

**A Nurse-Led, School-Based Obesity Improvement and Prevention Program: Physical  
Activity, Nutrition, and Psychological Interventions in Second-Grade Students**

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### **Abstract**

Childhood obesity is a national healthcare crisis. Obese children are at increased risk for medical, behavioral, emotional, and psychological complications. This school-based program will educate second-grade students about adopting healthier habits. An educational program was developed to support the students with three specific components: physical activity, nutrition, and psychological counseling, capitalizing on positive, trusting relationships between the teachers, school nurse, and students. The goal is to help develop healthier habits by increasing physical activity, providing guidance for better nutrition, and decrease BMI. Parents will be supported and provided tools for the ability to sustain this in the home. After completion of the first year of this program, the school nurse will collect data and continue to evaluate participants in third grade to see if these practices have been sustained over the year.

*Keywords:* overweight, obesity, prevention, assessment, BMI, nutrition assessment, treatment

### **A Nurse-Led, School-Based Obesity Improvement and Prevention Program: Physical Activity, Nutrition, and Psychological Interventions in Second-Grade Students**

The Massachusetts School Nurse Organization's (MSNO) (2021) vision states that all Massachusetts school nurses will be equipped to practice and advocate so every student in our Commonwealth will be healthy, safe, and ready to learn. In the US, children as early as 2 to 11 years of age are affected by obesity; and this is putting these adolescents at risk for poor health (Center for Disease Control [CDC], 2019). Children spend the majority of their day in school; therefore, schools are recognized as an ideal location to address the childhood obesity epidemic. According to the National Association of School Nurses (NASN) (2018), registered professional school nurses have the knowledge, expertise, and skills to promote the prevention and reduction of overweight and obesity among children and adolescents in schools. Social determinants of health (SDOH) are the conditions in the environments where people live, learn, work, and play that affect a wide range of health, functioning, and quality-of-life outcomes and risks (Office of Disease Prevention and Health Promotion, n.d.). Childhood obesity can cause other health complications such as high blood pressure, cardiovascular disease, risk of type 2 diabetes, asthma, and sleep apnea. In addition to the physical health complications, childhood obesity can also lead to psychological problems like anxiety, depression, or low self-esteem related to bullying and stigma (Centers for Disease Control and Prevention [CDC], 2021).

As of 2011, Massachusetts public elementary schools began measuring the height and weight of students in grades 1 and 4; school nurses screen and collect students' body mass index (BMI) in first grade and these results are communicated to the parents or guardians of each student screened (Commonwealth of Massachusetts, 2021). BMI measures weight related to height and is used to determine overweight and obesity (Centers for Disease Control and

Prevention [CDC], 2018). School staff, specifically nurses, need to be cognizant of what changes can be made in the school setting to promote positive, healthy choices. A school-based program to promote physical activity (PA), improve nutrition, and address any psychological issues could benefit children, specifically those that may have limited access or deal with obesity. Parents or guardians would be encouraged to play a role in supporting and maintaining these behaviors at home. If successful, advancing this program would be the goal, but the emphasis needs to be that the focus is on health. In the United States in 2018, within children aged 2-19, 19.3% or 14.4 million were obese (Centers for Disease Control and Prevention [CDC], 2019). Looking specifically at the Lexington Public Schools (LPS) second graders who had elevated BMI measurements in first grade, would provide the population of students that would meet the criteria for the program. According to Public Health Council (2020), the last published screening results from 2017 state that LPS screened 474 first graders, of which 16.2% of males and 17.2% of females were overweight or obese.

Evidence demonstrated that school programs are effective in preventing childhood obesity by encouraging healthier diets and increased physical activity (National Association of School Nurses [NASN], 2018). School-based physical activity programs are effective in decreasing levels of BMI, skinfold thickness, fasting glucose, and increasing the duration of moderate to vigorous physical activity (MVPA) (Li et al., 2014). An example is the Fuel up to Play 60 program, which was developed by the National Football League (NFL) and the National Dairy Council (NDC) to help schools meet their wellness goals and encourage youth to consume nutrient-rich foods and achieve at least 60 minutes of physical activity each day (Fuel Up to Play 60, 2020). Though they have a similar focus, they have not taken into consideration the psychological aspect such as bullying and self-esteem. Some districts focus on the PA portion of

this program by using activities such as Go Noodles as movement breaks in class yet neglect nutrition. Other districts have improved the school nutrition to align with the USDA Federal standards but are lacking in the physically active portion.

The purpose of this program is to aid second-grade students and their families in making more beneficial choices to lead a healthier, more active lifestyle. Increased PA, better nutritional intake, and learned habits, as well as monitoring mental and overall health, can reduce secondary complications associated with childhood obesity while decreasing BMI.

### **Objective**

The objective of this quality improvement project is developing a program to educate and support healthy behaviors in students with childhood obesity; more specifically beginning with an elementary school in Lexington Public Schools, with the overall goal to see an improvement in the BMI results. Technology has led to sedentary lifestyles for many young children, watching television and playing video games instead of playing outside. Further education is needed to inform the target population of how to address childhood obesity, such as reduction in sedentary behavior and improving nutrition. Incorporating moderate to vigorous PA, a nutritional education component, and allocating time with a guidance counselor to discuss any psychological contributing factors to childhood obesity, along with participation from parents at home will be the focus for this program.

### **Implementation**

Interventions in this program will assist students in learning healthier behaviors that are fun and easy to maintain, therefore decreasing their BMI. Implementation of this program will start at the beginning of the second-grade year, starting with one school, and run for six months,

October through March. It is designed for 1-2 second-grade students from each class, with a maximum of eight students to start.

Letters will be mailed home to eight families of students that were selected to participate, educating them about the program. This letter will include an invitation to a question and answer Zoom meeting and a request for their student's participation. A PowerPoint presentation will be presented including the interventions that have been determined. The nurse expects that all eight second-grade students that qualify and are selected to participate, will agree, and move forward to complete the baseline survey with assistance from their parent/guardian. Throughout the program, alternative versions of the baseline questionnaire will be sent home and will provide the team with evidence supporting the fact that students have adopted these healthy habits. The interventions will result in a significant increase in PA levels, healthy eating habits, and improved mental health in relation to childhood obesity, and will yield a reduction in selected second-grade students' BMI measurements.

The program interventions are limited to these students until the evidence suggests the program is successful, meaning BMI results are improving. Unfortunately, due to the COVID-19 pandemic, there were no BMI screenings completed during the 2020-2021 school year. Because of this, the implementation of this program will be delayed until the fall of 2022 to provide time for more thorough chart reviews of the most recent BMI data and enrollment of appropriate students. Before initiation, parents will have given consent (Appendix A) for their child to participate, and a baseline Physical Activity Questionnaire (Appendix B) will be completed by the second-grade student. Participation in this program will be voluntary. The collaboration will continue to be an integral part of the success of this school-based program and will include, other nurses, physical education teachers, guidance counselors, and administration, all of which are

members of the development team. There are three components to this program including physical activity, nutrition, and psychological interventions

### **Physical activity (PA)**

When the program begins in 2022, students will be removed from their class one day per week for 30 minutes, rotating topics each week. During the first week, students will participate in age-appropriate PA games with a focus on aerobic exercise, flexibility, and strength such as using jump ropes, four square, hula hoops, or relay races as examples. This will be led by the physical education teacher, who will also participate to role model the behaviors. For the PA portion of this program, the gym and hardtops will be used for games, providing numerous options for inside activities if there is a lack of safe outside space at home. The plan for data collection will be the baseline BMI measurements compared to BMI results upon completion of the program, as well as the amount of time the students can spend in physically active motion. A similar post-questionnaire will be compared to the baseline questionnaire for any changes in responses. In the first week, students will be introduced to the option of a paper versus a virtual activity diary to log their time spent moving. Students will be encouraged to continue to stay active at home for at least 30 minutes outside of school, document what activity they do, and for how long; then either share with the group in the next meeting or send a video to the teacher.

### **Nutritional intervention**

During the second week, school nurses will engage the students in educational games related to nutrition, such as healthy versus unhealthy food choices, proper portion sizes, guessing appropriate MyPlate food items, and introducing them to the electronic MyPlate™ game (Dairy Council of California, 2021). During these weeks, students will eat their lunches with the nurse while discussing nutrition. Students will go home each week with healthy meal ideas for the

family, lists of healthy foods to guide food shopping, and coupons that will be printed offline. The school nurse will reinforce healthy nutrition with kids using posters, coloring pages, hands-on materials, and interactive bulletin boards in the health office, allowing children to ask questions throughout. The nurse and students will discuss weekly goals that can be met, such as eating at least five fruits and vegetables a week. Students are encouraged to track their meals in a food diary or track via a virtual photo collage each week of the meals they have had and share it with the group. Discussions will follow regarding the choices that were made throughout the week.

### **Psychological intervention**

In the third week, students will meet with a guidance counselor for behavioral or emotional counseling. Students will be provided a true or false questionnaire related to how they feel about themselves, as well as discuss any issues they may be having in or out of school. Topics related to bullying and self-esteem will be addressed. Guidance counselors will meet with the students in groups or individually depending on the available time. Guidance counselors will rely on self-report from students and have the student rate "How are you feeling today" with a number scale from 1-5 (1 being great and 5 being awful) (Appendix C). Data will be compiled related to how that number changes over time. Teacher and parent feedback on how their students' overall effect has been improving will also be collected.

### **Parents**

Parent or guardian involvement will be focused on maintaining these healthy habits at home. Examples of how parents can continue this will be making a favorite dish healthier, encouraging more water intake, incorporating healthy snacks, and echoing proper serving sizes to children. Parents and guardians can continue to incorporate fun and exciting activities with ideas from the MyActivity Pyramid™ (Appendix D), limit screen time, and enforce a healthy



sleep routine. Each week there will be an opportunity to earn a reward such as a water bottle or a jump rope, based on how well they have followed the program in and out of school. The nurse will apply for a grant that will provide funding to award each student that has participated with a Fitbit activity tracker to motivate continued movement.

### **Expected Outcomes**

Over the past year, I have developed and initiated the implementation of an educational program aimed at addressing childhood obesity with second-grade students. Throughout this process, relationships were developed or strengthened with many different stakeholders, each of which has a role in the development of the program. This program will be implemented in the next academic year. Upon completion of the six-month program, the expected outcome is decreased prevalence of childhood obesity with a BMI under the 85<sup>th</sup> percentile, as well as an increase in understanding of healthy lifestyle choices. While each student participating may not experience a decrease in BMI, they will receive education about better nutrition, the benefits of more PA, and will also receive emotional support related to those topics and the psychological aspects related to childhood obesity.

Communication and collaboration between the stakeholders including the teachers, physical education teachers, nurses, guidance counselors, administration, students, and parents, has been the main component to its success and critical in the production. Each stage of the process has been mapped out, re-evaluated, and re-imagined providing the most effective and valuable program for the students. The multidisciplinary team has been selected to run the program, and approval was obtained from the superintendent. Due to the COVID-19 pandemic, BMI data was not collected this year, preventing us from selecting our target students (i.e., those with obesity), therefore the team is in a holding pattern until we return to in-person schooling.

At that time, after current BMI data from first-grade students in the 2021-2022 school year is obtained, we can begin the implementation of this program with invitations to those targeted students. We anticipate that the interventions will improve the overall health of each student that participates, as well as the adults in their home.

### **Physical Activity (PA)**

The goal for PA is that students will be active for 60 minutes per day, four to five days out of the week; this will be an increase from their baseline activity level ascertained from their Physical Activity Questionnaire. It is our intention that students will see exercise alternatives as exciting and enjoyable, therefore engage in activities such as walking or riding to school, taking the stairs when possible, increased performance in physical education, and agree to try activities they have not participated in before.

### **Nutritional intervention**

Expected outcomes for nutrition include 100% participation from each student. The nurse will anticipate that each student will provide virtual or written documentation of healthy food choices from each week. Students will have committed to eating at least 5 fruits or vegetables per week. Students will remain compliant with the nutritional standards for school meals and make smarter meal choices at lunch whether bringing from home or buying. Students will have a decreased consumption of high sugar foods and students and their parent or guardian will refer to healthy websites for additional information and assistance (i.e., MyPlate.gov). Children will report consuming more milk or water and less sugary drinks. Their diet will include a selection from each food group fruits, vegetables, grains, protein, and dairy; and they will be able to select the appropriate serving or portion sizes for each meal while demonstrating the ability to select healthy side options.

**Psychological intervention**

The nurse will expect to see improved student reports and answers to baseline mental health questionnaires. These students need to be able to communicate effectively with an adult they trust. The expected outcome is that these selected students will be able to build a relationship with the guidance counselor, a teacher, or another adult. The ability to communicate is just as important as the physical or nutritional aspects. Learning self-care will aid these students in changing their mindset. Teaching these methods of self-care gives students the tools to continue healthy living and wellness practices into adulthood.

**Parents**

Parent/guardian participation and support are critical for sustainability at home. Expected outcomes for parents throughout the program, and more importantly after completion, is to become a role model to their students. Student and parent satisfaction will be very high, and they will be able to report positive outcomes at home, such as improved healthy habits, family involvement, and support leading to sustainable behaviors. They will continue to promote a positive body image by maintaining an active lifestyle and participating in fun physical activities with the children. This will be accomplished by encouraging, supervising, and providing enjoyable options for physical activities. An important takeaway from this program for parents is to limit sedentary behavior, specifically screen time and video games. Healthy routines that begin with the adult can be more easily followed by the child.

**Implications**

The COVID-19 pandemic led to school districts canceling their annual BMI screenings for first-grade students, which is how the nurse plans to gather the data to select participants. The nurse awaits the 2021-2022 school year to begin screening again. Even though the implementation

is on hold, there has been much progress to this point. A parent/guardian consent was developed, as well as the baseline Physical Activity Questionnaire. The program staff has been acquired, and educational plans, handouts, posters, games, and rewards have been developed and agreed upon. The quality of resources and activities are valued highly by the teachers and guidance counselors that will participate in the program. Training provided to the staff as of this point has been consistent, but continued training throughout the next academic year will be important to strengthen the implementation of the program in October of 2022. Staff will be encouraged to continue to develop lesson plans allowing the meeting times with students to be a more efficient use of their time. Collaboration continues to be critical via all three roles, school nurse, physical education teacher, and guidance, which are taking place to enhance the plans, reflect, and change any areas that may lead to roadblocks. With proper planning and evidence-based success, grant funding is a possible option to open this up to more schools within the district and then possibly expanding to surrounding towns.

### **Evaluation plan**

Moving forward, the evaluation plan consists of feedback from the questionnaires, in-person participation as well as virtual feedback involving PA, nutritional intake, and self-reporting from students and parents about behavioral or mental health. During the program and upon completion, this data and BMI results will be shared with the parent/guardians to provide feedback and support them in continuing these behaviors at home. Evaluating the sustainability includes the nurse conducting a longitudinal study to assess the outcomes from year one (second-grade students) and then follow up with the same students in third grade, ensuring they have continued the behaviors taught the year prior. Though this program focuses on three areas to combat childhood obesity, more areas can be addressed. Other areas include but are not limited

to a focus on sleep patterns; according to the CDC (2021), inadequate sleep makes us eat more and be less physically active. Healthy nutrition is important, but some cases of childhood obesity may be more serious and require strict dietary compliance with calorie counting and limiting foods or drinks. For future research, there should be a focus on the effects of the program over the entire school year or future academic years to assess if the concepts introduced over time keep students engaged.

### **Parents**

Parents were not a large part of the development of this trial program, but they will be informed about the progress of their students at stages throughout the six-month duration. When the six months are complete, the team will evaluate the potential help that including the parents may offer. Conducting a focus group with parents pre-and post-program may provide more information about possible successes, limitations, or barriers, such as how they feel the program went and was it sustainable at home. Going forward initial surveys will be sent to gather information about what outcomes parents hope for and what they would appreciate us including in the program, this feedback will be instrumental in the program's success. Midway through the team will ask them how it is going at home with the diet, activity, and do they and the student feel supported. At the end of the program, we will conduct a closing focus group where parents/guardians will learn how much improvement was made and can report if they are content with the program. Adults will also complete a satisfaction survey to answer questions such as:

Did they wish for additional results?

How easy was it to follow at home?

Can you sustain the learned behaviors as a family?

### **Improvements**

When this initial year of the program has been completed, further research and feedback will be obtained to assess any benefits of lengthening the duration from six months to the full academic year. Other constructive information will be whether the concepts that will be introduced can engage and motivate the students to the extent that they want to continue the behaviors at home. Taking staff into account in future programs and how to disseminate this to more students, grades, schools, or districts, the program can be written or built into job descriptions, or lesson plans for the entire class. The nurse will file for grant funding as well as agree on stipends for teachers if evidence suggests this may work better as an after-school program.

### **Barriers/limitations**

Initial barriers to the program were acquiring the final staff. Many stakeholders showed interest and expressed the understanding of how much this program would support students, however it was too much work at this current time. Time was also a factor; obesity treatment and prevention can take years; we have allotted a six-month time frame. A final limitation was the sample size of students for this trial year. The limited number of students could show a more limited number of results as opposed to having a larger number of students participating

### **Dissemination plan**

Any success from this project was the result of a collaborative effort among the nurses, physical education teachers, classroom teachers, guidance counselors, social workers, administration, students, and parents. With the hope of future success of the project, the nurse hopes to further refine, sustain, and disseminate the interventions.

This being the first year, or trial, will provide the data needed to move forward with the successes, and seek feedback from family and staff on how we can improve on any areas. In the

future, if the program fails, the team will rework the barriers and attempt to present the improved interventions to a different grade. Once the evaluation is complete and successful, the nurse would like to transfer what was learned to more grades, additional schools, and other school nurses.

Implications for future practice are to continue to increase the education, with the support of the key stakeholders, for students as well as teachers that can apply some of this to the classroom. With the desire to decrease BMI and educate on the importance of physical activity, healthy nutrition, and a focus on mental health; the school nurses in the district will take the results and conduct more research for alternative ways to disseminate this out to additional students, grades, schools, and districts.

### **Conclusion**

Childhood obesity influences physical and mental health. Therefore, this quality improvement project of a school-based childhood obesity program, will prove to be effective in decreasing BMI in second-grade students, and provide options for increased physical activity, better nutrition and mental health. The severity of the childhood obesity epidemic has warranted public school involvement (Strawser & Wachob, 2016); this is an area that school nurses would excel and should engage in obesity prevention. The curriculum will provide evidence on the appropriateness of these set interventions to improve participants' overall health while promoting healthy behaviors more broadly. By ensuring these students have the means to acquire and select healthy foods and remain physically active will improve their overall health and assist in maintaining a healthy weight. Age-appropriate programs can help students eat nutritious foods and reduce overweight and obesity. This program, although not fully implemented at this time will encourage students to get involved, and provide exciting ways to be more active, make

healthier nutritional choices and build a trusting relationship with an adult to benefit their mental health.



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**Appendix A**

**Parent/Guardian Consent Form**

By signing below, you are giving permission for your child, \_\_\_\_\_ to participate in the school-based program with the school nurse, guidance counselor, and physical education teacher.

I hereby consent to the above child participating in this health-focused program. I confirm that I have read the program information handout, watched the PowerPoint presentation, and agree to my student participating in school, and personally promoting these healthy behaviors at home.

By signing this form, I give my child permission to participate in this school-based program. I understand that at any time I can remove my child from the program.

Parent/Guardian \_\_\_\_\_ Date \_\_\_\_\_

This consent will be on file throughout the course of the program. You may revoke the consent at any time, please feel free to reach out with any questions.

Created by Kaitlyn Williams 2021, Granite State College

**Appendix B**

**Physical Activity Questionnaire**

Please answer the questions as best as you can:

1. On average how many days per week do you play or exercise (running, riding bikes)
2. On average how many minutes do you play/exercise at this level?
3. Have you done any of the following activities in the last week? If yes, how many times?

Skipping	No	1-2	3-4	more than 4
Playing Tag	No	1-2	3-4	more than 4
Walking	No	1-2	3-4	more than 4
Riding bikes	No	1-2	3-4	more than 4
Running	No	1-2	3-4	more than 4
Swimming	No	1-2	3-4	more than 4
Baseball	No	1-2	3-4	more than 4
Dance	No	1-2	3-4	more than 4
Soccer	No	1-2	3-4	more than 4
Basketball	No	1-2	3-4	more than 4
Other: _____	No	1-2	3-4	more than 4

4. In the last three days, what did you do most of the time at recess? (Check one)
  - a. Sat down
  - b. Stood still
  - c. Ran or played a little bit
  - d. Ran and played the entire time

5. Select how often you watch TV, play video games, or use the computer each day?

<b>Sunday</b>	none	some	a lot
<b>Monday</b>	none	some	a lot
<b>Tuesday</b>	none	some	a lot
<b>Wednesday</b>	none	some	a lot
<b>Thursday</b>	none	some	a lot
<b>Friday</b>	none	some	a lot
<b>Saturday</b>	none	some	a lot

Appendix C

How Are You Feeling?

<p>I feel great</p> 	<p>1</p>
<p>I feel good</p> 	<p>2</p>
<p>I have a problem</p> 	<p>3</p>
<p>I am not happy</p> 	<p>4</p>
<p>I am not doing well</p> 	<p>5</p>

Appendix D

MyActivity Pyramid™



From the Department of Nutritional Sciences. (2021). *Myactivity pyramid for kids*. Extension

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