



# An Integrative Review of the Mind, Exercise, Nutrition Do it!

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## ABSTRACT

**Introduction:** Childhood obesity is a public health concern and the MEND 7-13 program may be key in improving childhood obesity rates. The purpose of this integrative review is to provide insight into the MEND 7-13 program and explore its effectiveness in reducing BMI in children with obesity.

**Research methodology:** Using a comprehensive search strategy, the Chamberlain university, national library of medicine, wiley online, science direct, and BMC Public Health databases were used to identify 17 studies that implemented the MEND 7-13 program anywhere in the world, published between 2016-2021, and written in English. The data was extracted utilizing the Johns Hopkins evidence summary tool.

**Results:** About 1,024 articles were found and excluded if studies included children less than 7 and greater than 13, published more than five years ago, and were literature reviews.

**Discussion:** The literature analysis of the studies and results of the interpretive review shows that the MEND 7-13 program is effective in reducing BMI even when variations of the program were implemented. The studies revealed similar gaps, limitations, and opportunities for improvement of the MEND 7-13 program.

**Conclusion:** An integrative review has been conducted on childhood obesity family based weight management programs. An effort to consider the evidence synthesizes the investigations that have been completed and guides future nursing practice and studies.

**Keywords:** Childhood obesity; Mind; Exercise; Nutrition; interpretive review; Public health

## INTRODUCTION

Childhood obesity is a serious, complex global healthcare concern that will need early intervention to prevent and minimize lifelong health effects. The World Health Organization (WHO, 2020) reports over 340 million children were overweight or obese in 2016. The significance of this

practice problem does not stop at childhood. Childhood obesity has consequences into adult years, leading to multiple adverse health outcomes such as diabetes, hypertension, low self-esteem, depression, and contributing to outstanding economic ramifications (The Centers for Disease Control and Prevention (CDC), 2021). Without early intervention and sustainable treatment, childhood obesity rates and

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consequences will continue to rise. The purpose of this paper is to present an integrative review of the MEND 7-13 program, discuss evidence found that supports this childhood obesity program, synthesize current literature, and explore the implications of the MEND 7-13 program on nursing and healthcare. The United States Preventative Service Task Force (USPSTF, 2017) report the most valuable intervention to prevent and treat childhood obesity is programs that include families and incorporate a combination of nutrition education, behavior changes, and physical activity. The CDC describe the treatment of childhood obesity should include lifestyle modifications that can be learned by families joining healthy weight programs, such as the MEND 7-13 program. The MEND 7-13 program is designed by childhood obesity experts, aligns with recommendations reported by the CDC and the USPSTF, and the program's effectiveness in reducing Body Mass Index (BMI) is well documented among evidence-based research. More than 85,000 children who are overweight or obese have completed the MEND 7-13 program and 80% of those participants lowered their baseline BMI.

## LITERATURE REVIEW

### Problem Statement

The WHO reports overweight and obese children aged 5-19 years old has dramatically increased from just 4% in 1975 to over 18% in 2016. The window of opportunity to prevent obesity, improve health outcomes, and reduce healthcare costs can lie in community support programs aimed to reduce BMI among children. The inquiry question guarding this integrative review is: In children aged 7 to 13 years old with a Body Mass Index (BMI) greater than the 85<sup>th</sup> percentile, will implementation of the Mind, Exercise, Nutrition, Do it! (MEND 7-13) program reduce body mass index? The following review will include a thorough discussion of the significance of childhood obesity, a comprehensive report of how the review was executed, a synthesis of the literature research findings, and a description of the implications on nursing and healthcare, and further recommendations [1-6].

### Significance of the Practice Problem

The majority of the world's population lives in countries where obesity and being overweight kills more than those who are underweight. Ritchie states obesity is the world's biggest health problem that resulted in 8% of global deaths in 2017 and has a significant economic impact on healthcare systems. Shekar and Popkin reports that although globally the costs of obesity related health care costs vary, the increasing costs linked to the increasing obesity rate are a trend across the world. China estimates 8.73% of the gross national product by 2035 will be spent on obesity-related health care costs and Brazil projects a doubling of costs due to obesity from \$5.8 billion to \$10.1 billion in 2050. In the United States, the most current data also shows childhood obesity has tripled in the past four decades, with more than one third or 35% of children overweight or obese. The state of childhood obesity organization's latest data reports 19.3% of children in

the U.S. between 2-19 years of age suffered from obesity and cost an estimated \$14 billion annually in direct health expenses. Waters and DeVolv calculated the direct and indirect costs of obesity cost the U.S. \$1.42 trillion in 2016. Used the medical expenditure panel survey for 2001-2015 to estimate the impact childhood obesity has on U.S. medical care costs and reported obesity to raise annual costs by \$907 or 92% higher annually than previous estimates and almost entirely borne by third payers. This prevalence of obesity has also influenced the way healthcare organizations and nursing care must tailor care to safely care for overweight or obese patients. Choi and Brings reviewed work related musculoskeletal disorders among nurses and found that nurses are at higher risk of injury when overweight or obese patients were moved or transferred. Data obtained from the U.S. Bureau of labor statistics reported such workplace hazards and work related injuries for nurses cost the medical industry \$13.1 billion. In 2011, California enacted a safe patient handling legislation mandating health care organizations to develop safe patient handling policies, which included lift teams, use of mechanical lifting equipment battery operated lifts to protect overweight or obese patients and prevent work related injuries among nursing staff. The health consequences of childhood obesity made a major impact on how healthcare organizations and nursing care must adapt to provide safe care among overweight and obese children [7-11].

### Translation Science Framework

The translation science model best suited for this change project is the Knowledge to Action (KTA) model. Harris, et al. describe the KTA model as knowledge creation, as knowledge is created it moves through a funnel and becomes more synthesized and feasible to stakeholders. Dang and Dearholt explain the KTA process includes these steps a) Identify the problem, b) Adapt the new knowledge to the local context, c) Assess barriers to use, d) Select, tailor, and implement interventions to promote the knowledge; e) Monitor its use, f) Evaluate the outcomes, and g) Ensure sustainability to practice. The first step of the KTA model is identifying a problem for review, which in this case, is a high prevalence of overweight and obese children aged 7-13 years and lack of family based weight management programs primary care physicians can refer them to. The second stage is adapting new knowledge or research to the local environment. The MEND 7-13 program can be implemented in communities, include children who are obese or overweight and a family member/caregiver, and address obesity early. The third step of the model assesses barriers to implementing the program, such as language barriers, lack of participants, and low attendance or participation. Having a language line available to obtain consent, educational material available in different languages and a strong recruitment phase will be important when planning the implementation phase. The fourth step will be implementing the program during weeks 2-9 with a thoroughly planned agenda for the MEND 7-13 program. The last few stages of the KTA Framework are monitoring the program and ensuring sustainability. Implementation of the

MEND 7-13 program can be accomplished by observing the weekly sessions, conducting ongoing discussions with the facilitators, and completing weekly chart audits to assess participation, attendance, and pre and post implementation BMI scores. Participant's paper charts with pre and post implementation BMI data can be used in the sixth step of the KTA model to evaluate the outcomes after the eight week program. The data analysis can be done with the assistance of a statistician to assess for improvements in BMI scores post implementation and evaluate any significance attendance has on those scores. The project outcomes can also be used to present the need of the program to stakeholders and ensure the sustainability of the intervention.

## METHODOLOGY

### Review Protocol

The purpose of the integrative review was to locate evidence based research that addresses childhood obesity by implementing the family based intervention, the MEND 7-13 program. The literature search process included the help of the Chamberlain university librarian and multiple databases using individually tailored search strategies. The databases used were Chamberlain university, the national library of medicine, wiley online library, science direct, and the BMC public health databases. Ease and access to full article texts were the primary reasons these databases were utilized. The literature search consisted of these search strings and keywords: childhood obesity, the MEND 7-13 program, MEND foundation, mind, exercise, nutrition...do it!, incentives, barriers, community based programs, primary care centers, weight management, weight loss, family based lifestyle intervention, severe and moderate obesity. The final articles were narrowed down after applying specific eligibility criteria and will be thoroughly discussed. An extensive amount of time was spent scanning about 1,042 articles for relevance. The Chamberlain university library database search resulted in 139 articles; the national library of medicine found eight articles, wiley online library found 165 articles, science direct found 356 articles, and the BMC public health database found 374 articles. The first screening process included scanning the titles and the abstracts to determine eligibility criteria. Limitations included abstract only articles found and the Chamberlain university library was utilized to gain access to full text articles. The first search was successful and resulted in 28 primary research studies implementing the MEND 7-13 program, however, many were outdated and only 11 of those articles were eligible to be used for this review. The remaining articles required several additional hours of literature searches utilizing different keywords [12-15].

### Inclusion/Exclusion Criteria

The articles that were screened by full-text were chosen by specific inclusion and exclusion criteria. Inclusion criteria included randomized control trials, systematic, quantitative, or qualitative reviews, implementation of the MEND program with participants within 7-13 years of age, and was conducted

anywhere in the world. The exclusion criteria included literature reviews, studies that included children less than 7 and greater than 13, implemented family based weight management programs other than the MEND 7-13 program, and those more than five years. There were two qualitative and systematic articles used to represent new themes found in the current literature on the MEND 7-13 program. After the inclusion and exclusion criteria were applied, seventeen articles were chosen to support the evidence based intervention, the MEND 7-13 program. Although outdated, two valid articles from 2015 were also chosen for this literature synthesis.

### Data Analysis

After the final articles were determined to be used for the integrative review, each article was read and analyzed thoroughly with the assistance of the Johns Hopkins evidence summary tool. An analysis of the evidence type, level, and quality of the articles used to inform the Integrative Review was conducted using the Johns Hopkins evidence summary tool and included as Appendix A and B. The Johns Hopkins evidence summary tool was also used to categorize the articles by similarities, aims, common themes, and gaps in knowledge base discussed by the researcher's project outcomes. The following includes a thorough synthesis of the literature found that supports the implementation of the MEND 7-13 program.

## RESULTS AND DISCUSSION

### Characterization of the Body of Literature

The body of literature used for this integrative review was finalized after a comprehensive literature search and analysis was completed. The MEND 7-13 program is evidence based practice with at least thirty five publications to date with reported positive outcomes and decreased BMI among the participants. A large portion of these studies are outdated and more than five years old. However, two current studies have successfully up scaled the MEND 7-13 program in community centers in British Columbia and the United States. The majority of the literature used for this integrative review has further evaluated how effective different variations of the MEND 7-13 program are on reducing BMI or improving lifestyle choices and improving health among additional subgroups among children aged 7-13 years of age who are overweight or obese. The following is a broad overview of the literature found, followed by a detailed review of the literature synthesis discovered on the MEND 7-13 program. All the articles used for this integrative review were classified as high quality, primary research, and were carefully hand picked. Two outdated, but relevant and valid studies, was used for this review. At least thirty articles that supported the MEND 7-13 program were excluded. The settings of the seventeen studies included in the review took place in community centers, health centers, and schools from around the world, including United States, Australia, Europe, London, and British Columbia. All articles were written in english and

published in various pediatric, childhood obesity, nutrition and behavior, and public health journals. The seventeen articles used for this integrative review all used similar methods and tools to answer the clinical question. BMI measurements, attendance, and similar strengths and limitations were reported. These studies included a large sample size, showed improvement in BMI post implementation, however, they all reported attendance and retention issues, and lack of long term follow up. In addition, although the CDC reports BMI is the most common tool used to screen for potential weight and health related issues categories, the more current publications suggest BMI may not be an effective tool to be used children with severe obesity and recommend additional studies exploring different tools to measure the effectiveness of the MEND 7-13 program. After careful review of the articles and use of the Johns Hopkins evidence summary tools, common themes, similarities, differences were found among the articles. The current studies also show new emerging themes and variations to the MEND 7-13 program being explored. Gaps, barriers, and facilitators to attendance and retention of the program were additional themes identified among the rest of the research articles. Common barriers and gaps found included lack of interest among the children, not incorporating screen time and sleep in the MEND 7-13 program, and the need for different approaches among children with severe obesity. These themes and findings will be extensively discussed in the following section. Based on these findings, recommendations for future studies and implications for the nursing practice will be also being discussed in this integrative review [16-18].

## FINDINGS SYNTHESIS

### The MEND 7-13 Program: Delivered at Scale

The MEND 7-13 program is a comprehensive weight management program that includes education on nutrition, behavior, and physical exercise among obese or overweight children along with a parent or caregiver intended to be implemented in community based centers to decrease body mass index and promote a life long healthy lifestyle. Liu, et al. found that after the MEND 7-13 program was scaled up and implemented among community centers throughout British Columbia the percentage of participants that were obese decreased from 82% to 79% and 3% reached a BMI for age below the 85<sup>th</sup> percentile. Sacher, et al. implemented a large scale MEND 7-13 program throughout several cities in the United States and found mean changes in BMI after the 10 weeks program. Although older, Hardy, et al. conducted one of the first valid studies to report outcomes of a government funded weight management program at scale and in a real world setting. Hardy, et al. found beneficial changes in BMI, BMI z-score among all children who completed 75% or more of the MEND 7-13 program. Up scaling community based interventions is an essential component in addressing childhood obesity. The conditions and limitations of these studies were similar report a lack of control groups and long term follow up as primary limitations of their study

and recommend further studies that examine results beyond the ten weeks. During the literature appraisal, a significant point discovered was the facilitators of these MEND 7-13 programs were delivered by trained professionals. At the end of the appraisal, it was concluded and demonstrate implementation of the MEND 7-13 programs, when delivered at scale in multiple community centers, successfully decreased participant's baseline BMI after the 10 weeks program. The findings of these literature articles reveal a promising intervention to treat childhood obesity and answer the clinical question.

### The MEND 7-13 Program: Specialists vs Non-specialists

The MEND foundation recommends the MEND 7-13 program be facilitated by specialists preferably with a background in nutrition, behavior, and physical exercise assessed changes in health related quality of life and weight status in obese or overweight children after participating in the MEND 7-13 program in the Netherlands. The facilitators of this study did not have a specific medical background or education level; however, they did receive 2 days MEND foundation training by an experienced MEND coach and were required to pass a test before implementation. Despite the lack of professionally trained facilitators, after completion of a MEND foundation training workshop reveal the MEND 7-13 program to be effective in significantly decreasing BMI and improving quality of life after the 10 weeks program observed the long-term outcomes, 2.4 years, following implementation of the MEND 7-13 in community centers throughout the United Kingdom and reports significant improvements in anthropometry and psychological metrics. It was not discussed if the facilitators of this study received official MEND foundation training as the previous study did explain that the children and their parent or caregiver who participated in the MEND 7-13 program were delivered by a non-specialist. Despite an older study, it was the only study that explored long-term outcomes of the MEND 7-13 program, included non-specialists, and reported MEND 7-13 as an effective intervention to decrease participant's BMI. The MEND foundation offers 2-day training workshops and resources for organizations and communities to ensure successful delivery of all the components of the MEND programs and manage childhood obesity effectively implemented the MEND 7-13 program among overweight and obese children in community centers and included facilitators without experience or education in the medical field. Although outdated, presented valid data to support the implementation of the MEND 7-13 programs and its effectiveness in reducing BMI. Despite the preference of having a medical background demonstrate the MEND 7-13 program can be taught to non-specialists and achieve successful outcomes as studies that included facilitators with experience.

### The MEND 7-13 Program: Community based vs.

#### Primary Care Programs

The MEND programs are intended to be implemented in community base centers; however, primary care centers have facilitators with medical backgrounds and have the resources

to implement family based weight management programs as well. Conducted similar studies to explore the efficacy of the MEND 7-13 program compared to a primary care center program. The participants included obese and overweight children aged 6-12 and were randomized to either the MEND 7-13 program at a YMCA or the next steps program at a primary care center. The next steps program provided brief counseling for primary care providers, activity booklets, and physical activity targets for children and their parents to work on at home in a self-directed manner. Found the MEND program more effective in reducing BMI post-implementation compared to those in the next steps program. Conducted the first study that assessed the changes having overweight or obese children participate in the MEND program at community centers in addition to clinician medical visits into the curriculum. The participants and one parent or caregiver attended the twice weekly MEND sessions and once a week visit with a designated federally qualified health center. Imoisili, et al. had a 6 months follow up after implementation and reports a decrease in BMI and a statistically significant decrease in blood pressure among the participants did not include a control group and included siblings of the participants who may or may not have had a weight above the 85<sup>th</sup> percentile. Regardless of the different study limitations, this study shows a significant decrease in the participant's BMI and supports implementing the MEND 7-13 program in community centers. Community centers are the intended setting to implement the MEND 7-13 program and can result in larger decreases in participants BMI when compared to primary care center programs found greater decreases in BMI among participants in the more intensive MEND program group compared to a primary care center program, the Next Steps a more recent study, found the combination of the MEND program and primary care center involvement has a positive impact on both BMI and blood pressure. Despite the different limitations and discussion points found after implementing the MEND 7-13 program in community centers the participants' BMI were decreased and provide the supportive literature for this review.

### **The MEND 7-13 Program: Session Frequency**

To achieve the best results, the MEND7-13 program requires participants and their parents or caregiver to meet twice a week for 2 hours sessions discuss the lack of studies that determine if the frequency of attendance required in the MEND 7-13 program to achieve outcomes is a factor. Khanal conducted similar randomized control trials to determine the effectiveness of a once a week program is compared to the current MEND 7-13 program requirements of twice a week sessions report a decrease in BMI from their baseline post implementation, however, no statistical difference between the once per week versus the twice a week groups found the participants with mild to moderate obesity showed a significantly decreased BMI after the 10 weeks programs in both the intensive and low-intensity programs validate that the MEND 7-13 program is effective in decreasing BMI among the participants even with decreased session requirements conducted an additional study four years after and assessed

the impact of the number of sessions attended had on the participant's BMI. The program requirements remained the same as the first study and participants were required to meet just once a week. The results showed participants who attended at least five sessions in the ten weeks program had a statistically significant decrease in their BMI z-score post implementation also found a correlation between maternal education level and program outcomes. Participants with mothers without university qualifications had lower improvements of post implementation BMI than those participants with mothers who had university qualifications. However, children with mothers without higher educations who attended at least seven sessions resulted in significantly better BMI z-score outcomes than those who attended less than seven. The MEND 7-13 program is an intensive family based childhood obesity program that requires many contact hours. However, Khanal, et al. Khanal, et al., and Barlow, et al. demonstrate that this weight management program is still effective in reducing the participant's BMI even when recommended sessions were reduced to once a week when compared to those included in the original and more intense MEND 7-13 program. Khanal, et al., Khanal, et al., and Barlow, et al. support the implementation of the evidence based intervention, the MEND 7-13 program, and confirm its effectiveness in decreasing BMI among children who are overweight or obese even with lowered session requirements.

### **The MEND 7-13 Program: Knowledge Gaps and Barriers**

Although many articles justify the effectiveness of the MEND 7-13 even when complete requirements of the program are not met, there are a few knowledge gaps and barriers identified in this childhood obesity intervention program were successful in decreasing BMI in participants with mild to moderate obesity after implementation of the MEND 7-13 program; however, the researchers also found that the participants with severe obesity did not show any difference in BMI post implementation. After this randomized control trial conducted an additional study to examine the relationship between changes in BMI metrics and change in adiposity after completion of the MEND 7-13 program found a higher association with change in body fat percentage than a significant decrease in the participant's BMI and suggest an alternative metric to measure weight related changes among children with severe obesity report a total of 12% of children 2-12 years of age in the United States have a BMI at or greater than the 97<sup>th</sup> percentile and identify the need for different approaches to improving health related outcomes among this subgroup conducted a systematic review and analysis of family based childhood obesity prevention interventions and found that only 16% of those programs included interventions on media use and sleep. Hartson, et al. also explored a correlation between physical activity and sedentary screen time among school aged children participating in the MEND 7-13 program in scattered community centers in the Western United States found that BMI or screen time behavior was not significantly associated with physical activity. However, Hartson, et al. did reveal a strong relationship between decreased body esteem and increased sedentary screen time

among the males of the study. Although the sample size was small and no correlation was found between BMI or screen time suggested an association between mental and physical health among the boys of this population be further explored. Despite having strong evidence based results and expose knowledge gaps and specific domains the MEND 7-13 program is missing and identify an opportunity to improve current practice to reach subgroups within children who are overweight, obese, or severely obese.

### **The MEND 7-13 Program: Facilitators**

Kelleher conducted a systematic review investigating the factors that influence attendance of community based programs, such as the MEND 7-13 program. Of the 13 studies used included three studies that implemented the MEND 7-13 program. Found that most children went along with their parents without any real interest or reason, however, as the program progressed, the children's positive social experiences, such as having fun, and making friends, fostered retention implemented the MEND 7-13 program and conducted a randomized control trial to assess the role incentives have on enhancing health related behavior change at 6 and 18 month follow ups found both the control and intervention groups decreased BMI and the incentives did not significantly impact health outcomes however, did find that attendance and sustained improvements at the follow up were better in the intervention group explored the perspective and experience of children completing the MEND program in multiple centers in London and reported that having fun was a fundamental part for the children during the MEND program. Although BMI scores were not reported found that having fun can be contributed to intrinsic motivation to improve health outcomes and can have a beneficial effect on future program design or delivery among children who are overweight or obese participating in the MEND 7-13 program and suggest adding incentives and ensuring the MEND 7-13 program remains fun for the children as the main focus when developing retention and attendance strategies during the implementation phase.

### **The MEND 7-13 Program: Literature Synthesis Roundup**

Current and outdated randomized controlled trials and subsequent evaluation of the MEND 7-13 program in communities have demonstrated successful outcomes and decreased BMI among the participants. Although medical specialists are recommended to facilitate the program, it was also found that the MEND 7-13 program principles can be successfully taught to non-specialists and achieve the same outcome and significantly decrease post implementation BMI. Regardless of altering requirements of the MEND 7-13 program, such as decreasing frequency of total sessions and contact hours required or adding a weekly medical visit to the program, the results remained the same and were reported to have positive improvements in participant's post implementation BMI. In addition, new and emerging themes regarding the MEND 7-13 program, such as providing incentives, including screen time into the program, and tailoring programs to those with severe obesity, are increasing

and provide new knowledge for further studies. All of the peer reviewed researches articles reviewed and added to the literature synthesis are high quality, provide strong evidence, and validate the continued implementation of the MEND 7-13 program.

## **CONCLUSION**

### **Implications for Nursing Practice**

Nurses and improving nursing practice can play an effective role in helping decrease childhood obesity and prevent the healthcare outcomes that can come with untreated obesity. Regis college argues that advanced nurse practitioners should be aware of the causes, consequences, and current evidence-based practices that are found to be effective treatments for childhood obesity. The healthcare consequences of untreated childhood obesity include immediate and long term mental health risks, breathing problems, and joint and mobility issues, cardiovascular and fatty liver disease. Understanding these complications and the current evidence-based programs aimed toward reducing childhood obesity can help nurses promote healthier activities, advocate for the implementation of the MEND 7-13 program, and refer children identified with a high BMI to these programs within the local community. The economic and medical costs associated with untreated childhood obesity are outstanding. Without early intervention and treatment, these costs will continue to rise. Nurses have the leadership skills and knowledge to ensure there are local and state interventions, such as the MEND 7-13 program, available to children who are identified as overweight or obese. The integrative literature review proved the MEND 7-13 program as an effective weight management program that reduced participant's BMI. Regis college encourages advanced nurse practitioners to advocate for childhood obesity weight management programs at the local, state, and national levels and increase access to the MEND 7-13 program. By increasing the reach of the MEND 7-13 program, nurses can play an active role in reducing childhood obesity, reducing their BMI, improving health care outcomes for the individual and healthcare services.

### **Contributions to the Professions of Nursing**

The integrative review has revealed the MEND 7-13 program as an effective evidence based program that reduced BMI among overweight and obese children. The MEND 7-13 program was successfully implemented at scale and in real life settings researchers have also found the MEND 7-13 program to be successful when implemented by facilitators without a medical or health background and with reduced sessions also found that the MEND 7-13 program to be more successful at reducing BMI than primary care center programs. The review has successfully answered the clinical question that asks if the MEND 7-13 program is effective in reducing BMI among children aged 7-13 years old who are identified as overweight or obese or with a BMI at or greater than the 85<sup>th</sup> percentile. Although the MEND 7-13 program is implemented throughout

the world and has proven to be successful in reducing the participants' BMI, there were common limitations found in the literature search. The most recent publications seem to be moving toward improving, making changes, and closing knowledge gaps found in the MEND 7-13 program. The common limitations to the MEND 7-13 program are attendance and retention. This integrative review also revealed only one outdated study that explored the long term benefits of the MEND 7-13 program and no studies that explored the cost effectiveness. Without long term outcomes and cost effective outcomes, it is difficult to conclude that the MEND 7-13 program has a direct impact on adult obesity rates, health care consequences, and economic costs. This integrative review has revealed recommendations for further studies for the nursing profession and policymakers. The findings of the integrative review highlight the contributions the profession of nursing can have on public health concerns. Nurses can actively participate in the cycle that identifies children with a high BMI early and refer them to the right health. The extensive review of the current literature and identifying gaps and barriers of evidence-based programs emphasize the insight advanced nurse practitioners have on treating childhood obesity. Nurses can be the main contact between identifying children with high BMI, referring their families to the most appropriate resources available, and increasing access to the MEND 7-13 program. With the information gained on this integrative literature review, nurses can bring their expertise to policymakers and advocate for additional evidence based programs, such as the MEND 7-13 program. Advanced nurse practitioners can also make a large impact on current family-based weight management programs by exercising their research skills. Based on the integrative review and knowledge gaps found in the research, advanced nurse practitioners have the competencies to collect and analyze current evidence based programs to help design, implement additional strategies to improve childhood obesity rates. Nurses can use the data from the integrative review to conduct further studies that aim to improve attendance and retention of the MEND 7-13 program and improve barriers found within the program. The integrative review has revealed the strong implications family-based weight management programs have on nursing practice and how nurses can utilize the current evidence to tackle childhood obesity rates at the micro, meso, and macro systems.

## RECOMMENDATIONS

The extensive integrative literature review has confirmed the MEND 7-13 program to be the greatest and most comprehensively evaluated child weight management in the world. The major findings of the review include that the MEND 7-13 program is proven to be effective in reducing BMI even when implemented in various, non-ideal program settings and is more effective than primary care center programs. Efforts to implement more family based weight management programs are supported with a large amount of literature available and nurses can utilize that knowledge to gain stakeholder support. With this data, advanced nurse

practitioners and leaders can lobby at the local, state, and national levels to increase implementation and access to the MEND 7-13 program. This data also provides nurses with more opportunities to contribute to additional research, improvements, and future designs of the MEND 7-13 program. Several current studies explored ways to improve the MEND 7-13 program and reduce its barriers and limitations reported. Barlow, et al. found participants with severe obesity or a BMI at or greater than the 97<sup>th</sup> percentile need tailored program metrics. For instance, suggest further studies that utilized other metrics other than BMI to measure the effects of the MEND 7-13 program for those children that suffered from moderate or severe obesity also found incentives have an effective way of improving attendance and retention barriers reported in previous studies recommend further studies that include an incentive scheme in addition to the standard MEND 7-13 program to reduce attendance and retention issues. Childhood obesity has also been linked to psychological problems, such as anxiety, depression, low self-esteem, and lower self-reported quality of life suggested further studies that include sedentary behaviors and screen time to the MEND 7-13 program to identify how these factors can be correlated with self-esteem concerns. The integrative review has provided more evidence that early treatment for childhood obesity is critical. These recommendations can guide future research of the MEND 7-13 program and can include those variations described in this integrative review. Based on the information gathered from the literature appraisal, the MEND 7-13 program can be flexible and still achieve successful project outcomes. Long-term follow up beyond 12 months is also recommended in order to report individual, healthcare settings, and economic benefits the MEND 7-13 program can have on childhood obesity. Policymakers can also utilize this knowledge to make changes to the program according to the needs of the participants and decrease BMI among underrepresented children who suffer from moderate to severe obesity made an alarming prediction that more than half of children today will suffer from obesity by the age of 35. The integrative review has concluded the MEND 7-13 program is effective in reducing BMI, however, there is an opportunity to improve and reach more children who suffer from obesity. Future research on the MEND 7-13 program and childhood obesity can focus on reducing the limitations noted in the review, including cost effective analysis, conducting follow up visits after completing the program and tailoring the program to children with moderate to severe obesity. The integrative review has highlighted the complexity of childhood obesity and the need for nurses to continue to translate the most recent data into practice. Future research and studies will be necessary to improve the MEND 7-13 program, treat more children who suffer from obesity, and continue to improve childhood obesity rates.

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