaint or concern about this research study, you may call the Director for Human Research Protections, at 252-744-2914. In addition, if you have concerns about confidentiality and privacy rights, you may phone the Privacy Officer at East Carolina University at 252-744-5200.

Name of Authorized Representative (print) **Signature** **Date**

I have decided my child can take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.

- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that my child can stop taking part in this study at any time.
- By signing this informed consent form, my child is not giving up any of his/her rights.
- I have been given a copy of this consent document, and it is mine to keep.

_____

Parent's Name (PRINT) **Signature** **Date**

By initialing in the following places, the parent/guardian and investigator indicate their opinion that the patient is too young (6 years or under) or otherwise not able to give consent/assent.

____Parent/Guardian ____Investigator

Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

_____

Person Obtaining Consent (PRINT) **Signature** **Date**

_____

Principal Investigator (PRINT) ***Signature*** ***Date***

If other than person obtaining informed consent

Assent Form

Things You Should Know Before You Agree To Take Part in this Research

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IRB Study # 22-000538

Title of Study: Assessing the Needs of Physical Activity in a Pediatric Obesity Clinic

Person in charge of study: Kiara Robins

Where they work: East Carolina University Human Performance Lab

Other people who work on the study: Dr. Katrina DuBose

Study contact phone number: 914-263-7069

Study contact E-mail Address: robinsk12@students.ecu.edu

People at ECU study ways to make people's lives better. These studies are called research. This research is trying to find out what type of physical activity support you need while getting care at the Pediatric Healthy Weight Research and Treatment Center (PHWRTC).

Your parent(s) needs to give permission for you to be in this research. You do not have to be in this research if you don't want to, even if your parent(s) has already given permission.

You may stop being in the study at any time. If you decide to stop, no one will be angry or upset with you. Your doctors will still continue to take good care of you.

Why are you doing this research study?
The reason for doing this research is to determine what patients at the PHWRTC think about physical activity, and what would help you be more physically active.

Why am I being asked to be in this research study?

We are asking you to take part in this research because you are between the ages of 5-17 years old and receiving treatment at PHWRTC.

How many people will take part in this study?

If you decide to be in this research, you will be one of about 100 people taking part in it.

What will happen during this study?

I will ask you a series of 36 questions about your currently physical activity levels, what you think about physical activity, what some barriers to physical activity are and what type of support you would like to help you be more active. After you complete the questionnaire, I will look at your medical records to get your: age, race, sex, number of visits to the clinic, insurance status, height, weight, BMI, BMI percentile and BMI z-score.

Who will be told the things we learn about you in this study?

Only the researcher and their team will have access to the questionnaires. All information will be reported to Dr. DuBose.

What are the good things that might happen?

By participating in this study, you will assist us in determining what kind of physical activity intervention we can provide for you and other patients

What are the bad things that might happen?

There are no known risks.

What if you or your parents don't want you to be in this study?

If you or your parents don't want you to be in this study, you will not lose any benefits that you would normally receive. You will continue your medical care as normal.

Will you get any money or gifts for being in this research study?

You will not receive any money or gifts for being in this research study.

Who should you ask if you have any questions?

If you have questions about the research, you should ask the people listed on the first page of this form. If you have other questions about your rights while you are in this research study you may call the Institutional Review Board at 252-744-2914.

If you decide to take part in this research, you should sign your name below. It means that you agree to take part in this research study.

_____ _____

Sign your name here if you want to be in the study Date

_____

Print your name here if you want to be in the study

_____ _____

Signature of Person Obtaining Assent Date

_____

Printed Name of Person Obtaining Assent

Verbal Assent for 7-11 year olds

Hello,

I am trying to find out what help you might want to become more physically active. I would like to ask your parent some questions about how active you are, what you like about being active, what makes it hard for you to be active, and what help you and your parent might need to become more active. I will ask your parents some questions and it will take about 20 minutes. While I am talking to your parents you will not have to do anything, you can just sit and listen, so it will take a little longer to leave the doctor's office. There are not any bad things that can happen by me asking your parent about your physical activity habits. It is possible that someone might find out later that you and your parents were part of this study, but we will not use your name on any of our forms, so it will be hard to someone to know that you were a part of this study. By agreeing to be a part of this study, you will help us better understand how we can help children like yourself be more active. Are you ok with me asking your parent some questions about your physical activity?

If the child nod's his/her head they will be asked to say either yes or no

Verbal assent will be documents on the parental permission document that is kept by research staff

APPENDIX C: Recruitment Script

Hi, my name is Kiara Robins and I am a graduate student at ECU in the Kinesiology department. I am here to see if you would be interested in participating in a research study that is trying to figure out what type physical activity support patients at the clinic would like to have. I am asking you and your child to participate because he/she is a patient at the clinic and is between 5-17 yrs old. If you do not understand English then you and your child cannot participate. I will ask you (the child/parent) a questionnaire that will take about 20 minutes long. This questionnaire will ask questions about your child's current physical activity levels, thoughts about physical activity, barriers to physical activity and what your child would like for additional support to be more active. I will also obtain information from your medical charts such as height, weight, BMI, gender, age, insurance status, and race. There are not any direct benefits that we know you or your child will get by doing this study, but it will help us have a better idea of how to support patients attending the clinic with adding physical activity as part of a healthy lifestyle. Would you like to participate in this study? If you would like to participate, I will go ahead and go over the consent documents and then we can begin the questionnaire.

Now proceed to paperwork:

1. Give parent parental permission consent and child assent form. Explain form, have each sign the correct form. For those 7-11 only do verbal assent
2. Begin reading Needs Assessment Questionnaire.
3. Collect necessary information from medical chart.

APPENDIX D: Medical Forms

ID #: _____ Date: _____

Physical Activity Needs Assessment

Medical Records Data Collection Form

****Information obtained from medical records****

Height

_____ in [PANA0202]

Weight

_____ kg [PANA0201]

BMI

_____ kg/m^2 [PANA0202]

BMI-Z Score

_____ [PANA0203]

BMI %

_____ [PANA0204]

Age

_____ YR [PANA0205]

Race

_____ [PANA0206]

Sex

_____ PANA0307]

Insurance Status

_____ [PANA0208]

Visit Number

_____ [PANA0209]

APPENDIX E: Physical Activity Needs Assessment Questionnaire Older Youth

Physical Activity Needs Assessment: ≥ 12 yrs

In order for us to provide the best medical care for our patients we would like to get some information from you about your current physical activity habits, barriers, wants, and needs.

Current Physical Activity Behaviors & Knowledge

1. On how many days per week do you participate in a total of 30 minutes of aerobic physical activity (e.g., walking for exercise, dancing, playing on a trampoline, bike riding, playing basketball, etc.)

   _____ days

2. On how many days per week do you participate in a total of 60 minutes of aerobic physical activity (e.g., walking for exercise, dancing, playing on a trampoline, bike riding, playing basketball, etc.)

   _____ days

3. On how many days per week do you participate in activities that build muscles (e.g., lifting weights, push-ups, using resistance bands, etc.)?

   _____ days

4. On how many days per week do you participate in activities that make strong bones (e.g., dancing, trampoline, jogging, jumping rope, playing basketball, etc.?

_____ days

5. The daily recommended amount of physical activity that I should participate in is_____?

   _____ 30 minutes

   _____ 45 minutes

   _____ 60 minutes

   _____ 90 minutes

   _____ I do not know

6. Are you currently participating in physical education class at school?

   _____ yes _____ no

7. If yes, how many days per week do you participate in physical education class at school?

   _____ 1 day/week _____ 2-3 days/week _____ 4 days/week _____ 5 days/week

8. Do you participate in recess at school?

   _____ yes _____ no

9. If yes, how many days per week do you participate in recess at school?

   _____ 1 day/week _____ 2-3 days/week _____ 4 days/week _____ 5 days/week

Attitudes toward Physical Activity

The following is a list of feelings people might have toward physical activity. Keeping in mind what you think about physical activity, respond to each question (using the scale given), based on how true that response is for you.

Circle the number that best reflects your feelings about each physical activity statement.					
	Disagree a lot	**Disagree**	**No opinion**	**Agree**	**Agree a lot**

10. Physical activity is important to help me manage my weight.	1	2	3	4	5
11. My weight limits me from being as active as I want.	1	2	3	4	5
12. Being physically active is important to me.	1	2	3	4	5
13. I enjoy being physically active.	1	2	3	4	5
14. If given the opportunity I would like to participate in more physical activity.	1	2	3	4	5

Physical Activity Wants

The items below describe ways to learn more about being physically active. If you were going to learn more about being physically active respond to each statement (using the given scale), identify how true each statement is for you.

I would like to….					
Circle the number that best reflects your feelings about each physical activity statement.					
	Disagree a lot	**Disagree**	**No opinion**	**Agree**	**Agree a lot**
15. learn how to make physical activity a habit.	1	2	3	4	5
16. learn about physical activity resources (parks, after-school programs, rec programs) near me.	1	2	3	4	5
	Disagree a lot	**Disagree**	**No opinion**	**Agree**	**Agree a lot**
17. have access to online physical activity resources (such as exercise videos).	1	2	3	4	5
18. learn about how many calories are burned with different physical activities.	1	2	3	4	5
19. learn about physical activities that are sport related (basketball, tennis, volleyball, etc.).	1	2	3	4	5

20. learn about physical activities that are not sport related.	1	2	3	4	5
21. learn about physical activities that can be done at home.	1	2	3	4	5
22. learn about physical activities that I can do by myself.	1	2	3	4	5
23. learn about physical activities that I can do with my family or friends.	1	2	3	4	5
24. learn about aerobic physical activity.	1	2	3	4	5
25. learn about muscle building physical activities.	1	2	3	4	5
26. learn about bone building physical activities.	1	2	3	4	5
27. learn how physical activity fits in with weight management.	1	2	3	4	5
28. learn about the benefits of being active.	1	2	3	4	5
29. participate in a virtual exercise class for adolescents.	1	2	3	4	5

Dissemination of Information

30. If you were to participate in a class to help you increase physical activity how would you want to get this information? (select all that apply)

_____ Face-to-face group meetings with others like me lead by a physical activity professional

_____ Face-to-face individual meetings lead by a physical activity professional

_____ An individual telephone calls lead by a physical activity professional

_____ An individual video conferences (on zoom or similar platform) lead by a physical activity professional

_____ By a blog or newsletter

_____ By email

_____ Other _____

31. For those items selected, rank order them with 1 being the most preferred method

_____ Face-to-face group meetings with others like me lead by a physical activity professional

_____ Face-to-face individual meetings lead by a physical activity professional

_____ An individual telephone calls lead by a physical activity professional

_____ An individual video conferences (on zoom or similar platform) lead by a physical activity professional

_____ By a blog or newsletter

_____ By email

_____ Other

Short Answer Questions

32. Do you want to be more active?

_____ yes _____ no

33. If yes, what are the reasons you would want to be more active?

34. If no, what are the reason you would not want to be more active?

35. What do you like about being active?

36. What do you not like about being active?

APPENDIX F: Physical Activity Needs Assessment Questionnaire Younger Youth

Physical Activity Needs Assessment: 5 - 11 yrs.

In order for us to provide the best medical care for our patients we would like to get some information from you about your child's current physical activity habits, barriers, wants, and needs.

Current Physical Activity Behaviors & Knowledge

10. On how many days per week does your child participate in a total of 30 minutes of aerobic physical activity (e.g., brisk walking, dancing, playing on a trampoline, bike/tricycle riding, playing games that involve catching, throwing or kicking, etc.)

    _____ days

11. On how many days per week does your child participate in a total of 60 minutes of aerobic physical activity (e.g., brisk walking, dancing, playing on a trampoline, bike/tricycle riding, playing games that involve catching, throwing or kicking, etc.)

    _____ days

12. On how many days per week does your child participate in activities that build muscles (e.g., climbing on playground equipment, rope/tree climbing, push-ups, uses resistance bands, etc.)?

    _____ days

13. On how many days per week does your child participate in activities that make strong bones (e.g., jumping/hopping/skipping, running, jumping rope, etc.)?

_____ days

14. The daily recommended amount of physical activity that your child should participate in is_____?

_____ 30 minutes

_____ 45 minutes

_____ 60 minutes

_____ 90 minutes

_____ I do not know

15. Does your child currently participate in physical education class at school?

_____ yes _____ no

16. If yes, how many days per week does your child participate in physical education class at school?

_____ 1 day/week _____ 2-3 days/week _____ 4 days/week _____ 5 days/week

17. Does your child participate in recess at school?

_____ yes _____ no

18. If yes, how many days per week does your child participate in recess at school?

_____ 1 day/week _____ 2-3 days/week _____ 4 days/week _____ 5 days/week

Attitudes toward Physical Activity

The following is a list of feelings people might have toward physical activity. Keeping in mind what you think about physical activity, respond to each question (using the scale given), based on how true that response is for your child.

Circle the number that best reflects your child's feelings about each physical activity statement.					
	Disagree a lot	**Disagree**	**No opinion**	**Agree**	**Agree a lot**
10. Physical activity is important to help my child manage his/her weight.	1	2	3	4	5
11. My child's weight limits him/her from being as active as he/she wants.	1	2	3	4	5
12. Being physically active is important to my child.	1	2	3	4	5
13. My child enjoys being physically active.	1	2	3	4	5
14. If given the opportunity my child would like to participate in more physical activity.	1	2	3	4	5

Physical Activity Wants

The items below describe ways to learn more about being physically active. If you and your child were going to learn more about being physically active respond to each statement (using the given scale), identify how true each statement is for you and your child.

My child and I would like to….					
Circle the number that best reflects your feelings about each physical activity statement.					
	Disagree a lot	**Disagree**	**No opinion**	**Agree**	**Agree a lot**
15. learn how to make physical activity habit.	1	2	3	4	5
16. learn about physical activity resources (parks, after-school programs, rec programs) near our family.	1	2	3	4	5
	Disagree a lot	**Disagree**	**No opinion**	**Agree**	**Agree a lot**
17. have access to online physical activity resources (such as exercise videos).	1	2	3	4	5
18. learn about how many calories are burned with different physical activities.	1	2	3	4	5

19. learn about physical activities that are sport related (basketball, tennis, volleyball, etc.).	1	2	3	4	5
20. learn about physical activities that are not sport related.	1	2	3	4	5
21. learn about physical activities that can be done at home.	1	2	3	4	5
22. learn about physical activities that my child can do alone.	1	2	3	4	5
23. learn about physical activities that my child can do with family or friends.	1	2	3	4	5
24. learn about aerobic physical activities.	1	2	3	4	5
25. learn about muscle building physical activities.	1	2	3	4	5
26. learn about bone building physical activities.	1	2	3	4	5
27. learn how physical activity fits in with weight management.	1	2	3	4	5
28. learn about the benefits of being active.	1	2	3	4	5
29. participate in a virtual exercise class for children.	1	2	3	4	5

Dissemination of Information

30. If your child were to participate in a class to help him/her increase physical activity how would you want your child to get this information? (select all that apply)

_____ Face-to-face group meetings with others like my child lead by a physical activity professional

_____ Face-to-face individual meetings lead by a physical activity professional

_____ An individual telephone calls lead by a physical activity professional

_____ An individual video conferences (on zoom or similar platform) lead by a physical activity professional

_____ By a blog or newsletter

_____ By email

_____ Other _____

31. For those items selected, rank order them with 1 being the most preferred method

_____ Face-to-face group meetings with others like my child lead by a physical activity professional

_____ Face-to-face individual meetings lead by a physical activity professional

_____ An individual telephone calls lead by a physical activity professional

_____ An individual video conferences (on zoom or similar platform) lead by a physical activity professional

_____ By a blog or newsletter

_____ By email

_____ Other

Short Answer Questions

32. Do you want your child to be more active?

_____ yes _____ no

33. If yes, what are the reasons you would want your child to be more active?

34. If no, what are the reason you would not want your child to be more active?

35. What do you like about your child being active?

36. What do you not like about your child being active?