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DEVELOPMENT OF A COMPREHENSIVE PRIMARY CARE ALGORITHM TO MANAGE CHILDREN WHO ARE OVERWEIGHT OR OBESE

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DEVELOPMENT OF A COMPREHENSIVE PRIMARY CARE ALGORITHM TO MANAGE CHILDREN WHO ARE OVERWEIGHT OR OBESE

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ABSTRACT

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Childhood obesity is an epidemic that continues to increase not only in the United States but also worldwide. For children aged 5-19 years, being overweight is considered a body mass index greater than one standard deviation above the growth reference median and obesity is defined as excess body fat that contributes to functional loss and life-threatening comorbidities. The literature indicated that previous population-based obesity prevention efforts have only been moderately successful and might not reflect the complex needs and preferences of some children and families. Thus, there was a need for individualized interventions that supported children who are overweight or obese in developing healthier practices that persist into adulthood. Primary care providers administer everything from prenatal to end-of-life care and are in a key position to monitor the health and wellbeing of children. However, many primary care providers serving pediatric populations lack a flexible set of guidelines to inform their care of children who are overweight or obese. Having a systematic yet localized approach might streamline the intervention process and improve patient outcomes. Clinical tools such as algorithms might guide providers toward evidence-based interventions and utilization of local services. The purpose of this Doctor of Nursing Practice scholarly project was to develop and evaluate a treatment algorithm for children identified as being overweight or obese designed for use in the primary care setting using published evidence and a panel of clinical experts. Using the Delphi method, a panel of nine clinical experts provided feedback on increasingly refined drafts of a

proposed algorithm. The Stetler (2001) model was utilized as a theoretical framework throughout the project. After two rounds of feedback and revisions, broad consensus among the panel was achieved. Findings from this scholarly project also included a proposal for future pilot testing of the final draft algorithm in a family practice or pediatric clinical setting.

Keywords: childhood obesity, obese, epidemic, comorbidities, intervention, algorithm

TABLE OF CONTENTS

LIST OF TABLES

Table

CHAPTER I

INTRODUCTION

Childhood obesity is an epidemic that continues to increase not only in the United States but also worldwide. Obesity is considered excess body fat that contributes to functional loss and life-threatening comorbidities and generally arises from being overweight (Sahoo et al., 2015). For children aged 5-19 years, being overweight is considered a body mass index (BMI) greater than one standard deviation above the growth reference median whereas obesity is classified as two standard deviations adjusted for male or female sex (World Health Organization [WHO], 2021). Similarly, the Centers for Disease Control and Prevention (CDC, 2022a) defined obesity among children as having a BMI within the top fifth percentile of the for-age growth charts and considering the child's sex. Across much of the literature, the terms child, adolescent, pediatric, and teen were used interchangeably. In this Doctor of Nursing (DNP) scholarly project, the term *childhood* was utilized and included the population 5-18 years of age as supported by Lansdown and Vaghri's (2022) definition.

Childhood obesity is increasing globally. Between 1980 and 2013, the percentage of overweight children in developing countries increased from 8.1% to 12.9% for males and from 8.4% to 13.4% for females (Liberali et al., 2020). In developed countries such as the United States, over 20% of children and adolescents are now considered obese (CDC, 2022a). Being overweight as a child is considered a risk factor for becoming obese as an adult (Sahoo et al., 2015; WHO, 2021). While prevention is key to curbing the childhood obesity epidemic, prior population-based efforts have been only moderately successful (Cuda & Censani, 2019). Thus,

there is a need for more innovative and individualized interventions that support children who are overweight or obese in overcoming systemic barriers and developing healthier practices that persist into adulthood.

Although childhood obesity is a major public health concern, this phenomenon warrants early intervention from primary care providers who are often the initial point of care for many children and families in the United States. Shi (2012) defined primary care

> as essential healthcare based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community by means acceptable to them and at a cost that the community and the country can afford to maintain at every stage of their development in a spirit of self-reliance and self-determination. (p. 3)

Primary care focuses on prevention, diagnostic, and therapeutic services; education on health-related subjects; minor surgeries; and basic counseling about health issues (Shi, 2012). Primary care providers administer everything from prenatal to end-of-life care and are in a key position to monitor the health and wellbeing of children. In this DNP scholarly project, the term *primary care provider* included nurse practitioners (NPs), physician assistants (PAs), medical doctors (MD), and Doctors of Osteopathic Medicine (DOs). Recent literature suggested that primary care providers serving pediatric populations lacked a consistent set of guidelines to inform their care of children who are overweight or obese (Hill et al., 2018). Having a systematic yet adaptable and localized approach could streamline the intervention process and improve patient outcomes. Utilization of a clinical tool such as an algorithm might assist in guiding providers toward evidence-based interventions and services. For example, educational interventions including behavior modification, improved nutrition, and increased physical activity have been proven

effective in treating childhood obesity (Sbruzzi et al., 2013), yet the wide array of recommendations in these areas are often time consuming for a provider to sort through during a brief well child visit. A more concise algorithm could serve as an essential tool for primary care providers in both family practice and pediatric primary care settings.

Background

Since 1971, a consistent rise in childhood obesity in both developed as well as developing countries has been noted (Ahmad et al., 2010). For example, over the past two decades, the number of children with obesity has doubled in the United States and tripled in Canada with 25-33% of the child populations in these countries now meeting either the overweight or obesity criteria described previously (WHO, 2021). In Brazil, the number of obese children grew from 4.1% to 13.9% and in urban Chinese children, it increased from 7.7% to 12.4% over a 10-year period (Ahmad et al., 2010). These numbers are predicted to rise unless more effective interventions are developed and implemented.

Children who are overweight or obese experience negative impacts on both their physical and psychological health and are more likely to remain overweight or obese into adulthood. For example, 10–14-year-old adolescents with obesity have an 80% risk of becoming overweight adults; 6-9-year-old children have a 50% risk; and children less than 5 years old have a 25% risk (Ahmad et al., 2010). Obese children are also more likely to develop comorbidities in adulthood such as metabolic/endocrinologic, neurological, hepatic, and renal disorders; cardiovascular disease; or orthopedic conditions (Sahoo et al., 2015). The contributors to childhood obesity are not fully understood but the literature suggested a wide range of factors might play a role including considerations like the built environment (e.g., an absence of walkways, poor access to healthy food sources, etc.), lifestyle patterns, cultural norms, lower socio-economic status and

educational levels, and, to a lesser extent, genetics (CDC, 2022a; Sahoo et al., 2015). Other factors known to contribute to this epidemic include excessive sugar intake, sedentary behaviors, and increased portion sizes, all of which are increasing not only in the United States but also globally (Sahoo et al., 2015). These contributors are explored in depth in Chapter II of this written project.

Numerous studies in the literature detailed interventions designed to reduce the prevalence of childhood obesity (Bogataj et al., 2021; De Miguel-Etayo et al., 2013; Sanyaolu et al., 2019). Most studies implemented the intervention at the population level and consideration for the individual context of the children, families, and primary care providers within the studies was often missing. For example, a randomized controlled trial conducted by Bogataj et al. (2021) evaluated the effects of school-based exercise and nutrition interventions on the body composition and physical fitness levels of overweight adolescent girls. The study measured the impact of an exercise program in a physical education class but long-term evaluation of the program outside of the school setting was limited as specific equipment was needed and additional environmental, social, and cultural factors for the sample of girls were largely ignored. In addition, much of the published literature evaluated community-based programs involving children with obesity and their family. These programs often required family participation. Although family participation was linked with better outcomes, it was not always feasible for family to be present or willing to participate in interventions such as physical activity camps or nutrition programs, creating a potential barrier. For example, Burke et al. (2015) conducted a single cohort intervention feasibility study over a two-year period. The program was a five-day per week, month-long camp for children with obesity that also required that parents/guardians met with their child and program staff for a two-hour long educational session every Saturday.

Although, there were positive outcomes with this program, scaling up might be difficult due to various economic, social, and cultural dynamics unique to each family. For example, families with prohibitive work schedules or limited financial means might be unable to participate in programs such as the one described by Burke et al. (2015).

Treating childhood obesity with pharmacological therapy was another modality found in the literature. However, this approach should only be considered for extremely obese children who are over the age of 12 and have undergone at least one year of lifestyle and dietary modification (Rogovik & Goldman, 2011). Pharmacological intervention is most appropriate when there are worsening comorbidities due to increased weight. This is a limited intervention as only a few medications are approved by the U.S. Food and Drug Administration for children and the criteria for the administration of these medications require meeting specific guidelines (Rogovik & Goldman, 2011). Thus, pharmacological interventions further illustrate the limitations of current interventions for childhood obesity.

The U.S. Preventative Services Task Force (USPSTF, 2017) on childhood obesity recommended that providers screen all children using the CDC-published BMI chart and engage in an intense behavioral intervention process to treat overweight/obese children six years and older. The taskforce noted that providers with 52 contact hours or more demonstrated an increased rate of weight loss and improved other comorbidities among their child patients. Contact hours included children either with or without their families and sessions primarily focused on healthy eating, exercising, goal setting, problem-solving, and encouraging stimulus control (USPSTF, 2017). There were some limitations to the USPSTF screening approach including an overreliance on BMI as an indicator (although this remains the most widely accepted metric in primary care and obesity medicine) and a general neglect of additional risk

factors that should be considered such as race, comorbidities, genetics, and socioeconomics. In addition, intensive behavioral interventions might be complex and difficult to enact due to logistical, cultural, and financial constraints and requires a consistent and long-term relationship between provider and patient/family.

Overview of Algorithms and Diagnostics for Childhood Obesity

Algorithms are a tool that could be used to streamline medical interventions and decision-making for providers (Keffer, 2001). While algorithms are formatted like a flow chart and are designed to reduce ambiguity, they provide opportunities for individualization to each patient based on assessment findings, provider judgement, and overall patient context. Healthcare continues to increase in complexity and advances in knowledge make it challenging for providers due to the vast amount of available information (Keffer, 2001). Use of an evidence-based algorithm guides providers toward certain treatments and simplifies the decision-making process.

For childhood obesity, diagnostic workup should start with a careful and detailed history that includes prenatal factors; family history; dietary, sleep, and exercise habits; family and cultural practices; screen time; bullying or any other psychological issues related to social isolation and friendships; and financial barriers (Cuda & Censani, 2019). Based on where the child falls on the BMI-for-age and sex chart, a classification of *overweight* or *mild*, *moderate*, or *severe obesity* could be determined. It is critical that providers assess for additional comorbidities or medical issues that might need further treatment in conjunction with the overweight or obesity finding. As introduced earlier in this chapter, medical management of children who are overweight or obese might be complicated by societal impedances such as poverty or cultural sensitivities like high caloric traditional diets (Perpich et al., 2011; Williams et al., 2018). When

accompanied by personalized care and a trusting relationship between provider and patient, an algorithm takes these complexities into consideration and provides a framework to assist providers with supporting families and children in making changes to improve their health.

Several published child/adolescent/pediatric algorithms currently in use are those from pediatricians Cuda and Censani (2019), the Obesity Medicine Association ("Pediatric obesity algorithm," 2021), and the American Academy of Pediatrics (2016). However, there were some limitations to these algorithms that this scholarly project attempted to address. Cuda and Censani produced one of the more widely used algorithms for pediatric obesity diagnosis and management. The algorithm identified the severity of the problem, age specific management, and consideration of comorbid conditions but does not consider socioeconomic factors or cultural nuances. The literature suggested these important factors should be included in the management of childhood obesity to improve the success of the treatment plan (Mead et al., 2017; Perpich et al., 2011; Williams et al., 2018).

The Obesity Medicine Association ("Pediatric obesity algorithm," 2021), considered a global leader in the field, designed another well-known pediatric obesity algorithm available for purchase. It largely incorporated the same criteria as Cuda and Censani's (2019) version but again failed to incorporate socioeconomic factors, cultural considerations, and patient/family preferences or context in a comprehensive and whole system manner. The Obesity Medicine Association algorithm briefly mentioned that family and cultural factors should be taken into consideration but offered very little guidance for how a provider should accomplish this, instead focusing heavily on diagnostic testing, nutrition, and physical activity aspects. Also missing from the Obesity Medicine Association pediatric algorithm was consideration of the educational levels of the child and their family, which was supported in the literature as being essential for

providing a well-rounded treatment approach to managing childhood obesity (Vaccaro et al., 2019). Strengths of the algorithm included incorporation of epigenetics, assessment data, differential diagnoses, and management strategies that include activity recommendations, pharmacology, and surgical options ("Pediatric obesity algorithm," 2021).

The American Academy of Pediatrics (AAP) published an updated version of their childhood obesity algorithm in 2016 based on decade-old expert committee recommendations. Although the AAP is one of the most recognized pediatric health organizations, several challenges and limitations were noted with this algorithm. For example, the algorithm appeared to suggest that if a child was of normal weight, there was an absence of risk factors. Various illnesses and conditions related to obesity were identified but the algorithm stopped at routine care if the child was of healthy weight, which might create a missed opportunity for prevention. Similar to the other published algorithms, socio-economic status, education level of the parents/caregivers, and ethnicity/race were absent. The algorithm was organized into four treatment stages, which might be overwhelming for primary care providers who often have just 15-minutes during a visit to assess and arrange a treatment plan for the patient. The algorithm clearly suggested a range of modalities and services but did not offer clear links to these options, creating additional labor for the provider. A major limitation was the algorithm failed to address food insecurity and access to nutritious foods such as fresh produce, both factors that place low-income children and those in certain geographic areas at risk for developing obesity (Williams et al., 2018). Overall, the AAP treatment algorithm presented with both strengths and weaknesses that further supported the need for this scholarly project.

Triantafyllidis et al. (2020) published a systematic review of computerized decision supports and machine learning applications, contributing to the development of both prevention

and treatment algorithms for childhood obesity. The authors concluded that an organized integration of machine learning algorithms into electronic healthcare systems was needed to fully implement interventions. The authors' assessment of digital algorithms designed to predict/identify children who are overweight or obese and to provide effective interventions revealed several limitations. For example, decision trees and artificial neural networks were proven to be helpful in predicting children to be overweight or obese but methodological limitations were noted and interventional studies that included machine learning and computerized decision support were limited (Triantafyllidis et al., 2020). Overall, the three published algorithms described above and this additional systematic review provided a foundation for the clinical management of children who are overweight or obese with potentially promising applications for digital health. However, consideration of additional factors presented in the literature and streamlining of the pathways for primary care providers might improve usability, function, time constraints, and patient outcomes.

Statement of the Problem

The incidence of childhood obesity continues to rise both in the United States and globally with long-term health consequences for patients, families, and communities. When prevention efforts fail, clinical interventions for childhood obesity are intended to reduce the risks to the child and disrupt the progression of disease into adulthood. Numerous strategies from the literature were designed at the population level as well as several existing algorithms for managing childhood obesity but these approaches were often overly general and difficult for providers to implement in the primary care setting when caring for highly diverse populations with various logistical and time constraints. In response to this issue, this project proposed to develop a streamlined yet comprehensive and localized treatment algorithm for children (aged 5-

18 years) who are overweight and/or obese that could be specifically tailored to the needs and preferences of individual children and families in the primary care setting.

Purpose of the Project

The purpose of this DNP scholarly project was to develop and evaluate a treatment algorithm for children identified as being overweight or obese designed for use in the primary care setting using published evidence and a panel of clinical experts.

Need for the Project

Although numerous studies evaluated community- or school-based interventions for childhood obesity and several published algorithms, there were limited resources for primary care providers to formulate a specific plan for individual patients. Selecting interventions in response to patient needs, local context, and individual preferences is a complex process that must consider factors such as the socioeconomic status of families and the availability of local resources (Vaccaro et al., 2019; Williams et al., 2018). There is a need for improved outcomes and decreased comorbidities associated with childhood obesity. A well-designed and holistic algorithm could direct primary care providers toward recommendations and resources appropriate for each child and family under their care to improve care of this population.

Study Question

This project intended to answer the following research question:

Q1 How will feedback from a panel of expert clinicians combined with a critical review of the literature contribute to the development of an evidence-based treatment algorithm designed for use with children who are overweight or obese in the primary care setting?

Objectives of the Project

The objectives of the project were to:

1. Evaluate the current literature to develop a comprehensive treatment algorithm for children who are overweight or obese that considers the physical, nutritional, psychological/behavioral, pharmaceutical, socioeconomic, educational, environmental, and cultural context based on assessment data.
2. Collect feedback from a panel of clinicians in primary care regarding the feasibility, practicality, and usefulness of the initial algorithm.
3. Analyze and integrate the feedback into increasingly refined drafts of the algorithm until broad consensus among the panel is achieved.
4. Propose a future pilot study for testing the algorithm in a primary care setting with children diagnosed as being overweight or obese.

Summary

Childhood obesity is an epidemic that is increasing not only in the United States but also around the world. The negative consequences of childhood obesity are both short- and long-term and include an increased risk of developing obesity as an adult. Previous efforts to prevent and mitigate childhood obesity have been largely designed at the community or population-level, which largely negated interventions appropriate for the primary care setting. In addition, existing childhood obesity algorithms that could be implemented in primary care were missing key components from the literature suggested for a more localized and socially/culturally sensitive approach to managing this condition. An evidence-based and well-designed algorithm that primary care providers could easily tailor and utilize in their daily practice was warranted.

Definition of Terms

Childhood Obesity: Among children, obesity is defined as being in the 95th percentile or greater on the body mass index (CDC, 2022a).

Childhood Overweight: Defined as 85th to less than the 95th percentile on the body mass index (CDC, 2022c).

Comorbidities: The presence of two or more disease processes or medical conditions at the same time.

Intervention: Action taken to improve a situation including a medical disorder.

Primary Care: Healthcare at a basic level rather than a specialized level delivered by a physician or advance practice provider such as a nurse practitioner or physician assistant.

Treatment Algorithm: A flow chart approach to healthcare treatment resulting in a tool that provides a full range of options while reducing indecision for the healthcare provider.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter describes the historical background of childhood obesity and how it contributed to the current context of this scholarly project. Literature pertaining to childhood obesity prevalence, mortality/morbidity rates, and the associated negative outcomes was reviewed. Evidence-based strategies for obesity prevention and intervention among this population were explored. Additionally, information from professional organization websites were also examined to supplement the current published information on childhood obesity. Finally, Stetler's (2001) model of research utilization was incorporated at the end of this chapter as the theoretical framework that guided this scholarly project.

Historical Background

Childhood obesity began garnering the attention of public health and medical professionals in the 1970s. Since then, the topic has become increasingly prevalent in the literature. Scientists and clinicians attribute some of the increase in childhood obesity rates to the rise of fast-food restaurants, low-cost convenience foods, and changes in menu choices over the past 50 years (Mohammadbeigi et al., 2018). Fast food establishments are often inexpensive but offer high caloric foods with low nutritional value. The average energy density of a fast-food menu is typically twice that of a healthy menu. Since the 1970s, fast food consumption has significantly increased due to convenience, relatively low cost, choice selection, and evolving tastes (Mohammadbeigi et al., 2018). The number of fast-food restaurants doubled between 1972

and 1996 and during this same period, the percentage of the average American family's food budget spent on dining out increased by 21% (Johnson, 2012).

Additional factors that have contributed to increasing childhood obesity rates include the consumption of high fructose corn syrup (commonly found in soft drinks and other sweetened beverages) and other lifestyle changes. The amount of consumed sugar in the average American diet has markedly increased from approximately 38 pounds in 1980 to 868 pounds in 1998 (Johnson, 2012). Processed foods are poor in micronutrients, high in glycemic load, and contain larger portions of sugar. When the increase in energy density of a diet consisting largely of fats and sugars is paired with unhealthy eating behaviors (such as snacking, binging, or eating out), this increases the likelihood of developing childhood obesity (Mohammadbeigi et al., 2018). Habitual physically inactive lifestyles, an increase in social media consumption, and the widespread availability of processed and fast food are all contributing factors to the childhood obesity epidemic that has developed over the past several decades (Singh et al., 2021).

Childhood obesity was first recognized as a health epidemic in the 1990s (Mitchell et al., 2011). Health providers began to observe significant medical problems associated with children being overweight or obese that contributed to an increased incidence of diabetes, hypertension, depression, and overall increased mortality in adulthood if left untreated (Sanyaolu et al., 2019). Initial treatment efforts in the 1990s largely focused on dietary and physical activity modifications with limited results. For example, school-based nutrition and physical activity programs were one of the earliest implemented interventions but have demonstrated only mild to moderate success in slowing childhood obesity rates (Sbruzzi et al., 2013). Over time, knowledge about high-risk behaviors and other factors that contribute to excess weight gain among children has evolved. Foods in low nutritional value and high caloric intake (such as high

sugar beverages) and certain medications, unhealthy sleep routines, lack of health education, and low socioeconomic status are now recognized as major contributors to this condition among the child population (Mohammadbeigi et al., 2018; Vaccaro et al., 2019). More recent efforts recognize that certain factors are etiologically relevant to childhood obesity such as the education levels and occupations of the child's parents (Lissner et al., 2015). Currently, an influx of childhood obesity research and the treatment process have become more intricate. Education, prevention, and individually tailored interventions are part of a more holistic, cohesive process for treatment by healthcare providers today ("Pediatric obesity algorithm," 2021).

Literature Review

Methodology

Literature on childhood obesity was identified using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Database of Systematic Reviews, PubMed (Medline), and Embase databases. Additional sources such as professional organizational websites were located using a Google search. This search of the literature and resources took place between July 2021 and June 2022. The Boolean operation "AND" was utilized to associate the main term of "childhood obesity" with "wellness," "physical activity," and "nutrition." The search query was further delineated to include full-text scholarly journal articles in English (but not limited to the United States) and published between the years 2011-2022. Articles that included children in the inpatient setting were excluded. Titles and abstracts of all articles were further screened to determine usefulness to this project.

In total, 29 articles met the inclusion criteria and were determined to be relevant to the project topic. The included articles consisted of eight systematic reviews (Ekambareshwar et al., 2021; Jacob et al., 2021; Mead et al., 2017; Penalyo et al., 2021; Rogovik & Goldman, 2011;

Sbruzzi et al., 2013; Smith et al., 2020; Umer et al., 2017), two randomized control trials (Bogataj et al., 2021; Brown et al., 2019), three cross sectional studies (Lissner et al., 2015; Mohammadbeigi et al., 2018; Vaccaro et al., 2019), one prospective cohort study (Lindberg et al., 2020), two authors' expression (Innes-Hughes et al., 2019; Joshi & Adhikari, 2017)), one secondary data analysis (Williams et al., 2018), one quantitative study (Singh et al., 2021), 10 review articles (Boisvert & Harrell, 2015; De Miguel-Etayo et al., 2013; Hemmingsson, 2018; Mantizios & Wilson, 2015; Matson & Fallon, 2012; Mitchell et al., 2011; Perpich et al., 2011; Sahoo et al., 2015; Sanyaolu et al., 2019; Wang & Lim, 2012), and one single cohort intervention feasibility study (Burke et al., 2015). In addition, information from several reputable professional organizations and foundations was gleaned from websites and integrated into this review.

Synthesis

Overall

The reviewed literature encompassed prevalence, risk factors, comorbidities, lifestyle modifications, and wellness interventions in relation to childhood obesity. Most of the studies focused on disease management, evidence-based interventions, and various wellness components. The outcomes of each study were variable but the foci can generally be categorized as (a) prevention strategies; (b) nutritional, physical activity, and behavioral interventions; (c) contributing socio-economic factors; and (d) adverse outcomes of childhood obesity. Many of the published interventions incorporated family, school, and individualized programs to address this health issue. Studies such as that from Smith et al. (2020) discussed primary and secondary preventative measures for limiting weight gain and tactics to prevent patterns of weight regain following an initial period of weight loss. Most sources focused on changing the behavior of children using diet and exercise interventions to prevent weight gain. However, there was limited

evidence for the impact of these preventative approaches (Brown et al., 2019). Therefore, although prevention interventions are important components of managing childhood obesity, they were not the primary focus of this project as the incidence of obesity continues to rise and innovative treatment modalities are needed in the primary care setting.

Several studies suggested the combined impact of dietary interventions, physical activity, and behavioral therapy sessions showed decreased levels of obesity in children up to a year after the interventions were initiated (Burke et al., 2015; Mead et al., 2017; Sbruzzi et al., 2013). In the short term, Bogataj et al. (2021) found improvement with body composition and physical aerobic performance after eight weeks of consistent maintenance of therapeutic interventions such as those listed above. In addition, family involvement appeared to support weight loss program effectiveness for children (Burke et al., 2015), although there were limitations to this approach as described in Chapter I of this written project. A systematic review was completed examining worksite wellness programs that used integrated levels of health promotion and disease management. The review evaluated virtual wellness programs in different settings and countries focused on nutrition guidelines and physical activity designed for use by the entire family (Penalyo et al., 2021). Workplace wellness programs are relevant to the child population as the literature suggests that when the adults of the family are obese, children within the family unit are at greater risk of developing the condition as well (Penalyo et al., 2021). Thus, parents and other caregivers play an important role in modeling health practices and managing the wellbeing of the children under their care.

This review of the literature revealed that childhood obesity has many contributing factors including insufficient preventative medical care, environmental components, and certain high-risk behaviors (Hemmingsson, 2018; Smith et al., 2020; Vaccaro et al., 2019). Children

who are overweight and/or obese have a higher incidence of comorbidities and are at risk for developing cardiovascular disease, sleep apnea, and diabetes as adults (Sanyaolu et al., 2019). As previously stated, there is a greater chance of becoming overweight and obese as an adult when obesity presents during childhood (Sahoo et al., 2015; Sanyaolu et al., 2019). Several studies in this review of the literature showed that the risk for being overweight or obese during childhood increased within socioeconomically disadvantaged families (Lissner et al., 2015; Williams et al., 2018). Studies from high-income regions in the United States and Europe suggested that parental education, income, and occupations were factors that contributed to childhood obesity. According to Williams et al. (2018), socioeconomics played an important role in this epidemic in the United States as evidenced by certain minority groups (Mexican Americans, Native Americans, and African Americans) that exhibited higher rates of childhood obesity related to lower socioeconomic status. Additional risk factors that directly related to socioeconomic status and childhood obesity prevalence in the United States included poor neighborhood safety, increased tobacco usage, consumption of low nutritional foods with increased sugar intake, and sedentary lifestyle (Mohammadbeigi et al., 2018; Smith et al., 2020; Williams et al., 2018). Reversely, higher socioeconomic status could increase childhood obesity rates in certain regions outside of the United States. According to Wang and Lim (2012), childhood obesity rates were generally elevated among those with a higher socioeconomic status in underdeveloped countries. This phenomenon was based on the affordability of certain luxuries and having access to a wide variety of food choices while less affluent children had limited access to food varieties and were frequently calorie deficient in these regions. Globally, sedentary lifestyle played a significant role in childhood obesity. Television viewing among children has increased considerably in recent years and physical activity has decreased (Sahoo et al., 2015). Overall, the literature

suggested that the nuances and context of the childhood obesity phenomenon are complex and vary considerably across regions and populations.

Childhood Obesity Risk Factors and Morbidity/Mortality Rates

Obesity plays a significant role in acute and chronic health problems, overall health and development, and the well-being of the child (Brown et al., 2019). Several studies sought to identify which factors contributed the most to childhood obesity prevalence (Perpich et al., 2011; Sahoo et al., 2015; Vaccaro et al., 2019). Various environmental and behavioral factors that elevated the risk of developing childhood obesity appeared to be unequally distributed among racial/ethnic and age groups. For example, there was a discrepancy in access to health care that negatively affected children from lower socioeconomic households and ethnic/racial minority children, resulting in increased rates of obesity among these groups (Vaccaro et al., 2019). Other factors such as the condition of the neighborhood (e.g., safety, access to green spaces, etc.) and family practices (e.g., physical activity levels, sleep patterns, regular mealtimes, etc.) also played a role (Perpich et al., 2011; Vaccaro et al., 2019). Genetics might contribute to childhood obesity given that BMI might be 25-40% inheritable. However, Sahoo et al. (2015) noted that genetics contributed to less than 5% of the overall risk for developing childhood obesity, indicating it was not the main cause for the significant increase in this issue over the past several decades.

Another factor noted in the literature was parental education and level of involvement in the child's activities (Perpich et al., 2011). If the parents were sedentary, the child was more likely to be sedentary as well. In addition, if the parent had less than 12 years of education, their basic understanding of the causes, prevention, and interventions for obesity was reduced, thus limiting their ability to support a healthy lifestyle among their children (Perpich et al., 2011). Similarly, Sahoo et al. (2015) noted the physical activity habits of family members had a strong

influence health outcome of the child. The authors found that having a mother who was obese or being in a single parent household were associated with an increased BMI and obesity rate among children. Although prepubescent children (ages 10-13 years) had a higher percentage of obesity when compared to adolescents (ages 14-18 years) in the United States, the latter had more risk factors pertaining to obesity such as impaired sleep patterns, sedentary behaviors, and decreased physical activity (Vaccaro et al., 2019). Many of these behaviors might be influenced by parental or caregiver supervision and modeling.

Of significant concern was a higher incidence of morbidity and mortality among children with obesity (Lindberg et al., 2020; Umer et al., 2017). A long-term, large cohort study of children (*n* =190,752) presented by Lindberg et al. (2020) found a total of 104 obesity-related deaths. The average age of death was 22 years. Of note, there were 38 deaths among the 7,049 children in the childhood obesity cohort, correlating to a mortality rate of 12 per 10,000 persons. Umer et al. (2017) surmised that overweight adolescents had a 40-80% chance of becoming obese or overweight adults and were at higher risk for experiencing premature death. In a study by Smith et al. (2020), childhood obesity was linked with health conditions such as high blood pressure that could affect the development of normal physiology and metabolism into adulthood.

Evidence-Based Interventions for Childhood Obesity

Prevention should be the starting point for patient care; however, the incidence of childhood obesity continues to rise, requiring that providers are also adept at creating effective treatment plans for this population (Vaccaro et al., 2019). When prevention fails, evidence-based treatment interventions should be implemented and evaluated for efficacy to mitigate the burden of obesity into adulthood. Interventions to promote weight reduction in the primary care setting include reducing sedentary habits by increasing physical activity and incorporating various other

supportive dietary and psychological behaviors (De Miguel-Etayo et al., 2013; Vaccaro et al., 2019). According to Brown et al. (2019), there was low certainty evidence that physical activity interventions alone resulted in a reduction in BMI across eight randomized controlled trials (*n*=16,583) focused on childhood obesity. Interestingly, even when physical activity was combined with a dietary intervention, there was still no impact on BMI when compared to control groups (Brown et al., 2019).

Dietary treatments for children who are overweight or obese should complement normal growth and development and the loss of lean body mass should be avoided (De Miguel-Etayo et al., 2013). Teaching proper dietary habits could help reduce a cyclic weight regain and produce healthier lifestyle behaviors. Promising results were found when dietary changes were combined with other behavioral modifications including increased physical activity, family involvement, and reframed thought processes regarding food (De Miguel-Etayo et al., 2013). Limiting screen time, eating breakfast, portion control, and decreased outings to restaurants are also interventions shown to mitigate childhood obesity (Perpich et al., 2011; Smith et al., 2020). In general, the literature suggested that dietary interventions were most effective when combined with multiple lifestyle interventions.

One promising intervention for combatting childhood obesity is the use of technology (Ekambareshwar et al., 2021; Vaccaro et al., 2019). Tips on exercise, diet, and health education can be delivered through apps distributed among social media and cellular phone use, which might be appealing to a child audience. Some apps track dietary and exercise patterns to facilitate goal setting and promote a lower BMI (Ekambareshwar et al., 2021). The use of technology is increasingly utilized in everyday life and might be an important part of disseminating obesity information and self-management strategies to children and families.

Mind-body approaches such as meditation and yoga were also evident in the childhood obesity literature. Yoga and meditation might aide a person to be more consciously aware and assist with self-control (Joshi & Adhikari, 2017). Mindfulness-based meditation specifically focused on eating behaviors could assist with weight loss, although this is not yet a well adopted intervention for children (Mantizios & Wilson, 2015). Meditation is designed to increase self-awareness, self-regulation, and improve control of healthy dietary choices. Yoga is a form of exercise that might contribute to weight loss through improved posture, hormone balance, emotional regulation, and blood circulation (Joshi & Adhikari, 2017). Cognitive behavioral therapy might also be used to support children with obesity. Cognitive behavioral therapy is a psychological intervention focused on changing unhealthy emotions, cognition, and behavior (Boisvert & Harrell, 2015). A more established intervention is family therapy, which could be used to encompass the entire family unit to address dysfunctional coping patterns or to provide guidance on navigating ethnic and cultural norms contributing to childhood obesity such as overeating as a sign of respect to older family members (Boisvert & Harrell, 2015). Overall, many of these mind-body interventions are low-risk and potentially promising but barriers such as access, cost, and the personal preferences of the child and family must be taken into consideration.

Lastly, there are several pharmacological modalities to treat childhood obesity. It is important to note that a limited number of medications can be used in the pediatric population as evidenced by this review of the literature. Orlistat is a first line pharmacotherapy for children 12 and older who are two units or more above the 95^{th} percentile on the BMI chart and continue to gain weight despite lifestyle modifications (Rogovik & Goldman, 2011). Orlistat is the only medication approved by the U.S. Food and Drug Administration for the treatment of childhood

obesity although adult medications are sometimes utilized in rare cases. Lifestyle modifications should be continued in conjunction with any medication (Rogovik & Goldman, 2011). Children should not be treated with medication unless there are significant comorbidities or continued weight gain despite lifestyle modifications; however, obese children with a history of diabetes (type 2) or cardiovascular risk factors might require more aggressive medication intervention (Matson & Fallon, 2012). According to De Miguel-Etayo et al. (2013), drug therapy should not be used as a single modality and is generally more effective when combined with diet, exercise, psychological therapy, and family involvement.

Examples of Programs and Resources for Managing Childhood Obesity

Although a critique of existing childhood obesity algorithms was discussed in Chapter I of this written project, the review of the literature also identified several additional resources and programs for providers, children, and families seeking support with obesity. An example from Australia was the Healthy Children Initiative (HCI): "a government-funded, statewide, comprehensive, and equitable approach to reduce childhood obesity and improve the health of children" (Innes-Hughes et al., 2019, p. 2). Modification programs such as the HCI could be adopted by providers to guide their support of children who are overweight/obese and under their care. However, the HCI primarily focused on prevention and consisted of interventions that addressed food patterns and behavior to encourage children and families to maintain a healthy weight, eat healthy, and stay physically active (Innes-Hughes et al., 2019). A major limitation of this program relied on state funding, putting it at risk for defunding due to government redistributions. Another limitation was the plan was designed to be implemented at the state-level, which sometimes created inconsistencies in delivery and limited the ability of providers to tailor the plan to the needs and preferences of individual children and families in their practice.

Burke et al. (2015) presented a different program available to providers in Canada seeking to support children with obesity. The Children's Health and Activity Modification Program (C.H.A.M.P) was developed as a family-based intervention focused on lifestyle modifications. The program design was based on a group of dynamic theories relating to community access and aimed to get parents and children actively involved in lifestyle change (Burke et al., 2015). The Children's Health and Activity Modification Program required that the child participate in a month-long camp focused on physical activity, dietary, and behavior modifications with additional education sessions held for families. One potential limitation was that although it was a theory-driven and structured program, it was not easily individualized to each participant and the program required long-term funding (Burke et al., 2015). In addition, over the course of two years, C.H.A.M.P was directed by five different directors, resulting in inconsistency in delivery of the interventions and limiting interpretation of the program evaluation findings.

Within the United States, several publicly available resources for providers and families focused on preventing and treating childhood obesity. The Robert Wood Johnson Foundation (2021) compiled research and program templates for professionals working in the public health, nutrition, and healthcare sectors. While an excellent source of information, it was not specifically geared toward clinicians in the primary care setting and consumers must still sort through and evaluate much of the information. The Centers for Disease Control and Prevention (CDC, 2022b) launched the Childhood Obesity Management with MEND Implementation Teams (COMMIT!) in 2019. The COMMIT! program was designed to offer state-level partners evidence-based guidance on childhood obesity preventative care and management in federally qualified health centers (CDC, 2022b). The National Institutes of Health (NIH) launched several

initiatives focused on childhood obesity through the National Collaborative on Childhood Obesity Research, which partnered with experts from four NIH institutes, the CDC, and the Robert Wood Johnson Foundation. Together, they trialed a national study on young girls to get them more involved in physical education classes, organized sporting activities, and recreational activities. The U.S. Department of Health and Human Services also developed a program called *We Can!* through the National Heart, Lung, and Blood Institute (2013). *We Can!* was designed to disseminate information and tools to families and communities about staying active and maintaining a healthy weight. There are more than 1,000 *We Can!* programs nationwide and in 11 countries that are active at the local level.

Although the above-described initiatives are useful at a population level or within the school-based or public health context, they were often less applicable to specific children and their families who might be presenting to a trusted healthcare provider in the privacy of primary care. In general, these U.S.-based resources were aimed at improving eating habits and encouraging physical activity and could be critiqued as being overly generalized and primarily focused on prevention. In contrast, once a child has been diagnosed as meeting the criteria for being overweight or obese, an intervention plan emergent from a primary care provider would be more distinct and better able to meet the needs of the patient and their family through long-term support.

Summary

Childhood obesity is an epidemic that continues to worsen, leading to elevated morbidity and mortality rates into adulthood, unless effective new interventions are developed and tested. While it is challenging to create a treatment plan that fits all children since so many physiological, genetic, psychological, social, and environmental factors need to be considered,

tailoring care to the individual child and their family in the primary care setting might represent a novel approach for supporting the wellbeing of children. Although programs and initiatives such as HCI, C.H.A.M.P.S, COMMIT!, and *We Can!* (National Heart, Lung, and Blood Institute, 2013) provided some guidelines for providers in the face of the ongoing childhood obesity epidemic, a more efficient process for individualizing care and setting the patient up for success by using tailored evidence-based interventions that align with local resources was warranted. For children who are overweight or obese, standardized programs located in the community or school systems might complement treatment plans but only after an individualized plan has been established with a provider. The literature suggested that chronological and developmental age, weight gain patterns, socioeconomic status, culture, environmental factors, race/ethnicity, educational levels, preferences, and family involvement should be considered in the development of a multifaceted childhood obesity treatment plan (De Miguel-Etayo et al., 2013; Mead et al., 2017; Mohammadbeigi et al., 2018; Perpich et al., 2011; Smith et al., 2020; Williams et al., 2018). Success of the plan would also likely depend on patient/family motivation and their relationship with the primary care provider. A comprehensive and flexible algorithm that could be utilized by advanced practice health professionals to guide the planning, implementation, and evaluation process might be helpful in curbing this epidemic.

Theoretical Model

Stetler Model of Research Utilization

The Stetler (2001) model of research utilization, commonly referred to as the Stetler model, was developed in 1976 with Marram and was updated and refined in 2001. The model continues to evolve based on refinement of integrative review methodology and continued utilization of evidence concepts in the practice of clinical nurse specialists (Stetler, 2001). This

model is intended to guide evidence-based practice and contains five phases: preparation, validation, comparative evaluation/decision making, translation/application, and evaluation. The Stetler model has been used in numerous studies since 1976. For example, a project to develop a research-based intervention to improve the satisfaction of hospital workers was published by Bradish et al. (1996). The authors applied the model to a hypothetical nursing administration case study to develop a research-based intervention for improving job satisfaction among employees in a hospital setting. The Stetler model was designed in such a manner to promote critical thinking about the integration of research into practice. It might be used by a single practitioner, groups of practitioners, or stakeholders that hold a special interest in a clinically focused problem (Christenbery, 2017).

Description of Phases and Application to the Project

There are three parts to the preparation phase (Stetler, 2001). The first involves identifying the need to solve the problem, which was established in the first two chapters of this project through a comprehensive literature review as well as the primary investigator's own professional experience as a nurse practitioner. The clinical observations of the primary investigator as well as those supported in the literature suggested that current approaches to reducing childhood obesity are highly generalized, often designed at the population level, and are only moderately successful. Next, this phase required that the user identify sources of research evidence that measures the intended outcomes addressed in phase five. For this project, that evidence was both the existing literature supporting the need for this project as well as data from the validation surveys that accompanied the evidence-informed algorithm drafts submitted to a panel of clinical experts in the field of childhood obesity. Thus, the measurable outcomes for this project were identified as a high-level of published evidence supporting the need for an

innovative algorithm combined with approval of the proposed algorithm among the panel of experts.

The validation phase is the second phase of this model. This phase assesses the credibility of each source of evidence provided by either accepting or rejecting the evidence (Stetler, 2001). Assessing sources and their quality, reviewing their credibility, and removing any non-credible sources was completed during the review of the literature (see Appendix A for Table of Evidence). If the primary investigator had been unable to find credible evidence supporting the need for a childhood obesity treatment algorithm, then the project would have terminated. Since the project was credible and the evidence was determined to be sufficient, the project continued. However, four additional elements took place in this phase including evaluation of the setting, usefulness of the project, current practice, and supporting evidence (Stetler, 2001). Applying all four elements determined whether the project was going to be successful or rejected during this phase. Evaluation of the intended setting for the algorithm (primary care) was considered as this was an important factor in the future application of the algorithm. Usefulness of the project was acknowledged as there were current practices in place to manage childhood obesity in primary care but the supporting evidence suggested these processes could be improved with specific plans for each individual patient. The algorithm also addressed a gap in current practice by offering a new tool for advanced practice primary care providers as indicated by the supporting evidence in this chapter and the Table of Evidence (see Appendix A).

The third element of the model entails comparative evaluation and decision making. This element organizes and displays the findings that have been surmised from all the sources and evaluates their similarities and differences. This phase also helps users determine if these findings could be applied in practice and are appropriate. Gathering internal information should

be completed before making final decisions about the evidence (Stetler, 2001). During this phase, the retained information was organized for future incorporation into the draft algorithm. Thus, the initial draft of the algorithm was supported by the evidence collected in the literature review. As described previously, a sufficient number of high-quality articles published between 2011-2022 were included to ensure an adequate amount of evidence supported the development of the algorithm. An intensive research review on interventions that should be incorporated into current practice to manage childhood obesity was completed and validated. There were sufficient high-quality findings to inform the development of the algorithm that could be applied to practice at a later phase.

Translation and application of the model is the fourth phase. This is the phase in which the implementation of the project takes place. It incorporates all the above phases with the evidence that was produced and assimilates them into a draft algorithm. In this phase of the DNP project, feedback data from the panel of stakeholders that would benefit from this project (advanced practice primary care providers) were gathered and integrated into increasingly refined drafts. A final version of the algorithm was developed based on the evidence from the literature review and through integration of multiple rounds of clinical expert opinions, which represented a translation of multiple sources of evidence into a usable instrument.

Evaluation is the fifth phase of model and according to Stetler (2001), it could be formal or informal at either the individual or institutional levels. Although the final draft of the algorithm was not implemented with actual patients during this scholarly project, formal evaluation of the goals and outcomes detailed in Chapter I of this written document were addressed at the conclusion of the project. In addition, formative evaluation of the algorithm occurred at the group level via quantitative and qualitive feedback from the panel of clinical

experts. The panel's opinion on the costs-benefits of the proposed algorithm was assessed during this phase as well. The final draft of the algorithm represented the outcome of this project and was made available to other healthcare practitioners for testing and to potentially improve treatment of patients with childhood obesity.

CHAPTER III

METHODOLOGY

The purpose of this DNP scholarly project was to develop and evaluate a treatment algorithm for children identified as being overweight or obese designed for use in the primary care setting using published evidence and a panel of clinical experts. This chapter focuses on the procedures for implementing this scholarly project including the design, setting, sample, objectives with process steps, instrumentation, and data analysis plan. The mission and vision of the project are articulated as well as the planned project timeline. Ethical considerations for development of the treatment algorithm are discussed in relation to acquiring data from the panel of experts and for implementation in the clinical setting in the future.

Design

The Delphi method was utilized as the design for this evidence-based practice project. The Delphi method achieves consensus among a group of experts to predict solutions to situations where data are not available or are incomplete (Davidson, n.d.) Several factors make up the Delphi method including (a) the participants must be experts in their field, (b) several rounds of information are disseminated to the participants for review, (c) the participants' responses are anonymous, and (d) the goal is to reach a broad consensus among the participants regarding future solutions to the problem of focus (Davidson, n.d.). For this scholarly project, the Delphi method began with a critical appraisal of the literature to draft an initial algorithm followed by critique/input from a panel of expert providers who provided controlled feedback. The Delphi method requires the participation of experts in their field (in this case, primary care

providers regularly caring for children who are overweight or obese) who are given an opportunity to co-develop a new clinical tool. In most cases, consensus is achieved among the group of experts over the course of two to three rounds of data collection using predominantly quantitative questionnaires (Twin, 2022). A series of revisions takes place in between data collection rounds until a final and accepted product is produced (Davidson, n.d.; Twin, 2022).

Setting

The setting of this scholarly project was virtual via an electronic questionnaire (see Appendix B for the round one questionnaire) that was distributed to a group of expert panel members along with the algorithm drafts. The questionnaire was completed individually and anonymously to reduce biased decision making by eliminating group discussion surrounding the topic. The algorithm was designed for use in the small-to mid-sized city of Pueblo, Colorado located in the southern region of the state. Thus, the panelists were all providers currently practicing in that community. According to the U.S. Census Bureau (2020), Pueblo's population is approximately 112,000 and predominantly White (75.4%) with a sizeable Hispanic/Latino ethnic population (49.9%). Pueblo's median household income of $42,902 is well below the national average of $67,500 and the percentage of people living in poverty is elevated at 21.8% (U.S. Census Bureau, 2020). Just over 22% of Pueblo's population is under 18 years old, resulting in a large number of children who might be at risk for being overweight or obese.

Sample

The candidates formed a panel of physicians and advanced practice providers who were in the primary care setting and routinely provided clinical care to children in the Pueblo, Colorado community. Inclusion criteria for the expert panel included credentialing as a nurse practitioner (NP), physician assistant (PA), Medical Doctor (MD), or Doctor of Osteopathic

Medicine (DO). Eligible participants must have had at least two years of advanced practice experience and be currently working in a primary care setting with children under the age of 18 years. Exclusion criteria included having less than two years of advanced practice experience caring for children in a primary care setting or currently working in a non-primary care setting (such as a pediatric emergency department or inpatient unit). Non-advanced practice providers such as registered nurses were ineligible to participate. The goal was to recruit seven providers meeting the inclusion criteria as an odd number was preferred to eliminate ties and a panel of this size allowed for a low level of planned attrition. Seven panelists would ideally provide a well-rounded expert group with clinical experience in pediatric care in the primary setting. The panel was recruited via private email (see Appendix C for the recruitment email) using my professional network established throughout my extensive career as a family nurse practitioner in southern Colorado.

Project Mission, Vision, and Objectives

This project's mission was to synthesize the evidence and expert opinion to develop an innovative and localized primary care algorithm for management of overweight and obese children. The vision of this project was to provide evidence-based options for advanced practice primary care providers caring for pediatric patients who are overweight or obese in an effort to improve health outcomes for this population and lead to increased wellbeing and longevity into adulthood. The project objectives and action steps were as follows:

1. Evaluate the current literature to develop a comprehensive treatment algorithm for children who are overweight or obese that considers the physical, nutritional, psychological/behavioral, pharmaceutical, socioeconomic, educational, environmental, and cultural context based on assessment data.

- Analyze current literature in CINAHL, Cochrane Database of Systemic Reviews, PubMed (Medline), and Embase databases to synthesize the full range of current evidence-based interventions for children who are overweight or obese.
- Under the supervision of the project advisor/chair, develop the first draft of the overweight/obesity algorithm for children ages 5-18 years.

2. Collect feedback from a panel of clinicians in primary care regarding the feasibility, practicality, and usefulness of the initial algorithm.
    - Enlist advanced practice providers (NPs, PAs, MDs, and DOs) who met the inclusion criteria and were willing and able to participate in the project.
    - Develop an anonymous validation questionnaire that would be electronically delivered to each of the panel members using Survey Monkey software. Questionnaires primarily consisted of yes/no questions with a limited open text space (<140 characters) for a "no" response to assist in development of subsequent draft algorithms.
3. Analyze and integrate the feedback into increasingly refined drafts of the algorithm until broad consensus among the panel is achieved.
    - Analyze the panelists' responses in Survey Monkey and track the recommended changes. Collaborate with the project advisor/chair to categorize and analyze any short open text responses.
    - Retain or add any changes deemed beneficial by the panel to the revised versions of the algorithm across the two rounds of data collection. Remove

content from the algorithm the panel identified as being inappropriate or less helpful.

- Assess and revise the algorithm drafts with the panel of experts until the group comes to a broad (majority) consensus. The final draft of the algorithm was representative of the consensus of the expert panel.

4. Propose a future pilot study for testing the algorithm in a primary care setting with children diagnosed as being overweight or obese.
    - In Chapter V of the written project, describe the procedures for a future pilot study that could be conducted with primary care providers and their child patients in Pueblo, Colorado.

Project Plan

Elements of this DNP scholarly project included:

- Applying to the University of Northern Colorado (UNC) Institutional Review Board (IRB) for project approval;
- Utilizing the completed literature review to develop a draft algorithm for children who are overweight/obese designed for use in a primary care setting;
- Constructing a validation questionnaire with yes/no responses and short answers for “no” responses using Survey Monkey software;
- Gathering an expert panel of advanced practice providers (NPs, PAs, MDs, and DOs) who met the inclusion criteria;
- Using the Delphi technique across two rounds, administer questionnaires that include revised versions of the algorithm for additional feedback with data analysis occurring in between rounds;

- Evaluate and track the quantitative responses from the expert panel using the basic descriptive format in Survey Monkey and collaborate with the project advisor/chair on analysis of any brief open text responses;
- Finalize the child overweight/obesity algorithm once broad consensus among the panel was reached and disperse the results in the final written product and defense of the DNP project that included an outline for future testing of the algorithm in a primary care setting.

Instrumentation and Translation Methods

This scholarly project incorporated questionnaires with mainly closed-ended yes/no answers as was consistent with the Delphi method (Davidson, n.d.). Also consistent with this type of questionnaire were brief open text (<150 characters) responses that were required for any "no" responses. The questionnaires were conducted using Survey Monkey software. This software both recorded the data and provided a basic analytic display that was used to develop increasingly refined algorithm drafts. The short qualitative responses were also displayed in Survey Monkey and were categorized and interpreted by the primary investigator and project advisor/chair. Demographic information was gathered including provider credentialing, years of practice in primary care caring for children (ages 5-18 years), and current employment status/location.

Clinical pathways were the translation method used in this project and considered a crucial component of evidence-based research. Aspland et al. (2018) stated that clinical pathways are an effective and efficient avenue for standardizing the advancement of treatments, enhancing patient care, and facilitating clinical decision making. Clinical pathways enable the application of evidence-based medicine into clinical practice.

Data Collection and Analysis

Data were collected using validation questionnaires administered via Survey Monkey. Participants were provided an algorithm draft to review with each questionnaire. Questionnaires missing demographic data were discarded; however, partially answered questionnaires might be considered during analysis due to the small sample size. All close-ended quantitative and open-ended qualitative results were carefully reviewed with the project advisor/chair and revisions were completed to achieve consensus on the algorithm. Two rounds of the Delphi Method were completed.

Duration of the Project

The first phase of this DNP project included creating the first draft of the child overweight/obesity algorithm, development of the first validation questionnaire, and oral defense of the written project proposal to the committee/team. This phase required three months to complete. Following the successful proposal defense, submission to the IRB required another two weeks to complete. It took the UNC IRB three weeks to approve the project as ‘exempt’ at which point the panel of experts was recruited by the primary investigator over the course of another week. Administering the first draft of the algorithm and the round one questionnaire to the expert panel was the next phase of this scholarly project. All nine panelists responded to the round one questionnaire within five days and analysis of the results, creation of the revised second draft algorithm, and preparation of the round two questionnaire required three weeks to complete. The panelists required one week to respond to the round two questionnaire with a single reminder email issued on day five. Once the second round of data collection ceased, the feedback was once again analyzed by the primary investigator and project advisor/chair, and a final draft algorithm was completed over the course of two weeks. The last phase entailed

completion of the last two chapters of the written document and engaging in a successful oral defense to the project committee/team, which took approximately five weeks. In conclusion, the total time it took to complete this scholarly project was six months.

Ethical Considerations

Submission and approval from the UNC IRB occurred prior to initiating this DNP scholarly project and engaging in any form of recruitment or data collection (see Appendix D). Implied electronic consent was obtained from the expert panelists at the start of the first-round questionnaire. All risks of participation were clearly explained to the panel in writing at the beginning of the initial questionnaire and confidentiality was ensured by only viewing the data in aggregate form, collecting minimal demographic information, and not collecting IP addresses of participants. Risks to the panelists were minimal but included a total time commitment of approximately one hour (two to three 20-minute sessions over the course of two months). There were no additional risks nor was there any monetary exchange for their participation. The benefits of participating in the project included contributing to the development of an evidence-based algorithm for childhood overweight/obesity designed to reduce the decision-making burden for providers and potentially improve patient outcomes. If a panelist was unable to perform the required duties of participating in this DNP project, they were removed from the panel and another advanced practice provider was asked to take their place. The questionnaires and the responses were stored in a secure folder on a password protected computer. Data were only shared with the project advisor/chair during the data analysis portions of the DNP project and using UNC's secure server. The questionnaires were administered and stored in Survey Monkey using a password-protected account created by the primary investigator. Once data collection had ceased, links to the questionnaires were broken by the primary investigator.

Summary

Using the Delphi Method, this DNP scholarly project attempt to develop an innovative child overweight/obesity algorithm designed for use in the primary care setting that was also localized to a specific community in southern Colorado. Tailoring the algorithm in this manner demonstrates how to individualize care while also alleviating the decision-making burden for providers and capitalizing on local resources that support childhood wellness. While the ethical concerns for this project were minimal, consideration of how to protect the anonymity of participants and best integrate their feedback into an expert-informed clinical tool were detailed above.

CHAPTER IV

DATA ANALYSIS AND RESULTS

This chapter describes the data analysis and results of this doctoral project. Using the Delphi method, data were collected across two rounds and were analyzed by the primary investigator with support from the project chair/advisor. The purpose of this scholarly project was to develop and evaluate a treatment algorithm for children identified as being overweight or obese designed for use in the primary care setting using published evidence and a panel of clinical experts.

Objective One: Results

The first objective of the project was to review the current literature to develop a draft algorithm for children who were overweight/obese appropriate for use in primary care. During the review of literature, several existing algorithms were located, however it was determined through critical analysis that key components were missing from these versions that could potentially lead to improved outcomes for this vulnerable pediatric population. In addition, the published algorithms were highly generalized and there was a need for more community-focused resources and individualized interventions to guide primary care providers. Additional findings from the literature review can be found in the Table of Evidence (Appendix A) and in Chapter II of this written project. Results from the literature review informed the creation of the first draft algorithm by the primary investigator including the development of an addendum of local resources for Pueblo, Colorado (see Appendix E). The algorithm and addendum focused on physical, nutritional, psychosocial/behavioral, pharmacological, and surgical interventions using

a patient-centered, strengths-based approach. The project chair/advisor supervised development of the initial draft algorithm to ensure cohesiveness and logical flow.

Objective Two: Results

The second objective of the project was to acquire input from a panel of experts who treated children who are overweight and/or obese in the primary care setting. Advanced practice providers (NPs, PAs, MDs, and DOs) were recruited via the professional network of the primary investigator. A recruitment email was sent to 12 primary care providers currently in pediatric primary care or family practice in the Pueblo, Colorado community (see Appendix C). Nine providers responded to the recruitment email and agreed to participate as expert panelists. The algorithm, addendum, and an electronic link for a validation questionnaire developed using Survey Monkey software were distributed to the expert panelists via email. All nine participants completed the round one questionnaire within three days without additional prompting. Basic descriptive analyses were completed using Survey Monkey to determine demographic characteristics of the sample and to categorize the panelists' feedback on the first draft algorithm and addendum. A summary of these findings follows.

Description of the Sample

Demographic data were collected to ensure inclusion criteria were met and to provide insight into the basic characteristics of the panel of experts (see Table 1). The round one panel consisted of all four types of advanced practice providers located in the Pueblo, Colorado community. The range of years in primary care practice varied but most providers had less than 10 years of experience. The majority of the panelists had a family practice specialty.

Table 1

Sample Demographics

Questions Asked	*n* (%)
Advanced Practice Role	
NP	5 (55.56)
PA	1 (11.11)
MD	1 (11.11)
DO	2 (22.22)
Total Number of Years in Advanced Practice	
1-10 years	7 (77.78)
11-20 years	1 (11.11)
21-30 years	0
31-40 years	1 (11.11)
Clinical Specialty	
Family Practice	8 (88.89)
Pediatrics	1 (11.11)
Currently Provide Primary Care for Pediatric Patients Between the Ages of 5-18 Years in Pueblo, Colorado	9 (100)

Note. $N = 9$

Results of the Round 1 Questionnaire

Additional results from the round one questionnaire are displayed in Table 2. The first round validation questionnaire was used to evaluate if the panelists found the algorithm valid and useful, applicable to their practice, and easy to follow. Panelists were also asked if they were previously aware of local resources (as captured in the addendum) and if they would consider incorporating the algorithm into their clinical practice. They were given the option to provide additional open-ended recommendations to improve the algorithm. The primary investigator and the project chair/advisor analyzed the responses and constructed a revision plan to incorporate into the next draft of the algorithm as detailed in the far-right column in Table 2.

Table 2

Summary of the Round 1 Questionnaire Responses with Revision Plan

Category	Yes n (%)	No n (%)	Comments	Revisions Based on Results
Appropriate for care of children	7 (77.78)	2 (22.22)	• "Rather see use of BMI percentiles instead of absolute BMI." • "Labs unnecessary except for lipids, A1C. Little value to do others." • "Would not be likely to prescribe medication as we do not always need a pill to fix things. Doubt that Orlistat would achieve statistically significant reduction." • "Place the focus not on the weight/ BMI/ but on the positives." • "How many steps did you do? Etc. Instead of focus on the "number" focus treatment on the behaviors that lead to emotional eating." • "Treatment of parent's lifestyle." • "Would not likely recommend pediatric bariatric surgery." • "Need correct definition for overweight and obesity and evidenced-based treatment protocol."	• Changed the BMI parameters to BMI percentiles. • Retained lipids and HgbA1c labs per the provider's discretion. • Medication (e.g., Orlistat) is one of the last choices to treat childhood obesity but will be retained per the provider's discretion as supported by the literature. • Added a reminder in the algorithm encouraging providers to utilize the strengths of the patient in the treatment plan. • The added reminder will also address the recommendation to focus on behavior rather than metrics. Referrals to therapy to address emotional eating are addressed in the algorithm. • Parental history is taken at the beginning of the algorithm but given that this is a pediatric algorithm the focus will remain on the pediatric patient. • Bariatric surgery is a late-stage option for certain situations per the literature and requires a referral to a pediatric obesity specialist at the provider's discretion. • Confirmed that the most recent CDC definition of overweight and obesity is used in the algorithm.

Table 2 Continued

Category	Yes n (%)	No n (%)	Comments	Revisions Based on Results
User friendly and easy to follow	8 (88.89)	1 (11.11)	• "Feel that history should have its own box and level. Only 1 arrow instead of parallel arrows. Feels like 6 weeks time may not be enough time for re-evaluation. Question if this supposed to be a multi-disciplinary approach then optimal treatment should be concurrent instead of sequential for the sake of an algorithm. At same level at same time-dietary, physical activity and behavior/psych assistance."	• Changed parent and child health histories to separate boxes at start of algorithm. • Added follow-up language to include a 6–12-week range per provider's discretion. • Language will be changed to suggest that treatments can run concurrently and/or out of sequence.
Previously aware of local resources	5 (55.56)	4 (44.44)	• "Resources in Pueblo are not widely advertised and must be specifically searched for." • "I was aware of some but not all of the available resources."	Retained addendum of local resources.
Use algorithm in current practice	7 (77.78)	2 (22.22)	• "Currently feels like screening for obesity, etc. is mostly done at well visits. All too often it's "be more active" or "eat better." When to affect behavioral change of anyone requires buy in of the parties, small actionable change and goal setting with appropriate support. This topic is difficult to reduce to a simple algorithm when it affected by different difficult to measure things." • "Ineffective procedures."	• The goal of this algorithm is to alleviate some of the complex decision-making burden for providers regarding treatment of overweight and obesity in children. Additional phrasing has been added (see above) to clarify that the algorithm can be implemented over the course of multiple visits (across an extended period of time). The provider also has discretion to use all or parts of the algorithm depending upon specific needs of the patient. • Unclear feedback: no revisions completed.

Table 2 Continued

Category	Extra Comments	Suggested Revisions
Other suggestions (open text response only)	• "Love the concept and intent of the project." • "Excited to see what revisions will come." • "This algorithm would be very helpful and definitely applicable to my medical practice." • "Pretty straight forward algorithm and helpful with the local resources that are listed." • "Very easy to follow."	• No required revisions: overall support of algorithm supports development of second draft version.

Note. N = 9

Summary of the Round 1 Questionnaire Findings

As displayed in Table 2, recommendations from the expert panelists were organized into a table in a Microsoft Word document and categorized according to each section of the questionnaire and algorithm. The feedback on the local resources addendum that was included with the first-draft algorithm was overwhelmingly positive and no revisions were suggested by the panel. However, several key revisions to the algorithm were completed. For example, one of the panelists requested that BMI percentiles be used instead of absolute BMI, so this was changed according to the CDC (2021) parameters. Another suggestion was the importance of the behavioral health aspect of the algorithm was not fully conveyed in the first draft. Panelist feedback also expressed doubt that the algorithm could be fully implemented in a single well child visit and multiple visits were typically required to complete screening and formulate a treatment plan for children who are overweight or obese. As a result, revisions to the second draft algorithm included clarification that both screening and interventions (including behavioral health) should most likely be performed over an extended period across multiple clinic visits and in collaboration with ancillary experts (such as therapists/counselors) as needed. Language suggesting that interventions could be implemented in any order (including concurrently) at the provider's discretion was added. The language in the algorithm was also changed to suggest that

the provider could use all or parts of the algorithm depending upon each patient's needs. There were other minor changes to the second draft algorithm to include language reflecting the need for follow-up visits every 6-12 weeks at the provider's discretion and a clearer separation between the health histories of the child and parents. As was consistent with an evidence-based practice project, not all the panelist's feedback led to changes in the algorithm when they contradicted current evidence. The primary investigator consulted the Table of Evidence (see Appendix A) and engaged in critical decision-making in these situations as supervised by the project chair/advisor. The fully revised second draft of the algorithm can be found in Appendix F.

Objective Three: Results

Following development of the second draft algorithm, a second-round validation questionnaire was created in Survey Monkey (see Appendix G). Once again, an email was sent to the original nine participants that included a copy of the second draft algorithm, the (unrevised) addendum, and an electronic link to the round two questionnaire. An email reminder was sent to the whole group on day 4 and eight panelists responded. However, only seven of the eight questionnaires were completed fully. The incomplete questionnaire was excluded from the second round of analysis.

Results of the Round 2 Questionnaire

Table 3 reflects the results of the second round validation questionnaire. In general, there was widespread consensus among the panel that the algorithm was appropriate, user friendly, adopted a strengths-based/patient centered approach, and could be implemented into clinical practice. There was feedback from one participant regarding the design and orientation of the

algorithm. The primary investigator and the project chair/advisor reviewed the feedback and formulated a minor revision plan.

Summary of the Round Two Questionnaire Findings

As seen in Table 3, broad consensus was obtained in the second round of data collection and analysis in alignment with the Delphi method. The final draft of the algorithm can be found in Appendix H/ There was a change of orientation in the algorithm from portrait to landscape. The instructions for how to use the algorithm were placed at the top per the recommendation of one of the expert panelists. Another recommendation was to place the local resources at the end of the algorithm; however, most of the panelists preferred the resources as originally placed so no changes were made. The addendum with more detailed local resources was retained.

Table 3

Summary of the Round 2 Questionnaire Responses with Revision Plan

Category	Yes n (%)	No n (%)	Comments	Revisions based on Results
Appropriate for care of children	7 (100)	0	None	None
User friendly and easy to use	6 (85.71)	1 (14.29)	"Think I would like to see if simplified to a front/back sheet of paper for print out. Would like to see it in Landscape layout. Instructions under the title. Determine weight status (history on labs on same level. Then a 3 pronged level (nutrition eval, physical activity eval, behavioral eval). Then treatment meds and surgery eval. Would change resources to either at very bottom like addendum or under 3 pronged level."	• After discussion with Project Advisor, determined that placing the algorithm front-to-back would disrupt flow. Final/third draft algorithm placed in landscape orientation. • Instructions placed at the beginning of the algorithm under the title. • Assessing weight/BMI percentile is necessary to start the pathway and will be retained at the start of the algorithm. • Feedback about creating a 3-pronged level is somewhat unclear, but decision made to avoid chronologically ordering the interventions so that providers have discretion to implement in any order based on each patient's needs. • Resources will be retained within the algorithm as most participants approved of this design in round one.
Encourage a patient-centered, strengths-based approach	7 (100)	0	None	None
Use algorithm in current practice	6 (85.71)	1 (14.29)	"Algorithm still too busy. Maybe by making changes with landscape layout and putting 3 pronged interventions all on same level…"	See above; algorithm changed to landscape orientation.
Other suggestions (open text response only)	• "Feel that changes have been made for the better. Keep working at it." • "The algorithm is clear and easy to follow and the attached local resources make it possible to recommend multiple options to the patient."			No further required revisions; overall support to create a third draft of the algorithm.

Note. N=7

Objective Four: Future Pilot Testing

Proposing a future pilot study to test the algorithm and addendum in the clinical setting was the fifth objective of this DNP scholarly project. Based on the above results, there was support for implementing the algorithm into a family practice or pediatric clinic setting for future testing. A potential pilot study design would be to enroll children who are identified through BMI screening as being overweight or obese into either an intervention (algorithm) group or a control (usual care) group for a minimum of 12 months. Primary care providers would need to be oriented to the algorithm and addendum before launching the project and baseline data for all participants including weight, age-adjusted BMI, lab values, and other metrics would be obtained. Follow-up visits would occur for both groups at regular intervals. e.g., every eight weeks. Additional feedback from both the providers and patients/families about the efficacy, feasibility, and applicability of the algorithm and addendum would be obtained. At the conclusion of the pilot study, a comparison between the intervention and control groups could be made, which would require statistical control of confounding variables and other considerations due to the complexity of individual patients. Chapter V further describes the implications of this scholarly project and additional considerations for future practice.

Analysis of Study Question

The study question for this scholarly project focused on how feedback from a panel of expert clinicians combined with a critical review of the literature would contribute to the development of an evidence-based treatment algorithm designed for use with children who are overweight or obese in the primary care setting. Using the Delphi method, the study question was adequately addressed, and an evidence-based, expert-informed algorithm was systematically developed.

Summary

The results described above emerged from a literature synthesis and feedback obtained from a panel of experts who offered recommendations across two rounds of data collection. After the first round, the algorithm was modified to include BMI parameters according to the CDC guidelines, new phrasing about follow-up visit frequency, and additional verbiage about implementation across several visits depending upon each patient's context. Language encouraging providers to remain strengths-based and patient-centered was also added. Only minor recommendations were obtained with the second round of data collection but these suggestions were incorporated into the proposed final draft algorithm found in Appendix H. Overall, the participants in this project found both the algorithm and the addendum with localized resources for the Pueblo, Colorado community to be a promising and potentially useful approach for managing the pediatric overweight/obesity epidemic within their clinical practice.

CHAPTER V

DISCUSSION

This chapter describes the conclusions, limitations, and recommendations for future practice relevant to this DNP scholarly project. The purpose of this project was to develop and evaluate a treatment algorithm for children who were identified as being overweight or obese designed for use in the primary care setting using the published evidence and a panel of clinical experts. As described in the Reflection section, this project reflected the 10 domains and advanced (level two) competencies outlined in *The Essentials: Core Competencies for Professional Nursing Education* as published by the American Association of Colleges of Nursing (AACN) in 2021.

Conclusions

The resulting final draft treatment algorithm created during implementation of this scholarly project utilized community resources and followed existing evidence-based guidelines to better meet the needs of pediatric patients as directed by a panel of expert clinicians. The algorithm was specific to Pueblo, Colorado to tap into existing local resources but the general approach could be adapted to other regions as well. As discussed in Chapter IV, the final draft of the algorithm could be tested in a future pilot study to determine efficacy and utility.

The literature review completed at the start of this project revealed several existing childhood overweight/obesity algorithms but they were highly generalized and failed to consistently consider socioeconomic, psychological, social, and environmental factors. The published algorithms also did not incorporate individualized, evidence-based interventions

utilizing local resources. The review of the literature also focused on disease management, evidence-based interventions, and various wellness components known to be helpful in the management of children who are overweight/obese. Chronological and developmental age, weight gain patterns, socioeconomic status, culture, environmental factors, race/ethnicity, educational levels, preferences, and family involvement were also considered as key components of the treatment plan. Success of the resulting algorithm also depends on patient/family motivation and their relationship with the primary care provider.

The Stetler model (2001) was the theoretical framework that guided this DNP scholarly project. The five phases of the Stetler model (preparation, validation, decision-making, translation/application, and evaluation) were described in detail in Chapter II and applied to the project throughout. A clinical problem was identified in Chapter I with the suggestion that a treatment pathway in the form of an easy-to-use algorithm could be helpful in assisting providers in the treatment of a specific pediatric population. As further guided by the Stetler model, translation of evidence into practice occurred through the systematic development of a treatment algorithm. Evaluation of the treatment algorithm by an expert panel occurred across two rounds of data collection and analysis as described in Chapter IV. The outcome of this scholarly project was the final draft algorithm and accompanying addendum of local resources that could be ready for testing in a clinical setting (see Appendix H).

Limitations

This DNP scholarly project encountered several limitations. The sample size was small; although typical of the Delphi method, nine participants were recruited initially (Davidson, n.d.). Although there was full participation among these nine panelists during the first round of data collection, only eight responded during the second round and only seven questionnaires were

included in the final analysis due to incomplete data. Although some level of participant attrition was expected, the full participation of all nine panelists across both rounds would have been ideal. Constructive and reasonable feedback from the expert panel was utilized to inform all subsequent drafts of the algorithm. Another limitation of the project was most participants had been in their current advanced practice role for less than 10 years. It is unknown if more experienced clinicians would have provided different feedback on the algorithm. A major limitation of this project was the algorithm was not tested with patients in a clinical setting; instead, the focus was on development.

Recommendations for Future Practice

Recommendations for future practice would include implementation of this algorithm in family practice and pediatric clinical settings to provide additional support to primary care providers and assist them in their decision-making for children who are obese or overweight. One of the goals of this algorithm was to simplify yet individualize a treatment plan by incorporating evidence-based interventions and local resources. The algorithm was intended to be a useful tool for providers that could be tailored to their specific practice and the needs of each patient and family. Although this version was designed for use in Pueblo, Colorado, providers in other areas might be able to adopt this development model and create their own localized version while retaining more universal portions of the algorithm.

Reflection

Ten domains and advanced (level two) competencies outlined in *The Essentials: Core Competencies for Professional Nursing Education* (AACN, 2021) are reflected in this DNP scholarly project. The *Essentials* dictate the necessary curriculum content and expected

competencies of graduates from an accredited nursing program with level two pertaining to graduate degrees.

Domain 1: Knowledge for Nursing Practice

Translating nursing science and other disciplinary science into practice is the focus of this domain (AACN, 2021). This DNP scholarly project included a synthesis of literature associated with childhood obesity. The focus of this review was on disease management, evidence-based interventions, and wellness components. The findings informed the development of the first-draft algorithm, which is considered a practice tool designed for streamlining decision-making and supporting more consistent clinical practice (Keffer, 2001).

Domain 2: Person-Centered Care

Developing evidence-based and person-centered interventions to improve outcomes is described in the level two competencies of this domain (AACN, 2021). Advanced practice providers such as nurse practitioners and physicians in family and pediatric clinical settings could use the algorithm in their clinical practice to potentially improve outcomes among children (ages 5-18 years) who are overweight or obese. The algorithm was designed to be person-centered, evidence-based, and to improve the overall health and wellbeing of children while also incorporating their families into the treatment plan.

Domain 3: Population Health

The population health domain and competencies in the *Essentials* are focused on identifying systemic health issues and suggesting solutions to improve the health of the community (AACN, 2021). Public health, academia, and health care entities such as nursing could contribute to improved outcomes in population health. Given that over 20% of children

and adolescents are now considered obese in the United States (CDC, 2022a), this DNP scholarly project directly addressed a prevalent and increasing public health epidemic.

Domain 4: Scholarship for the Nursing Discipline

A level two competency within this domain includes collaboration, participation, and dissemination of nursing research (AACN, 2021). A gap in the evidence was identified by the primary investigator and with the collaboration of the project advisor/chair and a clinical expert panel, an algorithm for childhood obesity was constructed and finalized. Participation from the panelists occurred across two rounds of data collection. The project will be disseminated via the UNCO dissertation, scholarly project, and thesis repository after approval from the Graduate School.

Domain 5: Quality and Safety

Level two competencies within this domain are primarily concerned with improving quality and safety outcomes across multiple levels (AACN, 2021). Although several childhood obesity algorithms have already been published, the primary investigator felt certain aspects were missing that lowered their overall quality. These additional components were added to the algorithm drafts developed during the course of this DNP scholarly project with the goal of improving usability, efficiency, and efficacy while remaining within the standard safety guidelines for primary care of children who are overweight/obese. Adding the local resources and making it specific to the Pueblo, Colorado community potentially improved the quality of the algorithm as well.

Domain 6: Interprofessional Partnerships

Promoting an environment that enhances interprofessional learning is a level two competency in this domain (AACN, 2021). The panel of clinical experts recruited for the sample consisted of the full range of advanced practice providers (NPs and PAs) and physicians (MDs and DOs). Although a small sample, it was diverse and represented providers from both family and pediatric specialties who routinely worked with overweight or obese children. Thus, the obtained feedback was interdisciplinary and diverse. In addition, the algorithm guided users toward collaboration with other clinical specialists (such as behavioral health experts or nutritionists) and the addendum represented a wide range of local resources from multiple settings.

Domain 7: Systems-Based Practice

Competencies within this domain suggested that system-wide initiatives should improve care delivery and/or outcomes and advanced practice nurses should design practices that enhance value, access, quality, and cost-effectiveness (AACN, 2021). This scholarly project guided providers toward using an algorithm that could be adopted system-wide within their clinic/facility to potentially improve patient outcomes. The developed algorithm might also assist providers in enhancing quality and cost-effectiveness by reducing childhood overweight/obesity rates within their practice and community. The algorithm was designed to improve the value of primary care and increase accessibility to resources and ancillary providers in the community.

Domain 8: Informatics and Healthcare Technologies

A level two competency within this domain suggested that advanced practice nurses should use information technologies to provide care, gather data to inform decision making, and

communicate with other professionals to increase their knowledge base (AACN 2021). The primary investigator utilized electronic databases to access the relevant literature and develop the initial draft algorithm. PowerPoint software was utilized to communicate both the proposed and completed project to the project team/committee. Survey Monkey software was used to create, disseminate, and evaluate feedback from a panel of experts across two rounds of data collection and analysis. Invitations to participate were sent via UNC's secure email server. The multiple forms of technology utilized in this project were widely available and useful to clinical scholars for building their knowledge base.

Domain 9: Professionalism

A level two competency within this domain suggested that advanced practice nurses should form and cultivate a professional identity that includes accountability, perspective, and a collaborative disposition that reflects the values and characteristics of nursing (AACN 2021). The nursing profession involves a continuous process of socialization that includes mentorship of other nurses. During the pursuit of the DNP degree and completion of the project, the primary investigator received clinical scholarship mentorship from the project team/committee and other faculty while demonstrating a high level of professional conduct. There was regular collaboration with the project chair/advisor on each of the project components. The primary investigator demonstrated accountability to the panel of experts by carefully considering their feedback and incorporating it into each draft of the algorithm.

Domain 10: Personal, Professional, and Leadership Development

Within this domain, the level two competencies aim to promote diversity and retention in the profession. Given that the primary investigator is a Latina NP who resides in the community of focus (Pueblo, Colorado), this project represented a culmination of her diverse clinical and life

experiences. Other competencies promote self-awareness, avoidance of stress-induced emotional and mental exhaustion, and guidance on switching negative perceptions to positive influences through leadership opportunities (AACN 2021). There were multiple phases and challenging points within this DNP scholarly project. The primary investigator developed the ability to multi-task, manage stress, and efficiently manage competing demands. This project represented a long-term learning experience and serves as an example to other providers about how to integrate evidence into their clinical practice.

Summary

Childhood overweight and obesity is a worldwide epidemic and is increasing despite the efforts of healthcare providers. In response, an evidence-based algorithm was developed with input from currently practicing clinical experts and incorporated multiple treatment options for treating childhood overweight and obesity. The algorithm was designed to be strengths-based and patient-centered, and was accompanied by an addendum of local resources in Pueblo, Colorado intended to reduce the decision-making burden of advanced practice providers caring for the local population. A future pilot study of the final draft algorithm in a clinical setting has been proposed. The goal of the algorithm was to reduce the prevalence and severity of overweight and obesity among children (aged 5-18 years) in the community to improve their long-term health and wellbeing outcomes.

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APPENDIX A

TABLE OF EVIDENCE

Table A1

Table of Evidence

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Bogotaj et al., 2021	To determine the effects of high interval intensity training (HIIT) and nutrition in a school-based program and what changes it has on obese adolescent girls.	None noted	RCT	48 adolescent girls. 24 randomized to a HIIT and nutrition group and 24 to a control group with normal activities. 46 completed the program.	Statistical analysis was performed using SOSS statistical program version 22. Komogorov-Smirnov test was used to demonstrate the data had a normal distribution. Lavene's test were determined for all test variables. Two-way analysis of variance (ANOVA) was used to test the main effect of the group, main effect of time and interaction of group x time for body composition values and PF test results. Cohen's d effect for changes. A partial eta squared was computed to check differences between groups. Statistical significance was set at $p \leq 0.05$ level of significance.	8 weeks of HIIT and nutrition intervention 3x/week can improve BMI and muscular and physical performance in overweight adolescent girls.	Future research should include identification of optimizing HIIT/nutrition interventions to include physical, physiological and cognitive health in school-based children.	II

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Boisvert & Harrell, 2015	To see if cognitive behavioral therapy and animal-assisted therapy can be used in conjunction with medical and educational interventions for childhood obesity.	None noted	Review Article	PubMed, Google Scholar	Evaluation of cognitive behavioral therapy and animal-assisted therapy to assist in treating pediatric obesity.	Children with obesity may benefit from conjunctional therapies and interventions that would result in improved physical, psychological and spiritual health.	Further research is needed to evaluate the use of these interventions in childhood obesity in the long and short term.	I
Brown et al., 2019	To determine the effectiveness of a range of interventions that include nutrition and physical activities.	None noted	RCT	CENTRAL, MEDLINE, Embase, PsychINFO and CINAHL databases searched from June 2015 to January 2018.	153 Randomized Control Trials from USA and Europe. 13 studies based in upper-middle income countries, and one based in a lower middle-income country. 85 children, ages 6-12 years.	Interventions including diet and physical activity can reduce the risk of obesity in young children aged 0-5. Little effectiveness in children ages 6-18 with just physical activity as an intervention.	Diet alone or physical activity alone is not as effective as both implemented together to reduce risk of obesity.	II
Burke et al., 2015	To determine the reach, effectiveness, adoption, implementation, and maintenance of a family focused program that targeted children with obesity.	RE-AIM framework	Single cohort intervention al feasibility study	85 families, 88 children started in the 2-year program, 31 families and 32 children completed the first year. 41 participants (Including families and children) completed both years.	Demographic survey beginning at the 4-week mark; completed several research assessments measuring BMI, body fat and muscle percentage, pediatric quality of life inventory 4.0 (valid measure of health-related quality of life for children 8-12 years)	Program was an, effective treatment intervention program for children with obesity but required a high level of staff and family participation.	This study addressed gaps in literature addressing behavioral treatments of childhood obesity. This will help researchers design and implement future community-based programs for children with obesity. Authors identified what worked well and what needed to be improved on.	IV

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
De Miguel-Etayo et al., 2013	To summarize the most effective types of interventions for treating childhood obesity.	None noted	Review Article	PubMed and Medline	Number of articles reviewed and search parameters not reported	Treatment of childhood obesity should include not only nutritional interventions but also a combination of increased physical activity, psychological support, and family involvement.	Drug and surgical therapy should not be an isolated treatment for childhood obesity but only in conjunction with other interventions or after other approaches have failed. A multifaceted approach is supported in the literature as being most effective.	I
Ekambareshwar et al., 2021	To summarize the literature in early childhood obesity prevention and intervention regarding interventions delivered via text messages and telephone delivery systems and to evaluate the stakeholders' acceptance of these types of interventions.	None noted	Systemic Review	Cochrane Collaboration tool for assessing risk of bias. Qualitative studies were assessed using the Consolidated Criteria for Reporting Qualitative Research and Standards for Reporting Qualitative Research Tools.	24 studies were included (various RCTs non-concurrent prospective comparison trials, pragmatic design studies, longitudinal controlled trials, quasi-experimental designs, 2-arm hospital-based pilot studies)	Interventions delivered remotely had the potential to reach more participants than face to face interactions; limited evaluation of participants' experiences using telephone or text messages.	Only 1/3 of the studies utilized an electronic mode of delivery. More research needs to be done to further evaluate the effectiveness of these interventions.	V

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Hemmingsson, 2018	To explore the interaction of infancy and early childhood risk factors related to social environment disturbances and how they can affect weight gain and obesity.	None noted	Review Article	PubMed, Google Scholar	Meta-analysis of studies with a retrospective study design or prospective studies	Infancy and early childhood are a crucial period of development. Childhood obesity is impacted by a triad effect of socioeconomic adversity, offspring stress and emotional distress, and increased junk food consumption.	There needs to be an improvement in identifying early risk factors and adding extra efforts to prevent and provide suitable interventions specific to the individual.	I
Innes-Hughes et al., 2019	Reflections on the Healthy Children Initiative (HCI), a multi-strategy approach to prevent childhood obesity.	None noted	Authors' expression	Evaluation of 3 primary prevention programs in New South Wales, Australia	Program sites were monitored annually through indicators set by the program related to nutrition, sedentary behavior, physical activity, and policy. Programs had direct contact with the school that is implementing the program.	The program promoted and supported change in relation to eating healthier, increased physical activity, and limiting sedentary behaviors.	There is a need for an increased focus on more diverse population groups and attention needs to be paid to the dietary and physical environmental factors that have a direct effect on active living and eating healthy among school-aged children.	VII
Joshi & Adhikari,, 2017	Review of pharmacological and non-pharmacological treatments for as childhood obesity given the increased rates and due to stigmatization.	None noted	Authors' expression	They reviewed different treatments and their effects on BMI and dyslipidemia.	Reviewed: Pharmacological treatment: Subutramine, Orlistat, Ephedrine and Caffeine. Non-pharmacological treatment: diet, exercise, yoga, and meditation =.	Although there are medication options, other methods should be first line. Diet, physical exercise, and behavioral changes should be tried and failed before initiating medication. Orlistat is first line but only for children older than 12 years.	Some current medications may be useful in treating weight. However, negative side effects such as depression, anxiety and suicidal ideations pose a risk	I

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Lindberg et al., 2020	To investigate whether children that were obese had an increased mortality risk in young adulthood when compared with a population-based comparison group.	None noted	Prospective Cohort Study	Swedish Childhood Obesity Treatment Register, ages 3-17 years.	Crude and adjusted Cox proportional hazards models Adjusted models Kaplan-Meier analysis Sensitivity analyses were used to determine pediatric obesity related factors and all-cause mortality and cause specific mortality.	This study showed that children who are obese have an increased risk of death in early adulthood.	Identifying specific factors that impact risk of early mortality in individuals with childhood obesity is important to prevent long term health problems.	IV
Lissner et al., 2015	To re-examine socioeconomic differences in obesity and overweight in the primary-school setting from five European countries, including any positive or negative associations.	None noted	Cross-Sectional Study	19,494 children were present on the first day;18,333 had complete anthropometric examinations; 12,189 were in the final sample. They were from Bulgaria, the Czech Republic, Lithuania, Portugal and Sweden. The mean age was 7 for boys and girls.	Data collected from the World Health Organization European Childhood Obesity Surveillance Initiative.	Europe continues to maintain a socioeconomically diverse region with notable associations with childhood obesity and overweight. These differences include education levels and employment status of both parents.	Data needs to be collected by healthcare providers regarding socioeconomic inequalities in obesity in all countries to assist in targeting preventative actions.	VI

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Mantizios & Wilson, 2015	To review the psychological research regarding eating behaviors and weight loss across all ages.	None noted	Review Article	Mindfulness in context of psychological research and how it relates to weight loss and eating behaviors. Mindfulness based intervention programs were reviewed. Any contradictive findings were reviewed and explored to see why they are happening. Reviewed adding self-compassion training to mindfulness training to help with weight loss and limitations and solutions were reviewed and explored. .	Mindfulness-Based Eating Awareness Training (MB-EAT). interventions were reviewed including meditation and compassion training.	Mindfulness-based interventions reduce weight and emotional or automatic eating. Behavior specific mindfulness has also been shown to be effective in weight management.	Although mindfulness-based meditations specific to eating habits may be helpful in weight loss and in improving eating behaviors, expanding the intended audience to all ages including children would be beneficial.	I
Matson & Fallon, 2012	Reviews of efficacy and safety of the medications are that are currently being used to treat childhood and adolescent obesity.	None noted	Review Article	Medline 1950-May 2011, Cochrane Database of Systematic Reviews 2000-May 2011	Multiple trials and studies were conducted including open-label, pilot, RCT, Observational. The RCT were double-blind placebo-controlled	Pharmacotherapy in conjunction with other lifestyle modalities can reduce long-term risks including the development of diabetes (type II).	More studies that include Orlistat, Metformin, growth hormone, Octreotide and Topiramate are needed to fully examine treatment options in adolescent population.	I

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Mead et al., 2017	To assess RCTs for the effects of diet, physical activity, and behavior modifications for treatment of overweight/ obese children 6-11 years.	None noted	Systematic Review	CENTRAL, MEDLINE, Embase, PsycINFO, CINAHL, LILACS, trial registers Clinicaltrials.gov and ICTRP Search Portal.	70 RCT's were included with 8,461 participants selected to either intervention or control groups. Number of members per trial were from 16-686. 55 trials were done comparing behavior-changing intervention without treatment/usual care control. 15 trials evaluated the effectiveness of adding another factor to a behavior-changing intervention. 64 parallel RCT's and 4 cluster RCT's.	Multi-component behavior-changing interventions including diet, exercise and changes in behavior are the most effective for decreasing BMI in children 6-11 years.	-There is a need for long-term follow up and further research on forms of post-intervention maintenance to allow for longer sustaining results.	I
Mitchell et al., 2011	To understand the significance of obesity in both adults and children.	None noted	Review Article	Data was taken from the National Health and Nutrition Examination Surveys (NHANES). The collection period was from 2007-2008.	National Health and Nutrition Examination Surveys, a major program of the National Center for Health Statistics.	There has been little success in assisting people maintain a healthy lifestyle with eating and physical activity and environment and culture that supports unhealthy lifestyles needs to be addressed.	We need successful models to continue to promote healthier lifestyles.	I

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Mohammadbeigi et al., 2018	To determine the health outcomes of fast-food consumption and to report on the types of fast food and the frequency of consumption.	None noted	Cross-sectional Study	300 students at 2 large universities in Iran that were studying medical and basic sciences in 2015.	Modified version of Nelson's Fast-Food Questionnaire	The prevalence of fast-food consumption and obesity in Iranian students was high.	Future studies are needed to determine the effect of fast-food consumption on different dimensions of obesity. Given that 30% of children consume fast food, these types of eating habits are carried into the young adult population with potentially long-term negative effects	VI
Penalvo et al., 2021	To explore how effective multicomponent worksite wellness programs are for improving diet and cardiometabolic risk factors.	None noted	Systematic Review	PubMed, Medline, Embase, Cochrane Library, Web of Science, Education Resources Information Center from Jan 1, 1990-June 30, 2020.	Types of reviewed studies: Randomized controlled trials and quasi-experimental interventions in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.	Workplace programs can be an asset in improving specific dietary, anthropometric, and cardiometabolic risk factors.	Continued efforts need to be made to improve cardiometabolic health in the workplace and home. Wellness programs can offer support to entire families (not just adult employees). Adults with healthy nutritional habits can improve the overall wellbeing of children in the home.	I
Perpich et al., 2011	Review of the etiology, pathophysiology, diagnosis, treatment, complications, and prevention of childhood obesity.	None noted	Review Article	Weight status categories and their respective percentiles. Obesity prevalence in low-income preschool children. Causes of childhood obesity. These categories were reviewed.	The World Health Organization and American Academy of Pediatrics guidelines for BMI were used to define childhood obesity. These guidelines were applied to data tables as measurements for weight status, prevalence of obesity in low- income preschool children, and causes of obesity.	Obesity increases the risks of health problems from excess body fat. Epidemiologic factors including age, race, gender, and socioeconomic status can influence childhood obesity.	More open discussions need to be held with the child or parent during a well child visit on a case-by-case basis. Cultural awareness and ethnic meal preparations also need to be taken into consideration.	I

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Rogovik & Goldman, 2011	To determine what medications are safe and effective for children to use for reducing obesity.	None noted	Systematic Review	PubMed, Google Scholar,	Reviewed the following RCTs: SCOUT-CAP, double-blinded and placebo-controlled, open-label controlled multicenter , and. single group.	Orlistat is the only medication indicated by the FDA for treatment of childhood obesity in children 12 years and over. BMI changes ranged from -0.5 kg/m² to -4.2 kg/m² with use of the medication.	Further research is needed to optimize clinical approaches for screening, prevention methods, and pharmacological treatment of childhood obesity.	I
Sahoo et al., 2015	To provide an overview of issues related to the prevention of obesity and chronic diseases through education in nutrition and child growth and development.	None noted	Review Article	Pub Med, Google Scholar	There were unspecified number and types of studies.	If society can focus on the underlying causes, it can slow the growth of childhood obesity. Root causes include high intake of sugary beverages and snack foods, increased portion sizes, decreased activity levels, and various environmental, socio-cultural, familial, and psychological factors.	Healthier lifestyles need to begin at home. Thus, good decision making will carry into everyday lives outside of the home.	I
Sanyaolu et al., 2019	This article highlights the health implications related to the physiological and psychological factors, comorbidities, risk factors, prevention, and control of childhood obesity.	None noted	Review Article	Pub Med, Medline Plus, Mendeley, Google Scholar, Research Gate, Global Health and Scopus	Types of reviewed studies: Cluster-randomized trial, systematic reviews and meta-analyses, and observational studies	The combination of primary and secondary prevention is necessary to achieve the most appropriate results. Primary preventions include educating the child and family and encouraging diet and exercise at a younger age to continue onto adulthood. Secondary prevention should be aimed at lowering the childhood obesity rate by continuing healthy habits into adulthood.	Failure to implement both levels of prevention can lead to serious health consequences.	I

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Sbruzzi et al., 2013	To assess the effectiveness of educational interventions that include nutrition, exercise and behavior modification to prevent and treat childhood obesity.	None noted	Systematic Review	26 RCTs enrolling children 6 to 12 years from inception until May 2012 located in PubMed, EMBASE, Cochrane CENTRAL	Performed in accordance with the Cochrane Collaboration and the Preferred Reporting Items for Systematic Review and Meta-analysis.	Educational interventions are effective in treatment but are less effective for prevention of childhood obesity and its consequences.	New approaches and more conclusive trials with comprehensive and specific strategies are needed to improve results.	I
Singh et al., 2021	To show the link between poor diet choices and both general and abdominal obesity and linking impaired immune function to organ damage.	None noted	Quantitative Study	13,274 children between the ages of 9-14 years in India.	Data was analyzed from the PAN India Survey organized by the Centre for Science and Environment	Obesity can impair immune function and increase the risk of organ damage. During the COVID-19 pandemic, poor maintenance of good health hygiene is predicted to increase childhood obesity.	Heightened awareness among children and young adults about the adverse effects of junk food is needed. Providers should be aware that the pandemic may contribute to a spike in childhood obesity.	VI
Smith et al., 2020	To understand the etiology of childhood obesity and the medical complications that can occur.	Conceptual and theoretical models with a translational-developmental perspective in reviewing intervention approaches across the developmental stages.	Systematic Review	Several studies were analyzed including prospective studies, cohort studies, longitudinal design studies, systematic reviews, meta-analyses, RCT's, quasi-experimental designs retrieved from PubMed and Google Scholar	The number of studies reviewed was not stated. The etiology, prevention, and intervention literature was reviewed to exemplify ways that models inform treatment approaches.	There needs to be more effective model-based interventions to improve quality and longevity of life. Consequences of childhood obesity include hypertension, nonalcoholic fatty liver disease, and depression. Interventions can occur in a variety of settings and across the developmental span.	Transdisciplinary teams should develop, implement, and evaluate interventions. An improved public understanding of obesity, the associated stigma, and increased prevention efforts and research for treatment and management are needed. Insurance reimbursement for intervention therapy should be implemented and as well as increased medical education regarding childhood obesity.	I

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Umer et al., 2017	To examine the relationship between childhood obesity and adult cardiovascular disease using at meta-analytic approach.	None noted	Systematic Review and Meta-Analysis	Studies included longitudinal and cohort studies (childhood exposure and adult outcomes based on the same individual over a period of time). Childhood obesity was defined by the original authors. Articles based in English and published up to June 2015. Cardiovascular risk factors, outcomes not self-reported, and exposure measurements on the child were evaluated.	Conducted and reported according to the Cochrane Collaboration's Recommendations and Guidelines for Conducting Systematic Reviews and Meta-analysis for Observational Studies. Preferred Reporting items for Systematic reviews and Meta-Analyses'(PRISMA). Study was registered in PROSPERO, an international registry for systematic reviews.	There is a correlation between childhood obesity and selected cardiovascular disease factors including hypertension and increased HDL, LDL, and total cholesterol.	Additional studies need to be done that include unadjusted and adjusted data. Larger sample sizes are also a factor that would need to be included.	I
Vaccaro et al., 2019	To compare preventative care and adequate health care considering sociodemographic for children 10-17 years. To measure the odds of the child becoming overweight or obese with parental report and to differentiate differences among race/ethnicity and their health habits and physical activity.	None noted	Cross Sectional Study	42,828 U.S. children, 10-17 years with BMI for age and sex in percentile categories. Unweighted sample: 4,554 Hispanics, 4,129 non-Hispanic blacks, 28,892 non-Hispanic whites and 4,253 from other or mixed races.	Child and Adolescent Health Measurement Initiative: All analyses were performed using Statistical Package for the Social Sciences version 24.	Black race and Hispanic ethnicity increased the risk of childhood overweight/obesity. Hispanic and non-Hispanic black children had 1.5 times higher rates of overweight/obesity as compared to non-Hispanic white children and other/mixed race. Higher percentage of Hispanic children did not have adequate preventative health care with inadequate medical insurance.	More focus needs to be on preventative medical care. Improve preventative medical care, better health insurance, and increased community-based interventions including physical and social activities to lower childhood obesity.	VI

Table A1 Continued

Author	Purpose	Theory/ Framework	Design	Setting/ Sample	Survey/ Instruments	Findings	Implications	Grade Level
Wang & Lim, 2012	Overview of childhood obesity to guide interventions and develop policies for prevention.	None noted	Review Article	This review included longitudinal studies, cross-sectional studies, and meta-analysis. There were also several "studies" stated throughout the article, however, they were not identified as to what type. These were all retrieved from PubMed.	Data were reviewed from the National Health and Nutrition Examination Survey (NHANES), International Association for the Study of Obesity, International Obesity Task Force (IOTF), Center for Disease Control and Prevention (CDC), US National Center for Health Statistics (NCHS) and World Health Organization (WHO).	This epidemic is a serious problem in both industrialized and developing countries and continues to grow. Children with a higher socioeconomic status in developing countries are at an increased risk for obesity.	Development of national and regional policies with population-based intervention programs that are individually tailored to the patient are needed for management of obesity in children and adolescents globally.	I
Williams et al., 2018	To create a model to examine how socioeconomic status modifies risk factors for childhood obesity.	None noted	Secondary data analysis	Early Childhood Longitudinal Birth Cohort (ECLS-B) sample of 14,000 children born in 2001. 7,022 children ages 4 to 5 years were included	Simple logistic regression. A significance level of 0.05 was utilized for variable entry and retention criteria. Odds ratios and Confidence Intervals were calculated at 95% SAS Survey procedures were used for the complex survey sample design.	Race, birth weight, parental smoking and not having meals together as a family were associated with increased rates of childhood obesity but there was not a significant correlation between socioeconomic status and these variables.	Childhood providers need to discuss these behaviors with families to include smoking and eating meals as a family. Also, need more public health programs to do the same.	VII

APPENDIX B

QUESTIONNAIRE #1 FOR PANELISTS

Development of a Comprehensive Primary Care Algorithm to Manage Children who are Overweight or Obese: Validation Questionnaire #1

Your participation in this project is greatly appreciated. Thank you for taking the time to provide feedback on a draft algorithm for managing children (ages 5-18 years) in the primary care setting who are overweight or obese. As part of this questionnaire, you will identify the feasibility, usefulness, and validity of the proposed algorithm. Based on your responses along with those of the other participants, revisions to the algorithm will be completed and you will be asked to review another draft. In the future, a pilot study testing the final draft algorithm in a clinical setting with children who are overweight and/or obese may be performed.

Completing this survey indicates your consent to participate in this project. Please reach out to me, Erika Almeida-Trujillo at alme3937@bears.unco.edu or to the project advisor, Dr. Natalie Pool, at natalie.pool@unco.edu should you have any questions or concerns about participating in this project. The Institutional Review Board of the University of Northern Colorado can also be reached at 970-351-1907 or via email at orsp@unco.edu.

Participant Information

Please answer the following demographic questions.

1. Your advanced practice primary care role (select one): NP PA MD DO
2. Total number of years in advanced practice (enter number):_____
3. Clinical Specialty (select one):
    a. Pediatrics b. Family Practice
4. Do you currently provide primary care for pediatric patients between the ages of 5-18 years in the Pueblo, CO community? (select one): YES NO

Feedback on the First Draft Algorithm

After carefully reviewing the provided algorithm and addendum, please answer the following questions.

5. Would you consider the information in the algorithm to be appropriate for your care of children who are overweight or obese? (select one): YES NO
   If you selected "NO" please briefly comment (150 character limit) _____
6. Did you find the algorithm to be user friendly and easy to follow? (select one): YES NO
   If you selected "NO" please briefly comment (150 character limit) _____
7. Were you previously aware of the local resources listed on the algorithm and in the addendum available to assist in your management of children who are overweight or obese? (select one): YES NO
   If you selected "NO" please briefly comment (150 character limit) _____
8. Would you use this algorithm in your current practice? (select one): YES NO
   If you selected "NO" please briefly comment (150 character limit) _____
9. Is there anything missing from this algorithm? (select one): YES NO
   If you selected 'YES" please briefly comment (150 character limit) _____
10. Please add any additional comments/suggestions/critiques related to the practicality and usability of this algorithm (optional response; 250 character limit) _____

APPENDIX C

RECRUITMENT EMAIL

RECRUITMENT EMAIL

Dear Colleagues,

I am currently in the data collection phase of my Doctorate of Nursing Practice (DNP) program at the University of Northern Colorado and I am requesting that you share your clinical expertise to help develop an algorithm for managing childhood overweight/obesity in the primary care setting. The purpose of this DNP scholarly project is to develop and evaluate a treatment algorithm for children who are identified as being overweight or obese designed for use in the primary care setting using the published evidence and a panel of clinical experts. If you agree to participate in this project, you will be asked to review 2-3 algorithm drafts and answer several questions about each draft over a period of 6-8 weeks. This should take approximately 10-15 minutes of your time with each review. Your responses will be kept confidential and will only be analyzed as a group. There is no compensation for participation other than contributing to evidence-based practice science.

Thank you in advanced for considering participating in my project as I know that your time is valuable. Please reach out if you have any specific questions or concerns. If you would like to participate in the project, please respond to this email or call/text me at 719-924-3650 by [enter date]

Sincerely,

Erika Almeida-Trujillo, ACNP-BC, NP-C, DNP student

APPENDIX D

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

Date:	12/06/2022
Principal Investigator:	Erika Almeida-Trujillo
Committee Action:	**IRB EXEMPT DETERMINATION – New Protocol**
Action Date:	12/06/2022
Protocol Number:	2211046172
Protocol Title:	DEVELOPMENT OF A COMPREHENSIVE PRIMARY CARE ALGORITHM TO MANAGE CHILDREN WHO ARE OVERWEIGHT OR OBESE
Expiration Date:	

The University of Northern Colorado Institutional Review Board has reviewed your protocol and determined your project to be exempt under 45 CFR 46.104(d)(702) for research involving

Category 2 (2018): EDUCATIONAL TESTS, SURVEYS, INTERVIEWS, OR OBSERVATIONS OF PUBLIC BEHAVIOR. Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

You may begin conducting your research as outlined in your protocol. Your study does not require further review from the IRB, unless changes need to be made to your approved protocol.

As the Principal Investigator (PI), you are still responsible for contacting the UNC IRB office if and when:

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

- You wish to deviate from the described protocol and would like to formally submit a modification request. Prior IRB approval must be obtained before any changes can be implemented (except to eliminate an immediate hazard to research participants).
- You make changes to the research personnel working on this study (add or drop research staff on this protocol).
- At the end of the study or before you leave The University of Northern Colorado and are no longer a student or employee, to request your protocol be closed. *You cannot continue to reference UNC on any documents (including the informed consent form) or conduct the study under the auspices of UNC if you are no longer a student/employee of this university.
- You have received or have been made aware of any complaints, problems, or adverse events that are related or possibly related to participation in the research.

If you have any questions, please contact the Research Compliance Manager, Nicole Morse, at 970-351-1910 or via e-mail at nicole.morse@unco.edu. Additional information concerning the requirements for the protection of human subjects may be found at the Office of Human Research Protection website - http://hhs.gov/ohrp/ and https://www.unco.edu/research/research-integrity-and-compliance/institutional-review-board/.

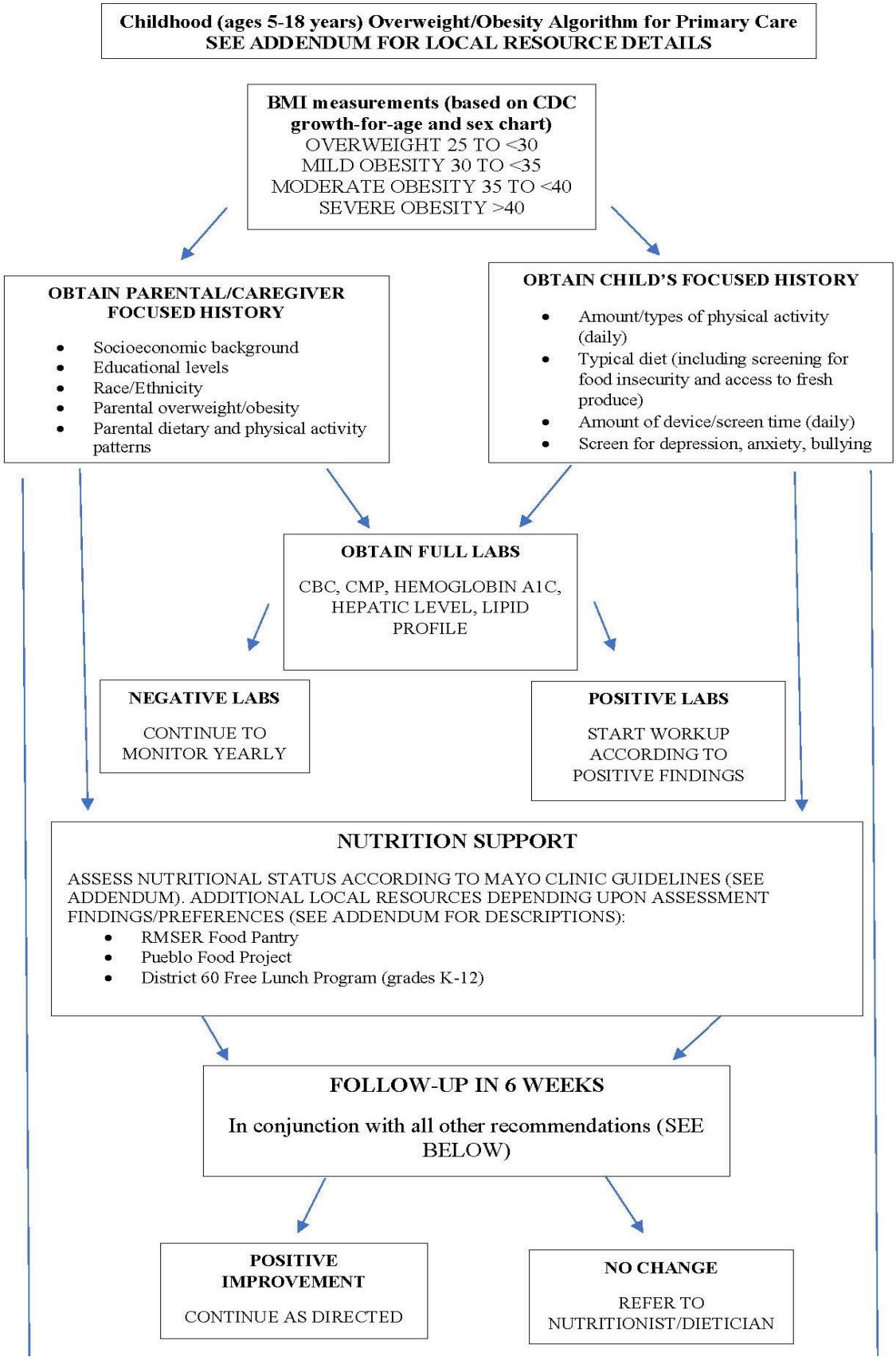
Sincerely,

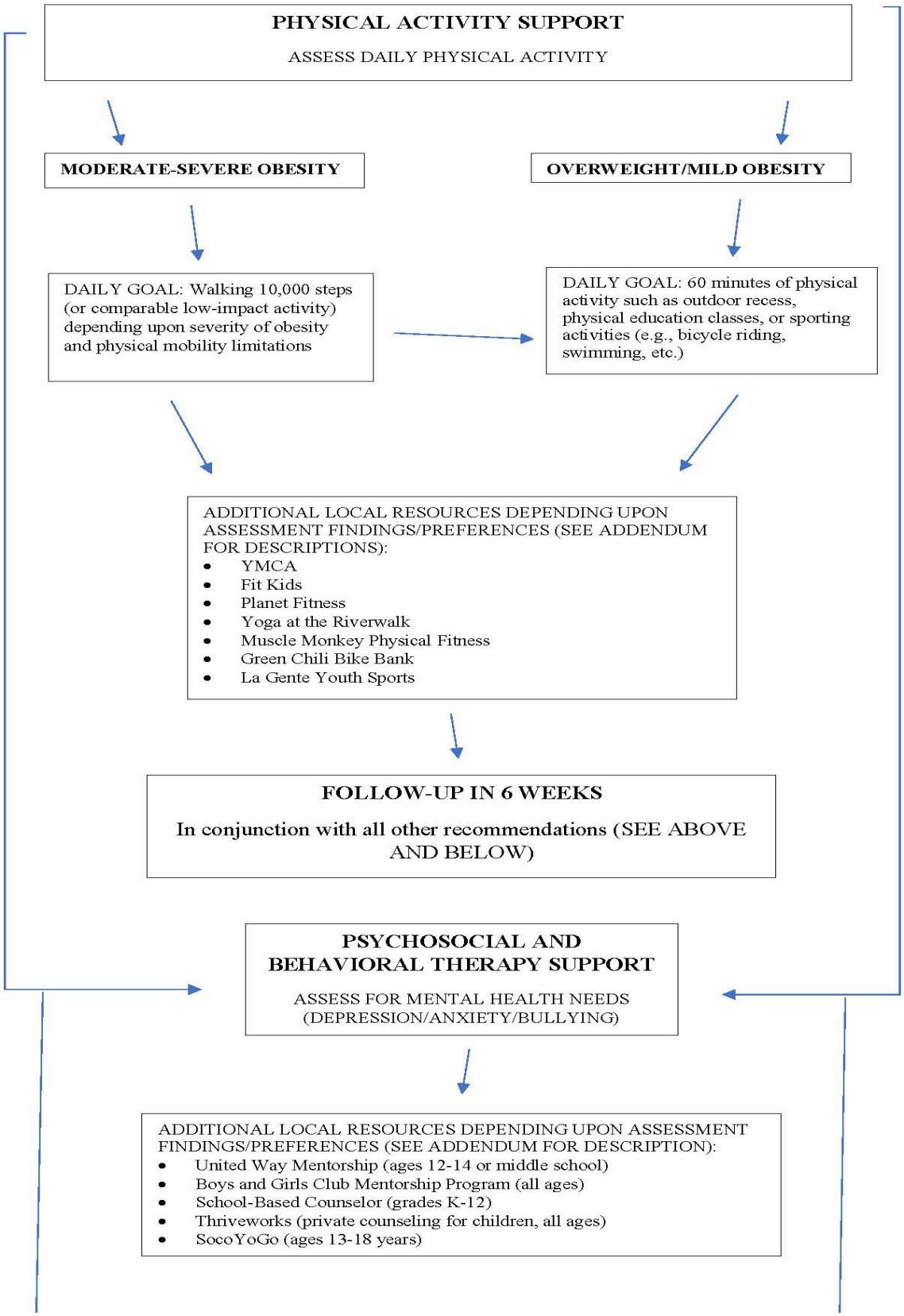
Nicole Morse
Research Compliance Manager

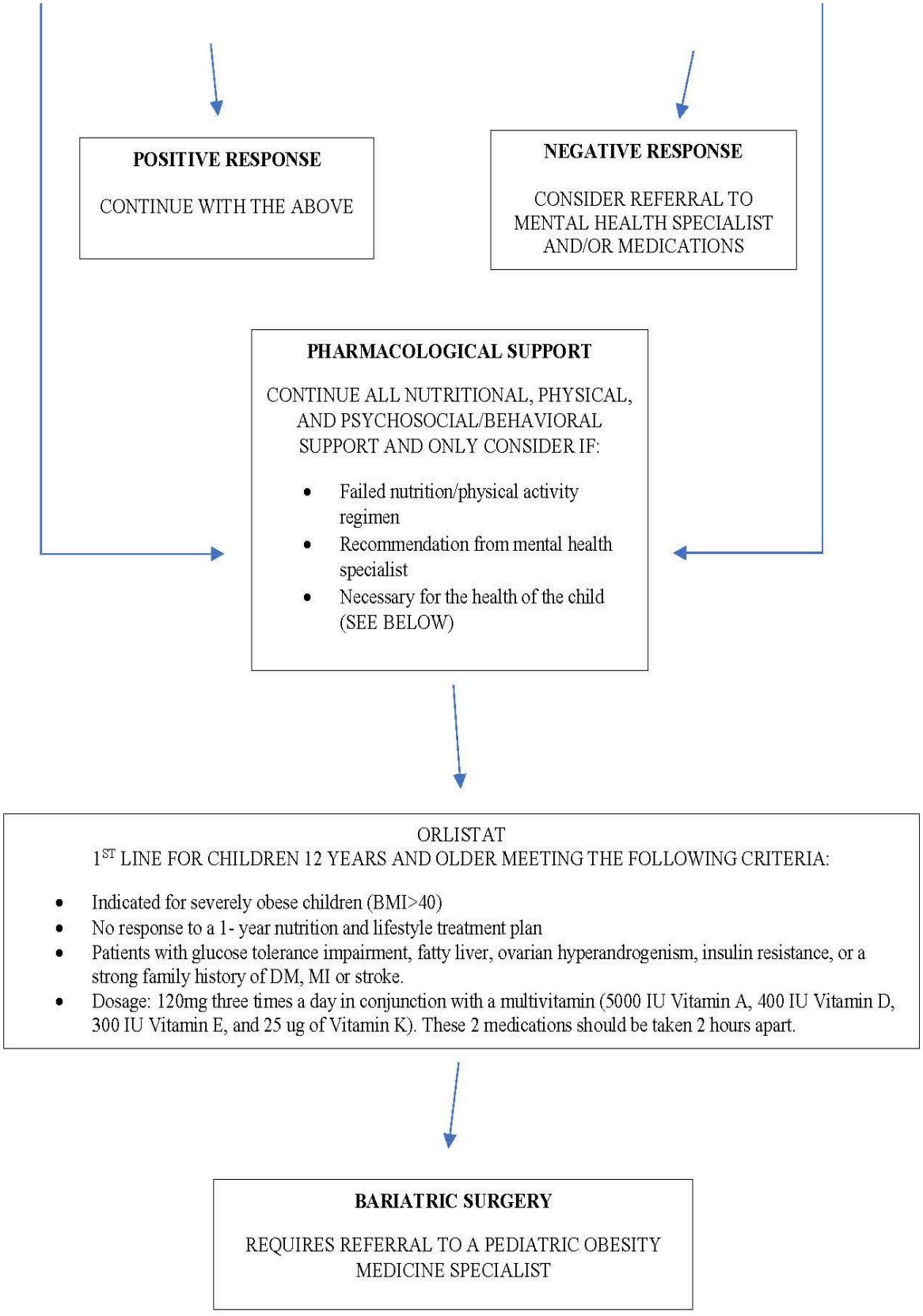
University of Northern Colorado: FWA00000784

APPENDIX E

CHILDHOOD OVERWEIGHT/OBESITY
FIRST DRAFT ALGORITHM


Childhood (ages 5-18 years) Overweight/Obesity Algorithm for Primary Care
SEE ADDENDUM FOR LOCAL RESOURCE DETAILS
BMI measurements (based on CDC growth-for-age and sex chart)
OVERWEIGHT 25 TO <30
MILD OBESITY 30 TO <35
MODERATE OBESITY 35 TO <40
SEVERE OBESITY >40
OBTAIN PARENTAL/CAREGIVER FOCUSED HISTORY
Socioeconomic background
Educational levels
Race/Ethnicity
Parental overweight/obesity
Parental dietary and physical activity patterns
OBTAIN CHILD'S FOCUSED HISTORY
Amount/types of physical activity (daily)
Typical diet (including screening for food insecurity and access to fresh produce)
Amount of device/screen time (daily)
Screen for depression, anxiety, bullying
OBTAIN FULL LABS
CBC, CMP, HEMOGLOBIN A1C, HEPATIC LEVEL, LIPID PROFILE
NEGATIVE LABS
CONTINUE TO MONITOR YEARLY
POSITIVE LABS
START WORKUP ACCORDING TO POSITIVE FINDINGS
NUTRITION SUPPORT
ASSESS NUTRITIONAL STATUS ACCORDING TO MAYO CLINIC GUIDELINES (SEE ADDENDUM). ADDITIONAL LOCAL RESOURCES DEPENDING UPON ASSESSMENT FINDINGS/PREFERENCES (SEE ADDENDUM FOR DESCRIPTIONS):
RMSER Food Pantry
Pueblo Food Project
District 60 Free Lunch Program (grades K-12)
FOLLOW-UP IN 6 WEEKS
In conjunction with all other recommendations (SEE BELOW)
POSITIVE IMPROVEMENT
CONTINUE AS DIRECTED
NO CHANGE
REFER TO NUTRITIONIST/DIETICIAN


PHYSICAL ACTIVITY SUPPORT
ASSESS DAILY PHYSICAL ACTIVITY
MODERATE-SEVERE OBESITY
OVERWEIGHT/MILD OBESITY
DAILY GOAL: Walking 10,000 steps (or comparable low-impact activity) depending upon severity of obesity and physical mobility limitations
DAILY GOAL: 60 minutes of physical activity such as outdoor recess, physical education classes, or sporting activities (e.g., bicycle riding, swimming, etc.)
ADDITIONAL LOCAL RESOURCES DEPENDING UPON ASSESSMENT FINDINGS/PREFERENCES (SEE ADDENDUM FOR DESCRIPTIONS):
YMCA
Fit Kids
Planet Fitness
Yoga at the Riverwalk
Muscle Monkey Physical Fitness
Green Chili Bike Bank
La Gente Youth Sports
FOLLOW-UP IN 6 WEEKS
In conjunction with all other recommendations (SEE ABOVE AND BELOW)
PSYCHOSOCIAL AND BEHAVIORAL THERAPY SUPPORT
ASSESS FOR MENTAL HEALTH NEEDS (DEPRESSION/ANXIETY/BULLYING)
ADDITIONAL LOCAL RESOURCES DEPENDING UPON ASSESSMENT FINDINGS/PREFERENCES (SEE ADDENDUM FOR DESCRIPTION):
United Way Mentorship (ages 12-14 or middle school)
Boys and Girls Club Mentorship Program (all ages)
School-Based Counselor (grades K-12)
Thriveworks (private counseling for children, all ages)
SocoYoGo (ages 13-18 years)


POSITIVE RESPONSE
CONTINUE WITH THE ABOVE
NEGATIVE RESPONSE
CONSIDER REFERRAL TO MENTAL HEALTH SPECIALIST AND/OR MEDICATIONS
PHARMACOLOGICAL SUPPORT
CONTINUE ALL NUTRITIONAL, PHYSICAL, AND PSYCHOSOCIAL/BEHAVIORAL SUPPORT AND ONLY CONSIDER IF:
Failed nutrition/physical activity regimen
Recommendation from mental health specialist
Necessary for the health of the child (SEE BELOW)
ORLISTAT
1ST LINE FOR CHILDREN 12 YEARS AND OLDER MEETING THE FOLLOWING CRITERIA:
Indicated for severely obese children (BMI>40)
No response to a 1- year nutrition and lifestyle treatment plan
Patients with glucose tolerance impairment, fatty liver, ovarian hyperandrogenism, insulin resistance, or a strong family history of DM, MI or stroke.
Dosage: 120mg three times a day in conjunction with a multivitamin (5000 IU Vitamin A, 400 IU Vitamin D, 300 IU Vitamin E, and 25 ug of Vitamin K). These 2 medications should be taken 2 hours apart.
BARIATRIC SURGERY
REQUIRES REFERRAL TO A PEDIATRIC OBESITY MEDICINE SPECIALIST

ADDENDUM TO ALGORITHM

Local Resources for Pueblo, Colorado

NUTRITION SCREENING

Mayo Clinic 'Nutrition for Kids: Guidelines for a Healthy Diet'
Description: Sex- and age-based guidelines for parents/caregivers and providers regarding recommended daily intake of calories, proteins, fruits, vegetables, grains, and dairy for children ages 2-18 years.
Location: Online.
Website: https://www.mayoclinic.org/healthy-lifestyle/childrens-health/in-depth/nutrition-for-kids/art-20049335
Cost: none.

NUTRITION SUPPORT

District 60 Free Lunch Program
Description: This is a free lunch program to all children during the summer when school is out. It meets federal guidelines for nutrition.
Location: Various. See website calendar.
Contact information: https://www.pueblod60.org/
Cost: none.

Pueblo Food Project
Description: Education on healthy food and provide healthy meals. There are several initiatives through this program that help all families/children in need. There are programs to show how to grow food and prepare healthy meal at various locations. Meal kits are sent home with the children and families. Includes a youth council that teens can be a part of.
Location: Various. See website calendar.
Contact information: https://pueblofoodproject.org/
Cost: none.

RMSER Food Pantry
Description: Free food every 2nd Thursday of the month. This is free to all the community of Pueblo. There are no income restrictions. It is healthy, nutritional foods with fresh fruits and vegetables offered.
Location: 2717 West Street, Pueblo, Colorado 81003
Contact information: https://www.rmser.org/
Cost: none.

PHYSICAL SUPPORT

Fit Kids
Description: Local program set up by local firefighters to participate in exercise programming and learn correct movement.
Location: Varies (e.g., fire stations, schools, parks). See website.
Contact information: https://www.facebook.com/firefitkids or Tim Trujillo at 719-553-2830.
Cost: none.

Green Chili Bike Bank
Description: Provides education on bike maintenance and safety; offers free bikes to low-income families.
Location: No physical address. See website.
Contact information: https://www.info@gcbbpueblo.org
Cost: none.

La Gente Youth Sports
Description: Offers wide range of sports programs for the community.
Location: 2804 E. 12th St., Pueblo, Colorado 81001
Contact information: https://www.info.lgys.org
Cost: Varies. Scholarships available to low-income kids for fees and equipment.

Muscle Monkey Functional Fitness
Description: Physical fitness gym offering physical fitness programs/personal training for kids who are overweight/obese.
Location: 3201 South Prairie, Pueblo, Colorado 81005
Contact information: https://musclemonkeyfunctionalfitness.com/
Cost: Varies. Discounted options for low-income children.

Planet Fitness
Description: Physical fitness gym offering free membership to children under 18 during the summer months.
Location: 3333 Dillion Dr., Pueblo, Colorado 81008
Contact information: https://www.planetfitness.com/
Cost: Free during the summer months; varies rest of year.

YMCA
Description: Activity center and physical fitness gym for families and children of all ages.
Location: 3200 E. Spaulding Ave., Pueblo, Colorado 81008
Contact information: https://puebloymca.org/
Cost: Varied membership fees. Multiple scholarships available with priority given to low-income children.

Yoga at the Riverwalk
Description: Free yoga classes in the summer to all community members on the Riverwalk.
Location: 125 Riverwalk Place, Pueblo, Colorado 81003. Location may vary; see website for details.
Contact information: https://www.puebloriverwalk.org/
Cost: none.

BEHAVORIAL SUPPORT

Boys and Girls Club of Pueblo
Description: Several programs for children/teens to engage in including health and wellness education, character and leadership development, the arts, sports and recreation, and career development.
Location: Multiple locations including 635 W. Corona, Suite 201, Pueblo, Colorado 81004
Contact information: https://www.bgcpckids.org/Programs
Cost: Membership fee of $40/year. Scholarships for low-income families may be available.

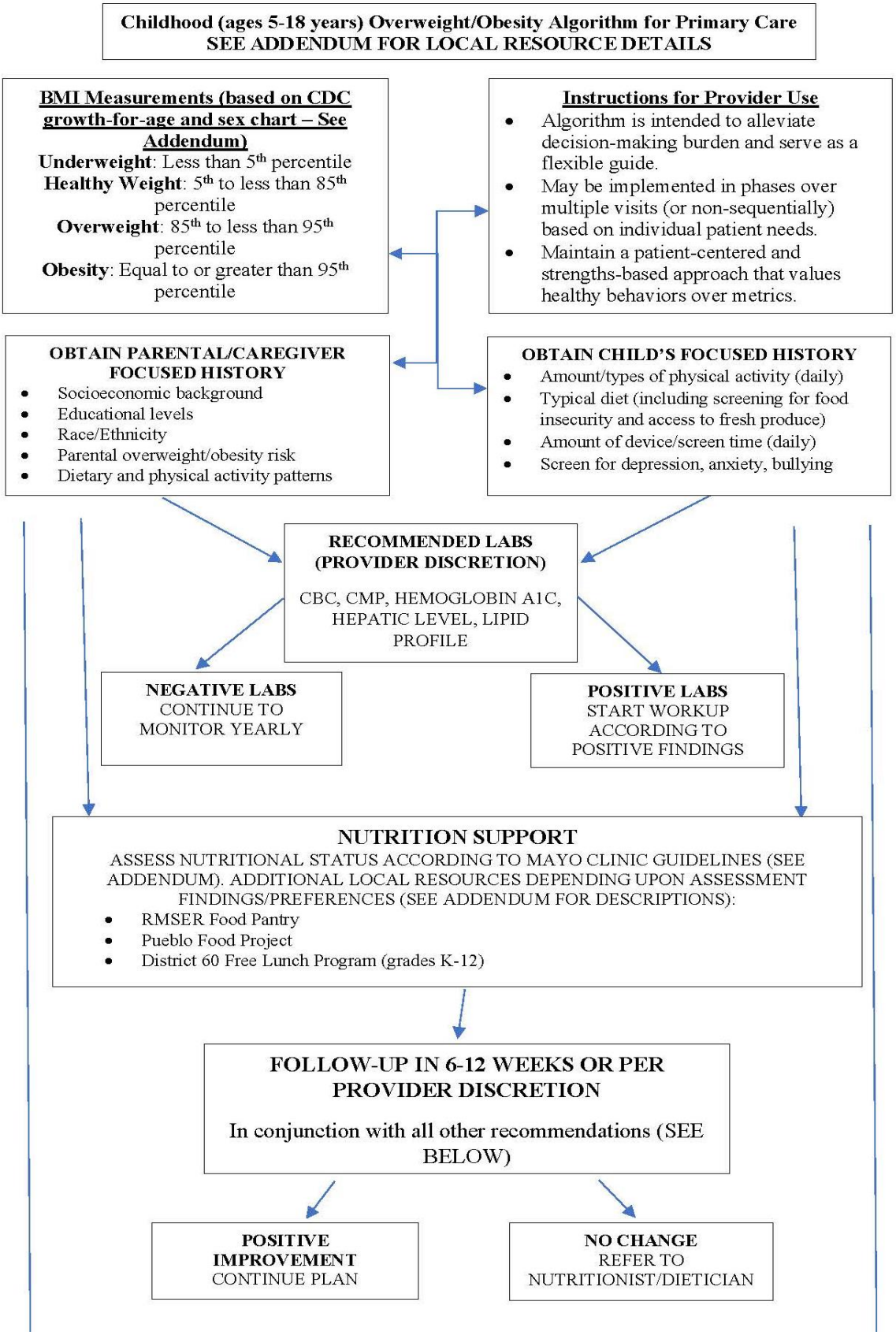
SoCoYoGo
Description: Free app that can be downloaded to encourage healthy activity and offers prizes for completed activities.
Location: Online app; activity locations vary.
Contact information: https://socoyogo.com/
Cost: none.

Thriveworks Counseling and Psychiatry Pueblo
Description: Mental Health counseling for children to address issues associated with childhood obesity such as. bullying, depression, and anxiety.
Location: 200 W City Center Dr Suite 302, Pueblo, CO 81003
Contact information: 719-838-6383
Cost: Varied. Insurance accepted and reduced cost options.

United Way Mentorship
Description: Variety of mentorship programs for middle school aged children. Mentoring typically includes one hour/week with a vetted adult doing activities based on the child's needs and interests.
Location: 310 E. Abriendo Ave., Pueblo, Colorado 81004
Contact information: https://www.pueblounitedway.org/mentor
Cost: none.

APPENDIX F

REVISED DRAFT OF ALGORITHM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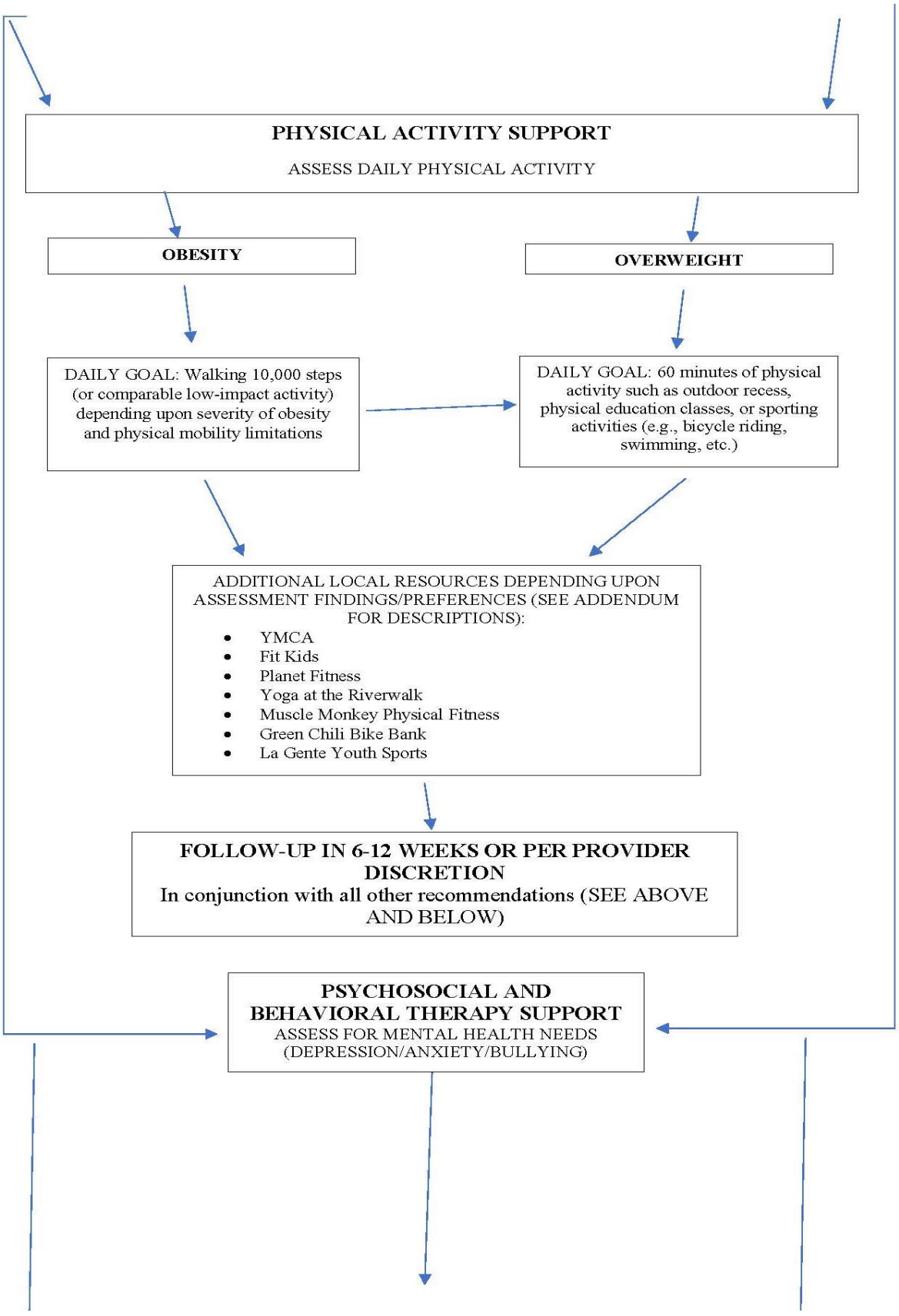
SEE ADDENDUM FOR LOCAL RESOURCE DETAILS
BMI Measurements (based on CDC growth-for-age and sex chart – See Addendum)
Underweight: Less than 5th percentile
Healthy Weight: 5th to less than 85th percentile
Overweight: 85th to less than 95th percentile
Obesity: Equal to or greater than 95th percentile
Instructions for Provider Use
Algorithm is intended to alleviate decision-making burden and serve as a flexible guide.
May be implemented in phases over multiple visits (or non-sequentially) based on individual patient needs.
Maintain a patient-centered and strengths-based approach that values healthy behaviors over metrics.
OBTAIN PARENTAL/CAREGIVER FOCUSED HISTORY
Socioeconomic background
Educational levels
Race/Ethnicity
Parental overweight/obesity risk
Dietary and physical activity patterns
OBTAIN CHILD'S FOCUSED HISTORY
Amount/types of physical activity (daily)
Typical diet (including screening for food insecurity and access to fresh produce)
Amount of device/screen time (daily)
Screen for depression, anxiety, bullying
RECOMMENDED LABS (PROVIDER DISCRETION)
CBC, CMP, HEMOGLOBIN A1C, HEPATIC LEVEL, LIPID PROFILE
NEGATIVE LABS
CONTINUE TO MONITOR YEARLY
POSITIVE LABS
START WORKUP ACCORDING TO POSITIVE FINDINGS
NUTRITION SUPPORT
ASSESS NUTRITIONAL STATUS ACCORDING TO MAYO CLINIC GUIDELINES (SEE ADDENDUM). ADDITIONAL LOCAL RESOURCES DEPENDING UPON ASSESSMENT FINDINGS/PREFERENCES (SEE ADDENDUM FOR DESCRIPTIONS):
RMSER Food Pantry
Pueblo Food Project
District 60 Free Lunch Program (grades K-12)
FOLLOW-UP IN 6-12 WEEKS OR PER PROVIDER DISCRETION
In conjunction with all other recommendations (SEE BELOW)
POSITIVE IMPROVEMENT
CONTINUE PLAN
NO CHANGE
REFER TO NUTRITIONIST/DIETICIAN


PHYSICAL ACTIVITY SUPPORT
ASSESS DAILY PHYSICAL ACTIVITY
OBESITY
OVERWEIGHT
DAILY GOAL: Walking 10,000 steps (or comparable low-impact activity) depending upon severity of obesity and physical mobility limitations
DAILY GOAL: 60 minutes of physical activity such as outdoor recess, physical education classes, or sporting activities (e.g., bicycle riding, swimming, etc.)
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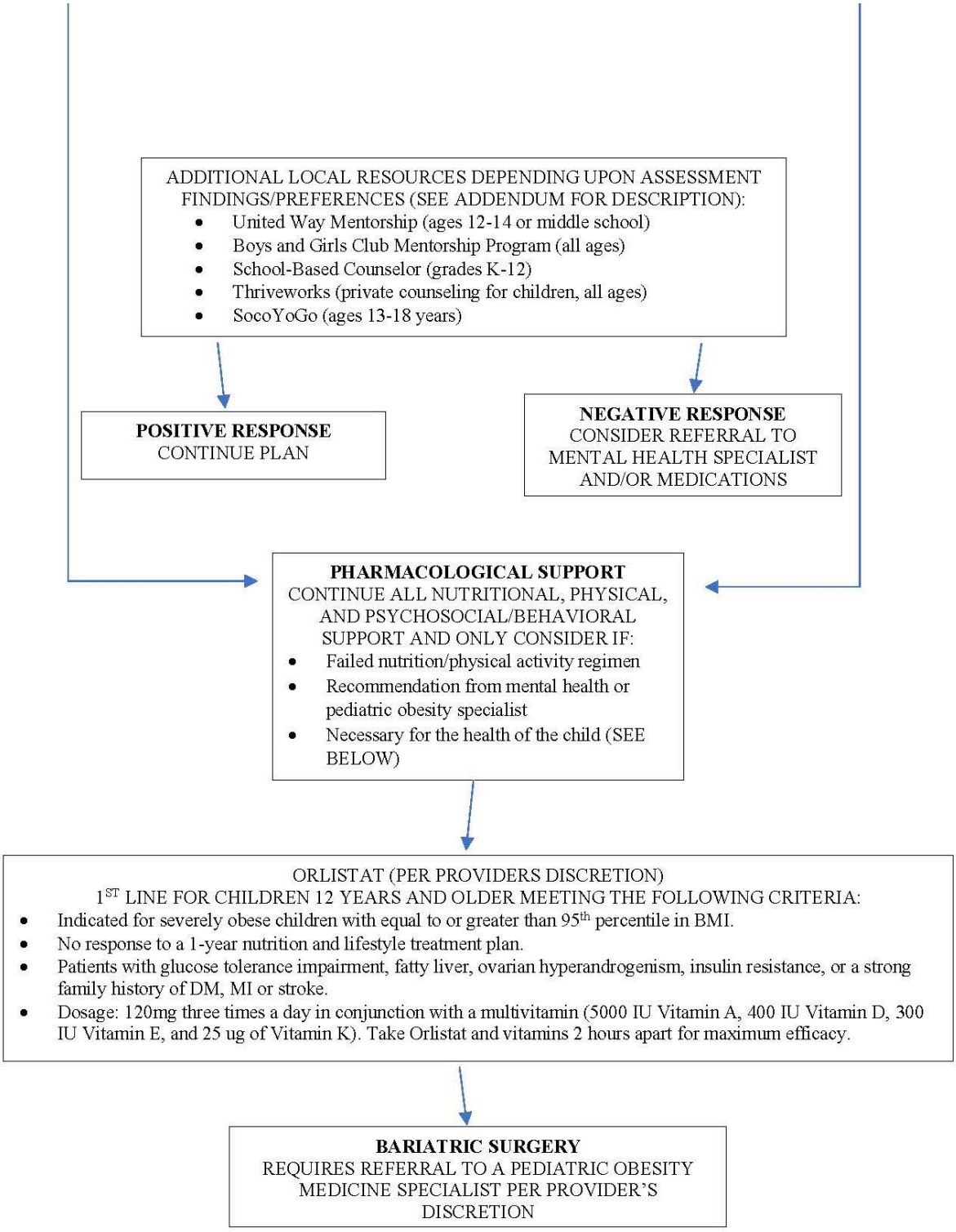
YMCA
Fit Kids
Planet Fitness
Yoga at the Riverwalk
Muscle Monkey Physical Fitness
Green Chili Bike Bank
La Gente Youth Sports
FOLLOW-UP IN 6-12 WEEKS OR PER PROVIDER DISCRETION
In conjunction with all other recommendations (SEE ABOVE AND BELOW)
PSYCHOSOCIAL AND BEHAVIORAL THERAPY SUPPORT
ASSESS FOR MENTAL HEALTH NEEDS (DEPRESSION/ANXIETY/BULLYING)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Boys and Girls Club Mentorship Program (all ages)
School-Based Counselor (grades K-12)
Thriveworks (private counseling for children, all ages)
SocoYoGo (ages 13-18 years)
POSITIVE RESPONSE
CONTINUE PLAN
NEGATIVE RESPONSE
CONSIDER REFERRAL TO MENTAL HEALTH SPECIALIST AND/OR MEDICATIONS
PHARMACOLOGICAL SUPPORT
CONTINUE ALL NUTRITIONAL, PHYSICAL, AND PSYCHOSOCIAL/BEHAVIORAL SUPPORT AND ONLY CONSIDER IF:
Failed nutrition/physical activity regimen
Recommendation from mental health or pediatric obesity specialist
Necessary for the health of the child (SEE BELOW)
ORLISTAT (PER PROVIDERS DISCRETION)
1ST LINE FOR CHILDREN 12 YEARS AND OLDER MEETING THE FOLLOWING CRITERIA:
Indicated for severely obese children with equal to or greater than 95th percentile in BMI.
No response to a 1-year nutrition and lifestyle treatment plan.
Patients with glucose tolerance impairment, fatty liver, ovarian hyperandrogenism, insulin resistance, or a strong family history of DM, MI or stroke.
Dosage: 120mg three times a day in conjunction with a multivitamin (5000 IU Vitamin A, 400 IU Vitamin D, 300 IU Vitamin E, and 25 ug of Vitamin K). Take Orlistat and vitamins 2 hours apart for maximum efficacy.
BARIATRIC SURGERY
REQUIRES REFERRAL TO A PEDIATRIC OBESITY MEDICINE SPECIALIST PER PROVIDER'S DISCRETION

APPENDIX G

SECOND-ROUND VALIDATION QUESTIONNAIRE

Your participation in this project is greatly appreciated. Thank you in advance for taking the time to provide feedback on a revised draft of an algorithm for managing children (ages 5-18 years) in the primary care setting who are overweight or obese. The revisions in this draft are in response to analysis of prior feedback. After reviewing the revised questionnaire, please identify its feasibility, usefulness, and validity in. Based on your responses along with those of the other participants, a final draft of the algorithm will be proposed for future pilot testing in a clinical setting.

Completing this questionnaire indicates your consent to participate in this project. Please reach out to me, Erika Almeida-Trujillo at alme3937@bears.unco.edu or to the project advisor, Dr. Natalie Pool, at natalie.pool@unco.edu should you have any questions or concerns about participating in this project. The Institutional Review Board of the University of Northern Colorado has approved this project and can be reached at 970-351-1907 or via email at orsp@unco.edu.

Participant Information

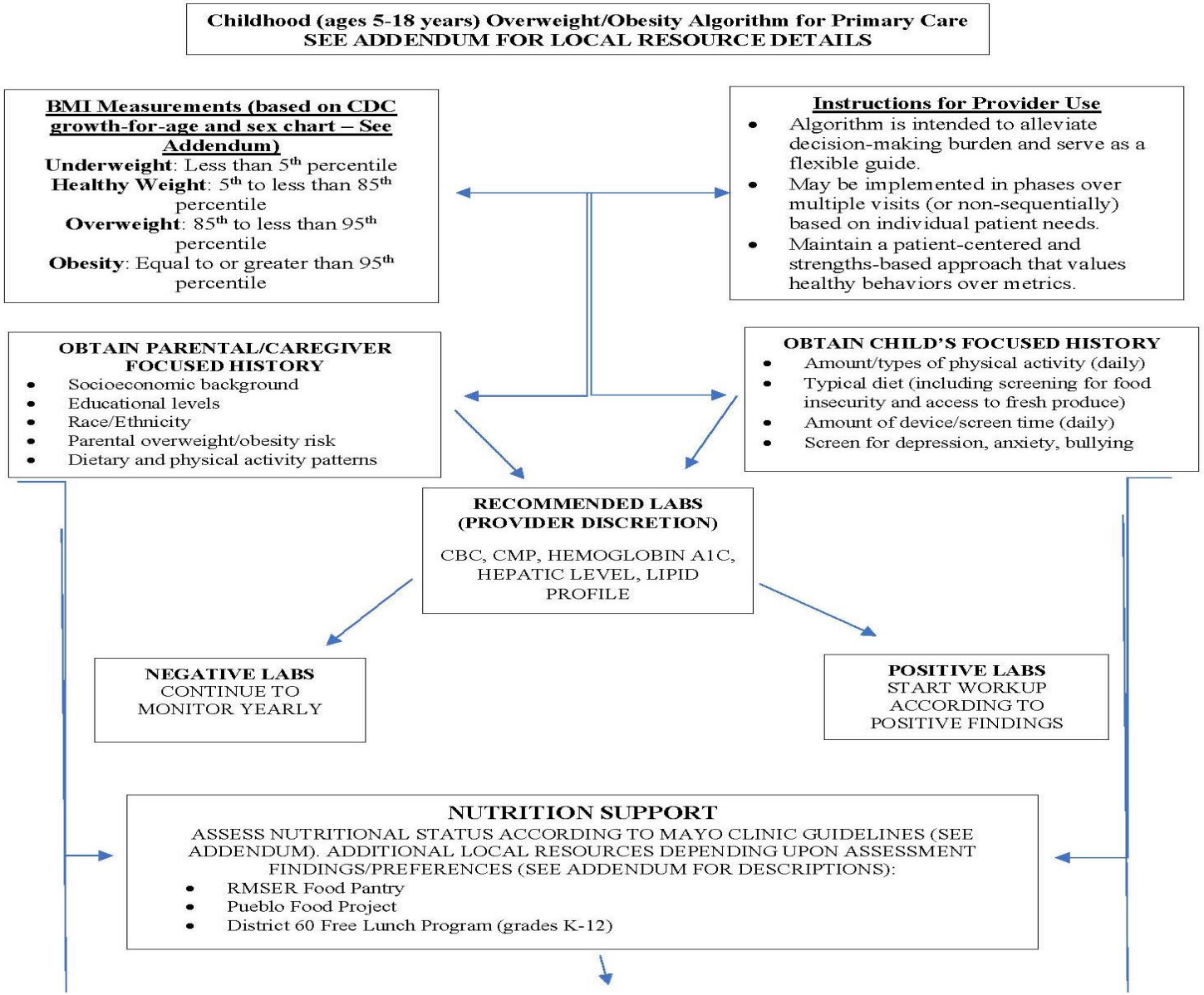
Please answer the following questions.

1. Your advanced practice primary care role (select one): NP PA MD DO
2. Total number of years in advance practice (enter number): _____
3. Clinical Specialty (select one):
    a. Pediatrics
    b. Family Practice
4. Do you currently provide primary care for pediatric patients between the ages of 5-18 years in Pueblo, Colorado community? (select one): YES NO

5. Would you consider the information in the revised algorithm to be appropriate for your care of children who are overweight or obese? If you selected, “NO” please briefly comment (150 character limit).
6. The revised algorithm can be used by providers across multiple visits and in any order, depending upon each patient’s needs. Given this information, did you find the revised algorithm to be user friendly and easy to follow? If you selected “NO” please briefly comment (150 character limit).
7. Given the wording and guidance provided on the revised algorithm, do you feel that it encourages a patient-centered, strengths-based approach to managing children who are overweight or obese? If you selected “NO” please briefly comment (150 character limit).
8. Would you use the revised algorithm in your current practice? If you selected “NO” please briefly comment (150 character limit).
9. Please add any additional comments/suggestions/critiques related to the practicality and usability of the revised algorithm (250 character limit).

APPENDIX H

FINAL ALGORITHM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Overweight: 85th to less than 95th percentile
Obesity: Equal to or greater than 95th percentile
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Educational levels
Race/Ethnicity
Parental overweight/obesity risk
Dietary and physical activity patterns
OBTAIN CHILD'S FOCUSED HISTORY
Amount/types of physical activity (daily)
Typical diet (including screening for food insecurity and access to fresh produce)
Amount of device/screen time (daily)
Screen for depression, anxiety, bullying
RECOMMENDED LABS (PROVIDER DISCRETION)
CBC, CMP, HEMOGLOBIN A1C, HEPATIC LEVEL, LIPID PROFILE
NEGATIVE LABS
CONTINUE TO MONITOR YEARLY
POSITIVE LABS
START WORKUP ACCORDING TO POSITIVE FINDINGS
NUTRITION SUPPORT
ASSESS NUTRITIONAL STATUS ACCORDING TO MAYO CLINIC GUIDELINES (SEE ADDENDUM). ADDITIONAL LOCAL RESOURCES DEPENDING UPON ASSESSMENT FINDINGS/PREFERENCES (SEE ADDENDUM FOR DESCRIPTIONS):
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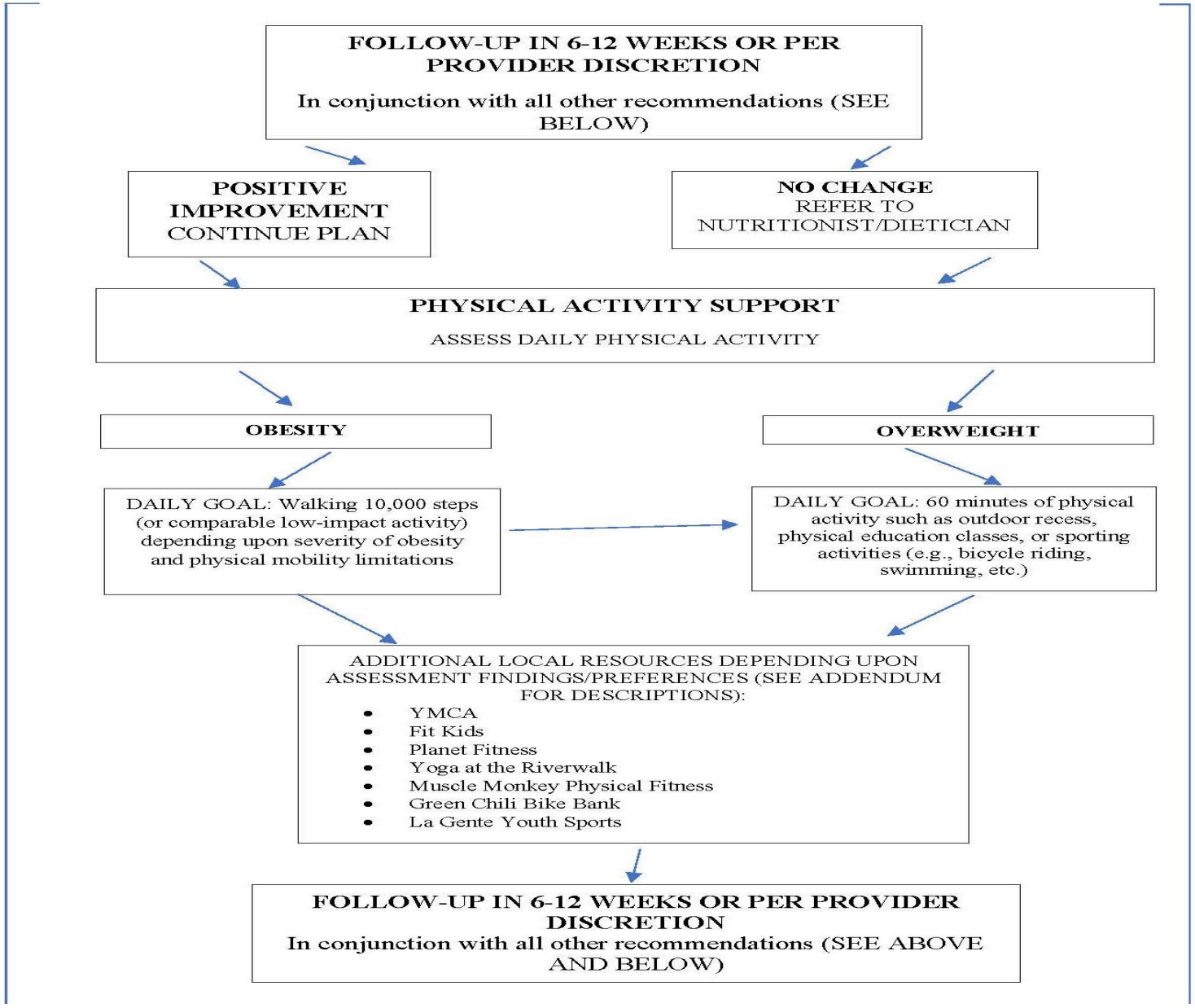
FOLLOW-UP IN 6-12 WEEKS OR PER PROVIDER DISCRETION
In conjunction with all other recommendations (SEE BELOW)
POSITIVE IMPROVEMENT
CONTINUE PLAN
NO CHANGE
REFER TO NUTRITIONIST/DIETICIAN
PHYSICAL ACTIVITY SUPPORT
ASSESS DAILY PHYSICAL ACTIVITY
OBESITY
OVERWEIGHT
DAILY GOAL: Walking 10,000 steps (or comparable low-impact activity) depending upon severity of obesity and physical mobility limitations
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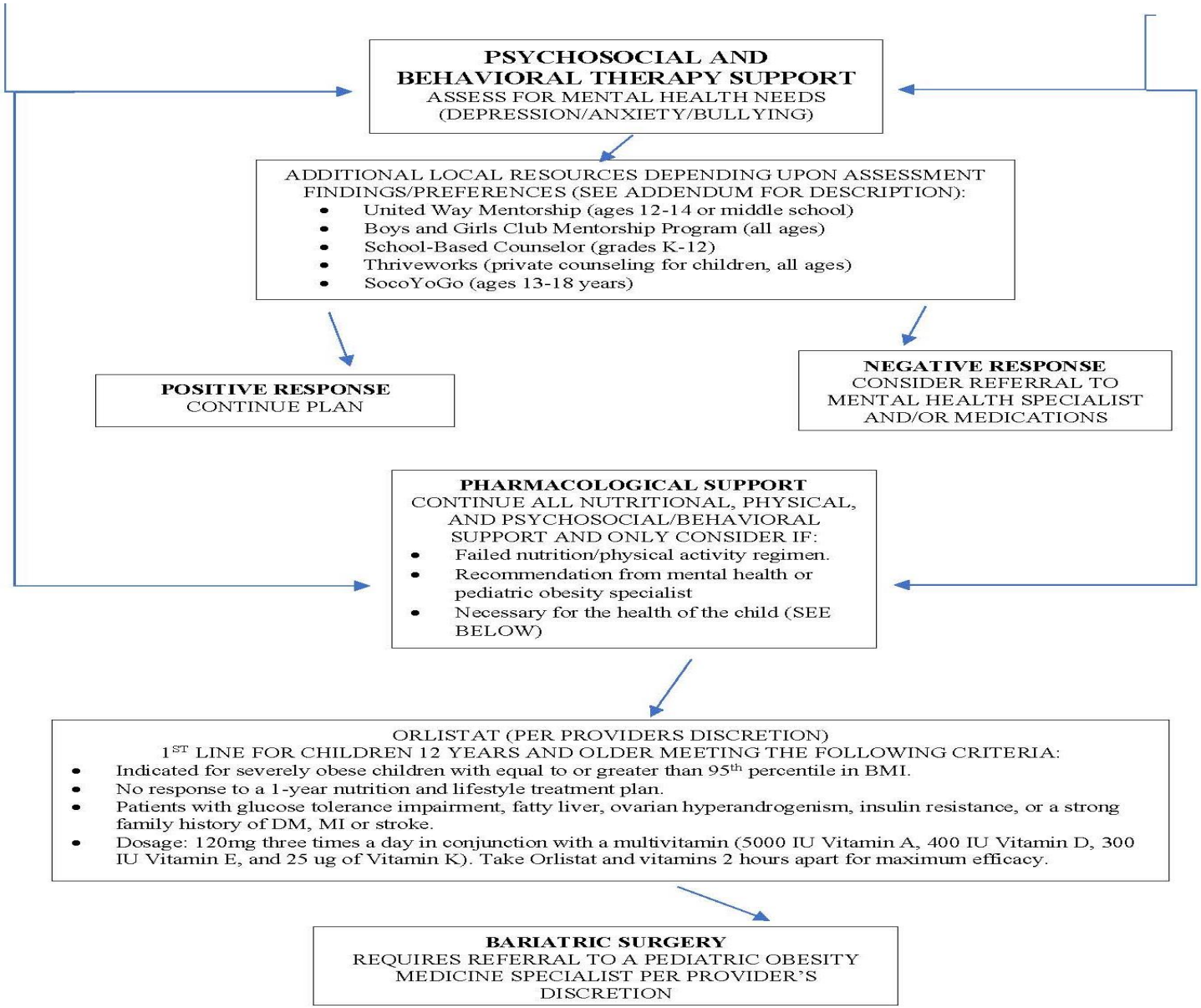
FOLLOW-UP IN 6-12 WEEKS OR PER PROVIDER DISCRETION
In conjunction with all other recommendations (SEE ABOVE AND BELOW)


PSYCHOSOCIAL AND BEHAVIORAL THERAPY SUPPORT
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CONTINUE PLAN
NEGATIVE RESPONSE
CONSIDER REFERRAL TO MENTAL HEALTH SPECIALIST AND/OR MEDICATIONS
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REQUIRES REFERRAL TO A PEDIATRIC OBESITY MEDICINE SPECIALIST PER PROVIDER'S DISCRETION